80 2025 MEDICAL UNIVERSITY PLOVDIV

35 YSA ASCLEPIUS

ABSTRACT BOOK

ANNIVERSARY CONFERENCE
WITH INTERNATIONAL PARTICIPATION

SCIENCE AND YOUTH

DAYS OF

MEDICAL SCIENCE

Plovdiv, 09 - 11. 05. 2025

2025

Medical University of Plovdiv

Abstract Book

SCIENCE and YOUTH	DAYS of MEDICAL SCIENCE
9–11 May	*9 May*

2025

Auditorium Complex
MU-Plovdiv

Съдържание

Програма

Наука и младост

Дни на медицинската наука

09 – 11 май 2025 г.

Петък, 09 май 2025

09.00 – 11.00 Регистрация — Фоайе ет. 1 Аудиторен комплекс

11.00 – 11.30 Откриване — Зала 2 Аудиторен комплекс

11.30 – 12.30 Пленарна лекция — Зала 2 Аудиторен комплекс

Personalized Medicine

Prof. Dr. Munis Dundar, MD, PhD

Модератор: проф. Николай Желев, дм

12.30 – 13.00 Кафе пауза

13.00 – 14.30 Хирургична сесия – 1 част ***/English/*** — Зала 2

Модератори: проф. Иван Новаков, дмн;
доц. Ганчо Костов, дм

13.00 – 13.10 *Diabetic foot ulcer – vac treatment with wall suction and free skin flap after ray amputation. Is it the prefect management for diabetic foot ulcers?* ***Andrey Ardashev***

13.10 – 13.20 *Retroperitoneal desmoid fibromatosis – clinical case and brief review in the literature.* ***Cholung Limbu***

13.20 – 13.30 *Obesity as an independent risk factor for benign and malignant endometrial pathology – a literature review.* ***Chrysoula Chrysostomi Kouineli***

13.30 – 13.40 *Pulmonary metastasis in the conus medullaris leading to lower paraplegia.* ***Dimos Feridis***

13.40 – 13.50 *Rare and unusual: primary endometrial stromal sarcoma masquerading in the colon.* ***Eleni Chatzi***

13.50 – 14.00 *Tracheal injuries: a perspective view.* ***Galabin Markov***

14.00 – 14.10 *Tamoxifen as a risk factor for benign and malignant endometrial pathology.* ***Gita Yamakova-Vladova***

14.10 – 14.20 *Video-assisted thoracic surgery for treatment of spontaneous pneumothorax.* ***Martin Boylov***

14.20 – 14.30 *Дискусия*

13.00 – 14.30 Сесия „Дни на медицинската наука“ – 1 част Зала 9

13.00 – 13.10 ***Проект НО-06/22 – Ръководител доц. Диана Карчева-Бахчеванска, дф***
Презентиращ доц. Диана Карчева-Бахчеванска, дф, кат. „Фармакогнозия и фармацевтична химия“
„Изследване на пребиотичния потенциал и антиоксидантни свойства на ензимно гликозилирани полифенолни съединения от червена боровинка (Vaccinium Vitis-Idaea L.)“

13.10 – 13.20 ***Проект НО-11/22 – Ръководител доц. Калин Иванов, дф***
Презентиращ ас. Ваня Кожухаров, кат. „Фармакогнозия и фармацевтична химия“
„Съвременни насоки и фармакоаналитични подходи при допинг превенция“

13.20 – 13.30 ***Проект ПМД-03/22 – Ръководител проф. д-р Чавдар Стефанов, дмн***
Презентиращ гл. ас. Ивайло Минев, дм, кат. „Анестезиология, спешна и интензивна медицина“
„Мултимодално мониториране на интракраниалната хипертензия и свързаните с нея специфични морфологични характеристики при пациенти след претърпяна тежка черепно-мозъчна травма“

13.30 – 13.40 ***Проект ДПДП-04/23 – Ръководител доц. д-р Мария Шиндова, дм***
Презентиращ ас. Кристина Табутова, кат. „Детска дентална медицина“
„Анализ на оралната среда и микробния биофилм при черен налеп по зъбните повърхности на деца в предучилищна и ранна училищна възраст“

13.40 – 13.50 ***Проект ДПДП-07/23 – Ръководители проф. д-р Людмил Пейчев, дм и доц. Нико Бенбасат, дф***
Презентиращ ас. Борислава Лечкова, кат. „Фармакогнозия и фармацевтична химия“
„Сравнително фитохимично, токсикологично и неврофармакологично изследване на етерично масло и етанолов екстракт от Tanacetum Vulgare L“

13.50 – 14.00 ***Проект ДПДП-08/23 – Ръководител доц. Станислава Иванова, дф***
Презентиращ ас. Станислав Дянков, кат. „Фармакогнозия и Фармацевтична химия“
„Аналитично охарактеризиране и проучване на биологична активност на Echinophora Tenuifolia Subsp. Sibthorpiana“

14.00 – 14.10 ***Проект ДПДП-12/23 – Ръководител ст. пр. Божидарка Хаджиева, дф***
Презентиращ ст. преп. Божидарка Хаджиева, дф, Медицински колеж
„Проучване удовлетвореността на пациентите от предоставената фармацевтична грижа, при отпускането на лекарствени продукти без лекарско предписание и други, които могат да се прилагат сред педиатричната популация“

14.10 – 14.20 ***Проект НО-05/23 – Ръководител проф. д-р Таня Денева, дм***
Презентиращ д-р Никола Боянов, дм, МТСЦ
„Оценка на ефективността и дълготрайното задържане на знания при участници в симулационна програма за обучение по ендоскопска ретроградна холангиопанкреатография година след приключването ѝ“

14.20 – 14.30 *Дискусия*

14.30 – 15.00 Кафе пауза

15.00 – 16.40 Хирургична сесия – 2 част Зала 2

Модератори: доц. Елеан Зънзов, дм;
доц. Ганчо Костов, дм

15.00 – 15.10 *Risk factors for malignancy of endometrial polyps – a literature review.* ***Sulaymaan Ahmed /English/***

15.10 – 15.20 *Gas gangrene caused by unusual type of clostridium species – a case report.* ***Velizar Hadzhiminev /English/***

15.20 – 15.30 *3D printing innovation in pediatric oncoorthopaedics illustrated by a rare case of Ewing sarcoma.* ***Wai Ho Chui /English/***

15.30 – 15.40 *Scaphoid bone fracture – diagnosis and treatment.* ***Semih Aziz /English/***

15.40 – 15.50 *Liposarcoma in the shoulder girdle – clinical case.* ***Semih Aziz /English/***

15.50 – 16.00 *How to treat distal radial fracture?* ***Semih Aziz /English/***

16.00 – 16.10 *Остър корем в гериатричната популация.* ***Александър Стоянов***

16.10 – 16.20 *Неинвазивни тестове за откриване на рак на пикочният мехур при пациенти с макро и микроскопска хематурия.* ***Ангел Белов***

16.20 – 16.30 *Успешно хирургично лечение на 6-килограмов тумор: клиничен случай.* ***Чудомира Тончева***

16.30 – 16.40 *Дискусия*

15.00 – 17.00 Сесия „Дни на медицинската наука“ – 2 част Зала 9

15.00 – 15.10 ***Проект НО-01/22 – Ръководители проф. д-р Виктория Сарафян, дмн и проф. д-р Анастас Баталов, дм***
Презентиращ Валентина Михайлова, кат. „Медицинска биология“
„Митохондриална функция и метаболизъм като параметри за оценка на терапевтичния ефект при ревматоиден артрит“

15.10 – 15.20 ***Проект НО-02/22 – Ръководител проф. Мария Казакова, дб***
Презентиращ проф. Мария Казакова, дб, кат. „Медицинска биология“
„Диагностична и прогностична роля на нови биомаркери при остри инфекции на централната нервна система“

15.20 – 15.30 ***Проект НО-04/22 – Ръководител проф. д-р Нешка Манчорова, дмн***
Презентиращ гл. ас. Мина Пенчева, дб, кат. „Медицинска физика и биофизика“
„Проучване на тъканния тропизъм на ACE2, регулаторни механизми за експресията му и значението им за COVID-19“

15.30 – 15.40 ***Проект НО-16/22 – Ръководител проф. д-р Виктория Сарафян, дмн***
Презентиращ Цветомира Иванова, дб, кат. „Медицинска биология“
„Роля на възпалението и автофагията в клетъчната резистентност към терапия при колоректален карцином“

15.40 – 15.50 ***Проект ДПДП-12/22 – Ръководител проф. д-р Радка Масалджиева, дм***
Презентиращ ас. Мирослава Христова, кат. „Неврология“
„Когнитивните нарушения като симптом на пост КОВИД синдрома при български пациенти в условията на глобална пандемия“

15.50 – 16.00 ***Проект ПМД-02/22 – Ръководител проф. д-р Виктория Сарафян, дмн***
Презентиращ доц. Николай Мехтеров, дб., кат. „Медицинска биология“
„Персонализиран миРНК профил при пациенти с папиларен тиреоиден карцином“

16.00 – 16.10 ***Проект ДПДП-01/23 – Ръководител проф. д-р Христо Тасков, дмн***
Презентиращ Теодора Калфова , кат. „Медицинска микробиология и имунология „Проф. д-р Елисей Янев“
„Разработване на алгоритъм за автоматизиран анализ на многопараметърни флоуцитометрични данни за В-лимфоцитни субпопулации“

16.10 – 16.20 ***Проект ДПДП-03/23 – Ръководител доц. д-р Силвия Генова, дм***
Презентиращ ас. Невена Илиева-Шипчанова, кат. „Клинична и обща патология“
„Предиктивно и прогностично значение на PD-L1, CD4, CD8, FOXP3 и ACE2 при тройно негативните и HER2-LOW карциноми на гърдата“

16.20 – 16.30 ***Проект ДПДП-10/23 – Ръководител доц. д-р Михаил Петров, дм***
Презентиращ д-р Милена Рупчева, кат. „Медицинска микробиология и имунология „Проф. д-р Елисей Янев“
„Сравнително проучване върху съвременни микробиологични методи за бърза етиологична диагностика на уроинфекции“

17.30 Коктейл „Добре дошли“

Петък, 09 май 2025

Зала 3

13.00 – 14.30 Сесия „Дентална медицина“ Зала 3

Модератори: доц. Веселина Кондева, дм;
доц. Атанаска Динкова, дм

13.00 – 13.10 *Приложение на ботокс при пациенти със сънен бруксизъм и асоциирана обструктивна сънна апнея.* ***Анастасия Желева***

13.10 – 13.20 *Проучване на оралното здраве на активно спортуващи деца – футболисти.* ***Александър Атанасовски***

13.20 – 13.30 *Ефикасност на водите за уста при пациенти с фиксирани ортодонтски апарати в училищна възраст: литературен обзор.* ***Михаела Евтимова***

13.30 – 13.40 *Влиянието на микросредата върху диференциацията на гингивалните мезенхимни стволови клетки при пародонтална регенерация: литературен обзор.* ***Михаела Евтимова***

13.40 – 13.50 *Profiling of dental pulp stem cells as potential for regeneration.* ***Mariya Lyubenova-Sultanova /English/***

13.50 – 14.00 *Expression of gfra3+ in human pulp with ageing – a pilot study.* ***Mariya Lyubenova-Sultanova /English/***

14.00 – 14.10 *The effect of glycerin on the surface hardness and roughness of composites.* ***Mihail Lyutsov /English/***

14.10 – 14.20 *Self-assembling peptides – a new approach to enamel biomineralisation.* ***Veselina Todorova /English/***

14.20 – 14.30 *Дискусия*

14.30 – 15.00 Кафе пауза

15.00 – 16.50 Сесия „Обществено здраве и здравен мениджмънт“

Зала 3

Модератори: доц. Георги Искров, дм;
доц. Ваня Рангелова, дм

15.00 – 15.10 *Медицински симулации в акушерството и гинекологията – технологичен подход към обучението на бъдещи здравни специалисти.* ***Александра Умленска***

15.10 – 15.20 *Предимства и недостатъци на използването на социалните мрежи като средство за здравна промоция.* ***Веника Белова***

15.20 – 15.30 *Възстановителна програма за физическа активност, базирана на метода пилатес след раждане.* ***Гергана Колева-Ташкова***

15.30 – 15.40 *Симулационно обучение с разширена реалност в медицината и здравеопазването.* ***Марине Асланидзе***

15.40 – 15.50 *Медиацията като инструмент за разрешаване на конфликти между лекари и пациенти.* ***Костадин Димитров***

15.50 – 16.00 *Генетичен неонатален скрининг: перспективи и етични предизвикателства.* ***Лилия Ценкова-Тончева***

16.00 – 16.10 *The socioeconomic burden of end-stage chronic kidney disease.* ***Elizabet Dzhambazova /English/***

16.10 – 16.20 *Advances in HPV prevention: integrating vaccination, screening, and public health strategies to reduce infection risk and disease burden.* ***Meri Hristamyan /English/***

16.20 – 16.30 *Application of artificial intelligence in pharmacovigilance – a systematic review.* ***Panagiotis Koletsas /English/***

16.30 – 16.40 *Analysis of data from the national health information system of Bulgaria.* ***Svetlana Chepilska /English/***

16.40 – 16.50 *Дискусия*

17.30 Коктейл „Добре дошли“

Събота, 10 май 2025 Зала 2

08.30 – 10.00 Медико-биологична сесия – 1 част Зала 2

Модератори: проф. Мария Казакова, дб;
д-р Мария Ивановска, дм

08.30 – 08.40 *Съвременни механизми на мускулната умора и тяхната връзка с контузиите, придобити по време на спорт – литературен обзор.* ***Николай Мандаджиев***

08.40 – 08.50 *Ин витро ефект на метотрексат и тофацитиниб върху митохондриална функция и оксидативен стрес при човешки синовиални клетки.* ***Валентина Михайлова***

08.50 – 09.00 *Оценка на поведението при професионални рискови екзпозиции сред клинични лаборанти.* ***Велина Стоева***

09.00 – 09.10 *Онкогенни мутации при недребноклетъчен белодробен карцином.* ***Виолета Станчева***

09.10 – 09.20 *Изкуственият интелект в клиничната лаборатория.* ***Йорданка Енева***

09.20 – 09.30 *Биоенергетични промени при пациенти с исхемичен инсулт преди и след тромболиза – пилотно проучване.* ***Тома Цветанов***

09.30 – 09.40 *Увреждане на обонятелния нерв в резултат на инфекция с Covid-19.* ***Димитър Димитров***

09.40 – 09.50 *Синхронно растящи липосарком и аденосарком на маточното тяло.* ***Лора Петрова***

09.50 – 10.00 *Криотерапия с азотен оксид.* ***Богомил Христов***

10.00 – 10.10 *Discussion*

10.10 – 10.30 Кафе пауза

10.30 – 12.00 Медико-биологична сесия – 2 част ***/English/*** Зала 2

Модератори: проф. Мария Казакова, дб;
д-р Мария Ивановска, дм

10.30 – 10.40 *Understanding triple-negative breast cancer: pathology, diagnostic imaging and oncology.* ***Anna Vasilska***

10.40 – 10.50 *Adrenal angiomyolipoma: a rare incidental finding with typical imaging feature.* ***Dannybala Karunadhas***

10.50 – 11.00 *The diverse role of α/β T-cells in wound regeneration.* ***Radoslav Tashev***

11.00 – 11.10 *Lactate liberation: from byproduct to biological asset. A literature review.* ***Cheryl Adamson-Crete***

11.10 – 11.20 *Digital transformation of histological and histopathological slides in medical education.* ***Usman Khalid***

11.20 – 11.30 *The bidirectional inter-relationship between obstructive sleep apnoea and the gut microbiota-brain axis.* ***Adham Rataba***

11.30 – 11.40 *A rare instance of acrometastasis from breast cancer – case report.* ***Shaimaa Missaoui***

11.40 – 11.50 *Food for mood: the science behind anti-anxiety and anti-depression foods.* ***Antoniya Hachmeriyan***

11.50 – 12.00 *Discussion*

12.00 – 13.00 Пленарна лекция — Зала 2

35 години МНД „Асклепий“.
Цифровите близнаци –
приложение и предизвикателства
Проф. д-р Благой Маринов, дм

Модератор: проф. Мария Токмакова, дм

13.00 – 14.00 Обедна почивка

14.00 – 15.30 Медико-биологична сесия – 3 част ***/English/*** — Зала 2

Модератори: доц. Николай Мехтеров, дб;
д-р Петър Димов, дм

14.00 – 14.10 *Effect of aronia juice on the levels of IL-1β, IL-4 and IL-10 in skeletal, smooth and cardiac muscles of old rats.* ***Silke Maria Petersen***

14.10 – 14.20 *The role of cardiopulmonary exercise testing (CPET) in the differential diagnosis of exercise-induced dyspnea (EID) in children. A review.* ***Nely Danailova***

14.20 – 14.30 *A case report of an incidental pancreatic mass and prior gastric and breast malignancies.* ***Tharni Sowmya Ramesh***

14.30 – 14.40 *Ferroptosis and atheroslecrosis – the mysterious ion.* ***Mihail Tokmakov***

14.40 – 14.50 *Synergistic molecular strategies for targeting upr modulation in cancer therapy: inductive vs. Inhibitory mechanisms.* ***Ovanes Muradyan***

14.50 – 15.00 *The role of ferroptosis in neurodegeneration: mechanisms and targeted therapies in alzheimer's and parkinson's diseases.* ***Merve Hasan***

15.00 – 15.10 *Effect of cytokines in muscle tissue of aged rats after supplementation with functional gaba-enriched foods.* ***Georgios Georgantas***

15.10 – 15.20 *Effects of herbs and plants on menstrual cycle.* ***Hristiyana Todorova***

15.20 – 15.30 *Discussion*

Събота, 10 май 2025 Зала 3

08.30 – 10.00 Хирургична сесия – 3 част Зала 3

Модератори: доц. Петър Антонов, дм;
д-р Валентин Иванов, дм

08.30 – 08.40 *Пилотно проучване на приложение на ИИ при диагностика и лечение на пациенти с политравма в УМБАЛ „Св. Георги“.* ***Валентин Петров***

08.40 – 08.50 *Набор от инструменти за проучване и доказване на предимството на координирания мултидисциплинарен екип в палиативните грижи като основен път към подобряване качеството на живот на пациентите и техните близки.* ***Ваня Балева***

08.50 – 09.00 *Диагностициране на едностранно неподвижната гласна връзка: литературен обзор.* ***Денис Милков***

09.00 – 09.10 *Блокади на гръдния нерв (PECS) за аналгезия след операция на гърдата.* ***Десислава Енчева***

09.10 – 09.20 *Тансуретрална Holmium-YAG лазерна en-block резекция при карцином на пикочния мехур – първоначален опит и резултати.* ***Иван Иванов***

09.20 – 09.30 *Сравнителен анализ на влагалищния микробиом и колпоскопската находка при бременни и жени в репродуктивна възраст.* ***Магдалина Влахова***

09.30 – 09.40 *Индикации за оперативно лечение на дивертикулоза.* ***Мартин Христев***

09.40 – 09.50 *Резултати от планова отворена, лапароскопска и робот-асистирана хирургия при дебелочревен карцином: ретроспективен анализ.* ***Стефан Иванов***

09.50 – 10.00 *Дискусия*

10.00 – 10.30 Кафе пауза

10.30 – 12.00 Сесия „Фармация и фармакотерапия“ – 1 част Зала 3

Модератори: проф. Делян Делев, дм;
доц. Елисавета Апостолова, дм

10.30 – 10.40 *Количествено определяне на пирацетам и примесите му в таблетки чрез високоефективна течна хроматография.* ***Данислава Запрянова***

10.40 – 10.50 *Приложение на изохинолинови алкалоиди за терапия на невродегенеративни заболявания.* ***Ванеса Хаджиева***

10.50 – 11.00 *Химичен състав и оценка на качеството на етерични масла от цитронела и лимонова трева, налични на българския пазар.* ***Виктория Панайотова***

11.00 – 11.10 *Негативно влияние на химиотерапевтиците върху половата система.* ***Поля Аврамова***

11.10 – 11.20 *Жълт кантарион: ефикасност в лечението на депресия и рискове от лекарствени взаимодействия.* ***Габриела Ангелова***

11.20 – 11.30 *Сравнение на химичен състав на етерично масло от портокал (търговски продукти).* ***Теодора Дечева***

11.30 – 11.40 *Предизвикателства при придържането към терапията с левотироксин.* ***Николета Чолакова***

11.40 – 11.50 *Ролята на фармацевтите с правомощия да предписват лекарства за подобряване на общественото здраве.* ***Петър Телбийски***

11.50 – 12.00 *Приложение на гъбите Grifola frondosa, Antrodia camphorata, Polyporus umbellatus, Ganoderma lucidum в медицината.* ***Надя Аноар***

12.00 – 13.00 Пленарна лекция Зала 2

35 години МНД „Асклепий“.
Цифровите близнаци –
приложение и предизвикателства
Проф. д-р Благой Маринов, дм

Модератор: проф. Мария Токмакова, дм

13.00 – 14.00 Обедна почивка

14.00 – 15.30 Сесия „Фармация и фармакотерапия“ – 2 част Зала 3
/English/

Модератори: доц. Пламен Кацаров, дф;
доц. Диана Карчева-Бахчеванска, дф

14.00 – 14.10 *Development of a novel platform for targeted drug delivery.* ***Plamen Simeonov***

14.10 – 14.20 *Binding mode of different zinc-binding groups (ZBGS) to histone deacetylases (HDACS): insights for drug design.* ***Antonia Maznikova***

14.20 – 14.30 *Development and characterization of polyacrylate-coated liposomes as a potential carrier of deferiprone.* ***Viktoria Panayotova***

14.30 – 14.40 *Exploiting the glymphatic pathway: overcoming the blood-brain barrier in neurodegenerative therapeutics.* ***Vladislav Velchev***

14.40 – 14.50 *Beyond hydroxamic acids: structural diversity of histone deacetylase inhibitors and the role of functional groups.* ***Reneta Koseva***

14.50 – 15.00 *Antifungal effects of black seed oil and its primary component thymoquinone.* ***Rino Hasegawa***

15.00 – 15.10 *Multifaceted therapeutic potential of isatin derivatives: exploring its anti-diabetic, antioxidant, and antimicrobial activities.* ***Armina Abdollahi***

15.10 – 15.20 *Discussion*

Събота, 10 май 2025

Зала 5

08.30 – 10.00 Терапевтична сесия – 1 част ***/English/*** Зала 5

Модератори: доц. Илия Костадинов, дм;
д-р Весела Благоева

08.30 – 08.40 *Unconventional personalised usage of electrical impedance tomography in intensive care settings.* ***Aneesha Bhambra***

08.40 – 08.50 *Severe systemic sarcoidosis – a rare case presentation.* ***Maritza Chterev***

08.50 – 09.00 *Urinary tract infections in transgender patients after male-to-female gender affirmation surgery with penile inversion vaginoplasty.* ***Matteo Pacini***

09.00 – 09.10 *Uncommon cases of paraproteinemia in lymphomas.* ***Slaveya Chilova***

09.10 – 09.20 *Waist circumference and proarrhythmogenicity in metabolic syndrome.* ***Spas Kitov***

09.20 – 09.30 *Primary Sjogren syndrome with lung involvement – a case report* ***Zain Ulhassan***

09.30 – 09.40 *Dilated cardiomyopathy – current concepts.* ***Tajmohammed Hussainzay***

09.40 – 09.50 *Apical hypertrophic cardiomyopathy – pits and falls.* ***Dolina Gencheva***

09.50 – 10.00 *Discussion*

10.00 – 10.30 Кафе пауза

10.30 – 12.00 Терапевтична сесия – 2 част Зала 5

Модератори: доц. Илия Костадинов, дм;
д-р Весела Благоева

10.30 – 10.40 *Тироиден папиларен карцином с лимфни метастази като случайна находка – клиничното значение на сонографската оценка и тънкоигленатa биопсия: клиничен случай.* ***Величка Златарева***

10.40 – 10.50 *Клиничен случай на миокардит след понесена вирусна инфекция.* ***Даниел Мекенян***

10.50 – 11.00 *Клиничен случай на остър миокарден инфаркт със сърдечен арест при употреба на кокаин – случай, който искам да забравя!* ***Дарина Йовановска***

11.00 – 11.10 *He4 и Ca-125 – ключови биомаркери за откриване на рак на яйчниците.* ***Теодор Станев***

11.10 – 11.20 *Leaflet thrombosis after transcatheter aortic valve replacement – a successful resolution using intravenous thrombolysis and oral anti-coagulation: a case report.* ***Evgenia Marinova*** ***/English/***

11.20 – 11.30 *Can Influenza B pneumonia be the sole cause of diffuse alveolar hemorrhage?* ***Zdravko Ivanov*** ***/English/***

11.30 – 11.40 *Emerging treatments for androgenetic alopecia.* ***Lidia Todorova*** ***/English/***

11.40 – 11.50 *Hyperandrogenism in athletes: prevalence of hyperandrogenism in female olympic athletes and implications for reproductive health and physical performance.* ***Maria Maridaki*** ***/English/***

11.50 – 12.00 *Attention deficit and memory function in children with bronchial asthma: a systematic review and meta-analysis with trial sequential analysis.* ***Plamen Penchev*** ***/English/***

12.00 – 13.00 Пленарна лекция — Зала 2

35 години МНД „Асклепий“.
Цифровите близнаци –
приложение и предизвикателства
Проф. д-р Благой Маринов, дм

Модератор: проф. Мария Токмакова, дм

13.00 – 14.00 Обедна почивка

14.00 – 16.00 Терапевтична сесия – 3 част — Зала 5

Модератори: проф. Пенка Атанасова, дмн;
доц. Божидар Христов, дм

14.00 – 14.10 *Сърдечно-съдови промени след понесена SARS-CoV2 инфекция.* ***Иван Манолов***

14.10 – 14.20 *Връзка между метаболитен профил и злокачественост на тиреоидното заболяване при пациенти, индицирани за тотална тиреоидектомия.* ***Любослав Димов***

14.20 – 14.30 *Хипертрофична кардиомиопатия – причина за сърдечна недостатъчност със запазена фракция на изтласкване.* ***Иван Кучмов***

14.30 – 14.40 *Когнитивните нарушения като симптом на пост-ковид синдрома при български пациенти в условията на глобална пандемия.* ***Мирослава Христова***

14.40 – 14.50 *Клиничен случай на кърмаче с идиопатична инфантилна хиперкалциемия с неописана до момента генетична мутация.* ***Памела Бойкова***

14.50 – 15.00 *Рядък случай на съчетание между астма, уртикария и ангиоедем.* ***Петя Делева***

15.00 – 15.10 *Оптимизация на оценката на GFR за дозиране на химиотерапия в детската онкология.* ***Петя Маркова***

15.10 – 15.20 *Случай на преходна загуба на зрение при инфекциозен ендокардит на аортна клапа.* ***Калин Кръстев***

15.20 – 15.30 *Случайно установена левопредсърдна тромбоза – предизвикателства.* ***Рафиела Читак***

15.40 – 16.00 *Дискусия*

Петък, 09 май 2025 Фоайе ет. 2, Аудиторен комплекс

15.00 – 17.00 **Постерна сесия I** – Фармация и фармакотерапия

Модератори: доц. Пламен Кацаров, дф;
доц. Весела Кокова, дм

P1 *Стратегии за таргетна доставка на етерични масла при лечение на улцерозен колит.* ***Яна Гвоздева***

P2 *Възможностите на хомеопатията в борбата с безсъние (обзор).* ***Унка Пехливанова***

P3 *GC-MS профил на етерични масла от чаено дърво, разпространени на българския пазар.* ***Нина Колева***

P4 *Инвитро инхибиторен ефект на екстракт от сладък корен върху разграждането на нишесте.* ***Теа Генишева***

P5 *Оценка на фотопротективен потенциал и антиоксидантна активност на екстракт от жаблек.* ***Теа Генишева***

P6 *Приготвяне и охарактеризиране на въглехидрат-модифициран хитозан.* ***Даниел Аргилашки***

P7 *Разработване и охарактеризиране на адхезивен пластир с натоварени с доксиламин трасферзоми за трансдермална доставка.* ***Селин Сербезова***

P8 *Лечебни растения прилагани при инфекции с Clostridium difficile.* ***Радостина Карева***

P9 *Разработване на нанокомпозитни микросфери – иновативен подход за интраназална доставка на деферипрон при терапия на невродегенеративни заболявания.* ***Радка Боюклиева***

P10 *Бензамид-базирани инхибитори на хистондеацетилаза (HDACI): DFT изследване.* ***Кристиян Величков***

P11 *Хранителни добавки, съдържащи червен ориз и безопасност на пациентите: необходимостта от професионален медицински съвет.* ***Катерина Славчева***

P12 *Потенциален ефект на Nigella sativa L. при тератозооспермия.* ***Мирела Тодорова***

P13 *Здравословна употреба на семена от Гинко билоба без гинкотоксини в тях.* ***Ерол Ешрефов***

P14 *Pharmacogenomics: evidence-based personalised medicine.* ***Zhivko Hristov***

P15 *Impact of an international student summer program on students' views on global pharmacy practice.* ***Yoana Tchoukova***

P16 *Natural zeolite: exploring the (un)known mineral.* ***Teodor Kamenov***

P17 *Gastro-duodenal ulcer treatment-antacids.* ***Stanescu Sabina-Elena***

P18 *Neutrophils contribute to the blistering effects of the sulfur mustard analog mechlorethamine.* ***Aisha Tahir***

P19 *Croton oil exposure and its effects on dermal integrity and neutrophil infiltration.* ***Adeel Khan***

Събота, 10 май 2025

Фоайе ет. 2,
Аудиторен комплекс

10.00 – 12.00 **Постерна сесия II –** Предклинична (Биомедицинска), Хирургична

Модератори: доц. Атанас Иванов, дм;
д-р Петър Димов, дм

P1 *Затлъстяването при децата: рискове и последици за здравето.* ***Борислава Дзивкова***

P2 *Съотношението Омега-6/Омега-3 ненаситени мастни киселини и неговата роля в затлъстяването: причини, превенция и социална значимост.* ***Васил Ацалов***

P3 *Мозъчна латерализация при шизофрения – данни от функционални изследвания на мозъка.* ***Вяра Зайкова***

P4 *Специфичност на денталните размери при българската и чилийската популация.* ***Здравка Харизанова***

P5 *Силата на витамин D: тайните на неговия метаболизъм.* ***Катерина Георгиева***

P6 *Uroquattro турбидиметрия като допълнителен метод за по-бързо изследване на антимикробната чувствителност на изолатите от разред Enterobacterales при инфекции на пикочните пътища – пилотно проучване.* ***Милена Рупчева***

P7 *D-димери при възрастни пациенти.* ***Валерия Бонева***

P8 *Interpretation of pediatric PFT (pulmonary function tests) using AI (artificial intelligence): a literature review.* ***Abdullah Sandhu***

P9 *Фактори, определящи показателите от функционалните изследвания на дишането (ФИД).* ***Неда Ангелова***

P10 *Lung function in pediatric asthma – forced oscillation technique (FOT) vs spirometry.* ***Taskin Chaudhry***

P11 *Unraveling the lipoxygenase enzyme system: how ALOX15 mediates ferroptosis in ischemia-reperfusion injury.* ***Mihail Tokmakov***

P12 *Evaluation of the importance of piriform aperture morphology obtained from 3d reconstructed msct scans.* ***Zlatizara Todorova***

P13 *Thionine/polyethyleneimine/2d tungsten disulfide /multiwalled carbon nanotubes network nanocomposite-based electrochemical sensor for label-free carcinoembryonic antigen (cea) immunoassay.* ***Shabeeb Hussain***

P14 *New approaches for prevention and treatment of diabetes mellitus using artificial intelligence.* ***Sebastian Scholz***

P15 *Shisha smoking – a modern habit with dangerous consequences.* ***Jovan Stojkov***

P16 *The anti-stress diet: how adaptogenic superfoods can support mental and physical resilience.* ***Ananya Agarwal***

P17 *Salivary diagnostics. Modern methods in preventive medicine.* ***Denitsa Slavcheva***

P18 *Метаболитни промени и техните биохимични последствия при алкохолна чернодробна болест.* ***Илина Ненева***

P19 *Интравезикална терапия при карцином на пикочния мехур – кога и защо?* ***Денис Ешрефов***

P20 *Приложение на AI в диагностичния процес.* ***Валентин Петров***

P21 *Retroperitoneal haematoma following vaginal hysterectomy: a rare complication with diagnostic and management challenges.* ***Abdulrahman Imran***

P22 *Анализ на резултатите при онкопластични техники с тъканно изместване пациенти с рак на гърдата: онкологична ефикасност, естетични резултати и усложнения.* ***Валентин Иванов***

P23 *Картографиране на сентинелни лимфни възли с използване на индоцианиново зелено и флуоресцентно изобразяване при пациенти с рак на гърдата.* ***Валентин Иванов***

P24 *Интраоперативна ултразвукова навигация за непалпиращи се малигнени лезии на млечната жлеза.* ***Валентин Иванов***

15.00 – 17.00 **Постерна сесия III** – Терапевтична, Дентална медицина, Обществено здраве и здравен мениджмънт

Модератори: доц. Ангел Джамбов, дм;
д-р Мариан Тополов, дм

P1 *Микроинвазивно естетично лечение на зъбна флуороза в детска възраст.* ***Алис Димитрова***

P2 *Оценка на ефективността на иновативна вода за уста върху гингивалното възпаление при пациент с фиксирани ортодонтски апарати в училищна възраст – клиничен случай.* ***Стефани Исакова***

P3 *The use of gamification to motivate dietary habits and oral hygiene in children.*
Temiloluwa Esho

P4 *Нови възможности за извършване на скрининг на белодробни заболявания чрез телемедицинска станция – резултати от пилотно проучване, проведено в българия.* ***Христо Бучков***

P5 *Влиянието на канабидиол при тревожност и паник атаки.* ***Таня Гешева***

P6 *Разпространение на вирусен хепатит B и хепатит C сред HIV-инфектирани пациенти в южна България (предварителни данни).* ***Николета Памукова***

P7 *A rapid review of health outcomes associated with the food environment in cities.* ***Kostadin Kostadinov***

P8 *Предимства и предизвикателства на електронните системи за работа в аптечната практика.* ***Елена Стойкова***

P9 *Регионални различия и динамика в осигуреността на физикалната терапия и рехабилитация в България.* ***Евелина Ръжева***

P10 *Оценка на пациенти за ролята на медицинската сестра при лечение на диабетно стъпало с хипербарен кислород.* ***Василка Гюрова-Кънчева***

P11 *The impact of social media in the vaccine decision making process amongst pregnant women: analyzing influences and misinformation.* ***Jeevana Sai Veeraraghavapuram***

P12 *Application of infrared thermography and cold stimulation test to study patients with primary and secondary Raynaud's.* ***Teodor Aleksiev***

P13 *Съвместно съчетание на папиларен тиреоиден карцином и рецидивиращ първичен хиперпаратиреоидизъм – клиничен случай.* ***Спаска Начева***

P14 *Tpeak-Tend interval in newly discovered metabolic syndrome.* ***Maria-Florance Kitova***

P15 *Полиартериитис нодоза – една истински рядка диагноза.* ***Иван Янакиев***

P16 *Невромиелитис оптика – рядка проява на невро-психиатричен системен лупус еритематозус или две припокриващи се заболявания – доклад на клиничен случай.* ***Ивайло Соколов***

P17 *Индекс на механична дисперсия при новооткрит метаболитен синдром.* ***Георги Трендафилов***

P18 *Тежко протичащ ревматоиден артрит с вторично припокриване към прогресивна системна склероза – клиничен случай.* ***Весела Христева***

Youth Scientific Association "Asclepius"

SCIENCE and YOUTH

A B S T R A C T S

Auditorium complex, MU-Plovdiv

9–11 May 2025

I. Surgical Session

ACUTE ABDOMEN IN THE GERIATRIC POPULATION

Alexander Stoyanov, Martin Hristev, Ivan Novakov

Medical University of Plovdiv

Background: The geriatric population is increasing, and the number of emergency department visits for this population is on the rise. This holds especially true for elderly patients presenting with acute abdomen. **Aim:** This publication presents the most common causes of acute abdomen in the geriatric population, emphasizing diagnostic problems and management of these clinical entities. **Material and methods:** The causes of acute abdomen in the geriatric population, their diagnosis, and management, were analyzed through publications in PubMed. Additionally, we used the knowledge and experience of the Department of Special Surgery of Medical University – Plovdiv in the management of this topic. History and physical examination with problems of misdiagnosing, associated medical diseases, radiological studies, conservative and operative management, and postoperative complications with outcome of the elderly patients with acute abdomen were recorded. **Results:** Based on our data and the research in PubMed, we established that the most common causes of acute abdomen in the geriatric population are acute appendicitis, acute mesenteric ischemia, small and large bowel obstruction, colonic diverticulitis, acute cholecystitis, acute pancreatitis, and strangulated abdominal hernias. **Conclusion:** Elderly patients with acute abdomen present a significant challenge even to the experienced clinician. The diagnosis is more difficult to secure in this age group, because it is challenging to obtain an accurate history, and physical findings are more subtle. The major factors that increase mortality include associated medical diseases, emergency surgery, and delays in correct diagnosis and treatment of these conditions.

Keywords: *geriatric population, acute abdomen, surgical procedures, complications*

NONINVASIVE TESTS FOR BLADDER CANCER DETECTION IN PATIENTS WITH MACROSCOPIC AND MICROSCOPIC HEMATURIA

Angel Belov, Atanas Ivanov, Petar Antonov

Medical University of Plovdiv

Bladder cancer is the seventh most commonly diagnosed cancer in men worldwide and the tenth most common cancer when both sexes are considered. The global age-standardized incidence rate (per 100,000 person-years) is 9.5 in men and 2.4 in women. According to a GLOBOCAN study – Bulgaria is one of the countries in the European Union where an increase in the frequency of new cases is observed. The study proves an increase in the frequency of bladder cancer by 2050 by up to 60% and an increase in mortality by up to 4%. As an example, an increase in the frequency of the disease in the countries of North Africa by up to 170%. And those of Eastern Europe by up to 50%. Approximately 75% of patients with breast cancer have disease confined to the mucosa (stage Ta, CIS) or submucosa (stage T1); this percentage is even higher in younger patients (< 40 years). Patients with TaT1 and CIS have a high prevalence of disease due to long-term survival in many cases and a lower risk of cancer-specific mortality compared with patients with T2-4 disease. The gold standard in the diagnosis of bladder carcinomas is cystoscopy. At this stage, an alternative in diagnosis are non-invasive tests for the detection of tumor cells in the urine. The development and refinement of non-invasive tests in the last two decades has shown good sensitivity and specificity for non-muscle invasive tumors and significant progress for muscle invasive tumors.

Keywords: *Non-invasive test, urinary bladder carcinoma, cystoscopy*

DIABETIC FOOT ULCER – VAC TREATMENT WITH WALL SUCTION AND FREE SKIN FLAP AFTER RAY AMPUTATION. IS IT THE PREFECT MANAGEMENT FOR DIABETIC FOOT ULCERS?

Andrey Ardashev, Ivaylo Moudjev, Katya Kalinova, Spaska Nacheva, Ivan Novakov

Medical University of Plovdiv

Diabetic foot ulcer is a serious complication of diabetes mellitus, involving deep tissue ulceration or destruction. It is the leading precursor to lower limb amputations in diabetic patients, causing severe complications, reduced quality of life, disability, and even death. Diabetic foot ulcer also increases medical costs and can sometimes be the first symptom of diabetes mellitus. This report highlights the significance of diabetic foot ulcer and the benefits of vacuum-assisted closure as an effective, cost-efficient method for managing ulcers. This therapy helps prevent major amputations, improves quality of life, and has a broader social impact. We present the case of a 65-year-old female with humid gangrene of unknown cause. She previously underwent ray amputation of four toes on her right foot at another facility, where diabetes mellitus was diagnosed. The gangrene was her initial diabetes symptom. After the surgery, she was admitted in septic condition with a reinfected postoperative wound and recurrent wet gangrene affecting deep soft tissues. Her treatment included vacuum assisted closure therapy for wound management, culminating in wound closure with a free skin graft. This approach resolved the septic condition and preserved her lower limb. The case underscores the critical importance of timely, precise treatment for diabetic foot ulcers to prevent reinfection. Vacuum assisted closure therapy is highlighted as a modern, effective solution. A multidisciplinary approach combining glycemic control, antibiotics, and surgical management is vital for positive outcomes, preserving patients' quality of life and societal roles. Minor defects can escalate without proper care.

Keywords: *Diabetic foot ulcers, Vacuum assisted closure, free skin graft*

INTRAOPERATIVE ULTRASOUND NAVIGATION FOR NON-PALPABLE MALIGNANT LESIONS OF THE BREAST

Valentin Ivanov

Surgery Department, University Hospital Kaspela;
Medical Simulation Training Center, Faculty of Medicine,
Medical University of Plovdiv

Introduction: Advances in imaging diagnostics have led to the detection of increasingly smaller, non-palpable breast lesions, necessitating the use of intraoperative localization techniques. Traditional needle-guided methods have limitations, including patient discomfort, potential migration, and placement challenges. Intraoperative ultrasound offers a highly precise alternative, providing continuous, real-time, three-dimensional navigation during surgery. **Objective:** To evaluate the efficacy, identification rate, and resection margins of intraoperative ultrasound as a localization technique for the excision of non-palpable malignant breast lesions. **Materials and methods:** A retrospective analysis was conducted on 112 female patients with malignant breast tumors treated between 2021 and June 2024. Non-palpable lesions were identified in 61 patients (54.5%), with intraoperative ultrasound used as the primary navigation method in 57 cases (93.4%). Needle-guided localization was employed in 3 patients (4.9%), while a combination of intraoperative ultrasound and needle guidance was used in 1 case (1.6%). **Results:** Intraoperative ultrasound enabled precise excision with a 100% identification rate for all non-palpable lesions. Clear resection margins were achieved in 100% of cases. The average tumor diameter was 0.7 cm (range: 0.3–1.9 cm). In two patients, intraoperative ultrasound was deemed unsuitable, and needle-guided localization was utilized instead. **Conclusion:** Intraoperative ultrasound is a highly effective method for localizing non-palpable malignant breast lesions, achieving excellent identification rates and clear resection margins. The ability to provide continuous, real-time, three-dimensional visualization of tumor location offers significant advantages over traditional localization techniques.

Keywords: *intraoperative ultrasound, breast carcinoma, non-palpable lesions*

SENTINEL LYMPH NODE MAPPING USING INDOCYANINE GREEN AND FLUORESCENCE IMAGING IN BREAST CANCER PATIENTS

Valentin Ivanov

Surgery Department, University Hospital Kaspela; Medical Simulation Training Center, Faculty of Medicine, Medical University of Plovdiv

Introduction: In recent years, indocyanine green (ICG) fluorescence imaging has gained prominence as a versatile tool in medical applications, offering real-time visualization of biological tissues. For sentinel lymph node biopsy (SLNB) in breast cancer patients, accurate identification and mapping of sentinel lymph nodes are crucial for nodal staging. Traditional methods, such as blue dye and radioactive tracers, have inherent limitations, prompting the exploration of ICG fluorescence as a reliable and effective alternative. **Objective:** This study aims to assess the clinical efficacy and utility of ICG fluorescence imaging for sentinel lymph node biopsy in breast cancer patients. **Materials and methods:** Between June 2023 and June 2024, 69 women with breast cancer underwent surgical treatment. Of these, 59.42% (41 patients) underwent sentinel lymph node biopsy using ICG fluorescence. Two near-infrared imaging systems were employed to map lymphatic pathways and detect dye accumulation in lymph nodes. Results: Metastases in the axillary lymph nodes were identified in 21.95% (9 patients), with 22.22% (2 patients) requiring subsequent axillary lymph node dissection. No additional metastatic lymph nodes were found in these cases. One patient (2.44%) experienced an intraoperative complication, necessitating conversion to axillary dissection. No postoperative complications related to the technique were reported. **Discussion and conclusions:** ICG fluorescence imaging has proven to be a highly effective method for sentinel lymph node biopsy in breast cancer patients, offering excellent detection rates and precise localization. The real-time visualization of lymphatic pathways, combined with minimal complications, positions this technique as a superior alternative to traditional methods for sentinel lymph node mapping.

Keywords: *sentinel lymph node biopsy, breast carcinoma, indocyanine green, fluorescence imaging, axillary staging*

ANALYSIS OF OUTCOMES IN VOLUME DISPLACEMENT ONCOPLASTIC TECHNIQUES FOR BREAST CANCER PATIENTS: ONCOLOGICAL EFFICACY, AESTHETIC OUTCOMES, AND COMPLICATIONS

Valentin Ivanov

Surgery Department, University Hospital Kaspela; Medical Simulation Training Center, Faculty of Medicine, Medical University of Plovdiv

Introduction: Oncoplastic surgery (OPS) has transformed breast cancer treatment by integrating tumor resection with plastic surgery principles. This approach aims to maintain the breast's natural appearance while ensuring oncological safety. Volume displacement techniques, utilize the patient's own breast tissue to reconstruct surgical defects, thereby preserving or enhancing breast aesthetics. **Purpose:** This study evaluates the oncological efficacy, aesthetic outcomes, and complications associated with volume displacement techniques, as well as their impact on patient satisfaction. **Materials and methods:** A retrospective analysis was conducted on breast-conserving surgeries performed at our clinic between June 2023 and June 2024. The study included 69 female patients with breast cancer, of whom 17.39% (12 patients) underwent mastectomy, while 82.61% (57 patients) received organ-preserving surgery. Volume displacement techniques were employed in 82.46% of cases, with lateral mammoplasty performed in 42.55% of patients, medial mammoplasty in 6.38%, matrix rotation in 4.26%, round block in 25.53%, batwing in 12.77%, J mammoplasty in 4.26%, and wise pattern with an upper vascular pedicle in 4.26%. **Results:** A grade IIIb complication was observed in 2.13% (1 patient). No re-excisions were required, and clear resection margins were achieved in all cases. Patient satisfaction with aesthetic outcomes was high, with 85.11% rating the results as very good, 12.77% as good, and 2.13% as satisfactory. **Discussion and conclusions:** Volume displacement oncoplastic techniques demonstrate high rates of clear resection margins, low complication rates, and excellent patient satisfaction. These findings support the adoption of such techniques as a standard protocol in breast-conserving contributing to improved quality of life for patients.

Keywords: *oncoplastic surgery, breast carcinoma, breast-conserving surgery, volume displacement techniques, aesthetic outcomes*

APPLICATION OF AI IN THE DIAGNOSTIC PROCESS

Valentin Petrov[1], Keti Tokmakova[1], Petar Molchovski[1], Mihail Tokmakov[2], Yordan Megenov[3]

1. Department of Orthopaedics and Traumatology, Faculty of Medicine, Medical University of Plovdiv
2. Faculty of Medicine, Medical University of Plovdiv
3. Department of Plastic, Reconstructive and Aesthetic Surgery, UMHAT "St. George"

Introduction: The application of Artificial Intelligence (AI) in the diagnostic process has significant potential to revolutionize medicine. Its development and training lead to the inclusion of an increasing number of medical activities and growing importance in daily clinical practice. **Objective:** To present the possibilities for applying artificial intelligence in the diagnostic process and the challenges associated with its implementation in healthcare / challenges related to its use in healthcare. **Materials and methods:** The applications of artificial intelligence in the diagnostic process were studied based on literature data and healthcare practice. The research focused on AI applications in the analysis of medical images and its impact on diagnostic accuracy and process automation in healthcare. **Results and discussion:** Artificial intelligence has the potential to improve the accuracy and speed of the diagnostic process. By analyzing large volumes of data and automating processes, rapid decision-making and timely treatment are achieved. However, the use of AI in medicine also presents numerous legal and ethical challenges. **Conclusion:** The integration of AI into diagnostics can lead to more efficient, accurate, and personalized healthcare, significantly improving patient outcomes and prognoses.

Keywords: *Artificial Intelligence (AI), Diagnostic process, Healthcare innovation*

PILOT STUDY ON THE APPLICATION OF AI IN THE DIAGNOSIS AND TREATMENT OF POLYTRAUMA PATIENTS AT UMHAT "ST. GEORGE"

Valentin Petrov[1], Keti Tokmakova[1], Petar Molchovski[1], Angel Balinov[2], Petra Popova

1. Department of Orthopaedics and Traumatology, Faculty of Medicine, Medical University of Plovdiv
2. Department of Imaging Diagnostics, UMHAT "St. George"

Introduction: Artificial Intelligence (AI) is increasingly entering the field of medicine, transforming the way diagnostics and therapy are performed. In imaging diagnostics, orthopedics, and traumatology, AI assists in the rapid and accurate diagnosis of bone fractures. Timely detection, especially in polytrauma patients, is crucial for preventing complications and improving treatment outcomes. **Objective:** To optimize the diagnostic and therapeutic process for polytrauma patients using AI. **Materials and methods:** The results from the pilot use of the Rayvolve® AI Suite by AZmed at UMHAT "St. George" were analyzed. This AI-powered tool is designed for X-ray diagnostics and is used to analyze medical images and detect fractures. **Results:** The software provides rapid fracture detection, reducing the number of false-negative results while decreasing interpretation time, minimizing the risk of errors, and supporting clinicians in decision-making. **Conclusion:** Artificial Intelligence will undoubtedly continue to play a key role in driving innovation and transforming medical practices. By automating the fracture detection process, AI can help physicians improve efficiency and accuracy, reduce diagnostic errors, and enhance patient outcomes.

Keywords: *Artificial Intelligence (AI), Polytrauma Diagnosis, Fracture Detection*

A SET OF TOOLS FOR INVESTIGATING AND DEMONSTRATING THE ADVANTAGES OF A COORDINATED MULTIDISCIPLINARY TEAM IN PALLIATIVE CARE AS A PRIMARY PATHWAY TO IMPROVING THE QUALITY OF LIFE OF PATIENTS AND THEIR FAMILIES

Vanya Baleva

Medical University of Plovdiv

This study examines tools to investigate the benefits of a coordinated multidisciplinary team in palliative care as a primary pathway to improving the quality of life for patients and families. Through a systematic literature review and comparative analysis of research methods, the study evaluates surveys, interviews, observation, and clinical data analysis. The survey method emerged as the most appropriate for assessing the impact of the multidisciplinary model, enabling structured, quantitative data collection for statistical analysis and direct comparisons between participant groups. It provides insights into patient and caregiver satisfaction, team coordination effectiveness, and the overall impact on symptom management and emotional well-being. However, while surveys offer standardized and efficient data collection, they may lack the depth to capture individual experiences, emotional challenges, and team dynamics. To address this, the study highlights the importance of integrating qualitative methods, such as in-depth interviews and observation, to complement numerical findings and provide a richer understanding of palliative care practices. Combining these approaches enables a holistic evaluation that considers both the statistical effectiveness and qualitative impact of the multidisciplinary model. Additionally, the study underscores the need for future research integrating both methodologies and longitudinal analyses to track changes over time and assess intervention sustainability. Examining long-term outcomes of coordinated palliative care can further inform best practices, policy development, and strategies for optimizing multidisciplinary team integration.

Keywords: *multidisciplinary team, palliative care, quality of life, patients, survey method*

GAS GANGRENE CAUSED BY UNUSUAL TYPE OF CLOSTRIDIUM SPECIES – A CASE REPORT

Velizar Hadzhiminev[1], Georgi E. Markov[1], Krasi Kalacheva[2], Lyubomir Paunov[1], Atanas Batashki[1]

1. Department of Propaedeutics of Surgical Diseases, Section of General Surgery, Medical University of Plovdiv
2. Department of Medical Oncology, MHAT Central Onco Hospital, Plovdiv

Introduction: Gas gangrene (GG) is a necrotizing soft tissue infection with extremely poor outcome. It is caused predominantly by Clostridium perfringens and is related with compromised immunity. **Case report:** We present a clinical case of 38 years old male with metastatic oesophageal cancer who developed gas gangrene as a site infection in the area of port-a-cath used for chemotherapy. Unfortunately the patient died sooner after the admission and the performed surgery. Bacterial wound culture revealed Clostridium limosum – unusual type of Clostridium bacteria as a cause of the infection. **Conclusion:** Gas gangrene could be caused by different types of Cl. Species. It has very high mortality rate even with timely treatment.

Keywords: *gas gangrene, soft tissue infection, clostridium limosum*

TAMOXIFEN AS A RISK FACTOR FOR BENIGN AND MALIGNANT ENDOMETRIAL PATHOLOGY

Gita Yamakova-Vladova[1], Krum Vladov[1], Eleonora Hristova-Atanasova[2], Kamen Yamakov[1], Ekaterina Uchikova[1]

1. *Department of Obstetrics and Gynaecology, Faculty of Medicine, Medical University of Plovdiv; Clinic of Obstetrics and Gynaecology, University Hospital "St. George" EAD Plovdiv*
2. *Department of Social Medicine and Public Health, Faculty of Public Health, Medical University of Plovdiv*

Worldwide and in our country, breast cancer is the most common cancer in women. Tamoxifen is an aromatase inhibitor that is used as adjuvant hormonal therapy for women with breast cancer. Studies have shown that tamoxifen has an antagonistic effect on estrogen in breast tissue, but it acts as an agonist on the uterine lining-endometrium. This proliferation-stimulating activity leads to benign and malignant intrauterine pathology such as endometrial polyps, hyperplasia and endometrial carcinoma in postmenopausal women. The literature review will expand our knowledge in this area. The aim is to create a recommendation for screening of endometrial pathology in women with breast cancer who use tamoxifen.

Keywords: *breast cancer, tamoxifen, endometrial polyp, endometrial carcinoma*

TRACHEAL INJURIES: A PERSPECTIVE VIEW

Galabin Markov[1], Vladimir Aleksiev[2], Georgi Chanliev[1], Martin Boilov[1], Ivan Novakov[3]

1. Medical Student, Faculty of Medicine, Medical University of Plovdiv
2. Department of Cardiovascular Surgery, Faculty of Medicine, Medical University of Plovdiv
3. Department of Special Surgery, Faculty of Medicine, Medical University of Plovdiv

Background: Tracheal injuries are result of blunt or penetrating neck and thoracic traumas, trauma, iatrogenic causes in healthcare procedures, strangulation, burns and caustic material ingestion. Although these injuries are uncommon, they are very important life threatening conditions that can lead to immediate death. **Aim:** The aim of this publication, combining self-experience study with narrative review is to present incidence and mechanism of tracheal injuries, their clinical presentation, diagnostic workup, treatment and outcome of the patients suffering from these airway injuries. **Material and methods:** The incidence of tracheal injuries, their diagnosis and management we searched through PubMed. Additionally we used the knowledge and experience in management of this topic of the Department of Special Surgery of Medical University – Plovdiv. Epidemiology, mechanisms of injury, clinical and radiological studies, airway and definitive management and outcome of the patients with tracheal injuries are presented. **Conclusion:** Although tracheal trauma is life threatening conditions, good outcome can be expected after surgical treatment. Primary repair with intent to restore the integrity of the trachea should be the scope of every attempt to surgically treat of this injury. Selected patients, mostly with iatrogenic injuries can be treated conservatively with strict follow up.

Keywords: *tracheal injuries; blunt trauma; penetrating trauma, iatrogenic injury*

INTRAVESICAL THERAPY FOR BLADDER CANCER – WHEN AND WHY

Denis Eshrefov[1], Petar Antonov[1], Janet Grudeva-Popova[2]

1. Department of Urology and General Medicine, Medical University of Plovdiv
2. Department of Clinical Oncology, Medical University of Plovdiv

Introduction: Transurethral resection of the bladder tumor is the standard minimally invasive method for treating non-muscle invasive bladder cancer. While transurethral resection effectively removes tumor lesions, the disease is associated with a high recurrence rate, necessitating adjuvant intravesical therapy to prevent neoplasm regrowth and progression. **Aim of the study:** This review aims to analyze the fundamental principles of intravesical therapy in patients with non-muscle invasive bladder cancer, focusing on the role of chemotherapy and immunotherapy. Additionally, it highlights current clinical guidelines and evidence-based practices for optimizing patient outcomes. **Material and methods:** A comprehensive literature review was conducted on the efficacy and indications of intravesical therapy in non-muscle invasive bladder cancer. The analysis is based on contemporary urological guidelines and recent clinical studies. **Results:** Intravesical therapy significantly reduces recurrence rates and delays disease progression. Bacillus Calmette-Guérin remains the gold standard for high-risk non-muscle invasive bladder cancer, while chemotherapeutic agents are effective in patients with low-risk and intermediate-risk disease. Treatment efficacy depends on proper risk stratification and adherence to maintenance protocols. **Discussion:** Despite its benefits, intravesical therapy has limitations, including adverse effects and potential treatment failures. Personalized approaches, risk-adapted therapeutic strategies, and novel intravesical agents are being investigated to improve long-term clinical outcomes. **Conclusion:** Intravesical therapy remains a cornerstone in the management of non-muscle invasive bladder cancer, complementing transurethral resection to reduce the recurrence rate and improve prognosis. Ongoing research aims to refine treatment protocols for better efficacy, tolerability, and patient outcomes.

Keywords: *Intravesical therapy, bladder cancer, adjuvant therapy, transurethral resection*

DIAGNOSING THE UNILATERAL IMMOBILE VOCAL CORD: A LITERATURE REVIEW

Denis Milkov, Dimitar Pazardzhikliev

Department of Otorhinolaryngology, Faculty of Medicine, Medical University of Plovdiv

Introduction: The true vocal cord may have a decreased or absent mobility, leading to significant clinical consequences, such as decreased voice quality, silent or clinical aspiration, ineffective cough and dysphagia. **Aim:** The aim of this study was to review the literature for the etiology of an immobile vocal cord and to present a contemporary diagnostic algorithm for its diagnosis. **Material and methods:** The material used for this literature review included academic publications, discussing the etiologic diagnosis of an immobile vocal cord. **Results and discussion:** Vocal cord impaired mobility may be due to cricoarytenoid joint dysfunction, vocal cord malignancy or neurogenic paralysis. The latter presents a diagnostic challenge due to the long course of the recurrent laryngeal nerves, from the jugular foramen to the superior thorax, and their susceptibility to skull base, neck and thoracic pathologies. Generally, vocal cord paralysis is most often idiopathic or iatrogenic. Following medical history and examination, imaging studies of the entire course of the recurrent laryngeal nerves are essential in the diagnostic algorithm for an immobile vocal cord. Serologic testing, such as rheumatoid factor, antinuclear antibodies, Lyme disease titer, and syphilis serology, is not routinely recommended. Flexible nasohypopharyngolaryngoscopy allows detailed examination of the immobile vocal cord, including its position, length, tone and glottic closure pattern, as well as an endoscopic swallowing study. Lastly, laryngeal electromyography has both diagnostic and prognostic applications. **Conclusion:** An immobile vocal cord has important clinical and social implications making the etiologic diagnosis imperative as the basis for timely and optimal treatment planning.

Keywords: *Immobile vocal cord, vocal cord paralysis, laryngeal ultrasound, laryngeal electromyography, injection laryngoplasty*

PECTORALIS NERVE (PECS) BLOCKS FOR ANALGESIA AFTER BREAST SURGERY

Desislava Encheva[1], Boris Tablov[2]

1. Burgas State University "Prof. Dr. Assen Zlatarov"
2. MHAT Life Hospital, Burgas

Introduction: Pectoralis nerve (Pecs) and serratus plane nerve blocks are newer ultrasound-guided regional anesthesia techniques of the thorax. They are nerve blocks for analgesia after breast and lateral thoracic wall surgery. **Objective:** To investigate how pectoralis nerve (Pecs) blocks used in breast surgery affect postoperative pain in the early postoperative period and the need for the use of analgesics in the first 24 hours after surgery. **Materials and methods:** In 12 women undergoing surgery for breast cancer, a pectoralis nerve (Pecs) blocks was performed before the start of the surgical intervention in order to improve postoperative analgesia. PAIN OUT was used to assess the effectiveness of the applied analgesia. PAIN OUT is an international quality improvement and registry project that provides a unique and user-friendly web-based information system to improve treatment of patients with post-operative pain. In addition to the quality of postoperative analgesia, the need for the use of analgesics in the first 24 hours after surgery was also assessed. **Results:** After the applied technique, 6 from 12 of the women reported complete pain relief after the operation, and 4 from 12 of the women rated it as satisfactory. 3 of the women reported a need for pain relief in the postoperative period. **Conclusions:** The use of pectoralis nerve (Pecs) blocks during breast surgery improve the gnality of postoperative analgesia and reduces the need for opiates in the early postoperative period.

Keywords: *Pectoralis nerve blocks, postoperative analgesia, breast surgery, PAIN OUT*

TRANSURETHRAL HOLMIUM-YAG LASER EN-BLOCK RESECTION FOR BLADDER CARCINOMA – INITIAL EXPERIENCE AND RESULTS

Ivan Ivanov, Petar Antonov

Department of Urology and General Medicine, Medical University of Plovdiv

Bladder carcinoma (BC) is the sixth most common malignant tumor in the male population worldwide. About 75% of patients with BC present with non-muscle invasive bladder cancer (NMIBC). The standard for treating NMIBC is transurethral electroresection. In recent years, alternative sources of energy have been developed. The aim of this article is to present our initial experience with the surgical technique for performing laser en-block resection of NMIBC using holmium laser and to evaluate the safety and efficacy of the method. A prospective analysis of patients with primary NMIBC was performed from November 2023 to October 2024. The cases were divided into two groups – group 1 with five patients who underwent transurethral Holmium-YAG laser en-block resection and group 2 with five patients who underwent transurethral bipolar resection. Despite the small number of patients in both groups and approximately the same average size of the tumor, 1.70 ± 0.44 cm for group 1 and 2.14 ± 0.50 cm for group 2, we can report a significantly longer average duration of the operation – 36.80 ± 4.03 min for group 2, compared to 25.00 ± 4.74 min for group 1 (P = 0.047). No intra- or postoperative complications were reported in group 1. There was no significant difference in hospitalization time – 2.00 ± 0.00 days and 2.60 ± 0.40 days, respectively for group 1 and 2 (P = 0.20). The results show that performing transurethral Holmium-YAG laser en-block resection of NMIBC is a good alternative to transurethral electroresection. Shorter duration of the operation and absence of complications were also reported, which makes the method safe and effective.

Keywords: *non-muscle invasive bladder cancer, transurethral electroresection, holmium laser, en-block*

COMPARATIVE ANALYSIS OF THE VAGINAL MICROBIOME AND COLPOSCOPIC FINDINGS IN PREGNANT WOMEN AND WOMEN OF REPRODUCTIVE AGE

Magdalina Vlahova[1,2], Elena Dimitrakova[1,2], Ekaterina Uchikova[1,2]

1. *Department of Obstetrics and Gynaecology, Faculty of Medicine, Medical University of Plovdiv*
2. *Clinic of Obstetrics and Gynecology, University Hospital "St. George" EAD Plovdiv*

Introduction: The vaginal microbiome is the combination of microorganisms that exist in the vagina. Lactobacilli dominate the normal vaginal flora. The remaining 5% are the so-called conditional pathogens. Doederlein bacteria are those that maintain the pH of the vagina within normal limits – 3.8 to 4.2 and thus prevent the development of infections. During pregnancy, changes occur in the vaginal microbiome, and this necessitates the need to perform certain tests with a view to early diagnosis and prevention. **Aim:** The aim of this study is to evaluate the literature and present a review about the changes on the cervix during pregnancy with or without changes in cytology. **Resources and methods:** Comparative analysis of the vaginal microbiome and colposcopic findings in pregnant women and women of reproductive age. **Results and discussion:** During pregnancy, changes occur in the vaginal microbiome, and this necessitates the need to perform certain tests with a view to early diagnosis and prevention. One of the most common sexually transmitted infections worldwide is HPV. Liquid-based cytology is the gold standard in cervical carcinoma screening in many countries. The method is characterized by high specificity and enables HPV-16 and 18 genotyping. **Conclusion:** Changes on the cervix during pregnancy with or without changes in cytology and the vaginal microbiome determine the need to perform a colposcopy and assess the need for a subsequent biopsy. All this will enable early detection of cervical intraepithelial lesions and would be of preventive importance

Keywords: *colposcopy; changes on the cervix during pregnancy;cervix biopsy*

VIDEO-ASSISTED THORACIC SURGERY FOR TREATMENT OF SPONTANEOUS PNEUMOTHORAX

Martin Boylov[1], Galabin Markov[1], Petar Bonev[2], Ivan Novakov[2]

1. Medical Student, Faculty of Medicine, Medical University of Plovdiv
2. Department of Special Surgery, Faculty of Medicine, Medical University of Plovdiv

Background: Spontaneous pneumothorax (SP) is a common reason for both planned interventions and emergency operations in thoracic surgery. The two main forms of spontaneous pneumothorax – primary spontaneous pneumothorax (PSP) and secondary spontaneous pneumothorax (SPS) – differ from each other in terms of the age group they affect, the reasons for their development, and the consequences for the patient. **Aim:** This publication aims to present the different treatment options for spontaneous pneumothorax using video-assisted thoracoscopic surgery (VATS), how they differ from conventional methods, and their advantages. **Materials and methods:** In addition to the materials on epidemiology, pathomorphological mechanisms, clinical studies, and operative techniques from various medical sources, clinical cases and data from the Department of Special Surgery of Medical University – Plovdiv were also used in this publication. **Results and conclusion:** Despite spontaneous pneumothorax being a life-threatening condition with many complications even after treatment, video-assisted thoracic surgeries have shown quite good results – shortened hospital stay, short period of intrapleural drainage, reduced postoperative pain, faster recovery of work capacity.

Keywords: *spontaneous pneumothorax, video-assisted thoracoscopic surgery*

THE INDICATIONS FOR SURGERY OF DIVERTICULAR DISEASE

Martin Hristev, Alexander Stoyanov, Ivan Novakov

Medical University of Plovdiv

Background: Diverticular disease is one of the most common gastrointestinal conditions. This disease has several subtypes (symptomatic, recurrent and complicated), each of which has an appropriate treatment. The aim of this publication is to present the current surgical indications and optimal timing of surgery for diverticular disease. **Material and methods:** This review is based on publications that were selectively searched through PubMed for studies and guidelines with information on the indications for surgery in diverticular disease. We also used the knowledge and experience in management of this topic of the Department of Special Surgery of Medical University – Plovdiv. **Results:** The German S2k guideline was used to classify the subtypes of diverticular disease. Asymptomatic diverticulosis (type 0) and uncomplicated diverticulitis (type 1) are not surgical indications. Freely perforated diverticulitis and peritonitis (type 2c) should be operated on at once (immediate surgery). Covered perforated diverticulitis with a macroabscess (type 2b) is an indication for elective surgery after successful conservative treatment. Elective surgery should also be considered for patients with chronic recurrent diverticulitis with complications (fistulae, stenosis – CDD type 3b). **Conclusion:** Indications and timing for surgery of diverticular disease are determined mainly by the stage of the disease. In addition to this major factor, the individual risk factors of the patient along with the course of the disease after conservative or operative therapy do play a big role in decision-making and treatment of this disease.

Keywords: *diverticular disease, elective surgery, immediate surgery.*

SCAPHOID BONE FRACTURE – DIAGNOSIS AND TREATMENT

Semih Aziz[1], Stanislav Karamitev[2]

1. Medical University of Plovdiv
2. University Hospital St. George, Plovdiv

Scaphoid fractures are the most common fractures of all wrist bones. That is why diagnosis and subsequent treatment are of utmost importance for restoring the function of the wrist joint. The localization of the fracture, its stability, the degree of displacement and the method of treatment are the major factors that influence the adequate bone fusion/union. There are four main diagnostic methods: radiography (facet and semi-profile projection), CAT, MRI and bone scintigraphy. Each of these methods provides sufficient information about the existing fracture, which, depending on its characteristics, can be treated both conservatively and surgically. Immobilization with plaster must always include the thumb. The most frequently applied surgical treatment techniques are in situ fixation with K-needles, open reduction and screw osteosynthesis using a Herbert screw with or without the application of a bone graft, endoprosthesis of the bone. Neglecting this fracture leads to chronic pain, wrist deformity and instability with subsequent arthritic changes.

Keywords: *scaphoid bone, fracture, pseudoarthrosis, treatment*

LIPOSARCOMA IN THE SHOULDER GIRDLE – CLINICAL CASE

Semih Aziz[1], Stanislav Karamitev[2]

1. Medical University of Plovdiv
2. University Hospital St. George, Plovdiv

Liposarcomas are malignant tumors of mesenchymal origin. These are the most common sarcomas in adult patients. They are distinguished by heterogeneous histomorphology, molecular and genetic characteristics and clinical prognosis. Diagnosis and treatment are challenging for surgeons dealing with this pathology. We present a clinical case of an 18-year-old girl with a rare anatomical localization of a well-differentiated liposarcoma in the shoulder girdle, treated surgically at the Clinic of Orthopedics and Traumatology at the University Hospital “St George” Plovdiv.
Keywords: *Tumour, liposarcoma, surgical treatment*

HOW TO TREAT DISTAL RADIAL FRACTURE?

Semih Aziz[1], Stanislav Karamitev[2]

1. Medical University of Plovdiv
2. University Hospital St. George, Plovdiv

Distal radial fractures are the most common fracture of the upper limb after the age of 65. Fractures involving the distal articular surface of the radius are difficult to treat and can lead to poor functional outcomes – rapid development of degenerative changes in the radiocarpal joint. These radius fractures are most often the result of falls in people who feel functionally independent at this age. For each specific patient, the most effective method of treatment, whether conservative or surgical, must be selected. The good clinical and functional outcome depends on the anatomical bone reposition and restoration of the articular surface of the radius. More than 50% of patients with distal radius fractures remain partially disabled after treatment, and some lose their functional independence.
Keywords: *fracture, distal radius, volar locking plate*

OPEN, LAPAROSCOPIC, AND ROBOTIC-ASSISTED ELECTIVE COLON CANCER SURGERY: A RETROSPECTIVE ANALYSIS

Stefan Ivanov[1], Stanimir Kormov[2], Gancho Kostov[3]

1. *Department of Surgery UMHAT Kaspela; Department of Special Surgery, Faculty of Medicine, Medical University of Plovdiv*
2. *Department of Surgery, UMHAT Kaspela*
3. *Department of Surgery, UMHAT Kaspela; Medical Simulation and Training Center, Faculty of Medicine, Medical University of Plovdiv*

Introduction: Colon cancer is a leading cause of cancer-related morbidity and mortality worldwide, with surgery being the cornerstone of the treatment. The choice of surgical approach – open, laparoscopic (LCS), or robotic-assisted colorectal surgery (RACS) – can significantly influence patient outcomes, including postoperative complications, blood loss, and recovery time. **Aim:** This study aims to compare the outcomes of open and minimally invasive colorectal surgeries performed in our department. **Materials and methods:** A retrospective analysis was conducted on patients diagnosed with colorectal cancer at the General Surgery Department of UMHAT Kaspela between July 2023 and December 2024. Patients undergoing open (n = 26), LCS (n = 14), or RACS (n = 112) procedures were evaluated for postoperative complications, hospital stay, and the need for blood transfusion. **Results and discussion:** Right hemicolectomy was the most common laparoscopic procedure (28.5%), while sigmoid resection was predominant in RACS (27.6%). Multiorgan resection due to cancer infiltration of small bowel, ureter, bladder, stomach, appendix was required in 10 (8.9%) RACS cases and 7 (26.9%) open cases. Reoperation rates were lower in RACS (6.5%) compared to LCS (14.2%) and open surgery (15.3%). Differences in mortality and blood transfusion requirements were not statistically significant. The average number of dissected lymph nodes was highest in RACS (8.2) compared to LCS (7.5) and open surgery (7.1). **Conclusion:** RACS demonstrated advantages in oncological clearance and lower reoperation rates, supporting its growing role in colorectal cancer surgery.

Keywords: *colon surgery; robotic surgery; laparoscopic surgery*

SUCCESSFUL SURGICAL TREATMENT OF A 6-KILOGRAM TUMOR: A CLINICAL CASE

Chudomira Toncheva[1], Tihomir Tenchev[2], Petar Uchikov[2]

1. Medical University of Plovdiv
2. Department of Special Surgery, Faculty of Medicine, Medical University of Plovdiv; Clinic of Special Surgery, University Hospital "St. George"

Introduction: Massive abdominal tumors present a significant challenge in clinical practice. This case report highlights a successful surgical intervention in a patient with a 6 kg tumor. **Clinical case:** A 47-year-old female patient with multiple comorbidities, including type 1 diabetes, autoimmune thyroiditis, seropositive rheumatoid arthritis, osteoporosis, chronic pyelonephritis, chronic kidney disease and chronic renal failure, was admitted with severe abdominal pain, nausea, vomiting and abdominal bloating. Imaging studies confirmed the presence of a massive tumor measuring 22/20/17 cm, causing bowel obstruction. A midline laparotomy was performed, successfully removing the tumor and evacuating 3 liters of ascitic fluid. **Discussion:** The massive tumor was successfully removed without signs of metastases or involvement of other organs. Postoperative recovery was uneventful despite the complexity of the case due to the significant number of comorbidities. This highlights the importance of a multidisciplinary approach in managing such patients, involving collaboration among experts from various medical specialties to address complex clinical scenarios effectively. **Conclusion:** Timely diagnosis and a well-coordinated surgical approach are key to achieving excellent outcomes in complex cases involving massive abdominal tumors.

Keywords: *Massive abdominal tumor, surgical treatment, successful recovery*

RETROPERITONEAL HAEMATOMA FOLLOWING VAGINAL HYSTERECTOMY: A RARE COMPLICATION WITH DIAGNOSTIC AND MANAGEMENT CHALLENGES

Abdulrahman Imran[1], Zain Ulhassan[1], Afshan Khaja[2]

1. Medical University of Plovdiv, Bulgaria
2. University Hospitals Birmingham, United Kingdom

Background: Vaginal hysterectomy is a common procedure for uterine prolapse and heavy menstrual bleeding. While generally low-risk, haemorrhage occurs in approximately 2.5% of cases, often due to vascular pedicle loosening or inadvertent injury. Retroperitoneal haematoma following vaginal hysterectomy is a rare but serious complication, posing diagnostic and management challenges due to potential morbidity. **Case presentation:** A 62-year-old female underwent vaginal hysterectomy with anterior vaginal repair for symptomatic uterine prolapse. Initially, her postoperative course was uneventful. However, on the first postoperative day, she developed anaemia and haemodynamic instability. Blood tests revealed a significant drop in haemoglobin. A contrast-enhanced computed tomography scan identified a twenty-centimetre retroperitoneal haematoma without active bleeding. She was managed conservatively with blood transfusions, tranexamic acid, and haemodynamic monitoring. Over her hospital stay, her condition stabilised, and follow-up imaging at one month confirmed haematoma reduction. She was discharged with oral antibiotics and scheduled for further monitoring. **Discussion:** This case highlights the importance of considering retroperitoneal haematoma in patients with postoperative haemodynamic instability or unexplained anaemia following vaginal hysterectomy. Contrast-enhanced computed tomography is critical for diagnosis, offering superior visualisation compared to ultrasonography. Conservative management is effective for stable cases, emphasising the role of multidisciplinary collaboration among gynaecology, surgery, and interventional radiology. **Conclusion:** Retroperitoneal haematoma, though rare, presents significant diagnostic and management challenges. Contrast-enhanced computed tomography is the diagnostic gold standard, and conservative management is often sufficient. Further research is needed to better define risk factors and optimal treatment strategies.

Keywords: *Vaginal hysterectomy, Retroperitoneal haematoma, Postoperative complication, Haemodynamic instability, Conservative management*

RETROPERITONEAL DESMOID FIBROMATOSIS – CLINICAL CASE AND BRIEF REVIEW IN THE LITERATURE

Cholung Limbu[1], Petar Antonov[2], Atanas Ivanov[2]

1. *Faculty of Medicine, Medical University of Plovdiv, Bulgaria*
2. *Department of Urology and General Medicine, Medical University of Plovdiv, Bulgaria*

Background: Retroperitoneal Desmoid Fibromatosis is a rare benign soft tissue tumour characterized by local aggressiveness. It infiltrates surrounding tissues and has a high recurrence rate after the surgical treatment. Diagnosing Retroperitoneal Desmoid fibromatosis can be challenging due to its non-specific imaging features, which often resemble malignant tumours. This report presents a case of a retroperitoneal desmoid tumour located at the lower pole of the kidney, along with a review of the diagnostic difficulties and surgical outcomes. **Case presentation:** A 56-year-old woman underwent a planned surgical procedure at the Urology Clinic of the University Hospital "St. George" in Plovdiv. A retroperitoneal mass was incidentally discovered in the lower pole of the left kidney. CT and MRI scans suggested a broad differential diagnosis, with the most likely being a renal cyst classified as Bosniak IV grade. Following surgical excision, the histological analysis confirmed the diagnosis of a retroperitoneal desmoid tumour. This tumour resembles other soft tissue tumours, complicating the diagnosis. Wide excision with a negative margin (R0) is typically preferred; however, recurrence is common. Some studies propose a "watch and wait" approach for asymptomatic or slow-growing tumours, as some cases remain non-progressive or even regress with close monitoring. **Conclusion:** Retroperitoneal desmoid tumours require a multidisciplinary approach. Close monitoring is required to detect tumour growth and recurrence. The surgical excision with a negative margin (R0) remains a standard approach, but it is being re-considered due to the high recurrence rate. In some cases, medical therapy may offer a viable alternative to surgery.

Keywords: *Retroperitoneal tumour, Desmoid-type fibromatosis, Aggressive fibromatosis, Soft tissue sarcoma, Watch and wait strategy*

OBESITY AS AN INDEPENDENT RISK FACTOR FOR BENIGN AND MALIGNANT ENDOMETRIAL PATHOLOGY – A LITERATURE REVIEW

Chrysoula Chrysostomi Kouineli[1], Krum Vladov[2], Gita Yamakova-Vladova[2], Kamen Yamakov[2], Ekaterina Uchikova[2]

1. Faculty of Medicine, Medical University of Plovdiv
2. Department of Obstetrics and Gynaecology, Faculty of Medicine, Medical University of Plovdiv

The World Health Organization (WHO) states that approximately 40% of adults over the age of 18 are overweight, and about 13% are obese. This trend is also increasingly observed in childhood. The International Agency for Research on Cancer and the Centers for Disease Control and Prevention report that overweight and obesity are associated with an increased risk of 13 types of cancer. This association has been confirmed by a number of epidemiological studies. Overweight and obesity are oncogenic factors that are associated with the development, progression, and worsening of the prognosis of malignant pathology. In this regard, scientists are studying the pathogenetic mechanisms of obesity and factors such as insulin, insulin-like growth factor-1 (IGF-1), glucose, lipids, proinflammatory cytokines, adipokines, steroids, immune cells, the autonomic nervous system, and the gut microbiota as contributing to the initiation and progression of cancer. The authors present a literature review in which overweight and obesity are independent risk factors for benign endometrial precancers such as endometrial polyps and for their progression to carcinomatype I.

Keywords: *Overweight, obesity, endometrial polyp, endometrial carcinoma*

PULMONARY METASTASIS IN THE CONUS MEDULLARIS LEADING TO LOWER PARAPLEGIA

Dimos Feridis[1], Daniel Markov[2], Elena Poryazova[2], Vladimir Aleksiev[3], Kristian Bechev[4]

1. *Student, Faculty of Medicine, Medical University of Plovdiv*
2. *Department of General and Clinical Pathology, Medical University of Plovdiv; Department of Clinical Pathology, University Multidisciplinary Hospital for Active Treatment (UMHAT) "Pulmed", Plovdiv*
3. *Department of Thoracic Surgery, UMHAT "Kaspela", Plovdiv; Department of Cardiovascular Surgery, Medical University of Plovdiv*
4. *Department of General and Clinical Pathology, Medical University of Plovdiv; Department of Neurological Surgery, University Multidisciplinary Hospital for Active Treatment (UMHAT) "Pulmed", Plovdiv*

Introduction: Lung cancer is a common malignancy with increasing rates of distant metastases. While metastases typically affect the spine, brain, liver, and skeletal system, involvement of the conus medullaris is rare, often causing severe neurological deficits due to ischemic changes from its delicate blood supply. **Aim:** This report aims to present a rare case of conus medullaris metastasis in lung cancer, emphasizing the clinical presentation, diagnosis, and multidisciplinary management. **Materials and methods:** A woman with diagnosed lung cancer undergoing chemotherapy and radiotherapy presented with neurological deficits in the lower extremities. Imaging revealed a metastatic lesion in the conus medullaris. The tumor was surgically excised via a dorsal (translaminar) approach, and histological and immunohistochemical analyses confirmed its pulmonary origin. Treatment included continued chemotherapy, radiotherapy, and physiotherapy. **Results and discussion:** The rare tumor localization led to irreversible lower paraplegia due to delayed diagnosis. Physiotherapy improved restricted lower limb function, while pelvic reservoir disorders required catheter placement, resulting in recurrent urinary tract infections. Early detection and prompt intervention are critical to prevent irreversible complications. **Conclusion:** Conus medullaris metastases in lung cancer are uncommon but can result in severe neurological impairments. This case highlights the importance of early diagnosis and a multidisciplinary approach, including surgery, oncology, and rehabilitation in order to optimize the best possible outcome and quality of life.

Keywords: *pulmonary metastases, spinal cord, conus medullaris syndrome, spinal cord metastases, histological diagnosis of metastases*

RARE AND UNUSUAL: PRIMARY ENDOMETRIAL STROMAL SARCOMA MASQUERADING IN THE COLON

Eleni Chatzi[1], Daniel Markov[2], Elena Poryazova[2], Kristian Bechev[3], Galabin Markov[1]

1. *Student, Faculty of Medicine, Medical University of Plovdiv*
2. *Department of General and Clinical Pathology, Medical University of Plovdiv; Department of Clinical Pathology, University Multidisciplinary Hospital for Active Treatment (UMHAT) "Pulmed", Plovdiv*
3. *Department of General and Clinical Pathology, Medical University of Plovdiv; Department of Neurological Surgery, University Multidisciplinary Hospital for Active Treatment (UMHAT) "Pulmed", Plovdiv*

Introduction: Endometrial stromal sarcomas are rare mesenchymal tumors, typically originating in the uterus. Extragenital Endometrial Stromal Sarcoma is exceptionally rare, with only eight documented cases. **Aim:** To describe the clinical presentation, diagnostic approach, and histopathological findings of a primary extragenital low-grade ESS located in the colon. **Material and methods:** A 46-year-old woman presented with abdominal pain, bowel obstruction, and hematemesis following episodes of vomiting. Imaging revealed a tunnel-shaped stenosis in the sigmoid colon with polypoid thickening and a large soft tissue mass posterior to the uterus. Emergency surgical resection of the sigmoid colon and rectum was performed, with an end-to-end anastomosis. Resected specimens underwent histopathological and immunohistochemical evaluation. **Results and discussion:** The tumor exhibited positive staining for CD10 and ER, with weak focal positivity for NSE. Negative markers included CD117 and CD20. The Ki-67 proliferative index was less than 5%, indicating low mitotic activity. These findings confirmed the diagnosis of a low-grade ESS. This rare condition, particularly as a primary extragenital tumor, presents diagnostic challenges and highlights the importance of IHC in distinguishing it from other malignancies. **Conclusion:** LGESS in intestinal endometriosis requires precise diagnostic techniques and tailored surgical interventions. This case underscores the need for vigilance in patients with a history of endometriosis and gastrointestinal complications.

Keywords: *Endometrial stromal sarcoma, extragenital tumor, low-grade sarcoma, immunohistochemistry, colon ESS*

RISK FACTORS FOR MALIGNANCY OF ENDOMETRIAL POLYPS – A LITERATURE REVIEW

Sulaymaan Ahmed[1], Roshini Varatharaj[1], Krum Vladov[2], Gita Yamakova-Vladova[2], Kamen Yamakov[2]

1. Medical University of Plovdiv
2. Department of Obstetrics and Gynaecology, Faculty of Medicine, Medical University of Plovdiv; Clinic of Obstetrics and Gynaecology, University Hospital "St. George" EAD Plovdiv

Endometrial polyps are the most common intrauterine pathology in gynecology, prevalent among women of all ages. Endometrial polyps are composed of stroma that is lined with glands. They are most often asymptomatic but sometimes lead to abnormal uterine bleeding (AUB) in premenopausal and postmenopausal women. Endometrial polyps are mostly benign, but about 1–15% are reported to be premalignant or malignant. Menopausal status and advanced age are leading risk factors for malignant transformation of endometrial polyps. Various studies have also indicated other risk factors such as obesity, polycystic ovary syndrome, diabetes mellitus and arterial hypertension, multiple polyposis and tamoxifen use. Therefore, our aim is to assess the risk factors for malignancy in endometrial polyps by analysing 30 studies conducted in the last 5 years. Identification of risk factors is extremely important for reducing the incidence of endometrial carcinoma.

Keywords: *endometrial polyp, malignancy, endometrial carcinoma, risk factor*

3D PRINTING INNOVATION IN PEDIATRIC ONCOORTHOPAEDICS ILLUSTRATED BY A RARE CASE OF EWING SARCOMA

Wai Ho Chui[1], Vimal Bhatt[1], Vladimir Pavlov Stavrev[2]

1. Medical University of Plovdiv
2. Department of Orthopaedics, Sveti Georgi Hospital

Bone sarcomas are primary juvenile malignant bone tumors affecting those aged 3–25. Where amputation is the surgical intervention of choice as prevention against systemic complication, 3-D printing techniques, which are salient in the manufacture of endoprosthetic devices, offer a chance of limb-sparing surgery. This clinical case, the first operation in the Republic of Bulgaria, showcases the practical application and efficacy of 3-D technology in manufacturing a personalized knee endoprosthesis for children with lower limb Ewing sarcoma. A 2nd generation endoprosthesis was preferred, which consisted of a two-part mechanism – "stem and articulation." Given the natural growth of the child's leg, the prosthetic must also be able to elongate. Therefore, the endoprosthetic design process was concluded with a growth allocation of 8 cm for the femoral and tibial components respectively. With vascular surgery collaboration, the endoprosthesis was implanted with reinsertion of the muscle groups to a LARS textile tube and fixation of the implant keels with locking screws. The post-operative period was uneventful with suture removal occurring on the 12th post-operative day. Support bracing alongside active physiotherapy allowed full patient ambulation post 3 weeks. The patient now receives chemotherapy as per protocol for Ewing sarcoma. To maintain bilateral tibial length, non-invasive elongation surgery is required when the length discrepancy reaches 2 cm. Total revision upon cessation of skeletal growth will replace the current implant with a non-growing megaendoprosthesis. This case presents 3-D innovations as an alternative to radical surgery in juvenile Ewing sarcoma patients, thus facilitating limb preservation.

Keywords: *3D printing/Ewing Sarcoma/Endoprosthesis*

THE ROLE OF CARDIOPULMONARY EXERCISE TESTING (CPET) IN THE DIFFERENTIAL DIAGNOSIS OF EXERCISE-INDUCED DYSPNEA (EID) IN CHILDREN. A REVIEW

Neli Danailova[1], Aglika Byandova[2], Peter Dimov[2], Zdravko Taralov[2]

1. Faculty of Medicine, Medical University of Plovdiv
2. Department of Pathophysiology, Medical University of Plovdiv

Introduction: Exercise-induced dyspnea (EID) can stem from a variety of underlying causes, including respiratory, cardiovascular, neuromuscular, and psychosomatic disorders. Traditional diagnostic approaches often rely on patient history, physical examination and diagnostic imaging, which may not fully capture the physiological mechanisms contributing to the symptoms. **Aim:** This review explores the role of cardiopulmonary exercise testing (CPET) as a comprehensive diagnostic tool for the differential diagnosis of EID in children. **Materials and methods:** A systematic analysis of the literature was conducted, using the PubMed and Scopus databases, with the keywords “children”, “exercise-induced dyspnea” and “cardio-pulmonary exercise testing”. **Discussion:** CPET enables a differentiation between ventilatory, cardiac, hematological and deconditioning-related causes of EID. In children with asthma, it helps to distinguish between exercise-induced bronchoconstriction and non-respiratory limitations of exercise. CPET can uncover underlying cardiovascular dysfunction, such as congenital heart disease or arrhythmias, that may not be apparent at rest. **Conclusion:** CPET is a powerful, non-invasive diagnostic tool that enhances the accuracy of the differential diagnosis in EID in children.

Keywords: *cardiopulmonary exercise testing, exercise-induced dyspnea, children, differential diagnosis*

UNDERSTANDING TRIPLE-NEGATIVE BREAST CANCER: PATHOLOGY, DIAGNOSTIC IMAGING AND ONCOLOGY

Anna Vasilska[1], Daniel Markov[2], Hristo Hadzhiev[3], Margarita Vasilska[4], Silvia Tsvetkova[4]

1. Department of Diagnostic Imaging, Medical University of Plovdiv; Department of Diagnostic Imaging, University Hospital Kaspela – Plovdiv
2. Department of General and Clinical Pathology, Medical University of Plovdiv
3. Complex Oncological Center – Plovdiv
4. Department of Diagnostic Imaging, Medical University of Plovdiv

Introduction: Triple-negative breast cancer (TNBC) is an aggressive subtype of breast cancer, accounting for approximately 10–15% of all cases. **Aim:** To provide a comprehensive overview of the latest developments in the fields of pathology, diagnostic imaging and oncology, related to TNBC. **Resources and methods:** A literature search was conducted using the PubMed, Google Scholar and Science Direct databases. **Results and discussion:** Histologically, triple-negative breast cancer often presents as high-grade, poorly differentiated tumors with increased mitotic activity, frequent necrosis, and a lack of expression of estrogen receptor (ER), progesterone receptor (PR), and HER2. On mammography and sonography TNBC can sometimes present with benign features, including a lack of spicules and calcifications, round shape and posterior acoustic enhancement, which can make diagnosis challenging. Magnetic resonance imaging is of particular importance in the diagnosis, as it provides detailed images that help to differentiate it from benign lesions, to evaluate the extent of disease, and to assess response to treatment. The management of TNBC typically encompasses a combination of chemotherapy with or without the incorporation of immunotherapy, surgical interventions, radiation therapy, targeted therapy, and antibody drug conjugates. Depending on the stage of the disease, clinical trials or new proven molecules with different mechanisms of action are considered in order to individualize treatment and maximize results. **Conclusion:** This review article is intended to serve as a resource for medical specialists, residents and medical students, who are willing to enhance their understanding of the morphology, diagnostic imaging and treatment of triple-negative breast cancer.

Keywords: *triple-negative breast cancer; pathology, diagnostic imaging, oncology*

OBESITY IN CHILDREN: RISKS AND HEALTH CONSEQUENCES

Borislava Dzivkova, Teodora Stankova, Ginka Delcheva, Katya Stefanova, Anelia Bivolarska

Medical University of Plovdiv

Introduction: Obesity in children is a global health issue that affects not only physical but also mental health in the younger generation. **Methods:** This scientific review analyzes articles from PubMed and studies conducted by the World Health Organization on the given topic. **Objective:** The purpose of this article is to inform about the seriousness of the consequences that childhood obesity can lead to. **Results:** The causes of obesity are related to poor nutrition, lack of physical activity, early childhood trauma and genetic predisposition. Obesity leads to serious health consequences such as precocious puberty, mental disorders, metabolic syndrome, type 2 diabetes, cardiovascular diseases, depression and sleep apnea. **Conclusion:** Although genetic factors play an important role, the main factor is an unhealthy lifestyle, which can be prevented through changes in eating habits and increased physical activity. Prevention and early intervention are key steps in addressing the problem and reducing the risks of long-term health issues.

Keywords: *Overweight; premature puberty; metabolic syndrome; depression; sleep apnea*

IN VITRO ACTIVITY OF METHOTREXATE AND TOFACITINIB ON MITOCHONDRIAL FUNCTION AND OXIDATIVE STRESS IN HUMAN SYNOVIAL CELLS

Valentina Mihaylova[1], Desislav Tomov[2], Zguro Batalov[3], Rositza Karalilova[3], Maria Kazakova[1]

1. *Department of Medical Biology, Medical University of Plovdiv*
2. *Research Institute at Medical University of Plovdiv*
3. *Department of Propaedeutics of Internal Diseases, Medical University of Plovdiv*

Rheumatoid arthritis (RA) is an autoimmune disease affecting synovium. Altered mitochondrial activity in synovial cells and chondrocytes inevitably leads to disease promotion. Mitochondrial damage is associated with a high amount of proton leak, respectively increased levels of mitochondrial reactive oxygen species. They damage cell structures and increase the likelihood of mitochondrial DNA mutations. The **aim** of the study was to determine the effect of methotrexate and tofacitinib on mitochondrial function and oxidative stress in an *in vitro* study of the synovial cell line SW982. TNF-stimulated SW982 cell line, as well as control, untreated cells, were incubated with methotrexate and tofacitinib for 24 h. A metabolic test was performed to assess mitochondrial function and a chromatographic analysis to determine oxidative stress after the applied therapeutics. The **results** obtained showed an increase in ATP levels ($p < 0.0018$**) and a decrease in proton leak ($p < 0.0001$***), after treatment with tofacitinib. No change was detected in the levels of the oxidative stress marker 8-ISOPGF2A. When using the drug methotrexate, the opposite trend was observed – reduced ATP production ($p < 0.013$*) and increased levels of proton leak ($p < 0.0011$**). A two-fold increase in 8-ISOPGF2A was measured relative to TNF-stimulated and untreated cells. The dynamics of mitochondrial activity and oxidative stress were monitored in a certified rheumatoid arthritis cell line after administration of two different therapeutics. Methotrexate was found to induce mitochondrial dysfunction and oxidative stress *in vitro*, while tofacitinib partially improved mitochondrial parameters.

Keywords: *Rheumatoid arthritis, mitochondrial function, oxidative stress*

Acknowledgement: Project: BG-RRP-2.004–0007-C01

THE OMEGA-6/OMEGA-3 UNSATURATED FATTY ACID RATIO AND ITS ROLE IN OBESITY: CAUSES, PREVENTION, AND SOCIAL SIGNIFICANCE

Simona Peeva[1], Vasil Atsalov[1], Teodora Stankova[2], Anelia Bivolarska[2]

1. Faculty of Medicine, Medical University of Plovdiv
2. Department of Medical Biochemistry, Faculty of Pharmacy, Medical University of Plovdiv

Omega-3 and omega-6 fatty acids are polyunsaturated fatty acids (PUFAs), essential for maintenance of body homeostasis. They play pivotal role in the regulation of inflammatory and metabolic processes. The balance between these fatty acids significantly influences a range of physiological and pathological mechanisms, including chronic inflammation, adipose tissue accumulation, and metabolic dysfunctions. Today's Western diet is typically characterized by a very high omega-6/omega-3 ratio reaching up to 16.7/1. While omega-6 fatty acids are indispensable, they are often linked to pro-inflammatory responses, whereas omega-3 fatty acids exhibit potent anti-inflammatory and protective properties. Therefore, the high omega-6/omega-3 ratio in Western diet is associated with chronic low-grade inflammation and adverse metabolic outcomes. This imbalance is implicated in the progression of obesity and its exacerbation of related conditions, such as obstructive sleep apnea, and certain types of cancer. This review article explores the mechanisms through which omega-3 fatty acids mitigate obesity and obesity-related risks and underscores the importance of optimizing the omega-6/omega-3 ratio. It further examines various preventive strategies, including dietary modifications, public health initiatives to enhance awareness, and reforms in the food industry aimed at improving nutritional profiles. Additionally, the article highlights the necessity of further research to determine the optimal omega-6/omega-3 ratio for effective prevention and management of obesity. Particular emphasis is placed on the potential benefits of dietary interventions in restoring energy homeostasis and reducing the prevalence of chronic diseases.

Keywords: *omega-6 and omega-3 polyunsaturated essential fatty acid ratio, obesity, inflammation, metabolic dysfunctions, dietary modifications*

ASSESSMENT OF BEHAVIOR IN OCCUPATIONAL RISK EXPOSURES AMONG LABORATORY TECHNICIANS

Velina Stoeva

Department of Epidemiology and Disaster Medicine,
Faculty of Public Health, Medical University of Plovdiv

Awareness of the correct behavior in risky exposures, the use of personal protective equipment and post-exposure prophylaxis are of paramount importance for their prevention. **Aim:** To assess the knowledge of the standards of prevention of blood-borne infections and professional behavior in the event of an incident among clinical laboratory technicians. **Materials and methods:** The anonymous survey covered 41 laboratory technicians, personnel of private clinical laboratories from 3 regional cities in Bulgaria for the period December 2024 – January 2025. The data were statistically processed with SPSS v.19. **Results:** Among the respondents covered in the study, the proportion of those with work experience over 10 years prevailed (n = 32, 78%), followed by those with experience of less than 5 years (n = 6, 14.6%). Over half (n = 25, 60.9%) defined percutaneous inoculation as a cut at work, and for (n = 16, 39.1%) it was a cut, a puncture and blood getting into the conjunctiva. The share of those who indicated that the actions they took after an incident were checking the patient's infectious status, washing the wound, testing for viral hepatitis B and HIV and vaccination against viral hepatitis B was (n = 22, 53.7%). **Conclusion:** Only knowledge of the rules for infection prevention and strict adherence to the anti-epidemic regime, as well as adherence to post-exposure prophylaxis protocols, would lead to a decrease in occupational risk exposures and a reduction in infections associated with medical care.

Keywords: *risk exposures, standard protective equipment, prevention of infections*

ONCOGENIC DRIVER MUTATIONS IN NON-SMALL CELL LUNG CANCER-CONCOMITANT EGFR, KRAS – RARE CASE REPORT

Violeta Stancheva[1], Cvetelina Pencheva[1], Nevena Ilieva[2]

1. Medical University of Plovdiv
2. Department General and Clinical Pathology, Medical University of Plovdiv; Department Clinical Pathology, Complex Oncology Center Plovdiv

Introduction: Non-small cell lung cancer (NSCLC) is one of the two primary types of lung cancer and the most common kind. The most prevalent genes that drives tumorigenesis in NSCLC are Epidermal growth factor receptor (EGFR), v-Kras2 Kirsten rat sarcoma viral oncogene (KRAS) and anaplastic lymphoma kinase (ALK). They were thought to be mutually exclusive, but recent studies identify some tumors that harbor concomitant mutations. **Case report:** A 69-year-old female patient was sent for a regular CT-scan check up, due to a history of breast cancer. The CT scan revealed a lesion in the left pulmonary apex and the subsequent histological examination showed primary pulmonary adenocarcinoma, mostly with cribriform and acinar growth patterns. The patient was sent afterwards for molecular DNA analyzes, where concomitant KRAS G12 and EGFR-mutation S768I in exon 20 were detected. **Conclusion:** Normally the driver mutations are mutually exclusive. Cases in which more than one pathway is activated are rare. In the era of the personalized medicine, reporting such cases is important, because they bring more insights in understanding the biological behavior of the tumors and can lead to more precise treatment decisions for the patients in our everyday practice.
Keywords: *KRAS, EGFR, mutations, lung cancer*

BRAIN LATERALIZATION IN SCHIZOPHRENIA – DATA FROM FUNCTIONAL MAGNETIC RESONANCE IMAGING

Vyara Zaykova[1], Ferihan Popova[1], Sevdalina Kandilarova[2], Zdravka Harizanova[1], Tina Zdravkova[3]

1. *Department of Anatomy, Histology and Embryology, Faculty of Medicine, Medical University of Plovdiv*
2. *Department of Psychiatry and Medical Psychology, Faculty of Medicine, Medical University of Plovdiv*
3. *Research Complex for Translational Neuroscience, Medical University of Plovdiv*

Schizophrenia is a socially significant psychiatric disorder affecting approximately 1% of the global population. Recent studies of mental illnesses reveal structural alterations and disturbances in cerebral lateralization in patients with such conditions. The literature shows a reduction in the morphological and functional heterogeneity of the cerebral hemispheres, particularly in schizophrenia. The **aim** of this study is to review the literature on the structural and functional brain lateralization in patients with schizophrenia using functional magnetic resonance imaging. Functional Magnetic Resonance Imaging is a non-invasive method used to study cognitive processes in healthy individuals and patients with neuropsychiatric disorders. Functional studies demonstrate the relationship between disturbances in the nervous system activity and cognitive deficits in patients with schizophrenia. There is an abnormal asymmetry of functional connectivity in patients with schizophrenia in comparison with healthy individuals. **Results:** from resting-state fMRI studies suggest that disruptions in the connections between brain networks are associated with the development of negative and positive symptoms in patients, as well as behavioral deficits. These changes occur in the early stages of schizophrenia and precede the onset of the clinical symptoms. Therefore, the presence of alterations in brain structure, along with a decrease in cerebral lateralization, could serve as predictors of the disease. The study of structural and functional changes in the brain is fundamental to understanding the etiology and pathophysiological mechanisms of schizophrenia and would undoubtedly contribute to the diagnosis and determination of a proper therapeutic approach to the disease.

Keywords: *brain lateralization, schizophrenia, functional magnetic resonance imaging*

THE ANTI-STRESS DIET: HOW ADAPTOGENIC SUPERFOODS CAN SUPPORT MENTAL AND PHYSICAL RESILIENCE

Ananya Agarwal[1], Annmaria Alex[1], Gabriela Panayotova[2], Hristiyana Todorova[2], Antoniya Hachmeriyan[2]

1. 2nd year students of Medicine in Medical University – Varna, Bulgaria
2. Department of Physiology and Pathophysiology, Division of Physiology, Medical University – Varna, Bulgaria

Introduction: Chronic stress negatively affects both mental and physical health, contributing to anxiety, depression, and metabolic disorders. While nutrition plays a key role in stress regulation, certain unpopular superfoods possess unique bioactive compounds that may enhance resilience through endocrine balance, neurotransmitter support, and oxidative stress reduction. **Aim:** This study aims to explore the impact of different superfoods – such as maca root, ashwagandha, moringa, camu camu, sacha inchi, goji berries, lucuma, amla (Indian gooseberry), baobab, spirulina, and tulsi (holy basil) – on stress modulation and physiological resilience. **Materials and methods:** A comprehensive analysis of peer-reviewed studies (2014–2024) from PubMed, Scopus, Web of Science, and Google Scholar examined the effects of selected superfoods on stress biomarkers, including cortisol, oxidative stress, neurotransmitter function, and gut microbiota. **Results:** Findings suggest that these superfoods enhance stress resilience through multiple mechanisms. Maca root and ashwagandha affect adrenal function, while moringa and camu camu provide neuroprotective and anti-inflammatory benefits. Sacha inchi, baobab, and lucuma offer essential fatty acids, amino acids, and antioxidants for neural support. Goji berries and amla strengthen immunity and reduce oxidative stress, while spirulina and tulsi improve cognition and gut-brain balance. These superfoods help regulate the endocrine system, neurotransmitters, and inflammation, promoting mental and physical resilience. Their bioactive compounds support stress adaptation, improve cognitive function, and foster long-term emotional and physiological well-being. **Conclusion:** Incorporating nutrient-dense, lesser-known superfoods into daily diets offers a promising natural approach to stress management. Further clinical trials are needed to confirm their role in optimizing mental and physical well-being.

Keywords: *Adaptogenic superfoods, stress resilience, cortisol regulation, neuroprotection, gut-brain axis*

ADRENAL ANGIOMYOLIPOMA: A RARE INCIDENTAL FINDING WITH TYPICAL IMAGING FEATURE

Dannybala Karunadhas[1], Sevdzhan Metuh[2], Anna Vasilska[2], Katya Doykova[2], Silvia Tsvetkova[3]

1. *Faculty of Medicine, Medical University of Plovdiv*
2. *Department of Diagnostic Imaging, Medical University of Plovdiv; Department of Diagnostic Imaging, University Hospital Kaspela – Plovdiv*
3. *Department of Diagnostic Imaging, Medical University of Plovdiv*

Angiomyolipomas are benign mesenchymal tumours originating from perivascular epithelioid cells, typically composed of smooth muscle cells, mature adipocytes, and thick-walled blood vessels. While most are renal and associated with tuberous sclerosis, adrenal angiomyolipomas are exceedingly rare, with fewer than 20 cases reported in the English literature. We present a 46-year-old female who experienced epigastric and hypochondrial pain, dark-coloured urine, low-grade fever, altered bowel movements, and unintentional weight loss. The adrenal lesion was asymptomatic and incidentally identified during a computed tomography (CT) scan performed for an unrelated condition. Imaging revealed a 42 × 43 mm hypodense lesion in the right adrenal gland, predominantly composed of fat with hyperdense foci, indicative of a benign angiomyolipoma. Additional findings included a hepatic haemangioma. Adrenal angiomyolipomas are typically asymptomatic and discovered incidentally. Advanced imaging techniques, particularly the CT washout equation, are essential for distinguishing these lesions from other adrenal masses. In this case, the CT washout confirmed the lesion's benign nature, avoiding the need for invasive procedures. This report aims to present a typical imaging representation of a rare adrenal angiomyolipoma case, contributing to the limited literature on this uncommon entity.

Keywords: *Adrenal lesions, Angiomyolipomas, Computed Tomography, Contrast Washout, Adrenal Incidentaloma*

SALIVARY DIAGNOSTICS. MODERN METHODS IN PREVENTIVE MEDICINE

Denitsa Slavcheva, Katya Stefanova, Ginka Delcheva

Medical University of Plovdiv

It is known that science reaches new inventions during times of necessity when people's lives are on the line. In times like this experimenting with new methods became hope for convenient solutions. Due to the sudden outbreak of the COVID-19 pandemic the interest in quicker, safer and more efficient diagnosis has been raised dramatically. The present review aims to summarize the observations in the literature on the recent advances in salivary biomarkers and their potential use as an alternative to diagnose and monitor various diseases. Salivary diagnostics is an innovative method with countless benefits, few of which, to the biological and mental well-being of patients, is the best choice for examination. The study pays attention to both age groups – children (0–18) and adults but primarily focuses on the pediatrics. It includes information about the role of biomarkers in dental health, metabolomics, diabetes, obesity and covers the advances in saliva diagnostics. Furthermore, it refers to the COVID-19 pandemics where this method became the main source of information for the patient's condition. In conclusion, despite the variety in procedures and techniques used to identify different illnesses there is still a huge possibility of mistakes. There is a great diversity of biosensors and each of them can correspond to more than one disease. This information leads us to question the reliability of these kinds of examinations as a main prospect of testing and to search for new salivary biomarkers that will facilitate the monitoring of various conditions.

Keywords: *salivary diagnostics, biosensors, salivary biomarkers, pediatrics*

DAMAGE TO THE OLFACTORY NERVE AS A RESULT OF COVID-19 INFECTION

Dimitar Dimitrov[1], Petar-Preslav Petrov[2], Maria Motrenikova[3], Plamen Penchev[1], Darina Barbutska[2]

1. Faculty of Medicine – Students, Medical University of Plovdiv
2. Department of Anatomy, Histology and Embryology, Medical University of Plovdiv
3. Department of Medical Biochemistry, Medical University of Plovdiv

The olfactory nerve is the firstmcranial nerve. Its function is related to the olfactory apparatus. An important characteristic is that the nerve does not originate from the brainstem. It is believed that during embryonic development it derives from the nasal plate and has the ability to regenerate. The olfactory receptor neurons of the nerve are highly specialized and their anatomical location is the olfactory mucosa of the upper parts of the nasal cavity. Unlike the other cranial nerves, the olfactory nerves do not form two trunks. Receptor neurons are formed throughout the life of the individual as the newly formed axons reach the olfactory bulb. Various types of infections could lead to pathological damage to the first cranial nerve and loss of smell. An example of such an infection is the COVID-19 virus. COVID-19 is a highly infectious viral disease with an etiological agent SARS-CoV-2. In the world literature, many authors initially considered the disease to be purely respiratory, but later it was established that the virus affects a number of organs and systems in the body. The central and peripheral nervous systems are one of the main target points of the disease with a direct and indirect mechanism of infection. Direct brain infection can occur through axonal transport through the olfactory nerve, affecting the olfactory cortex, the brain stem, and other fundamental anatomical structures in the temporal lobe. Regardless of the mechanism and route of infection, improper and delayed treatment can lead to irreversible consequences for the individual.

Keywords: *Olfactory nerve, infection, COVID-19*

DENTAL DIMENSION SPECIFICITY IN BULGARIAN AND CHILEAN POPULATION

Zdravka Harizanova, Ferihan Popova

Department of Anatomy, Histology and Embryology, Faculty of Medicine, Medical University of Plovdiv

Introduction: Dental profile includes all the individual dental traits and dimensions which can provide significant information on such human biological problems as the genetic relationships between populations and human environmental adaptation. The **purpose** of this research is to assess the differences of tooth measurements between Bulgarians and different nations. **Methods:** The survey included 232 Bulgarians aged 20–40 years. Vestibulo-lingual and mesio-distal dental diameters were obtained by Dentistry Sliding Vernier Caliper and analyzed with SPSS 28.0. **Results:** We detected significant differences in vestibulo-lingual and mesio-distal diameters of maxillary incisors, canines, premolars and first molars, mandibular first molars between Bulgarians and Chileans. Numerous statistically significant differences in the upper teeth and less statistically significant differences in the lower teeth between Bulgarians and Chileans were detected. Our findings revealed that tooth measurements vary in the populations and thus they can be reliable predictors in forensic identification.

Keywords: *Odontometric Dimension, Sexual Dimorphism, Population Specific, Forensic Identification, Anthropology*

Acknowledgments: This study is supported by Medical University of Plovdiv, Bulgaria. This article is part of a scientific project № 9247/2023, №-11/2023 “Morphological study on correlations between odontometric and some cephalometric dimensions in Bulgarians. Their application in anthropology, forensic and dental medicine” Medical University of Plovdiv, Bulgaria.

DIGITAL TRANSFORMATION OF HISTOLOGICAL AND HISTOPATHOLOGICAL SLIDES IN MEDICAL EDUCATION

Usman Khalid[1], Zdravka Harizanova[2], Ferihan Popova[2]

1. *Student in Medicine at Medical University of Plovdiv*
2. *Department of Anatomy, Histology and Embryology, Faculty of Medicine, Medical University of Plovdiv*

Virtual microscopy has many useful features compared to light microscopy and turns into a necessity in modern medical education. Provoked by the Covid pandemic we initiated a common project with the medical universities of Iași (Romania), Alicante (Spain), Gdansk (Poland), Patras (Greece) and the Euromed Foundation. Our aim was to create a virtual platform of histological and pathohistological digital slides. Our partners from Iași used the Aperio ScanScope AT2, a linear scanner that achieves precise focus at different magnifications. Each scanned image was 200 megapixels in size, and Image Scope software was then used to compress the images and incorporate them into the platform. All the universities together provided 300 microscopic slides. We established curriculum that contains all the main histological and pathohistological preparations – epithelial tissue, connective tissue (general and special), muscle tissue, nervous tissue, blood tissue, cardiovascular system, immune system, endocrine system, digestive system, respiratory system, excretory system, female and male reproductive systems, skin, nervous system, glands, as well as histopathology regarding these systems. Keywords from each slide have been selected, in which hyperlinks were incorporated leading to the corresponding structure. The platform gives access to this international database at any time, so we believe it has many advantages without denying the teachers's role.

Keywords: *virtual microscopy, histology, histopathology, medical education*

EVALUATION OF THE IMPORTANCE OF PIRIFORM APERTURE MORPHOLOGY OBTAINED FROM 3D RECONSTRUCTED MSCT SCANS

Zlatizara Todorova[1], Ferihan Popova[1], Irina Angelova[2], Iva Naydenova[3], Zdravka Harizanova[1]

1. Faculty of Medicine, Medical University of Plovdiv
2. Faculty of Dental Medicine, Medical University of Plovdiv
3. Department of Mathematics, Physics, Chemistry, Technical University of Sofia, Branch Plovdiv

Introduction: Piriform aperture is an important structure that contributes to the formation and appearance of the face and is involved in physiological nasal respiration of individuals. **Aim:** The aim of this prospective observational study is to evaluate the clinical significance of nasal morphology for diagnosis and treatment planning as well as its importance for science branches such as anthropology, forensic medicine and archaeology. **Materials and methods:** The analyzed literature studies included three-dimensional skull models rendered from multi-slice computed tomography head scans with landmarks acquired on them to approximate traditional cranial measurements. **Results and discussion:** Literature data results revealed that mean values of all linear measurements of the piriform aperture showed presence of significant sexual dimorphism, ethnic and age differences which can be useful for wide range of fields. It was also confirmed that multi-slice computed tomography data, especially if rendered in 3D, can provide morphometric information which is precise and accurate when compared to manually acquired measurements. **Conclusion:** Data obtained for morphometric characteristics of piriform aperture from 3D reconstructed MSCT scans is reliable reference source for sex determination, ethnic differentiation and ancestry in human identification. It provides essential information for facial reconstruction, preoperative examination, plastic and surgical procedures and postoperative controls.

Keywords: *piriform aperture, computed tomography, morphology*

METABOLIC CHANGES AND THEIR BIOCHEMICAL CONSEQUENCES IN ALCOHOLIC LIVER DISEASE

Ilina Neneva[1], Kalina Metodieva[2], Merlin Esad[2]

1. *Student, Faculty of Pharmacy, Medical University of Plovdiv*
2. *Department of Medical Biochemistry, Faculty of Pharmacy, Medical University of Plovdiv*

Introduction: Chronic alcohol consumption contributes to the global problem of liver disease through the accumulation of metabolic and biochemical changes. The mechanisms explored in detail, with the help of visual and statistical data, can help understanding the progression of these conditions and suggest potential treatment options. **Aim:** The purpose of this review is to assess the scientific evidence and adequacy of the metabolic changes and treatment of liver diseases associated with alcohol consumption. **Materials and methods:** The review presents information from a number of methods including enzymatic assays of alcohol metabolism pathways, biochemical analysis of oxidative stress markers, and microbiota profiling of the gut-liver axis. Sophisticated imaging and histopathological analyses to determine the quantities of lipids and inflammatory mediators in the liver were also included. **Results and discussion:** The findings give a clear picture of metabolic dysfunction in alcoholic liver disease. It contains data on the reduction of gut microbial diversity and the translocation of endotoxin which enrich the understanding of the role of inflammation in disease progression. Nutritional therapies and microbiota modulation were found to be potentially useful, but their efficacy needs to be confirmed in clinical trials. **Conclusion:** The review highlights the importance of oxidative, metabolic, and immune processes in the progression of alcoholic liver disease. While the scientific approach is solid, future studies should focus more on individual patients and examine their responses to treatment in order to improve the overall effectiveness.

Keywords: *Alcoholic liver disease, oxidative stress, lipid metabolism, nutritional therapy*

UNLOCKING THE POWER OF VITAMIN D: THE SECRETS OF ITS METABOLISM

Katerina Georgieva[1], Kalina Metodieva[2], Merlin Esad[2], Maria Motrenikova[2], Anelia Bivolarska[2]

1. *Student, Faculty of Medicine, Medical University of Plovdiv*
2. *Department of Medical Biochemistry, Faculty of Pharmacy, Medical University of Plovdiv*

Introduction: Despite the fact vitamin D is a fat-soluble vitamin, it cannot be characterized simply as a cofactor required for the function of certain enzymes. Normal vitamin D concentrations are vital for the maintenance of calcium-phosphate balance and proper bone mineralization, but its effects expand far beyond the well-known ones. **Aim:** The pleiotropic actions of vitamin D are explored, aiming at outlining its essential role in signal transduction, homeostasis, immunity and the detrimental effects its deficiency could have on human body. **Materials and methods:** This review provides information from meta-analyses and comparative studies about the metabolism and synthesis, physiological roles and signaling systems of the vitamin. It emphasizes on the effects on gestation and immune response and a new anti-cancer strategy. **Results and discussion:** Vitamin D is a steroid hormone, which can directly affect gene expression via its nuclear receptor (VDR). The presence of membrane-localized VDR has been discussed as a prerequisite for non-genomic action. Vitamin D is essential as a protective factor for pregnancy prolongation. It is of great importance for immunomodulation since it stimulates the secretion of anti-inflammatory cytokines and antimicrobial substances such as cathelicidin. Molecules that inhibit one of its metabolizing enzymes can be used as antiproliferative agents in cancer treatment. **Conclusion:** The multifaceted actions of vitamin D are significant for various physiological processes. Research continues to demonstrate its importance and therapeutic benefits in pregnancy, autoimmune diseases and cancer. However, further studies are needed to fully understand its mechanisms and optimize its use in clinical practice.

Keywords: *Vitamin D, Immunomodulation, Pregnancy prolongation, Cancer treatment*

SYNCHRONOUS LIPOSARCOMA AND ADENOSARCOMA OF THE UTERINE CORPUS – CASE REPORT

Lora Petrova[1], Silvia Garcheva[1], Nevena Ilieva[2]

1. Medical University of Plovdiv
2. Department General and Clinical Pathology, Medical University of Plovdiv; Department Clinical Pathology, Complex Oncology Center Plovdiv

Introduction: Liposarcomas are type of malignant tumors, that arise from adipocytes and they are exceptionally rare to be found in the uterine corpus. Even more atypical is the simultaneus growth of liposarcoma and adenosarcoma with this location. **Case presentation:** We present a case of an 87-year-old female patient presenting with genital bleeding after 51 years of menopause, along with an enlarged uterus and slightly elevated tumor markers. The patient underwent total hysterectomy. On gross examination two separate formations were found. The first one was completely expanding the uterine cavity and histologically was defined as adenosarcoma. The second one showed intramural multinodular growth and was diagnosed as atypical spindle cell lipomatous tumor/well-differentiated G1 liposarcoma. However, two months later, a follow-up CT scan revealed local recurrence. Laparotomy was performed, revealing two adipocytic tumor formations, which showed histological transition into dedifferentiated liposarcomas. **Discussion and conclusion:** To date, there have been only nine additional reported cases of liposarcoma in the uterine corpus. There are no described cases of concomitant lipo- and adenosarcoma. Currently, no standardized treatment protocols for such tumors exist. Reporting uncommon lesions is important, because it provides information about their biological behavior and survival rate, which can lead our therapeutical decision making in the future.

Keywords: *liposarcoma, uterine corpus, adenosarcomas, dedifferentiated liposarcoma*

A RARE INSTANCE OF ACROMETASTASIS FROM BREAST CANCER – CASE REPORT

Shaimaa Missaoui[1], Margarita Vasilska[2], Anna Vasilska-Hadzhieva[3], Hristo Hadzhiev[4], SIlvia Tsvetkova[2]

1. *Faculty of Medicine, Medical University of Plovdiv*
2. *Department of Diagnostic Imaging, Medical University of Plovdiv*
3. *Department of Diagnostic Imaging, Medical University of Plovdiv; Department of Diagnostic Imaging, University Hospital Kaspela – Plovdiv*
4. *Complex Oncological Center – Plovdiv*

Introduction: Bone metastases are among the most prevalent sites of breast cancer spread. However, the presence of acrometastases is an exceptionally rare occurrence, accounting for a mere 0.1% of all bone metastases. **Case report:** We present the case of a 57-year-old female patient diagnosed with breast cancer in May 2014, who underwent a combination of chemotherapy, mastectomy, radiotherapy and hormonal therapy. In July 2024, the patient began to experience pain in the lower part of the left arm, accompanied by swelling and oedema. A PET/CT scan identified left axillary lymphadenopathy and areas of increased metabolic activity in the left forearm and wrist. Magnetic resonance imaging further revealed pathological fractures in the radius and ulna, resulting from metastatic involvement. Such changes affected the metacarpal bones, articular and periarticular tissues, with lymphoedema of the surrounding structures. Subsequent histological verification established that the lesions were metastases from the primary breast cancer. **Conclusion:** This case report documents a rare occurrence of acrometastases, a consequence of the second most prevalent malignancy worldwide- breast cancer. It underscores the necessity for close monitoring and thorough evaluation in oncology patients, as atypical presentations can significantly impact clinical management and patient outcomes.

Keywords: *acrometastases, breast cancer, MRI*

UROQUATTRO TURBIDIMETRY AS A COMPLEMENTARY METHOD FOR SWIFTER ANTIMICROBIAL SUSCEPTIBILITY TESTING OF ENTEROBACTERALES ISOLATES IN URINARY TRACT INFECTIONS – A PILOT STUDY

Milena Rupcheva[1], Radoslav Tashev[1], Violeta Zheleva[2], Maritsa Chterev[3], Michael Petrov[1]

1. *Department of Medical Microbiology and Immunology "Prof. d-r Elissay Yanev", Medical University of Plovdiv*
2. *Second Department of Internal Medicine, Section of Nephrology, Medical University of Plovdiv*
3. *Medical student, Medical University of Plovdiv*

Introduction: Antimicrobial susceptibility testing (AST) is essential for correct antibiotic therapy. The current gold standard for AST is the disk-diffusion method (DDM). One of its limitations is the long time needed for results. A complementary approach to AST is through turbidimetry using HB&L Uroquattro, Alifax (AST Alifax). **Aim:** To evaluate and compare the advantages and limitations of HB&L Uroquattro turbidimetry as a complementary method to Kirby-Bauer DDM in antimicrobial susceptibility testing. **Materials and methods:** A total of 8 Enterobacterales isolates – 4 Escherichia coli, 3 Klebsiella pneumoniae, and 1 Enterobacter cloacae complex – from 8 midstream urine samples were tested for antibiotic susceptibility using both methods. 16 different antibiotics suitable for the order Enterobacterales, according to EUCAST, were used. The results were analysed and compared to each other. Results and discussion: Both methods yielded similar results in 11 out of 16 antibiotics across all samples (69%). 5 out of 16 (31%) had differences. Uroquattro also allows turbidimetry for AST of antibiotics, which cannot be interpreted via DDM, like colistin. Despite those differences, Uroquattro provided the information in a shorter time. This meant that it could be used as a preliminary guide for the antibiotic treatment. AST Alifax is fully automated and requires minimal manual intervention. **Conclusion:** Our findings demonstrated the effective use of Uroquattro turbidimetry as a supplementary method to classical AST. Its speed and possibility for minimal meant that it could be used as an antibiotic therapy guidance even before the isolate is identified. More testing is required.

Keywords: *antibiogram, antimicrobial susceptibility testing, turbidimetry, disk diffusion method*

CONTEMPORARY MECHANISMS OF MUSCLE FATIGUE AND THEIR ROLE IN SPORTS INJURIES – A LITERATURE REVIEW

Nikolay Mandadzhiev, Veselin Vasilev, Petar Hrischev

Department of Physiology, Faculty of Medicine, Medical University of Plovdiv

Muscle fatigue has been studied extensively and the basic molecular, cellular and systemic mechanisms have been elucidated in great detail. Fatigue is a major limiting factor to sports performance and as such has been a main research target for exercise physiology and sport science, but it has also repeatedly been demonstrated to have an association with injuries in sport. The **aim** of this review is to explore the existing literature and describe the newest proposed mechanisms of fatigue, as well as investigate the hypotheses and evidence of their link to sports-related injuries. Materials and methods. The medical databases Scopus, Web of Science, PubMed and Google Scholar were searched for the purpose of this review. **Results and discussion:** The newest mechanisms of muscle fatigue are described as peripheral and central in nature, meaning that processes happening locally in the individual muscle cell are as important as those that are affecting the nervous system and the neuromuscular junction. The leading mechanistic cause of muscle fatigue is considered to be contractile failure, which has shown a strong association with injury occurrence, especially in sports where fatigue accumulation is common because of sport-specific characteristics like longer duration and higher training load. **Summary:** Muscle fatigue has shown a strong association to sports-related injuries, so understanding of the underlying mechanisms is of great importance to clinicians and the quality of care that they provide to athletes.

Keywords: *muscle fatigue, injury, mechanism*

D-DIMERS IN ADULT PATIENTS

Valeria Boneva, Nikoleta Stoykova, Mariya Proshenska, Mariya Panchovska

Medical University of Plovdiv

Worldwide, deep vein thrombosis of the lower extremities and its complication, pulmonary embolism, is characterized by high mortality and represents a serious medical issue. Mortality from pulmonary embolism ranks third after acute myocardial infarction and stroke. With advancing age, the incidence of venous thromboembolism increases several times – 30–40 new cases per 100,000 people are registered annually. A predisposing factor for this trend is the presence of concomitant diseases, such as heart failure, oncological diseases, chronic obstructive pulmonary disease (COPD), diabetes mellitus, bone fractures. In case of suspected venous thromboembolism, D-dimers are tested at this stage, which are a product of fibrin degradation and are markers of hypercoagulation and thrombotic events. The diagnostic significance of the D-dimer test is in its establishment as the gold standard for the diagnosis of venous thromboembolism. The test has high sensitivity and negative predictive value (over 98%). In addition to being an indicator of intravascular thrombosis, the D-dimer test is clinically useful for diagnosing and monitoring of disseminated intravascular coagulopathy (DIC), for assessing the effectiveness of antithrombotic therapy and determining the risk of new thrombosis after its discontinuation. The increase in D-dimer levels with age is associated with reduced clearance of plasma proteins, increased fibrinogen and systemic inflammation (atherosclerosis). Therefore, after the age of 50, a significant percentage of the examined individuals show elevated values compared to the standard D-dimer threshold. For a more accurate assessment of D-dimers in cases of suspected venous thromboembolism, some authors suggest the determination of an age-adjusted cut-off.

Keywords: *D-dimers, thromboembolism, adult patients*

INTERPRETATION OF PEDIATRIC PFT (PULMONARY FUNCTION TESTS) USING AI (ARTIFICIAL INTELLIGENCE): A LITERATURE REVIEW

Abdullah Sandhu, Plamena Stoimenova

Medical University of Plovdiv

Background: Pulmonary function tests (PFTs) like spirometry and forced oscillation technique (FOT) are a vital component in diagnosing and managing respiratory diseases in the pediatric population. Whilst PFTs are imperative in a good clinical practice, they also come with their difficulties due to age-related limitations and compliance issues, as well as cases of inaccurate interpretations by physicians. The uprising of artificial intelligence has introduced us to many machine-learning algorithms that can be used to improve PFT interpretations, leading to accurate diagnosis' and improved clinical decision-making. **Objective:** This literature review aims to explore the application of artificial intelligence (e.g. machine learning algorithms like Catboost) in pediatric PFT interpretation, leading to accurate diagnosis and hence management of respiratory diseases. Methods: A literature review was undertaken using sources from many different databases e.g. PubMed, Folica media, to collect studies focusing on machine-learning algorithms, its application and success in interpreting pediatric PFTs. **Results:** Artificial intelligence has successfully improved interpretation of pediatric PFTs, acknowledging the increased diagnostic accuracy and improved pattern recognition. **Conclusion:** The collaboration of AI with pulmonologists is more accurate in pediatric PFT interpretation than just a pulmonologist's analysis alone.

Keywords: *Artificial intelligence, machine-learning algorithms, pediatric pulmonary function tests, pulmonary function test interpretation*

FACTORS DETERMINING THE PARAMETERS OF THE PULMONARY FUNCTION TESTS (PFTS)

Neda Angelova, Plamena Stoimenova

Medical University of Plovdiv

Introduction: The factors that influence pulmonary function tests' (PFTs) results should be taken into account when interpreting the data obtained. The rapid growth of the child's body is also associated with changes in lung function, measured by the two main methods used in childhood – spirometry and the forced oscillation method. The present literature review aims to examine the importance of various factors when interpreting the data obtained from PFTs. **Methods:** Studies and clinical cases on pulmonary function testing are reviewed and evaluated, with sources available in databases like PUBMED, Google Scholar, and ScienceDirect. **Results and discussion:** Age, sex, and height are key physiological factors that influence pulmonary function test parameters. As individuals age, lung elasticity decreases, respiratory muscles weaken, and alveolar surface area reduces, leading to a natural decline in lung function. Sex also plays a role, as males typically have larger lung volumes and higher pulmonary function values than females. Height is a crucial determinant of pulmonary function test (PFT) parameters, as it directly correlates with lung volume and capacity. While height is a strong determinant of lung function in all age groups, its impact is most pronounced during growth and development. **Conclusion:** PFTs' results are compared to predicted normal values based on factors like height, age, sex, and ethnicity. Among these, height is one of the strongest predictors of lung volumes and capacities, as taller individuals generally have larger lungs and greater airway length.

Keywords: *Pulmonary function tests, childhood, diagnosis, spirometry, forced oscillation technique*

LUNG FUNCTION IN PEDIATRIC ASTHMA – FORCED OSCILLATION TECHNIQUE (FOT) VS SPIROMETRY

Taskin Chaudhry, Plamena Stoimenova

Medical University of Plovdiv

Background: Bronchial asthma is the most prevalent chronic respiratory condition in children, with significant morbidity. Accurate and reliable assessment of lung function is required for diagnosis, monitoring, and treatment evaluation. Spirometry is the current gold-standard test for evaluating pulmonary function, but its use in young children can be limited due to the need for significant patient cooperation. The Forced Oscillation Technique (FOT) offers a promising alternative, requiring minimal patient effort, making it more suitable for younger children and those unable to perform spirometry. **Objective:** This review aims to compare the use, accuracy, and clinical relevance of the forced oscillation technique (FOT) and spirometry in assessing lung function in pediatric asthma. Methods Articles from databases such as PubMed, European Respiratory Journal, Nature, and Folia Medica were reviewed. Key parameters included ease of use, sensitivity, and repeatability in measuring airway obstruction and bronchodilator response. **Results:** FOT provides reliable, repeatable measurements of airway resistance and reactance with minimal cooperation. It correlates well with spirometry in detecting airway obstruction and bronchodilator response while offering additional insights into peripheral airway function. The combination of both methods may offer a more comprehensive assessment of lung function in paediatric asthma. **Conclusion:** While spirometry remains essential, FOT's advantages in younger and less cooperative children suggest it should be integrated into the routine practice to improve early diagnosis and monitoring. Integrating both methods may enhance the diagnosis and management of pediatric asthma. Further research is needed to standardize FOT and expand its clinical application.

Keywords: *Pediatric asthma, Forced Oscillation Technique (FOT), spirometry, lung function, airway obstruction*

THE DIVERSE ROLE OF A/B T-CELLS IN WOUND REGENERATION

Radoslav Tashev[1,3], David Rot[2], Hristo Taskov[3], Michael Petrov[1,3], Mariana Murdjeva[1,3]

1. Department of Medical Microbiology and Immunology "Prof. Dr. Elissay Yanev", Medical University of Plovdiv
2. student, 3rd course, Faculty of Medicine, Medical University of Plovdiv
3. Research Institute at Medical University of Plovdiv

Introduction: Alpha/beta (α/β) T lymphocytes have a primary role in immunity, regulating the immune response and eliminating intracellular pathogens and cancer cells. With the advancements in cell analysis technologies, additional functions of T cells have been discovered. This implies the need for summarising articles regarding their different roles in wound healing. **Aim:** To explore and outline the role of peripheral α/β T-cells in wound regeneration. **Materials and methods:** A search was conducted in the PubMed database using the keywords: α/β T-cells, wound healing, regeneration, and reparation. Articles with original results in animal and human models were included. **Results and discussion:** The database search showed 53 unique results fitting the inclusion criteria. They were analysed and summarised. Although more research is needed in the respective area, there was sufficient information to draw conclusions. There is no clear cut in the function of each T-cell subtype, as it is context dependent. Mainly Th1, Th17, and Th22 are pro-inflammatory and help clear out foreign pathogens and debris. T-regulatory and Th2 suppress inflammation and induce tissue proliferation. T-cytotoxic cells are responsible for the clearance of damaged and senescent structural cells. Perturbations in any of the subsets were shown to delay healing. **Conclusion:** Although the current data are limited, they underscore the significance of α/β T cells in wound regeneration. This highlights the need for further research and the development of novel techniques for the diagnosis and treatment of wounds.

Keywords: *Wound healing, regeneration, α/β T-cells*

ARTIFICIAL INTELLIGENCE IN THE CLINICAL LABORATORY

Yordanka Eneva

Medical University of Varna

Introduction: Advancements in clinical laboratory diagnostics have introduced new analytical techniques that improve accuracy, speed, and efficiency. Artificial Intelligence (AI) plays a key role in automating processes, processing large data volumes, and enhancing diagnostic precision. AI integration optimizes workflows and allows for more personalized patient care. **Objective:** This study aims to explore new analytical techniques in clinical laboratories and how AI supports their application, focusing on the advantages, challenges, and opportunities for AI integration in laboratory practice. **Materials and methods:** A review of modern analytical techniques was conducted, including high-resolution mass spectrometry (HRMS), next-generation sequencing (NGS), liquid biopsy, and digital pathology. AI algorithms for image processing, pathogen identification, and disease prediction were analyzed using data from peer-reviewed sources, medical databases, and clinical innovation reports. **Results and discussion:** Results indicate that AI integration with these techniques significantly improves diagnostic accuracy, reduces analysis time, and minimizes errors. In digital pathology, AI algorithms enable automatic recognition of pathological changes, while in genetic analysis, they assist in detecting mutations and rare diseases. However, challenges remain in validating AI algorithms, setting integration standards, and addressing regulatory requirements. **Conclusion:** Combining new analytical techniques with AI is transforming clinical laboratory diagnostics, improving efficiency and personalizing healthcare. Despite challenges, AI's role in early diagnosis and enhancing healthcare quality will continue to grow.

Keywords: *AI, clinical laboratory, analytical techniques, diagnostics*

BIOENERGETIC CHANGES IN PATIENTS WITH ISCHEMIC STROKE BEFORE AND AFTER THROMBOLYSIS – A PILOT STUDY

Eleonora Kovacheva[1], Margarita Koeva[2], Toma Tsvetanov[3], Maria Gevezova[1], Emanuela Kostadinova[2], Maria Kazakova[1,3], Victoria Sarafian[1,3]

1. Department of Medical Biology, Medical University of Plovdiv
2. Department of Neurology, University Hospital Pulmed
3. Research Institute at Medical University of Plovdiv

Introduction: Stroke is the second leading cause of death worldwide and accounts for 55% of all neurological disabilities. This statistic calls for focused scientific and clinical research on the prevention, early diagnosis and prognosis of ischemic stroke (IS). Intravenous thrombolysis is a safe and effective therapeutic method in acute IS treatment. **Aim:** The aim of the study is to identify changes in cellular bioenergetics in IS patients, before and after thrombolysis. **Materials and methods:** Peripheral blood mononuclear cells (PBMCs) were isolated from IS patients (n = 16), before and after thrombolysis. The severity of neurological symptoms was assessed using the NIHSS scale, and the level of consciousness was measured using the GLCS scale. The topology and area of the ischemic region was determined by CT-scan. The metabolic studies of PBMCs were performed using a Seahorse XFp analyzer. **Results:** The data showed that pre-thrombolysis IS patients had significantly impaired mitochondrial function, reduced spare respiratory capacity and basal respiration compared to the samples, obtained 24 hours after the treatment. The indicators increase significantly after therapy, which is an evidence of improved mitochondrial activity. **Conclusion:** Assessment of the bioenergetic changes in IS patients could serve as additional indicators for disease severity and predictors of outcome.

Keywords: *ischemic stroke, mitochondria, respiration*

Acknowledgement: This study is financed by the European Union – NextGenerationEU, through the National Recovery and Resilience Plan of the Republic of Bulgaria, project № BG-RRP-2.004-0007-C03

EFFECTS OF HERBS AND PLANTS ON MENSTRUAL CYCLE

Hristiyana Todorova, Gabriela Panayotova, Antoniya Hachmeriyan

Department of Physiology and Pathophysiology, Division of Physiology, Medical University – Varna

Introduction: With modern fast-paced life a growing number of females are suffering from problems related to their menstrual cycle, including amenorrhea, dysmenorrhea, menorrhagia. The treatment of these conditions is usually pharmacological. However, a more holistic approach using herbal medicine may offer an alternative management. **Aim:** This paper aims to examine the impact of various herbs and plants (Vitex agnus-castus, Ashwaganda, Achillea Millefolium, Chamomile, Purslane, Rhodiola Rosea) on the menstrual cycle. **Materials and methods:** Our team analyzed recent studies published over the last decade in reputable scientific databases, including PubMed, Scopus, and Web of Science examining the effect of the selected herbs and plants on symptoms related to menstrual flow. **Results:** The results suggest that herbal medicine plays a key role in regulating the menstrual cycle. Vitex agnus-castus alleviates symptoms of premenstrual syndrome (PMS), cycle irregularities, and dysmenorrhea. Ashwaganda as an adaptogen can be used both in patients with amenorrhea caused by stress and in perimenopausal women affecting the climacteric symptoms. Achillea Millefolium, Chamomile, Evening primrose oil are found to affect the cycle length and PMS symptoms. Purslane can be used to reduce heavy menstrual bleeding. Rhodiola Rosea used daily helped restore the menstrual cycle in patients with amenorrhea. **Conclusion:** Herbs and adaptogens can be incorporated into the treatment plan for irregular menstrual bleeding and PMS management. While some of them are supported by substantial clinical data, further research on the efficacy of others is needed.

Keywords: *Herbs, adaptogens, female hormone regulation, menstrual cycle*

NITROUS OXIDE CRYOTHERAPY

Bogomil Hristov[1], Chudomira Toncheva[2], Nikola Pirovski[3]

1. *Student, Faculty of Medicine, Trakia University – Stara Zagora*
2. *Student, Medical University of Plovdiv*
3. *Chief Assistant Professor, Anthropology Laboratory, Department of Anatomy, Faculty of Medicine, Trakia University – Stara Zagora*

Introduction: Cryotherapy is a therapeutic technique that employs controlled cold temperatures to induce the destruction of unwanted tissue, leading to cellular necrosis. This approach is particularly common in dermatology due to its effectiveness, safety, and low levels of discomfort for patients. **Aim:** The goal of this study is to explore the use of Nitrous Oxide Cryotherapy (CryoPen) as a component of personalized medicine, aimed at treating a variety of skin conditions and other medical concerns with an individualized treatment plan. **Materials and methods:** CryoPen uses nitrous oxide (N2O) to target and freeze specific tissues, causing controlled necrosis. This process involves rapid freezing followed by a slow thaw to minimize damage to surrounding healthy tissues. The treatment is tailored based on the unique needs and medical profile of the patient, promoting a personalized approach to therapy. **Results and discussion:** CryoPen has demonstrated substantial effectiveness in managing common dermatological conditions such as warts, actinic keratoses, genital lesions, and other skin issues. The device promotes swift recovery, with minimal risks such as scarring or infection. It is versatile, featuring interchangeable applicators that enhance its applicability across various medical fields, including dermatology, gynecology, pediatrics, and aesthetic treatments. The customized treatment strategy contributes to improved outcomes by addressing the specific characteristics and needs of each patient. **Conclusion:** Nitrous Oxide Cryotherapy, through CryoPen, offers an advanced and individualized treatment approach. It provides precision, safety, and minimal invasiveness, making it an adaptable solution across a broad range of medical disciplines and ensuring high-quality care for patients.

Keywords: *Cryotherapy, Nitrous Oxide, CryoPen, personalized medicine, skin lesions*

THE ROLE OF FERROPTOSIS IN NEURODEGENERATION: MECHANISMS AND TARGETED THERAPIES IN ALZHEIMER'S AND PARKINSON'S DISEASES

Merve Hasan, Abha Chatterjee, Georgia Apostolaki

Faculty of Medicine, Medical University of Plovdiv

Introduction: Ferroptosis is an iron-dependent, non-apoptotic form of regulated cell death driven by lipid peroxidation and oxidative stress. It is a key contributor to the pathogenesis of neurodegenerative disorders such as Alzheimer's (AD) and Parkinson's diseases (PD). Both conditions are characterized by disrupted iron metabolism, oxidative damage, and mitochondrial dysfunction, accelerating neuronal degeneration. **Aim:** This review examines the role of ferroptosis in the pathogenesis of AD and PD, focusing on common and distinct mechanisms, and evaluates therapeutic strategies targeting ferroptotic pathways. **Resources and methods:** A literature search on the PubMed database was conducted using the following keywords: ferroptosis, AD, PD, mitochondria, nuclear factor-erythroid factor 2-related factor 2 (Nrf2), system xc-, glutathione peroxidase 4 (GPX4). **Results and discussion:** In AD, ferroptosis is implicated as a consequence of amyloid-beta deposition, tau hyperphosphorylation, and aberrant iron accumulation in the hippocampus and cortex, leading to oxidative stress and neuronal degeneration. In PD, ferroptosis is triggered by excessive iron deposition in the substantia nigra, which induces lipid peroxidation, alpha-synuclein aggregation, and dopaminergic neuronal death. Emerging therapeutic strategies include iron chelators such as deferoxamine, lipid peroxidation inhibitors like ferrostatins and liproxstatin-1, and glutathione precursors like N-acetylcysteine. These approaches have demonstrated efficacy in preclinical studies, highlighting their potential to mitigate neurodegeneration in both diseases. **Conclusion:** Ferroptosis is a key pathogenetic mechanism driving neurodegeneration in AD and PD, emphasizing its relevance as a target for therapeutic intervention and a focus for ongoing medical research.

Keywords: *ferroptosis, Alzheimer's disease, Parkinson's disease, oxidative stress, glutathione peroxidase-4 (GPX-4)*

THE BIDIRECTIONAL INTER-RELATIONSHIP BETWEEN OBSTRUCTIVE SLEEP APNOEA AND THE GUT MICROBIOTA-BRAIN AXIS

Adham Rataba[1], Ghani Khan[1], Krasimir Avramov[2], Todor Georgiev[2], Aneliya Draganova[2], Kiril Terziyski[2]

1. Medical University of Plovdiv
2. Department of Pathophysiology, Medical University of Plovdiv

Obstructive sleep apnoea (OSA) is a highly prevalent chronic condition with the hallmark feature of intermittent hypoxia (IH) associated with an increased risk of vascular and cognitive sequelae. Although continuous positive airway pressure (CPAP) treatment for OSA successfully achieves normalization of apnea-hypopnea index, a proportion of patients suffer from residual symptoms which evokes the search for a potential contributor in the pathogenetic mechanisms of OSA. This review explores the bidirectional pathogenetic relationship between the gut microbiota and OSA as a means of determining if such an alteration could be a mediator in the development of metabolic complications. A structured search was conducted using the PubMed Advanced Search database, utilising the following keywords: “microbiota”, “obstructive sleep apnea”, “metabolism”. Experimental models assessing IH on faecal microbiotal composition observed an alteration of the gut microbiota, hypothesising a dysregulation between host health and gut microbiota under the influence of OSA. In patients with severe OSA, it was also found that the abundance of bacteria producing biomarkers responsible for sleep regulation was decreased. This perhaps establishes a ‘vicious cycle’ in the pathogenesis. IH contributes to dysbiosis, which disrupts gut microbiota balance and increases intestinal permeability (“leaky gut”). This allows microbial products such as lipopolysaccharides to induce neuroinflammation and influence the pathogenesis of metabolic comorbidities. The understanding and application of the gut-brain axis can provide as a target for the monitoring of OSA patients, prognostic markers, and potential treatment.

Keywords: *obstructive sleep apnea, microbiota, metabolism, leaky gut, complications*

SYNERGISTIC MOLECULAR STRATEGIES FOR TARGETING UPR MODULATION IN CANCER THERAPY: INDUCTIVE VS. INHIBITORY MECHANISMS

Ovanes Muradyan, Diyana Kaidy, Al-Mamoon Ghrairi

Faculty of Medicine, Medical University of Plovdiv

Introduction: Cancer cells frequently exhibit elevated proteostasis demand, leading to an upregulated Unfolded Protein Response (UPR). This adaptive mechanism presents a unique therapeutic opportunity. By strategically modulating the UPR with specific inducers or inhibitors, proteostasis may be disturbed, thereby inducing apoptosis or cytotoxicity in cancer cells. This review explores the novel field of co- therapeutic approaches leveraging UPR modulation in conjunction with diverse drug classes to enhance anti-cancer efficacy. **Aim:** To explore the effect of UPR-targeting drugs in potentiating anti-cancer therapies and their impact on tumor cell cytotoxicity, apoptosis and autophagy. **Materials and methods:** Comprehensive review of literature was performed with the aim of identifying all available scientific papers investigating the co-therapeutic approach of combining UPR modulators with other drugs for cancer treatment. The collected data was systematically sorted and filtered across specific criteria. **Results and discussion:** Synergistic UPR modulation strategies utilize two primary approaches. Firstly, UPR inducers, such as proteasome inhibitors, are administered with potentiating agents. These agents, including feedback regulation inhibitors or kinase inhibitors, amplify endoplasmic reticulum (ER) stress. This drives cancer cells into the pro-apoptotic stage 2 UPR, overcoming resistance to proteasome monotherapy. Secondly, direct UPR inhibition disrupts proteostasis and induces cytotoxicity, particularly in UPR-dependent cancers. The optimal UPR modulation strategy varies depending on cancer type and UPR reliance. **Conclusion:** Targeting the UPR pathway, in synergy with metabolism-targeting agents, promotes apoptosis in sensitive tumor cells; providing a novel approach for the treatment of cancer. This holds promise for enhancing treatment efficacy and overcoming resistance in multiple malignancies.

Keywords: *Unfolded protein response, UPR modulation, synergistic therapy, apoptosis, cancer*

FOOD FOR MOOD: THE SCIENCE BEHIND ANTI-ANXIETY AND ANTI-DEPRESSION FOODS

Antoniya Hachmeriyan, Gabriela Panayotova, Hristiyana Todorova

Department of Physiology and Pathophysiology, Division of Physiology, Medical University – Varna

Introduction: Depression and anxiety are among the most prevalent mental health disorders, and their management involves pharmacological and psychological interventions. However, an emerging field, nutritional psychiatry, highlights the impact of dietary choices on mood regulation. **Aim:** This review aims to analyze the biological mechanisms through which diet influences mental health. **Materials and methods:** A comprehensive analysis of peer-reviewed studies (2014–2024) in the scientific web databases PubMed, Scopus, and Web of Science was conducted. The focus was on the gut-brain axis, the role of omega-3 fatty acids, and the impact of vitamins and minerals on neurotransmitter synthesis, inflammation, and overall brain functions. **Results:** Probiotic and prebiotic-rich diets enhance gut microbiota diversity, which correlates with reduced symptoms of anxiety and depression. Omega-3 supplementation can alleviate depressive symptoms by enhancing serotonin and dopamine pathways. Folate (B9), B6, and B12 are critical for neurotransmitter synthesis and methylation processes. Deficiencies in these vitamins are linked to an increased risk of depression and cognitive decline. Low levels of vitamin D have been associated with increased depression risk. Vitamins C and A contribute to antioxidant defense and reduce oxidative stress. Trace elements play a role in neurotransmitter regulation and neurogenesis. **Conclusion:** The connection between nutrition and mental health is increasingly recognized, with strong evidence supporting the impact of diet on mood regulation. While further research is needed to establish standardized dietary guidelines for mental health management, current findings suggest that nutritional interventions can serve as an adjunctive strategy in the treatment and prevention of mood disorders.
Keywords: *nutrition, anxiety, depression, mood disorders, mental health*

LACTATE LIBERATION: FROM BYPRODUCT TO BIOLOGICAL ASSET. A LITERATURE REVIEW

Cheryl Adamson-Crete[1], Aglika Byandova[2]

1. Faculty of Medicine, Medical University of Plovdiv
2. Department of Pathophysiology, Medical University of Plovdiv

Introduction: Lactate, historically regarded as a metabolic waste product, has undergone a paradigm shift in its scientific perception. Recently, it has been recognised as a key molecule with several essential functions, including acting as a chemical signal, serving as a gluconeogenic precursor and functioning as a potent fuel source. **Aim:** This review examines the nuanced transformation of lactate's reputation over time, and implications in medical therapies and athletic performance. **Materials and methods:** A review of the current literature included PubMed and Scopus database searches. A total of 9 articles were chosen spanning the period 1918–2024. **Discussion:** Lactate is accepted as a fuel source during aerobic and anaerobic conditions, but its efficiency is still being scrutinised. Cell-to-cell shuttling such as astrocyte-neuron lactate shuttle (ANLS) supply neurons but lactate-only energy supply is found sufficient for short wave ripples (SWR) but detrimental for Delta and Theta wave oscillations. Additionally, knowledge about lactate metabolism has promising uses in cancer treatments. Tumours have higher expression of monocarboxylate transporters (MCTs), which are important for lactate transport to and from the malignant cell. MCTs have been tested as target molecules for newly developed cancer therapies. There is emerging data concerning the role of T1470A polymorphism in the MCT gene. Athletes with the AA genotype seem to have a genetic advantage in endurance and high intensity exercise characterised by delayed lactate accumulation. **Conclusion:** Traditionally considered merely a metabolic waste byproduct, lactate is now regarded as a biological asset performing various physiological functions in the body.

Keywords: *Lactate, Metabolism, Athletes, MCTs, Cancer*

EFFECT OF CYTOKINES IN MUSCLE TISSUE OF AGED RATS AFTER SUPPLEMENTATION WITH FUNCTIONAL GABA-ENRICHED FOODS

Georgios Georgantas, Olivare Todorov, Mina Pencheva, Elena Daskalova, Kalina Metodieva

Medical University of Plovdiv

Aging is a multifactorial process affecting all organs and systems in the body. Specific to aging is the establishment of a chronic subacute inflammatory state in tissues underlying age-related pathologies. GABA is an inhibitory neurotransmitter in the central nervous system. GABA's pharmaceutival properties on non-neuronal peripheral tissues and organs were reported from anti-hypertension, anti-diabetes, anti-cancer, antioxidant, anti-inflammation, anti-microbial, anti-allergy, hepato-protection, reno-protection, and intestinal protection. GABA was indicated as an inflamation inhibitor via decreasing pro-inflammatory mediator production and ameliorating inflammatory symptoms. Aim: Evaluate GABA-containing diet's effects on the inflammatory status in muscle tissue of aged rats. **Material and methods:** Male Wistar rats (n = 32) were put in 4 groups: YK (3 month-old controls); OK (24 month-old controls); G (24 month-old rats supplemented with GABA at dosage of 10 ml/kg), NG (24 month-old rats supplemented with sprouted chickpeas, GABA source, into the food) at dose. At the experiment's end, skeletal muscle, small intestine and heart material was collected for immunohistochemical analysis. **Results:** Comparative analysis of the intensity of IL-10, IL-4 and IL-1β immunoreaction in different muscle tissues showed that inflammatory responses varied with age and tissue. Aged animals showed higher IL-1β levels than young animals, and these effects amplified in IL-10- and IL-4-deficient rat muscles. In groups of GABA-supplemented animals, the intensity of IL-1β in skeletal muscle, heart and small intestine was reduced compared to adult controls. **Conclusion:** GABA supplementation can influence inflammatory status in old animals' muscle tissue, by modulating levels of pro- and anti-inflammatory cytokines. GABA can be applied for prevention of aging processes.

Keywords: *IL-10, IL-4, IL-1β, GABA, aging*

SHISHA SMOKING – A MODERN HABIT WITH DANGEROUS CONSEQUENCES

Jovan Stojkov[1], Teodora Stankova[2], Ginka Delcheva[2], Katya Stefanova[2]

1. *Faculty of Medicine, Medical University of Plovdiv*
2. *Department of Medical Biochemistry, Faculty of Pharmacy, Medical University of Plovdiv*

Introduction: Shisha smoking has been gaining popularity, especially among youth, due to misconceptions about its reduced harm compared to traditional cigarette use. However, shisha smoking has been recently associated with even higher health risks. **Aim:** The aim of this review is to summarize some of the major detrimental health effects of shisha smoking. **Material and methods:** A comprehensive literature search of PubMed data was performed. **Results and discussion:** Shisha smoke contains potentially dangerous substances including: nicotine, formaldehyde, carbon monoxide, acrolein and heavy metals, such as lead and arsenic. The inhaled nicotine and toxin levels in shisha smoke are much higher in comparison to cigarette smoking. Noteworthy, carbon monoxide, particulate matter and other pollutant levels have also been documented to be significantly higher in secondhand smoke from shisha than from cigarettes. Shisha smoke constituents induce oxidative stress and inflammation which are the key pathophysiological factors for a plethora of diseases. Shisha smoking has been linked to an increased risk of cardiovascular and lung diseases. People who smoke shisha regularly are at a higher risk of developing coronary artery stenosis and have a higher mortality rate associated with ischemic heart disease. Furthermore, carcinogens in shisha smoke may promote the development of cancer of the lungs, mouth, esophagus and stomach. **Conclusion:** There should be increased awareness about the disease potential of shisha smoking and it should be considered as a serious public health threat.

Keywords: *shisha, smoking, oxidative stress, cardiorespiratory diseases, cancer*

A CASE REPORT OF AN INCIDENTAL PANCREATIC MASS AND PRIOR GASTRIC AND BREAST MALIGNANCIES

Tharni Sowmya Ramesh[1], Sara Sariyan[2], Margarita Vasilska[3], Ivelina Georgieva[3], Katya Doykova[3,4]

1. Faculty of Medicine, Medical University of Plovdiv
2. SMDL – Mediscan
3. Department of Diagnostic Imaging, Medical University of Plovdiv
4. Department of Diagnostic Imaging, UMHAT Kaspela, Plovdiv

The occurrence of multiple primary malignancies in one patient is rare especially involving primary breast, gastric and pancreatic cancers. Male breast cancer is an uncommon condition that accounts for less than 1% of all male cancers. Gastric and pancreatic cancers are also one of the most challenging malignancies to detect early. Here we present a rare case of a 79-year-old male with a history of gastric adenocarcinoma (pT3N0M0, Stage IIA) which was treated with subtotal gastrectomy and hormonal therapy, and right breast carcinoma (pT4N0M0, Stage III) treated with radical mastectomy, chemotherapy, radiotherapy, and Tamoxifen. As he underwent oncologic follow-up, he presented with epigastric pain, appetite loss, fatigue and melena. Contrast-enhanced CT revealed a 5/7 cm heterogeneous mass in the pancreatic head, infiltrating the duodenum and closely associated with the portal vein. Lab tests showed mild anemia with normal tumour markers. The findings suggest a primary pancreatic tumour, highlighting the risk of multiple malignancies in cancer survivors. The use of multiple imaging modalities, including multidetector computed tomography (MDCT), PET (positron emission tomography), and ERCP (endoscopic retrograde cholangiopancreatography), is crucial for accurately diagnosing and staging malignancies such as gastric, breast and pancreatic cancers. Each technique offers unique advantages – MDCT provides detailed anatomical visualisation, PET detects metabolic activity and ERCP evaluates biliary and pancreatic ducts. However, imaging diagnosis remains challenging due to overlapping presentations and tumour heterogeneity. A multimodal imaging approach is essential for early detection, precise staging, and creating appropriate treatment strategies, improving patient outcomes.

Keywords: *Cancer, oncology, diagnostic, imaging, male*

NEW APPROACHES FOR PREVENTION AND TREATMENT OF DIABETES MELLITUS USING ARTIFICIAL INTELLIGENCE

Sebastian Scholz, Katharina Brüggemann, Liubka Decheva-Ikonomova

Medical University – Varna

Introduction: As a major global health issue diabetes mellitus remains a main risk factor for cardiovascular diseases, leading to elevated morbidity and mortality rates. The disease can be controlled by patient-sided modifications along with drug interventions like metformin and insulin. Pharmacological treatment for diabetes can result in serious side effects including hypoglycemia and lactic acidosis which make long-term management of the disease more difficult. **Aim:** This research aims to explore new treatment and early prevention methods for diabetes mellitus using artificial intelligence and machine-based learning. A special focus is placed on personal interventions and smartphone applications. **Material and methods:** A comprehensive analysis of peer-reviewed studies (2014–2024) from PubMed, Scopus, Web of Science, and Google Scholar was conducted to examine machine learning models for risk prediction and digital health platforms for lifestyle adaptations. **Results and discussion:** Artificial intelligence provides an opportunity for the identification of individuals at risk of developing diabetes mellitus. It uses predictive models and increases treatment compliance and adherence through real-time feedback systems. The studies showed advanced glycemic control and engagement by the patients. However, data privacy, integration in the existing healthcare system, and the interpretability of different models remain challenging in the future. **Conclusion:** Artificial intelligence could serve as a promising approach to the treatment and prevention of diabetes mellitus. Future research should address ethical concerns, particularly data security, the integration of different models, and the enhancement of acceptance in daily clinical practice. Collaboration between experts is essential for successful implementation and progress.

Keywords: *diabetes mellitus, treatment, prevention, artificial intelligence, digital health*

THIONINE/POLYETHYLENEIMINE/2D TUNGSTEN DISULFIDE /MULTIWALLED CARBON NANOTUBES NETWORK NANOCOMPOSITE-BASED ELECTROCHEMICAL SENSOR FOR LABEL-FREE CARCINOEMBRYONIC ANTIGEN (CEA) IMMUNOASSAY

Shabeeb Hussain

Department of Chemistry, Szeged University, Hungary

Carcinoembryonic antigen (CEA), a glycoprotein, has been established as a biomarker for the clinical identification of colon, breast, ovarian, and cystadenocarcinoma cancers. The detection of CEA is thus critical in diagnostic and clinical research. Immunoassay techniques, which are based on the property of highly specific molecular recognition of antigens by antibodies, have emerged as the primary analytical approach for selective and sensitive analysis, gaining popularity in the quantification of tumor markers and cancer screening in general. Electrochemical approaches have sparked substantial attention among conventional immunoassay techniques, owing to their excellent sensitivity, fast diagnostic time, and downsizing potential. Electrochemical immunosensors are a type of electrochemical analytical technology that has a promising application in the early detection of cancer. Herein we demonstrate Thionine/PEI/2D-WS2/MWCNTs Network, a newly designed highly active electrode material for the electrochemical detection of CEA. In this study we found that WS2 present in the composite is basically active material capturing protein on its surface during incubation while its lover electrochemical response is improved by mixing with oxidized MWCNT and the dispersibility of the material in DI-water was improved by mixing appropriate amount of Polyethyleneimine. The resulted composite material found as very sensitive material of electrochemical CEA detection

Keywords: *Carcinoembryonic antigen (CEA), biomarker, Polyethyleneimine, immunoassay*

EFFECT OF ARONIA JUICE ON THE LEVELS OF IL-1B, IL-4 AND IL-10 IN SKELETAL, SMOOTH AND CARDIAC MUSCLES OF OLD RATS

Silke Maria Petersen, Mina Pencheva, Elena Daskalova, David Baruch, Kalina Metodieva

Faculty of Medicine, Medical University of Plovdiv

The world's aging population and the associated health challenges due to increased life expectancy are becoming exceedingly significant. One of the key factors that can help in slowing down aging is diet, especially in the shape of functional foods. Aronia melanocarpa has proven antioxidant and anti-inflammatory properties, thanks to its rich composition of polyphenols and vitamins. The **aim** of this study was to evaluate the effect of Aronia melanocarpa juice on the inflammatory status in muscle tissue of naturally aged rats. **Material and methods:** Male Wistar rats (n = 24) were divided in to 3 groups: YK (3-month-old young controls); OK (24-month-old controls); A (24-month-old rats supplemented with 100% Aronia melanocarpa juice at a dose of 10 ml/kg. After the end of supplementation skeletal muscle, small intestine and heart material were collected for immunohistochemical analysis. **Results:** Comparative analysis of the intensity of IL-10, IL-4 and IL-1β immunoreaction in different muscle tissues showed that inflammatory responses varied with age and tissue. Aged animals showed higher IL-1β levels compared with young animals, and these effects were stronger in IL-10- and IL-4-deficient rat muscle. In the group of Aronia-supplemented animals, the intensity of IL-1β in skeletal muscle, heart and small intestine was significantly reduced compared to the values in in adult controls. **Conclusion:** Supplementation with Aronia juice can favorably influence the inflammatory status in muscle tissue in old animals by modulating the levels of pro- and anti-inflammatory cytokines. Aronia may be a tool to aid in aging healthily.

Keywords: *IL-10, IL-4, functional foods, Aronia, aging*

UNRAVELING THE LIPOXYGENASE ENZYME SYSTEM: HOW ALOX15 MEDIATES FERROPTOSIS IN ISCHEMIA-REPERFUSION INJURY

Mihail Tokmakov, Denis Kadiev, Valeri Stavrev

Faculty of Medicine, Medical University of Plovdiv

Introduction: Ischemia-reperfusion injury is a pathological process caused by the restoration of blood flow to ischemic tissues, leading to oxidative stress, inflammatory responses, and extensive cell death. Ferroptosis, a recently identified iron-dependent form of regulated cell death, has been implicated as a major contributor to ischemia-reperfusion-induced damage. **Aim:** This review highlights the mechanism of ferroptosis and the role of the lipoxygenase enzyme in the pathophysiology of Ischemia-reperfusion injury. It highlights how lipid peroxidation contributes to cell damage and oxidative stress. **Materials and methods:** A review of the literature was performed using the PubMed and Web of Science databases. **Results:** Recent findings suggest that a crucial mediator of ischemia-reperfusion cell death is the lipoxygenase enzyme system, particularly ALOX15 – Arachidonate 15-lipooxygenase. The overexpression of this enzyme is correlated with ferroptosis and ischemia/hypoxia-induced cardiomyocyte damage. Inhibiting the enzyme may represent a potential therapeutic strategy for myocardial infarction-reperfusion injury. **Conclusion:** Further research is needed to explore specific inhibitors of ALOX15 and their clinical applicability in preventing ischemic tissue injury.

Keywords: *Ferroptosis, Ischemia-reperfusion injury, Lipid peroxidation, Lipooxygenase, Cardiovascular therapy*

FERROPTOSIS AND ATHEROSLECROSIS – THE MYSTERIOUS ION

Mihail Tokmakov, Denis Kadiev, Valeri Stavrev

Faculty of Medicine, Medical University of Plovdiv

Introduction: Ferroptosis, an iron-dependent form of regulated cell death driven by lipid peroxidation, has been increasingly recognized as a contributor to atherosclerosis progression Atherosclerosis is a chronic, progressive disease marked by lipid accumulation, inflammation, and fibrosis within the arterial walls, leading to plaque formation and vascular dysfunction. **Aim:** This review highlights the mechanistic role of ferroptosis in endothelial dysfunction, macrophage foam cell formation, and vascular smooth muscle cell death, all of which contribute to atherosclerotic plaque instability. Additionally, emerging therapeutic strategies aimed at mitigating ferroptosis, including iron chelation, lipid peroxidation inhibitors, and GPX4 activators are discussed. **Materials and methods:** A comprehensive literature review was conducted using the PubMed database, focusing on studies investigating the relationship between ferroptosis and atherosclerosis. **Results:** Recent findings suggests that ferroptosis contributes to atherosclerotic plaque progression through iron-dependent lipid peroxidation, endothelial dysfunction, and vascular smooth muscle cell death. Elevated levels of ferroptotic markers, such as ACSL4 upregulation, GPX4 suppression, and lipid hydroperoxide accumulation, have been identified in atherosclerotic lesion. Experimental studies indicate that ferroptosis inhibition reduces oxidative damage and plaque instability. **Conclusion:** The emerging role of ferroptosis in atherosclerosis underscores its significance as a novel pathway contributing to plaque progression and instability. Targeting ferroptosis through pharmacological inhibition or modulation of iron metabolism may represent a promising therapeutic strategy for preventing cardiovascular complications.

Keywords: *Ferroptosis, Atherosclerosis, Lipid Peroxidation, Iron Metabolism, GPX4, Cardiovascular Therapy*

BINDING MODE OF DIFFERENT ZINC-BINDING GROUPS (ZBGS) TO HISTONE DEACETYLASES (HDACS): INSIGHTS FOR DRUG DESIGN

Antonia Maznikova[1], Yordanka Uzunova[2], Reneta Koseva[1], Nikolay Toshev[2]

1. *Faculty of Medicine, Medical University of Plovdiv*
2. *Department of Bioorganic Chemistry, Faculty of Pharmacy, Medical University of Plovdiv*

Introduction: Inhibition of histone deacetylases is one of the therapy methods that can be used to treat cancer. Within the HDAC family of enzymes, HDAC8 is the most studied. Moreover, HDAC8 is overexpressed in different cancers. Currently, a small number of HDACi are approved for use as anticancer drugs. Romidepsin is a cyclic tetrapeptide, Chidamide is a benzamide, SAHA is a hydroxamic acid. Despite their chemical diversity, these molecules have something in common in their action – the functional group is chelating the zinc ion in the active site of the HDAC8 enzyme. **Aim:** The objective of this study was to systemize and classify the diversity of binding modes of different zinc-binding groups to HDAC8 enzyme. **Materials and methods:** A literature review of articles written between 2000 and 2024 served as the basis for this investigation. Various keyword combinations were used in our search of the Scopus, Web of Science, and PubMed databases. **Results and discussion:** Our findings systemize and analyze: (a) binding modes of approved inhibitors to HDAC8 enzyme, (b) binding modes of structurally different zinc-binding groups to HDAC8 enzyme, (c) structural determinants of enzyme binding together with significant interactions within the HDACi-HDAC8 complex. **Conclusion:** The study of the binding mode of various HDACi with HDAC8 enzyme can serve as a starting point to optimize the binding affinity of the zinc-binding groups (ZBGs) to the enzyme's active site, potentially facilitating the design of new drugs that have different potency, affinity, and isoform selectivity.

Keywords: *HDACi, HDAC8 enzyme, zinc-binding group, binding mode, cancer*

MULTIFACETED THERAPEUTIC POTENTIAL OF ISATIN DERIVATIVES: EXPLORING ITS ANTI-DIABETIC, ANTIOXIDANT, AND ANTIMICROBIAL ACTIVITIES

Armina Abdollahi[1], Yordanka Uzunova[1], Svetlana Georgieva[2], Kaloyan Mihalev[2], Nikolay Toshev[1]

1. Medical University of Plovdiv
2. Medical University of Varna

Introduction: Isatin derivatives have garnered significant attention from researchers due to their broad spectrum of pharmacological activities, including anti-diabetic, antioxidant, antimicrobial, anticancer, anti-tuberculosis, anti-fungal, anti-inflammatory, anticonvulsant, and anti-HIV effects, among others. The chemical structure of isatin motivated intensive research into the design and synthesis of biologically active analogs. **Aim:** The study aimed to uncover the multifaceted therapeutic potential of isatin derivatives with a focus on relationships between possible structural modification(s) and possible therapeutic potential. **Materials and methods:** A detailed search of literature published between 2000 and 2024 was conducted across Scopus, Web of Science, and PubMed databases, employing a variety of keyword combinations. **Results and discussion:** Our findings systematically categorize (a) biologically active isatin derivatives, demonstrating their therapeutic potential; (b) the mechanisms of action and potential molecular targets in different therapeutic areas; and (c) the chemical classification of isatin derivatives with potential pharmacological activity as outlined by their pharmacophoric model. **Conclusion:** This work emphasizes the significance of exploring the multifaceted therapeutic potential of isatin derivatives. Systematizing structural data on anti-diabetic, antioxidant, and antimicrobial properties establishes an excellent starting point for following in-depth structure-activity studies.
Keywords: *Isatin, Isatin Derivatives, therapeutic potential, activity*

CHEMICAL COMPOSITION AND QUALITY ASSESSMENT OF CITRONELLA AND LEMONGRASS ESSENTIAL OILS FROM THE BULGARIAN MARKET

Viktoria Panayotova[1], Vanya Rangelov Kozhuharov[2], Stanislava Ivanova[2,3], Nina Koleva[4]

1. Faculty of Pharmacy, Medical University of Plovdiv
2. Department of Pharmacognosy and Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Plovdiv
3. Research Institute at Medical University of Plovdiv
4. Medical College, Medical University of Plovdiv

Introduction: In the past decade, many concerns were raised about the widespread use of classic pesticides and repellents. Currently, many companies are trying to replace numerous synthetic molecules with safer and natural compounds to respond to the demands for healthy lifestyle, safer and environmentally friendly products. Citronella (Cymbopogon winterianus Jowitt) and lemongrass (Cymbopogon citratus (DC.) Stapf) EOs are examples of EOs providing good mosquito protection – their volatile constituents interfere with the mosquito's olfactory receptors, reducing host attraction. **Aim:** The study aimed to evaluate the chemical composition of citronella and lemongrass EOs samples available on the Bulgarian market. **Materials and methods:** The samples were analysed using GC-MS system. The identification of the compounds was based on their retention indices and mass spectra. **Results and discussion:** GC-MS analyses confirmed the presence of the major bioactive compounds required for repellent activity. In lemongrass EOs, the major constituents were citral, citronellal, limonene, geraniol and linalool. In citronella EOs the main compounds were citronellal, limonene, citronellol, geraniol, eugenol and β-caryophyllene. **Conclusion:** Citronella and lemongrass EOs could provide good mosquito protection. The analysed samples were found to contain the main bioactive compounds responsible for the repellent activity. Moreover, these EOs could be used as repellents in many different conditions and approaches: by addition in aroma diffusers for indoor protection, by inclusion is a sprays/ lotion for skin application, by inclusion in different matrices, etc.

Keywords: *citronella, lemongrass, essential oils, commercial products, mosquito repellents*

DEVELOPMENT AND CHARACTERIZATION OF POLYACRYLATE-COATED LIPOSOMES AS A POTENTIAL CARRIER OF DEFERIPRONE

Viktoria Panayotova[1], Plamen Simeonov[2], Radka Boyuklieva[2,3], Dimitar Penkov[2]

1. Faculty of Pharmacy, Medical University of Plovdiv
2. Department of Pharmaceutical Sciences, Faculty of Pharmacy, Medical University of Plovdiv
3. Research Institute at Medical University of Plovdiv (RIMU)

Introduction: Deferiprone is an oral iron chelator indicated for transfusional iron overload both in adults and children. Data also demonstrate that acute deferiprone treatment could act in an iron-independent way by changing neuronal activity in the lateral amygdala. The treatment is characterized as rather safe and effective but due to the relatively low biological half-life, frequent administration is required. The aim of the present study was to develop a polyacrylate-coated liposomal formulation for sustained release of deferiprone. **Materials and methods:** L9_3 Taguchi array was applied to assess the components' influence on the liposomes technological characteristics. Thin-film hydration method was used for the preparation of the vesicles, followed by extrusion, providing an additional particle size reduction. Liposomes were characterized in terms of their average size and zeta potential through dynamic and electrophoretic light scattering. Entrapment efficiency was determined indirectly by UV-vis analysis of the free deferiprone. Furthermore, the liposomes were coated with polyacrylic acid to achieve increased physical stability and ensure prolonged drug release, which was in vitro investigated by the dialysis bag method. **Results and discussion:** Based on the applied Taguchi method, a liposomal formulation with optimal characteristics was prepared. Moreover, the liposomes were successfully coated, showing a change in the zeta potential value from positive to negative. The synthesized structure showed sustained release of deferiprone at pH 7.4. **In conclusion,** the coated nano-vesicles could be used as a promising carrier that provides extended release of deferiprone.
Keywords: *deferiprone, sustained release, coated liposomes*

EXPLOITING THE GLYMPHATIC PATHWAY: OVERCOMING THE BLOOD-BRAIN BARRIER IN NEURODEGENERATIVE THERAPEUTICS

Vladislav Velchev[1], Tsenka Grancharova[2]

1. Faculty of Medicine, Medical University of Plovdiv
2. Department of Medical Physics and Biophysics, Faculty of Pharmacy, Medical University of Plovdiv

The glymphatic system, discovered in 2012, has redefined our understanding of brain homeostasis. It provides an efficient pathway for nutrient delivery, waste clearance, and maintenance of the ionic microenvironment. This network, equivalent to the peripheral lymphatic system, removes neurotoxins such as β-amyloid and phosphorylated tau proteins, the accumulation of which is central to neurodegenerative diseases. Using the glymphatic pathway for drug delivery offers a promising strategy to circumvent the restrictive blood-brain barrier, which allows only small lipophilic molecules (typically 400–600 Da) to pass, thus limiting macromolecular therapy. Recent advances have shown that the glymphatic system can improve the delivery of therapeutic agents to the brain. Aquaporin-4 (AQP4), a key channel protein, is essential for the rapid transport of water and solutes and thus for glymphatic function. Moreover, physiological factors which modulate cerebrospinal fluid flow such as sleep, arterial pulsatility, and exercise further influence glymphatic efficiency and treatment outcomes in neurodegenerative disorders. This review highlights the crucial role of the glymphatic pathway in improving the treatment outcomes in neurodegenerative diseases and its mechanisms.

Keywords: *glymphatic system, neurodegenerative diseases, drug delivery pathway, brain lymphatic system*

HYPERICUM PERFORATUM L.: EFFICACY IN DEPRESSION TREATMENT AND RISKS OF DRUG INTERACTIONS

Gabriela Angelova[1], Atanas Lambrev[1], Vanya Nalbantova[2]

1. Faculty of Pharmacy, Medical University of Plovdiv
2. Department of Pharmocognosy and Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Plovdiv

Introduction: Depression is a common mental disorder. It involves a depressed mood or loss of pleasure or interest in activities for long periods of time. It can affect all aspects of life, including relationships with family, friends and community. Depression is a mood disorder characterized by persistent sadness, hopelessness, and loss of interest in daily activities. It is often associated with a deficiency in neurotransmitters such as serotonin, dopamine and norepinephrine and can result in symptoms like fatigue, appetite changes, and difficulty concentrating. **Aim:** The aim of the current review is to summarize the potential therapeutic role of Hypericum perforatum L. in the management of depression, as well as some of its drug interactions. **Materials and methods:** The survey summarises scientific literature available in the PubMed and Google Scholar databases. **Results and discussion:** Hypericum perforatum L. is one of the best-investigated medicinal plants that belongs to Hypericaceae family. It contains a variety of secondary metabolites such as phenolic compounds, naphthodianthrones, flavonoids, etc. to which a range of pharmacological properties are attributed. Despite its therapeutic potential, Hypericum perforatum L. is known to interact with various pharmacological agents such as synthetic antidepressants (SSRIs – fluoxetine, paroxetine), benzodiazepines (midazolam), antidiabetic medications (metformin), antihyperlipidemic drugs (atorvastatin, rosuvastatin, simvastatin), non-steroidal antiinflammatory drugs (ibuprofen) and oral contraceptives. **Conclusion:** Hypericum perforatum L. has a good antidepressant activity. However, further studies are needed in order to confirm the mechanisms of action of the compounds, to understand drug interactions and to prevent them.

Keywords: *depression, drug interactions, Hypericum perforatum L., phenolic compounds*

PREPARATION AND CHARACTERIZATION OF CARBOHYDRATE-MODIFIED CHITOSAN

Daniel Argilashki, Bissera Pilicheva, Yordanka Uzunova

Medical University of Plovdiv

Introduction: Chitosan is a natural polysaccharide used in the pharmaceutical industry and medicine due to its hydrophilic, biocompatible, biodegradable and non-toxic properties. It is a linear polymer with a cationic character and consists of N-acetyl-D-glucosamine and D-glucosamine units linked by α(1→4) glycosidic bonds. Due to the insolubility of chitosan in water and most organic solvents, its derivatives such as carbohydrate-modified chitosans are being developed. **Objective:** Development of chemical modifications of chitosan with glucose, fructose and xylose and their characterization. **Materials and methods:** Carbohydrate chitosan derivatives were prepared using Maillard reaction and subsequently characterized by IR spectroscopy. **Results and discussion:** The Maillard reaction has been known for over 100 years as a non-enzymatic reaction between reducing sugars and amino acids, peptides or proteins. Thus, the carbonyl groups of monosaccharides can react with the amino groups in the chitosan molecule, resulting in water-soluble derivatives. Chitosan derivatives with glucose (CG), fructose (CF) and xylose (CX) were synthesized, dialyzed and freeze-dried. The characterization with IR spectroscopy proved the success of the chemical modification. Further tests performed on the obtained chitosan derivatives showed their better solubility in neutral and alkaline environment compared to chitosan itself. **Conclusion:** The development of carbohydrate-modified chitosans greatly expands the scope of this biopolymer and the resulting derivatives can be further explored as drugdelivery systems.

Keywords: *chitosan, carbohydrate derivatives, Maillard reaction*

Acknowledgements: This work is supported by Plovdiv Medical University's project DPDP-05/2024 "Chemical modification of chitosan for application in drugdelivery systems"

SIMULTANEOUS DETERMINATION OF PIRACETAM AND ITS IMPURITIES IN TABLET DOSAGE FORM BY RP-HPLC

Danislava Zapryanova[1], Boyka Tsvetkova[2]

1. *Department of Pharmaceutical Chemistry and Pharmacognosy, Faculty of Pharmacy, Medical University Pleven*
2. *Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University Sofia*

Introduction: Piracetam (2-oxo-pyrrolidin-1-yl)-acetamide is a psychopharmacological agent having a variety of physiological effects. Piracetam is a nootropic substance that has been used in clinical trials for decades but is still a mystery due to a lack of knowledge of its mechanism of action. **Aim:** The aim of this study is to develop and validate simple, reliable and sensitive reverse-phase high performance liquid chromatographic (RP-HPLC) method for simultaneous separation and determination of piracetam and potential impurities in tablet dosage form. The related substances of piracetam we examined were pyrrolidine-2-one and 2-oxopyrrolidin-1-yl-acetic acid, both mentioned in the European Pharmacopoeia as impurity A and impurity D, respectively. **Materials and methods:** The chromatography was carried out on a C18, 250 mm x 4.6 mm, 5 µm column with mixture of water:methanol:o-phosphoric acid:tetrahydrofuran (80:20:1:3 v/v/v/v) as a mobile phase, at a flow rate of 1.0 ml/min, with detection at 205 nm. **Results and discussion:** This paper described the elaboration of simple and fast analytical procedure for assay of piracetam and related substances in tablets by RP-HPLC. The method was validated for the parameters like specificity, linearity, precision, accuracy, LOD and LOQ. **Conclusion:** The results of the studies showed that the proposed chromatographic procedure is rapid, precise and accurate, which can be applied for the routine assessment of piracetam in the presence of related substances in tablets.

Keywords: *RP-HPLC, validation, piracetam, impurities*

HEALTHY USE OF GINKGO BILOBA SEEDS WITHOUT GINKGOTOXINS IN THEM

Erol Eshrefov, Atanas Senin, Teodora Tomova, Desislav Tomov, Mariana Argirova

Medical University of Plovdiv

Introduction: Ginkgo biloba nuts contain flavonoids, the terpenes ginkgolides and bilobalide that are unique to this tree species with proven positive effects on cognitive function. In contrast to Ginkgo leaves, nuts also contain significant amounts of the so-called ginkgotoxin, which acts an anti-vitamin B6. At high concentrations ginkgotoxin can cause seizures, breathing difficulties and loss of consciousness. This seems to be a major obstacle to using the nuts for their health benefits. **Aim:** This study aims to develop a simple but effective method to lower the levels of ginkgotoxin in extracts obtained from Ginkgo biloba kernels. **Materials and methods:** Multi-step liquid-liquid extraction with different polar or non-polar extractants was applied. After each extraction step a sample was collected and analyzed using a highly sensitive analytical method – UHPLC-MS. The concentration of flavonoids, terpenoids and ginkgotoxin was quantified in each in each sample. **Result:** Very low levels of ginkgotoxin were measured at the end of the extraction steps compared to single-step extraction with 70% methanol. At the same time most of the active components of the extract (flavonoids, ginkgolides and bilobalide) were still present in significant amounts in the final extract. **Conclusion:** By applying various extraction techniques, it is possible to lower the amount of harmful ginkgotoxin to safe levels.

Keywords: *plant extracts, Ginkgo biloba, ginkgotoxin, UHPLC-MS*

THE POTENTIAL EFFECT OF NIGELLA SATIVA L. IN TERATOZOOSPERMIA

Mirela Todorova[1], Zhan Bashev[2], Vanya Nalbantova[2], Diana Karcheva-Bahchevanska[2]

1. Faculty of Pharmacy, Medical University of Plovdiv
2. Department of Pharmacognosy and Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Plovdiv

Introduction: Teratozoospermia is a condition that has affected an increasing proportion of men in recent years, characterized by abnormal sperm morphology and, depending on the degree to which it is diagnosed, can make it difficult to conceive naturally. Teratozoospermia is observed in conditions such as increased free radicals, DNA disruption, lipid peroxidation, etc. There are a variety of medicinal plants that are used in the treatment of male infertility among which are the seeds of Nigella sativum L., also known as black seed. It is an annual plant belonging to the Ranunculaceae family. **Aim:** The present review aims to investigate and evaluate the potential therapeutic effects of Nigella sativa L. on sperm characteristics. **Materials and methods:** The study was conducted using the following databases: Google Scholar, PubMed, and ResearchGate. The timeframe for the review is 2013–2024. **Results and discussion:** A previous animal study showed an enhancement in semen and sperm parameters, as well as sexual hormones, attributed to one of the main constituents of Nigella sativa L. – thymoquinone. Its content can increase both the number and daily production of spermatozoa as well as the weight of the testes and epididymis. Furthermore, improvements in semen parameters were observed with black seed oil intake due to the unsaturated fatty acids it contains, administered in a randomized, double-blind clinical trial for 2 months. **Conclusion:** Despite Nigella sativa L. seeds showing good potential effects in improving fertility parameters, further studies are needed to confirm their mechanism of action and therapeutic application.

Keywords: *black seed, Nigella sativa L., teratozoospermia, male infertility*

PHARMACOGENOMICS: EVIDENCE-BASED PERSONALISED MEDICINE

Zhivko Hristov[1], Merlin Esad[2], Kalina Metodieva[2], Maria Motrenikova[2], Anelia Bivolarska[2]

1. Student, Faculty of Pharmacy, Medical University of Plovdiv
2. Department of Medical biochemistry, Faculty of Pharmacy, Medical University of Plovdiv

Introduction: Pharmacogenomics optimises therapeutic outcomes and reduces adverse drug reactions (ADRs) by applying genomic knowledge to the field of pharmacology. It is an essential part of personalised medicine, which uses genetic information to solve the problems of variability of drug response. **Aim:** In addition to outlining technological advances and challenges to implement it, the clinical aspects of pharmacogenomics are also explored. The aim is to demonstrate its application in different areas of medicine and its potential to change evidence-based medicine. **Materials and methods:** The review presents information from clinical trials, FDA-approved pharmacogenomic biomarkers, and new technologies such as artificial intelligence and next-generation sequencing. The focus is placed on the actionable gene-drug pairs such as CYP450 enzymes, human epidermal growth factor receptor 2 (HER2), and thiopurine methyltransferase (TPMT). **Results and discussion:** Pharmacogenomics has changed oncology, cardiology and psychiatry through the use of genetic information in treatments. HER2-targeted therapies, CYP2C19 genotyping, and TPMT-guided treatments demonstrate its impact. However, pharmacogenomics present problems that should be solved: the costs of genotyping, lack of awareness among clinicians, and also ethical concerns regarding data privacy. Advances in new methods and technologies promise to solve these problems making pharmacogenomics more accessible and effective. **Conclusion:** Pharmacogenomics is revolutionising the medical practice by personalising therapy. Its potential through scientific and technical advances to transform healthcare is increasing. Therefore, technical, regulatory, and collaborative worldwide efforts are needed to address the current issues and guarantee broader usage and efficacy in clinical practice.

Keywords: *Pharmacogenomics, Personalised medicine, Genetic biomarkers, Drug response*

IMPACT OF AN INTERNATIONAL STUDENT SUMMER PROGRAM ON STUDENTS' VIEWS ON GLOBAL PHARMACY PRACTICE

Maja Kragelj[1], Kinga Pajor[2], Denisa-Florina Diaconu[3], Sebahat Nida Buyukcoban[4], Yoana Tchoukova[5]

1. *Faculty of Pharmacy, University of Ljubljana, Ljubljana, Slovenia*
2. *Faculty of Pharmacy, Jagiellonian University Medical College, Cracow, Poland*
3. *University of Medicine and Pharmacy "Grigore T. Popa", Iasi, Romania*
4. *Faculty of Pharmacy, Yeditepe University, Istanbul, Turkiye*
5. *Faculty of Pharmacy, Medical University of Plovdiv, Plovdiv, Bulgaria*

Introduction: The International Student Summer Program (ISSP) at the University of Southern California (USC) provides pharmacy students with a unique opportunity to explore global pharmacy practice through seminars, workshops, and site visits. The program allows students to engage with diverse perspectives on pharmacy education, regulation, and practice across countries. **Aim:** This study aims to assess the impact of ISSP on students' knowledge of global pharmacy practice and to examine key differences across regions and countries. **Methods:** The 2024 ISSP included 98 students from 12 countries, divided into three focus areas: clinical pharmacy, regulatory science, and pharmaceutical sciences. Students prepared country-specific posters for the USC Integration, Internationalization, and Leadership in Pharmacy Education (IILPE) Symposium. Group projects, workshops, and guest speakers facilitated discussions on global pharmacy issues. A post-program survey was conducted to evaluate the program's effectiveness in promoting awareness of global pharmacy practice. **Results and discussion:** A total of 69 students responded to the survey, reporting significant improvement in self-reported knowledge of global pharmacy practice, with scores increasing from 4.3 to 7.4 out of 10. The program enhanced understanding of global pharmacy challenges (7.8) and the importance of international pharmacy practice (8.1). Social interactions (83%) and group discussions (74%) were key learning tools. Focus area sessions and group projects were ranked as the most effective in broadening perspectives. The program increased students' likelihood of pursuing international

opportunities (7.6). **Conclusion:** The ISSP effectively enhanced students' global perspective on pharmacy practice, fostering international collaboration and preparing future pharmacists for a diverse healthcare landscape.

Keywords: *Global pharmacy practice, international education, pharmaceutical sciences, student learning, pharmacy collaboration.*

The authors would like to acknowledge the invaluable guidance and input of our mentors: Yasi Mojab, Terrence F. Graham, Eunjoo Pacifici, Rory E. Kim, Ian S. Haworth of University of Southern California Mann School of Pharmacy and Pharmaceutical Sciences, Los Angeles, CA, USA.

RED YEAST RICE SUPPLEMENTS AND PATIENT SAFETY: THE NECESSITY OF PROFESSIONAL MEDICAL ADVICE

Katerina Slavcheva[1], Radiana Staynova[1], Dimitar Dimitrov[2], Nelina Neycheva[1], Daniela Kafalova[1]

1. Department of Organisation and Economics of pharmacy, Faculty of Pharmacy, Medical University of Plovdiv
2. Student, Faculty of Pharmacy, Medical University of Plovdiv

Introduction: Red yeast rice (RYR) is found in many food supplements designed to maintain normal cholesterol levels. It contains monacolin K, which has the chemical characteristics and pharmacological activity of lovastatin. Monacolins from RYR are listed in Article 8 of Regulation (EC) No 1925/2006 and are classified as “Restricted substances” and “Substances under Community scrutiny”. Consequently, these substances are subject to risk assessment. **Aim:** Our study aims to highlight the need to consult a healthcare provider before using RYR supplements. **Materials and methods:** Published data from various adverse event reporting systems, randomized controlled trials, and meta-analyses related to the use of RYR were assessed and analyzed. **Results and discussion:** There are some requirements related to the use of RYR supplements. Individual portion of the product for daily consumption shall provide less than 3 mg of monacolins from RYR. The vulnerable populations by whom RYR should not be consumed are pregnant women, children, adolescents, subjects aged over 70 years, people with predisposing conditions. Consumers take RYR, with or without medical advice and there is a trend to be used as a substitute for statins. Nevertheless, RYR contains potentially toxic substances and can causes adverse reactions such as muscle and liver damages, dermatology and gastroenterology problems. Furthermore, the concomitant consumption of some substances and RYR can lead to unwanted interactions. **Conclusion:** It is essential for patients to receive guidance from a healthcare professional before consuming food supplements containing RYR, as the use of these products may pose health risks to certain individuals.

Keywords: *food supplements, red yeast rice, healthcare professionals, consultation, safety*

BENZAMIDE-BASED HISTONE DEACETYLASE INHIBITORS (HDACI): A DFT STUDY

Kristiyan Velichkov[1], Yordanka Uzunova[2], Nikolay Toshev[2]

1. *Faculty of Medicine, Medical University of Plovdiv*
2. *Department of Bioorganic Chemistry, Faculty of Pharmacy, Medical University of Plovdiv*

Introduction: Epigenetic medicines are regarded as novel therapeutic strategies for the treatment of various cancers. Chidamide is a benzamide derivative that received approval from drug regulators in China (2014) and Japan (2021) for the treatment of peripheral T-cell lymphoma. Currently, a few other benzamides are in different stages of clinical trials. The achieved progress so far makes benzamides one of the most promising drug candidates for different types of cancer. As a Zn-dependent inhibitor of histone deacetylases (HDACi), benzamides coordinate to the active site of an HDAC8 enzyme. **Aim:** The study aims to elucidate the metal binding properties of benzamide-based derivatives towards the HDAC8 enzyme active site. **Materials and methods:** Quantum chemistry calculations that employ Density functional theory (DFT) were used to elucidate the physicochemical properties of a series of benzamide-based HDACi. The B3LYP functional and 6-311++G(d,p) basis set were used. **Results and discussion:** Metal binding properties of benzamide-based HDACi towards the HDAC8 enzyme active site were calculated. Additionally, the binding and deprotonation energies of the corresponding metal-ligand complexes were determined. The affinity of divalent metal ions (Zn2+, Fe2+, and Mg2+) to the different benzamide-based HDACi connected in HDACi-HDAC8 complexes complex was studied using DFT methods, the B3LYP functional and the 6-311++G(d,p) basis set was studied. **Conclusion:** DFT techniques can be very powerful to shed light on the metal-binding capabilities of benzamides concerning the active site of the HDAC8 enzyme. These findings could potentially be used as a framework for the development of new isoform-selective inhibitors of histone deacetylase.

Keywords: *HDAC8 enzyme, benzamide-based HDACi, chidamide, DFT study, anticancer drug*

APPLICATION OF ISOQUINOLINE ALKALOIDS IN NEURODEGENERATIVE DISEASE THERAPY

Vanesa Hadzhieva[1], Tanya Uzunova[1], Tsvetomir Dafov[1], Vera Gledacheva[2], Miglena Milusheva[3]

1. Faculty of Medicine, Medical University of Plovdiv
2. Department of Medical Physics and Biophysics, Faculty of Pharmacy, Medical University of Plovdiv
3. Department of Bioorganic Chemistry, Faculty of Pharmacy, Medical University of Plovdiv; Department of Organic Chemistry, Faculty of Chemistry, University of Plovdiv

Introduction: Neurodegenerative diseases (NDs) are a group of disorders characterized by the progressive degeneration of the nervous system, often leading to cognitive decline, motor dysfunction, and psychological disturbances. They include major brain diseases such as Alzheimer's, Parkinson's, Huntington's, amyotrophic lateral sclerosis, and others. Nowadays, the multi-target therapeutic approach to treating this class of diseases is considered more effective compared to classical pharmacological treatments that focus only on a single target. Isoquinoline alkaloids (IA) are a class of biologically active compounds found in various plants with polypharmacological properties. These alkaloids have shown promising effects in NDs by modulating key mechanisms such as oxidative stress, inflammation, and mitochondrial dysfunction. **Aim:** This study aims to summarize the current results on the effects of isoquinoline alkaloids for NDs treatment and to establish their considerable potential in drug design and development. **Materials and methods:** A comprehensive literature review was conducted through keywords searches in scientific databases. **Results:** IAs comprise a diverse range of structural scaffolds with biological activities, including antitumor, antibacterial, anti-inflammatory, antioxidant, and neuroprotective effects. Some IAs are already used in medicine for their antiparkinsonian, anti-Alzheimer, and antioxidant activities, contributing to improved cognitive function and disease management. Taking that into account, IAs represent promising lead compounds in drug discovery. **Conclusion:** Concerning the complex symptomatology of neurodegenerative diseases, a multitarget approach to their treatment yields good results, making isoquinoline

alkaloids and their synthetic derivatives suitable candidates for therapeutic agents. Further extensive clinical trials are required to validate their efficacy and safety.

Keywords: *neurodegenerative diseases, isoquinoline alkaloids, multi-target therapy, biologically active, antioxidant*

APPLICATION OF THE MUSHROOMS GRIFOLA FRONDOSA, ANTRODIA CAMPHORATA, POLYPORUS UMBELLATUS, GANODERMA LUCIDUM IN MEDICINE

Nadia Anoar[1], Marina Parushev[1], Alexandra Popova[1], Daniel Lalev[1], Mihail Chervenkov[1,2]

1. *University of Forestry*
2. *Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences*

Introduction: There is a lot of empirical data for the application of mushrooms in traditional Chinese medicine. **Aim:** The objective of our review was the collection of information from experimental studies demonstrating the medicinal properties of the edible mushroom species Grifola frondosa, Antrodia camphorata, Polyporus umbellatus, Ganoderma lucidum and, more specifically, their antitumor, immunostimulant, anti-inflammatory and organoprotective effects. **Materials and methods:** The information was collected using the platforms: Google Scholar, Scopus, Web of Science, Research Gate, PubMed. **Results:** Our main focus was the anticancer action tested on different types of human and animal cancer cell lines, as well as the biologically active substances isolated from the fungi responsible for their positive effect. **Conclusion:** Our review reveals that some of the medicinal properties of the mushrooms claimed in the traditional Chinese medicine are supported by experimental data.

Keywords: *Fungi, medical use, biologically active substances*

ADDRESSING ADHERENCE CHALLENGES IN LEVOTHYROXINE TREATMENT

Nikoleta Cholakova[1], Radiana Staynova[2]

1. *Faculty of Pharmacy, Medical University of Plovdiv*
2. *Department of Organisation and Economics of Pharmacy, Medical University of Plovdiv*

Introduction: The primary treatment for hypothyroidism is thyroid hormone replacement therapy, which has been proven effective in restoring normal hormone levels and alleviating symptoms. However, despite its established efficacy, some patients do not achieve the expected therapeutic outcomes. **Aim:** To identify and analyze the key factors that affect adherence to levothyroxine therapy in patients with hypothyroidism. **Material and methods:** A systematic literature search was performed across the PubMed, Google Scholar, and Scopus databases to identify relevant studies on levothyroxine adherence in patients with hypothyroidism. The main search terms included levothyroxine, patient compliance, patient adherence, and hypothyroidism. **Results:** Non-adherence to levothyroxine therapy remains a prevalent issue, even among high-income and well-educated populations. A study conducted in Italy found that a significant proportion of patients demonstrated suboptimal adherence to levothyroxine therapy, primarily due to the requirement of delaying breakfast by at least 30 minutes. Another investigation reported that more than 20% of patients expressed dissatisfaction with their replacement therapy, particularly due to the necessity of waiting 30–60 minutes after tablet ingestion before eating breakfast. In Lebanon, a study revealed that only 14.5% of patients exhibited high adherence, while 54.9% exhibited low adherence levels. Additionally, data from the United States indicated that adherent patients were significantly less likely to experience all-cause hospitalizations compared to their non-adherent counterparts. **Conclusion:** Adherence to therapy in patients with hypothyroidism remains a significant challenge, contributing to reduced treatment effectiveness and a lower quality of life. Addressing the barriers to adherence may improve patient outcomes and overall healthcare efficiency.

Keywords: *levothyroxine, patient compliance, patient adherence, hypothyroidism*

GC-MS PROFILING OF TEA TREE ESSENTIAL OILS: INSIGHTS FROM THE BULGARIAN MARKET

Nina Koleva[1], Velislava Todorova[2,3], Stanislava Ivanova[2,3], Daniela Grekova-Kafalova[4], Kalin Ivanov[2,3]

1. *Medical College, Medical University of Plovdiv*
2. *Department of Pharmacognosy and Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Plovdiv*
3. *Research Institute at Medical University of Plovdiv*
4. *Department of Organisation and Economics of Pharmacy, Faculty of Pharmacy, Medical University of Plovdiv*

Introduction: Melaleuca alternifolia (Myrtaceae), native to Australia, is one of the key sources of tea tree essential oil (EO). It has been used for nearly a century in Australia. Nowadays, its use has been growing worldwide. Tea tree EO is available in pure form and as an active ingredient in various products. It is composed of monoterpenes, sesquiterpenes, and their alcohols. The EO is recognized as safe, natural, and effective. Moreover, it exhibits various biological activities, including antiviral, antibacterial, antifungal, antioxidant, and anticancer effects. **Aim:** The present study aimed to verify whether tea tree EOs from Bulgarian markets meet the requirements. **Materials and methods:** Commercial products of the EOs were randomly selected from the Bulgarian market. They were analyzed using gas chromatography-mass spectrometry. Retention indices and mass spectra of the compounds were used for their identification. **Results and discussion:** The conducted analysis revealed that all the examined samples were abundant in monoterpenes and sesquiterpenes. The dominant component in the examined samples was terpinene-4-ol. Consequently, the EOs are classified as the terpinen-4-ol chemotype, which is the characteristic profile of high-quality tea tree EO. Gamma-terpinene, eucalyptol, alpha-terpineol and terpinolene were among the main compounds. **Conclusion:** All examined commercial products contained the required chemical compounds and complied with the necessary standards, except for one that did not meet the percentage criteria.

Keywords: *Melaleuca alternifolia, tea tree, commercial products, terpinene-4-ol*

THE ROLE OF PHARMACIST INDEPENDENT PRESCRIBERS IN ADVANCING GLOBAL PUBLIC HEALTH

Petar Telbiyski[1], Radiana Staynova[2]

1. Faculty of Pharmacy, Medical University of Plovdiv
2. Department of Organisation and Economics of Pharmacy, Faculty of Pharmacy, Medical University of Plovdiv

Introduction: Pharmacist independent prescribers (PIPs) are healthcare professionals who have the autonomy to prescribe, change or substitute medications for specific conditions and diagnoses. Numerous countries, such as the United Kingdom and Canada, have implemented PIPs into their healthcare systems. However, the degree of implementation differs from country to country. **Aim:** The aim of this study is to compare and evaluate the impact of PIPs on healthcare systems and patient access to medicines and care across different countries. Additionally, it aims to summarize the outcomes associated with the implementation of PIPs. **Methods:** A comprehensive review of existing data from various countries utilizing PIPs has been conducted. The sources of information included government documents, scientific articles, and media research. The analysis focused on several impacts, including patient satisfaction and the economic benefits for both healthcare systems and patients. **Results:** Findings show that PIPs can reduce the workload of physicians, particularly in primary care, while enhancing the efficient use of healthcare resources. Access to healthcare, especially in remote areas, is notably improved. However, training requirements, legislative issues such as access to patient health data, and professional acceptance are some of the challenges that remain. Furthermore, the implementation of PIPs varies across countries, reflecting different approaches to their adoption and integration. **Conclusion:** Overall, PIPs contribute positively to patient care and the efficiency of healthcare systems. While their benefits are well-documented, the implementation and outcomes vary across countries.

Keywords: *pharmacist independent prescribers; community pharmacy; healthcare; primary care*

DEVELOPMENT OF A NOVEL PLATFORM FOR TARGETED DRUG DELIVERY

Plamen Simeonov[1], Bissera Pilicheva[1,2]

1. *Department of Pharmaceutical Sciences, Faculty of Pharmacy, Medical University of Plovdiv*
2. *Research Institute at Medical University of Plovdiv*

Introduction: Malignant diseases are one of the leading causes of death amongst human population. Conventional chemotherapy, sometimes, does not achieve significant effect because of numerous reasons like drug resistance or insufficient drug concentration in the tumor site. A possible solution lies in the stimuli-sensitive drug delivery platforms. They can enhance the pharmacokinetics of conventional chemotherapeutics and augment the effect of multiple bioactive compounds. The **aim** of the present work was to develop acoustically sensitive nanodroplets for targeted drug delivery of xanthohumol. **Materials and methods:** Liposomes were prepared by thin-film hydration method, followed by ultrasonication for additional size reduction. Taguchi robust design was used for the optimization of the technological parameters and evaluation of their influence over liposomes' characteristics. Hydrodynamic diameter and zeta potential were evaluated through dynamic and electrophoretic light scattering techniques. Entrapment efficiency was determined by UV-Vis analysis of the incorporated xanthohumol. After that an optimal model was formulated and perfluorohexane was incorporated by ultrasonic homogenization. **Results and discussion:** The prepared liposomes showed size in the range between 180.0 and 369.0 nm and zeta potential between -27.99 and – 78.35 mV. Entrapment efficiency was between 8.14 and 74.5%. After the inclusion of perfluorohexane in the lipid structures' size remained relatively the same. In vitro drug release showed that after ultrasound irradiation the amount of released xanthohumol increased significantly compared to the nonirradiated structures. In **conclusion**, the developed liposome-based nanodroplet platform has the potential to be utilized as a suitable carrier for the targeted delivery of xanthohumol.

Keywords: *Ultrasound triggered drug release, Liposomes, Xanthohumol, Targeted drug delivery*

DEVELOPMENT AND CHARACTERIZATION OF ADHESIVE PATCH WITH DOXYLAMINE LOADED TRANSFERSOMES FOR TRANSDERMAL DRUG DELIVERY

Selin Serbezova[1], Plamen Simeonov[2], Nikolay Zahariev[2,3], Plamen Katsarov[2,3]

1. Faculty of Pharmacy, Medical University of Plovdiv
2. Department of Pharmaceutical Sciences, Faculty of Pharmacy, Medical University of Plovdiv
3. Research Institute at Medical University of Plovdiv

Introduction: Nausea and vomiting are among the most prevalent medical conditions during pregnancy. First generation H1 antihistamines (like Doxylamine and others) are often used to manage these symptoms. In search of a less invasive and patient-friendly road of administration, transdermal drug delivery demonstrates several advantages. In this aspect transfersomes, a specific type of liposomes, can be particularly useful. Consisting mainly of phosphatidylcholine, they can efficiently cross various transport barriers, such as the transdermal, and act like drug carriers, ensuring prolonged and targeted delivery of therapeutic agents. The **aim** of the present study was to develop a transdermal patch containing doxylamine loaded transfersomes. **Materials and methods:** Four models of transfersomes were prepared with varying concentrations of phospholipid, Tween 80 and Doxylamine. Thin-film hydration method was applied, followed by sonication for additional size optimization. Transfersomes were characterized in terms of their average size and zeta potential trough dynamic and electrophoretic light scattering. Drug entrapment efficiency was determined by quantitative analysis of the unentrapped doxylamine. An optimal model was selected based on the obtained data, which was further incorporated into a transdermal HPMC/sodium alginate patch system. **Results and discussion:** The transfersomes showed size range between 207.1 and 751.7 nm, zeta potential at the neutral range, between 0.077 and 3.728 mV and high entrapment efficiency. Based on the results, model M2 was selected as optimal and then incorporated in the adhesive patch. In vitro drug release showed delayed profile. **Conclusion:** The developed transfersomes loaded adhesive patch system is a suitable carrier for transdermal delivery of doxylamine.

Keywords: *transfersome, adhesive patch, transdermal drug delivery, doxylamine*

ADVERSE EFFECTS OF CHEMOTHERAPEUTICS ON REPRODUCTIVE SYSTEM

Polya Avramova[1], Mihail Chervenkov[1,2]

1. *University of Forestry, Sofia*
2. *Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences*

Introduction: Chemotherapy is a major method used in the treatment of various types of cancer, but its negative impact on the reproductive system is raising concern. **Aim:** That is why, the aim of our review is the negative impact on reproductive organs following the use of some chemotherapeutic agents. The main focus of our review includes cytotoxicity, the specific organ structures affected by different types of chemotherapeutic agents, and the impact on sex hormones, as well as the long-term implications for fertility. **Materials and methods:** The data was taken from scientific publications involving experiments conducted on laboratory animals. The articles were collected from renowned data base like Scopus, Web of Science, and PubMed etc. **Results and discussion:** Some of the most common negative effects found in the ovaries include a reduction in ovarian reserve, atrophy and dysfunction of the gland. In the testis, direct toxicity on the germinal epithelium, Sertoli cells, reduced motility of mature sperm were among the most common findings. **Conclusion:** Most of the chemotherapeutic agents have various negative effect on the reproduction which needs to be taken into account when applied for treatment of cancer conditions.

Keywords: *chemotherapy, toxicity, gonads, fertility*

SYNTHESIS OF NANOCOMPOSITE MICROSPHERES – A NOVEL APPROACH FOR INTRANASAL ADMINISTRATION OF DEFERIPRONE IN NEURODEGENERATIVE DISEASES

Radka Boyuklieva, Plamen Katsarov, Bissera Pilicheva

Department of Pharmaceutical Sciences, Faculty of Pharmacy, Medical University of Plovdiv; Research Institute of Medical University of Plovdiv

The aging population has led to a sharp rise in the number of people affected by neurodegenerative diseases, making them essential worldwide health concerns. Metals like copper and iron catalyze the body's oxidation-reduction processes. The physiological functions of the brain, such as myelin development, neurotransmitter production, and mitochondrial respiration, depend heavily on iron. Deferiprone, a short-acting iron chelator, has been proposed as a treatment option for neurodegenerative diseases such as Parkinson's and Alzheimer's. However, prolonged use of deferiprone can lead to side effects such as neutropenia and agranulocytosis. To minimize these risks, the frequency of administration could be reduced by using sustained-release formulations. On the other hand, using alternative routes of administration, such as the nasal route, may lower systemic exposure to deferiprone, thereby reducing the likelihood of side effects. This study aimed to create nanocomposite microspheres that could be administered intranasally by integrating techniques from nanotechnology and microparticles. Using the emulsion solvent evaporation method, nanoparticles based on the biodegradable poly-ε-caprolactone were created, with an average particle size of 213 nm. These nanoparticles were incorporated into composite structures of sodium alginate, produced through spray drying. The resulting composite structures have a spherical shape, a smooth surface, and an average diameter of over 6 µm. Deferiprone demonstrated sustained release from the nanocomposite microspheres and high iron-chelating activity.

Keywords: *deferiprone, nanocomposite microspheres, nose-to-brain delivery*

Acknowledgements: This research was funded by the European Union – NextGenerationEU, through the National Recovery and Resilience Plan of the Republic of Bulgaria, project No. BG-RRP-2.004-0007-C01.

PLANT-BASED TREATMENT OF CLOSTRIDIUM DIFFICILE INFECTION

Radostina Kareva[1], Vesela Kokova[2], Paolina Lukova[3]

1. Medical University of Plovdiv
2. Department of Pharmacology, Toxicology and Pharmacotherapy, Medical University of Plovdiv
3. Department of Pharmacognosy and Pharmaceutical Chemistry, Medical University of Plovdiv

Introduction: Clostridium difficile infection (CDI) is a significant cause of antibiotic-associated diarrhea, resulting in serious gastrointestinal issues and increased healthcare costs globally. The rising resistance to standard antibiotics has led to the need for alternative treatment options, including the use of medicinal plants known for their antimicrobial and anti-inflammatory effects. This review **aims** to highlight various medicinal plants that have been traditionally and scientifically investigated for their effectiveness against C. difficile. **Material and methods:** A literature review was conducted to summarize the medicinal plants utilized in treating CDI, emphasizing the biologically active compounds that contribute to their efficacy. **Results and discussion:** Numerous plant-derived substances, such as essential oils, phenolic compounds, alkaloids, and terpenoids, have shown antibacterial properties against C. difficile by inhibiting its growth, toxin production, and spore germination. Notable examples of such plants and the substances they contain include Thymus vulgaris and Origanum vulgare (thymol), Nigella sativa (thymoquinone), Commiphora myrrha (terpenoids), Berberis vulgaris (berberine), Curcuma longa (curcumin), Allium sativum (allicin), and Camellia sinensis (catechins). These phytochemicals not only have direct antimicrobial effects but also help modulate gut microbiota, reduce inflammation, and boost host immunity. Additionally, medicinal plants may create a synergistic effect when combined with conventional antibiotics, potentially lowering the chances of CDI recurrence. **Conclusion:** Despite promising in vitro and in vivo studies, clinical trials on plant-based therapies for CDI remain limited. Future research should focus on standardizing dosages, understanding pharmacokinetics, and ensuring safety profiles to integrate medicinal plants into CDI treatment.

Keywords: *Clostridium difficile, medicinal plants, antimicrobial activity, gut microbiota.*

BEYOND HYDROXAMIC ACIDS: STRUCTURAL DIVERSITY OF HISTONE DEACETYLASE INHIBITORS AND THE ROLE OF FUNCTIONAL GROUPS

Reneta Koseva[1], Yordanka Uzunova[2], Antonia Maznikova[1], Nikolay Toshev[2]

1. Faculty of Medicine, Medical University of Plovdiv
2. Department of Bioorganic Chemistry, Faculty of Pharmacy, Medical University of Plovdiv

Introduction: Histone deacetylase inhibitors (HDACi) have emerging therapeutic potential, especially in cancer treatment. SAHA, a hydroxamic acid, was the first molecule approved by the FDA as an anti-cancer agent. The drug's mechanism of action entails the chelation of the zinc ion in the enzyme's active site by the "hydroxamic head". As a result, a lot of research interest is focused on the development of structurally diverse functional groups that are capable of chelating zinc in the enzyme active site. **Aim:** The objective of this study was to systemize and classify the diversity of chemical compounds that act as zinc-binding groups for HDACs and exhibit promising anti-cancer activity. **Materials and methods:** The research was based on a literature review of articles published between 2000 and 2024. Various keyword combinations were employed to search Scopus, Web of Science, and PubMed databases. **Results and discussion:** Our results systemize: (a) current approved HDAC inhibitors and their structural diversity, (b) prospective functional zinc-binding groups that could be used for drug development, (c) benefits and drawbacks of these compounds relative to those approved by various drug regulatory bodies, (d) their inquiry could be used not only for discoveries but also for the improvement of already existing ones. **Conclusion:** This data can serve as a roadmap for the development of novel and structurally diverse HDAC inhibitors with an improved therapeutic index. Moreover, these results are necessary for analyzing the binding modes of different Histone Deacetylase Inhibitors towards different isoforms of HDACs.

Keywords: *HDACi, HDACs, zinc-binding group, affinity, structural diversity*

GASTRO-DUODENAL ULCER TREATMENT-ANTACIDS

Stanescu Sabina-Elena, Lungu Ionut-Iulian, Stefanache Alina,
Diaconu Denisa Florina

University of Medicine and Pharmacy "Grigore T. Popa Iasi"

Following several studies based on the effects of minerals used in the treatment of peptic ulcer, we chose this topic of interest in order to minimise harmful effects on the body and to increase the rate of treatment success. Literature information has been taken up, using databases such as PubMed, Clinical Key, the site of WHO, Google Scholar to observe the link between the minerals, the organic chemical compounds required for a patient with ulcers and the recommended diet. All of our studies are based on surveys and scientific research by doctors from Europe. These studies showed that the use of minerals as antacids combined with anti-secretory agents, protective agents and beta-blockers in the treatment of gastric and duodenal ulcers in the active phase but also in the prevention of relapses in at-risk periods significantly reduced the duration of treatment.

Keywords: *Gastric ulcer, minerals, colloidal bismuth, antacids, antisecretory medicinal products*

EVALUATION OF THE PHOTOPROTECTIVE POTENTIAL AND ANTIOXIDANT ACTIVITY OF GALEGA OFFICINALIS EXTRACT

Thea Genisheva[1], Iva Slavova[2], Teodora Tomova[2], Mariana Argirova[2]

1. Faculty of Pharmacy, Medical University of Plovdiv
2. Department of Chemical Sciences, Faculty of Pharmacy, Medical University of Plovdiv

Introduction: Plant extracts contain various compounds that absorb in the UV range, and many of them have antioxidant, anti-inflammatory, and antibacterial properties. The combination of these features makes them a prominent alternative to the synthetic compounds used to protect human skin against harmful effects of UVB and UVA solar radiation. **Objective:** The present study aims to evaluate the photoprotective and antioxidant capacity of aqueous extract of Galega officinalis. The photoprotective properties of the extract were compared to those of a synthetic UV absorber. **Materials and methods:** Spectrophotometric analyses were performed to quantify the total phenolic content and antioxidant activity of the extract. Its photoprotective properties were determined by calculating its sun protection factor (SPF) according to Mansur equation. **Results and discussion:** The Galega officinalis extract showed good radical scavenging properties with IC50 90.9 µg/mL, which can be attributed to the presence of polyphenolic compounds (88 mg/g) in it. Even at low concentration (100 µg/mL) the extract has SPF value 6.38 and therefore significantly absorbs UVB radiation. Furthermore, Galega officinalis extract is photostable, with no significant reduction in SPF after UVB irradiation for 2 hours. In addition, it was found that dibenzylideneacetone used in some commercial sunscreens demonstrated very good UV protection (SPF 8.98) at very low concentration (10 µg/mL). **Conclusion:** The results obtained indicate that Galega officinalis extract would be a feasible choice as a natural active ingredient in broad-spectrum sunscreens.

Keywords: *Plant extract, Antioxidant, Sun protection factor, Photostability*

IN VITRO INHIBITORY EFFECT OF GLYCYRRHIZA GLABRA EXTRACTS ON STARCH DIGESTIBILITY

Thea Genisheva[1], Iva Slavova[2], Teodora Tomova[2], Mariana Argirova[2]

1. *Faculty of Pharmacy, Medical University of Plovdiv*
2. *Department of Chemical Sciences, Faculty of Pharmacy, Medical University of Plovdiv*

Introduction: Diabetes mellitus is a serious metabolic disease with increasing prevalence. It is marked by elevated blood glucose levels, resulting from a deficiency in insulin secretion or insulin action. To combat this disease, various antidiabetic drugs are currently available. However, all of them are associated with a significant number of side effects. Plants can be used as a basis for obtaining antidiabetic remedies, considering their rich content of bioactive compounds. **Objectives:** The current study aims to evaluate the hypoglycemic effect of aqueous and methanolic extracts of Glycyrrhiza glabra. **Materials and methods:** A digestible starch and resistant starch assay kit was used to investigate the ability of the extracts to inhibit the enzymes α-amylase and α-glucosidase. The Acarbose was used as the standard inhibitor. **Results:** The aqueous extract of Glycyrrhiza glabra showed slightly higher inhibitory activity (44.7%) compared to that of the methanol extract (37.3%). Also, both extracts demonstrated concentration dependent inhibition of α-amylase and α-glucosidase. The highest inhibition, i.e. 68%, was observed at a concentration of 15 mg/mL with the aqueous extract. In addition, the flavonoid quercetin contained in Glycyrrhiza glabra extract was found to effectively slow the breakdown of starch to glucose. **Conclusion:** The results obtained provide a good basis for further research into the potential application of Glycyrrhiza glabra extracts for the management of type 2 diabetes.

Keywords: *Glycyrrhiza glabra, enzyme inhibition, diabetes mellitus*

NATURAL ZEOLITE: EXPLORING THE (UN)KNOWN MINERAL

Teodor Kamenov, Denitsa Kiradzhiyska, Nikolina Milcheva

Faculty of Farmacy, Medical University of Plovdiv

Natural zeolites (NZ) have been used extensively in different branches of industry. Recently, efforts to explore their potential in biotechnology, biomedicine, and pharmacy are notable. These alumosilicate materials are reported as stable, non-toxic and edible compounds, which can decrease the pH of the body, refine tissue oxygenation, stimulate skin regeneration, terminate noxious substances, and deliver essential minerals to the organisms. The remarkable detoxifying, antioxidant, and anti-inflammatory properties have prompted a variety of applications, including but not limited to oral administration, in vivo supplementation, cosmetic manufacturing, drug design, targeted cancer therapy, among others. The mineral matrix of zeolites is still undergoing enrichment. Herbs, fruits, inorganic nanoparticles, drug molecules, polymers, etc. are mostly embedded to achieve new therapeutic potentials, such as bactericidal effects, regulation of immunity, improved heavy metal or toxic metabolities removal. Nowadays, a variety of zeolitic products with or without modifications can be found on the pharmacy market worldwide. To investigate the perceptions of Bulgarian costumers and pharmacists towards the use of NZ dietary supplements, along with other products based on the mineral, two different surveys were undertaken. The results show that most of the customers questioned are aware of different zeolite-based products but approximately 20% have used zeolitic food supplements. Meanwhile, NZ dietary additives are available in almost half of the pharmacies examined. According to the participating specialists, the popularity of zeolites is significantly lower compared to other products with analogous properties. In summary, the therapeutic virtues of this ancient mineral are not well recognized to Bulgarian users.

Keywords: *Natural Zeolites, Therapeutic potential, Popularity of zeolitic products*

COMPARISON BETWEEN THE CHEMICAL COMPOSITION OF COMMERCIAL PRODUCTS CONTAINING ORANGE ESSENTIAL OIL

Teodora Decheva[1], Zoya Dzhakova[2], Stanislava Ivanova[2,3], Nina Koleva[4]

1. *Faculty of Pharmacy, Medical University of Plovdiv*
2. *Department of Pharmacognosy and Pharmaceutical Chemistry, Faculty of Pharmacy, Medical University of Plovdiv*
3. *Research Institute at Medical University of Plovdiv*
4. *Medical College, Medical University of Plovdiv*

Nowadays, natural ingredients are increasingly preferred over synthetic ones. Orange essential oil (EO) is one of the most distributed and used throughout the world, precisely because of its significant benefits for human health. It has been used for hundreds of years as part of the human diet. Orange EO is utillized in the perfumery, cosmetic, pharmaceutical, and food industries, due to its antioxidant, antimicrobial, anti-inflammatory, and immunostimulating activity. The extraction of the EO is mainly from the peel of the fruits of Citrus sinensis L., by using cold pressing method. The current study aimed to evaluate the phytochemical profile of commercial products containing orange EO. The analysis was performed by gas chromatography with mass spectrometry and the data obtained indicate that the main component in all tested samples was D-limonene. According to the requirements, sweet orange oil should contain D-limonene as a major compound. Other components present in the commercial products are α-pinene, β-pinene, sabinene, n-octanal, n-nonanal, n-decanal, linalool, neral, valencene, and geranial. Most of these compounds qualified the requirements for the content of sweet orange oil.

Keywords: *essential oils, phytopharmaceuticals, D-Limonene, Citrus sinensis L.*

THE POSSIBILITIES OF HOMEOPATHY IN THE FIGHT AGAINST INSOMNIA (REVIEW)

Unka Pehlivanova, Emi Dueva, Eleonora Gudjova, Galina Tosheva

Specialty "Assistant Pharmacist", Medical College,
Medical University of Plovdiv

Introduction: Insomnia is the most common sleep disorder, affecting 1/3 of the adult population in Europe and the United States. Between 30% and 48% of people around the world experience insomnia problems at least once in their lives. Insomnia is the most common sleep disorder in the world. **Objective:** Review of the use of homeopathic medicinal products in the treatment of insomnia **Materials and methods:** A review of published articles on the topic in the databases Google Scholar, Scopus, Pubmed and other scientific sources has been carried out. **Results and discussion:** Numerous studies confirm the role of homeopathy as an effective and gentle approach in the context of insomnia control and treatment. In this review, we will look at the practical benefits of applying homeopathy, both as a standalone method and as an addition to the main treatment. According to one of the studies conducted, homeopathic therapy demonstrates a particularly pronounced effect on the following indicators: time spent in bed, total sleep time and sleep efficiency. Both symptomatic and etiological and field homeopathic monoproducts can be included in the treatment. Among the most commonly used medications for acute conditions are Coffea cruda, Nux vomica, Cocculus indicus, Gelsemium sempervirens, Chamomilla, etc. **Conclusion:** Knowledge and skillful use of homeopathic medicinal products in the treatment of insomnia can lead to a significant improvement in the quality of life of patients. Homeopathy is a safe and effective alternative that can be integrated into the therapeutic regimen without the risk of side effects or contraindications.
Keywords: *insomnia, homeopathy*

TARGETED DELIVERY STRATEGIES OF ESSENTIAL OILS FOR ULCERATIVE COLITIS TREATMENT

Yana Gvozdeva

Department of Pharmaceutical Sciences, Faculty of Pharmacy,
Medical University of Plovdiv, Research Institute of Medical University of Plovdiv

Ulcerative colitis is a chronic inflammatory bowel disease marked by inflammation and ulceration of the colon and rectum. Conventional treatments often provide limited long-term relief and may cause adverse effects. Essential oils, known for their anti-inflammatory and wound-healing properties, are emerging as potential therapeutic agents for ulcerative colitis management. This literature review explores various delivery systems intended to optimize essential oils administration for UC treatment, prevention, and management. A key challenge in ulcerative colitis treatment is achieving precise local targeting while minimizing therapy-related side effects. To address this, microencapsulation and nanotechnology offer promising strategies for controlled and sustained release following oral administration. These advanced delivery techniques could enhance the effectiveness of essential oils in inflammatory bowel disease treatment. Among them, microparticulate drug delivery systems have gained significant attention for their potential to target the colon with a controlled and sustained release. Additionally, combined approaches, such as pH-dependent and time-dependent systems, provide maximum essential oil release in the colon, further improving therapeutic outcomes. This review proves the use of micro- and nanoparticulate systems for site-specific essential oils delivery to the colon with sustained and controlled release and the possibility of reducing the dosage and masking the unpleasant taste by oral administration.

Keywords: *ulcerative colitis, essential oils, colon targeted delivery*

Acknowledgments: This research is supported by the Bulgarian Ministry of Education and Science under the National Program “Young Scientists and Postdoctoral Students-2”

CROTON OIL EXPOSURE AND ITS EFFECTS ON DERMAL INTEGRITY AND NEUTROPHIL INFILTRATION

Adeel Khan[1], Kamran Ali[1], Ganming Mao[2], Dalon Douglas[2], Blase Billack[3]

1. Faculty of Medicine, Medical University of Plovdiv, Bulgaria
2. Department of Pharmaceutical Sciences, College of Pharmacy and Health Sciences. St. John's Catholic University, New York, USA
3. Department of Pharmaceutical Sciences, College of Pharmacy and Health Sciences. St. John's Catholic University, New York, USA; Department of Pharmacology, Toxicology and Pharmacotherapy, Faculty of Pharmacy, Medical University of Plovdiv, Bulgaria

Introduction: The skin serves as an essential barrier against environmental pathogens, relying on its structural integrity and immune response for protection. Croton oil, derived from Croton tiglium plant seeds, is known for its pro-inflammatory properties due to phorbol esters. **Aim:** This study investigated the acute effects of croton oil (2.5% wt/vol) on dermal integrity and neutrophil infiltration. **Materials and methods:** Mouse ears were topically exposed to croton oil, acetone (vehicle), or left untreated. Tissue biopsies were collected 4 hours post exposure and then formalin-fixed, paraffin-embedded, and stained with haematoxylin and eosin or for selected markers using immunohistochemistry. Neutrophil infiltration was assessed using myeloperoxidase staining whilst analysed using QuPath imaging software. **Results and discussion:** Minor disruptions of the dermal:epidermal junction were observed in 7 out of 8 croton oil-treated slides compared to 5 out of 8 vehicle-treated and untreated slides. Croton oil exposure significantly increased neutrophil infiltration, with an average of 508 neutrophils per field compared to 207 (naïve) and 168 (vehicle-treated). Histological analysis revealed fluid accumulation, epidermal thinning, and tissue disruption in croton oil-treated tissues, which is consistent with the inflammatory processes. **Conclusion:** Croton oil exposure significantly compromises dermal integrity, inducing small micro blister formation and aggressive neutrophil infiltration. These findings suggest that mouse ear skin serves as an effective model for studying irritant contact dermatitis and evaluating anti-inflammatory treatments.

Keywords: *Croton oil, neutrophil infiltration, blister formation, skin inflammation, QuPath*

NEUTROPHILS CONTRIBUTE TO THE BLISTERING EFFECTS OF THE SULFUR MUSTARD ANALOG MECHLORETHAMINE

Aisha Tahir[1], Ayaaz Fuzurally[1], Ganming Mao[2],
Trishaal Janardhanam Raghavendra Rao[2], Blase Billack[2]

1. Department of Pharmacology, Toxicology and Pharmacotherapy, Faculty of Pharmacy, Medical University of Plovdiv, Bulgaria
2. Department of Pharmaceutical Sciences, College of Pharmacy and Health Sciences, St. John's Catholic University, New York, USA

Background: Mechlorethamine (HN2) is a nitrogen mustard alkylating agent that has been widely applied as an anticancer drug, and in the past, as a chemical warfare agent. As an analog of the corrosive reagent, sulfur mustard, organisms exposed to HN2 could develop significant skin irritation, edema and blisters. These pathological symptoms are related to tissue damaging, necrosis and repairing. **Aim:** The purpose of this study was to evaluate the contribution of neutrophils toward the blistering effects of mechlorethamine. **Materials and methods:** The mouse ear vesicant model (MEVM) was used. In brief, DMSO (vehicle) or increasing test concentrations of HN2 (25, 50, 100 or 200 mM) were applied to the interior side of the ear of Swiss-Webster mice. After 24 hr, mice were euthanized and ear punch biopsies were collected. The ear tissue was fixed and paraffin embedded for H&E staining for the determination of vesicating incidence and the presence of immune cells. QuPath was used for bioimage analysis to quantifiably assess the presence of neutrophils. **Results and discussion:** Evaluation of light micrographs showed tissues treated with higher concentrations of HN2 exhibited signs of vesication when compared to lower concentrations and untreated tissue. Additionally, samples treated with increasing amount of HN2 had higher numbers of neutrophilic infiltration. **Conclusion:** The findings from this study highlight the role of neutrophils in the toxicological mechanisms underlying nitrogen mustard-induced skin damage, providing potential targets for treatment and protection strategies.

Keywords: *Nitrogen Mustard, Dermatotoxicity*

ANTIFUNGAL EFFECTS OF BLACK SEED OIL AND ITS PRIMARY COMPONENT THYMOQUINONE

Rino Hasegawa[1], Victoria Grigorova[1], Anita Mihaylova[2], Nina Doncheva[3], Blase Billack[4]

1. *Faculty of Medicine, Medical University of Plovdiv, Bulgaria*
2. *Department of Pharmacology, Toxicology and Pharmacotherapy, Faculty of Pharmacy, Medical University of Plovdiv, Bulgaria*
3. *Research Institute, Medical University of Plovdiv, Bulgaria*
4. *Department of Pharmaceutical Sciences, College of Pharmacy and Health Sciences. St. John's Catholic University, New York, USA*

Introduction: Candidiasis, a prevalent opportunistic fungal infection, presents a considerable difficulty in clinical practice because of increasing resistance of Candida spp. to antifungal treatments. Nigella sativa (black seed) has been utilized in traditional medicine for generations, and its main active ingredient, thymoquinone (TQ), has demonstrated promising antibacterial capabilities. In this study, the antifungal effects of black seed oil and TQ on C. albicans S1 strain were investigated by measuring yeast growth and plasma membrane H+-ATPase activity (Pma1p) in the presence or absence of these compounds. **Aim:** To purpose of the work was to determine the extent to which black seed oil and TQ inhibit the growth and Pma1p activity of C. albicans in comparison to a standard antifungal drug miconazole (MICO). **Materials and methods:** The macrodilution and microdilution methods were used to evaluate fungal growth inhibition, which was determined by measuring absorbance at 600 nm of yeast samples treated with increasing concentrations of BSO, TQ or MICO. A standard medium acidification assay was used to determine the effects of the test compounds on Pma1p activity. **Results and discussion:** Both TQ and MICO exhibited concentration-dependent growth inhibition, which was complete at 25 µg/mL for TQ and at 13 µg/mL for MICO. Black seed oil showed little inhibition under the test conditions. The vehicle control (0.1% methanol) had no effect on yeast growth. Interestingly, both MICO and TQ inhibited the Pma1p in a concentration-dependent manner. **Conclusion:** TQ exhibits potent antifungal activity in vitro, making it a promising candidate for in vivo studies.

Keywords: *black seed oil, thymoquinone, Candida albicans, antifungal therapy*

UNCONVENTIONAL PERSONALISED USAGE OF ELECTRICAL IMPEDANCE TOMOGRAPHY IN INTENSIVE CARE SETTINGS

Aneesha Bhambra[1], Gergana Petkova-Ivanova[2], Anishka Gujral[1], Ivaylo Minev[2]

1. *Faculty of Medicine, Medical University of Plovdiv*
2. *Department of Anaesthesiology and Intensive Care, Faculty of Medicine, Medical University of Plovdiv*

Introduction: Electrical impedance tomography (EIT) is a non-invasive method used for bedside monitoring of lung ventilation. Despite its conventional application and proven efficacy, its full capabilities remain unclear. Its growing potential in round-the-clock monitoring and personalised care exhibits value in the Intensive Care Unit (ICU). **Aim:** The aim of this study is to extend the boundaries of EIT application in the ICU beyond its traditional uses in general monitoring to a more personalised approach. **Methods and materials:** Conventionally, chest electrodes are applied and the electro-impedance monitors ventilatory changes. However, the level of dysfunction is impossible to deduce. Comparatively, the unconventional use employs thoracic computed tomography, fem mesh development and integration of raw EIT tissue recognition illustrating anatomical contours of each patient. Using computed tomography, a level of interest is decided which directs electrode placement. This optimised approach was applied in mechanically ventilated patients within the Department of Anaesthesiology and Intensive Care at “St. George” University Hospital as part of the PERsonalised Innovative MEDicine (PERIMED) project. **Results and discussion:** The personalised approach specifically locates areas of lung dysfunction, exceeding current standard EIT images. The final EIT image produced directly maps onto the anatomic configuration established by computed tomography, allowing for complex tissue recognition, enhanced accuracy and a more patient-centred approach. **Conclusion:** EIT is a highly valuable tool for bedside monitoring of pulmonary function especially in the ICU. The personalised approach provides comprehensive patient data with increased informational value which can prospectively be applied in a variety of patients.

Keywords: *Electrical impedance tomography, intensive care, personalised approach, tissue recognition*

THYROID PAPILLARY CARCINOMA WITH LYMPH METASTASES AS INCIDENTAL FINDING – THE CLINICAL SIGNIFICANCE OF SONOGRAPHIC EVALUATION AND FINE NEEDLE BIOPSY: A CASE REPORT

Velichka Zlatareva, Emanuela Vasileva, Ian Raytchev, Atanas Boyukliev, Boyan Nonchev

Medical University of Plovdiv

Introduction: Thyroid nodular disease is characterized by increasing in incidence and though most of the nodules are benign, and don't cause any symptoms, a small percentage can indicate thyroid cancer. Most patients with thyroid cancer are asymptomatic and the incidental nodule is found on imaging studies performed for other reasons. **Aim:** The present clinical case of a 31-year female with papillary carcinoma found on another occasion emphasizes on the diagnostic significance of routine neck ultrasound evaluation and fine needle biopsy in the diagnostic workup in these patients. **Methods:** Initial evaluation of the patient included anamnesis, physical examination, thyroid serum function markers (TSH, FT3, FT4, TAT, MAT, TRAb), neck ultrasonography (US), cytology by fine-needle aspiration biopsy (FNA), followed by total thyroidectomy with lateral lymph node dissection. **Results:** At the time of examination, the patient was euthyroid, with no laboratory data for autoimmune thyroiditis. US showed a multinodular goiter with a hypoechoic nodule 11/8/9 mm in the left lobe of the thyroid gland with undefined margins and irregular shape, with microcalcifications. Unilateral lymphadenopathy was detected. Multiple cystic lymph nodes were visualized caudal to the left thyroid lobe and istmus, the largest – 12/10/10 mm in size. FNA biopsy with cytology revealed papillary thyroid carcinoma – Bethesda IV, possible cyst lymph node metastasis. Thyroglobulin in washout fluid of the lymph node > 1000 ng/ml. Diagnosis was confirmed postoperatively and patient was staged as T1N1M0. **Conclusion:** US with FNA are considered highly informative, non-invasive and cost-effective methods for primary evaluation of patients with thyroid nodules suspicious of malignancy.

Keywords: *Thyroid nodular disease, thyroid cancer, fine-needle aspiration biopsy, thyroglobulin*

SEVERE RHEUMATOID ARTHRITIS WITH SECONDARY OVERLAP SYNDROME TOWARD PROGRESSIVE SYSTEMIC SCLEROSIS: A CLINICAL CASE

Vesela Hristeva[1], Ivaylo Sokolov[1], Ivan Yanakiev[1], Emilia Toseva[2], Mariela Geneva-Popova[1]

1. Medical University of Plovdiv;
Rheumatology Clinic, University Hospital St. George
2. Medical University of Plovdiv

Rheumatoid arthritis (RA) is a chronic inflammatory joint disease primarily characterized by symmetric, erosive polyarthritis, disease-specific autoantibodies (rheumatoid factors), and, less commonly, involvement of internal organs, vasculitis, and secondary Raynaud's phenomenon. Overlap with Progressive Systemic Sclerosis (PSS) is rare, particularly when it occurs as a secondary phenomenon following a well-established primary diagnosis of RA. PSS is distinguished by progressive microvascular damage, sclerodactyly, distal vasculopathy, and systemic organ involvement, primarily pulmonary fibrosis and pulmonary hypertension. PSS is associated with disease-specific autoantibodies, some of which may also be detected in overlap syndromes, collectively classified as mixed connective tissue disease (MCTD). We present a case of a 42-year-old female with rheumatoid polyarthritis refractory to conventional treatment with methotrexate, corticosteroids, and TNF-alpha inhibitors. Over the disease course, she developed an atypical overlap syndrome with systemic sclerosis, manifesting as capillaroscopic abnormalities, sclerodactyly, and secondary vasculitis. However, she lacked disease-specific autoantibodies for systemic sclerosis, as well as the characteristic clinical profile and U1-RNP antibodies typically associated with mixed connective tissue disease.

Keywords: *Rheumatoid arthritis, Progressive Systemic Sclerosis, mixed connective tissue disease*

INDEX OF MECHANICAL DISPERSION IN NEWLY DISCOVERED METABOLIC SYNDROME

George Trendafilov, Spas Kitov, Maria-Florance Kitova, Lyudmila Kitova

Cardiology Clinic, University Hospital "St. George", Plovdiv

Cardiomyocyte changes induced by metabolic and proinflammatory factors impair repolarization, exacerbate the heterogeneity of the transmural dispersion of repolarization, and this is proarrhythmogenic. Mechanical dispersion correlates with fibrosis, therefore correlates with the risk of ventricular arrhythmias. Data on the role of mechanical dispersion as a predictor of ventricular arrhythmia in metabolic syndrome are scarce. **Methods:** 71 patients with newly diagnosed metabolic syndrome, aged 35–55 years, were studied. Ischemic heart disease was excluded in all patients with stress test cycle ergometry, CT-angiogdraphy or selective coronary angiography. All patients underwent a 48-hour Holter ECG recording. Based on the latter, they were divided into two groups – with a high arrhythmogenic load – 38 patients (53.5%) (includes supraventricular or ventricular tachycardia, atrial fibrillation/flutter, ventricular extrasystoles over 10%, frequent supraventricular extrasystoles > 500/24 h) and with low arrhythmogenic load – 33 patients – 46.5% (includes no significant rhythm disturbances). Echocardiography was performed with a GE Vivid T9 emphasizing global longitudinal strain and mechanical dispersion index. Statistically significant difference in the mechanical dispersion index was found between the group with low arrhythmogenicity (64.00 ± 1.72 msec) and the group with high arrhythmogenicity (79.82 ± 1.83 msec). The index of mechanical dispersion has the most optimal sensitivity and specificity of all investigated echocardiographic markers. The ROC curve results for the mechanical dispersion index demonstrated a very large AUC and high statistical significance (p = 0.0001). A mechanical dispersion value above 57.5 msec is the cut-off for proarrhythmogenicity. These results support the mechanical dispersion index as an additional tool for assessing proarrhythmogenicity.

Keywords: *metabolic syndrome, proarrhythmogenicity, mechanical dispersion, global longitudinal strain,*

Acknowledgements: Project ДПДП-09/2023 of Medical University, Plovdiv, Bulgaria

CLINICAL CASE OF MYOCARDITIS FOLLOWING A VIRAL INFECTION

Daniel Mekenyan[1], Rafiela Chitak[1,2], Iliya Yanev[1], Mariya Tokmakova[1,2]

1. *Cardiology Clinic, UMHAT "Sveti Georgi", Plovdiv*
2. *First Department of Internal Medicine, Section of Cardiology, Faculty of Medicine, Medical University of Plovdiv*

Introduction: Myocarditis has a polyetiological origin, and clinical diagnosis is often more challenging than pathoanatomical diagnosis. **Clinical case:** A 55-year-old woman developed myocarditis following a confirmed influenza A virus infection. She was admitted with acute shortness of breath and persistent atrial fibrillation. Echocardiography showed an enlarged left atrium, a non-enlarged left ventricle with mildly reduced ejection fraction, moderate mitral regurgitation with anterior mitral leaflet prolapse, moderate tricuspid regurgitation, and a small pericardial effusion. Laboratory tests showed slightly elevated troponin levels and normal inflammatory markers. After starting amiodarone therapy, the patient achieved and maintained sinus rhythm. Additional medications included a loop diuretic, mineralocorticoid receptor antagonist, SGLT2 inhibitor, beta-blocker, direct oral anticoagulant, and a low-dose RAAS inhibitor due to low blood pressure tendencies. Cardiac MRI met the Lake Louise criteria for myocarditis, showing limited areas of increased water content and areas of late enhancement in the left ventricular myocardium. During a one-year follow-up, the patient restored left ventricular systolic function with the combined therapy. **Conclusion:** Early diagnosis and timely treatment based on current therapeutic recommendations are crucial for the prognosis of myocarditis patients.

Keywords: *myocarditis, viral, diagnosis, treatment*

CLINICAL CASE OF ACUTE MYOCARDIAL INFARCTION WITH CARDIAC ARREST DUE TO COCAINE USE – A CASE I WANT TO FORGET!

Darina Yovanovska[1], Ivan Manolov[1], Radostina Pavlova[2], Bistra Dobreva-Yatseva[1], Mariya Tokmakova[1]

1. Clinic of Cardiology, UMHAT "Sv. Georgi" EAD; First Department of Internal Diseases, Section Cardiology, Faculty of Medicine, Medical University of Plovdiv
2. Medical University of Plovdiv

Introduction: Cocaine is a widely used narcotic substance that creates a euphoric feeling of happiness and increased energy. High concentrations can lead to arrhythmias, heart attack, stroke, seizures, headaches, gastrointestinal problems, and other disorders. We present the case of a 24-year-old man, actively engaged in sports, with no known illnesses, who visited the emergency department due to severe and prolonged chest pain. The complaints appeared after an active football training session. Upon admission, he collapsed with loss of consciousness and cessation of breathing. Active cardiopulmonary resuscitation (CPR) was initiated, including intubation with mechanical ventilation. On monitor ventricular fibrillation, followed by episodes of ventricular tachycardia, idioventricular rhythm, ventricular fibrillation, and asystole were registered. Multiple defibrillations and medications were administered. The electrocardiogram showed monomorphic sustained ventricular tachycardia with ST elevation in aVR and precordial leads and ST depression in the inferior leads. Transthoracic echocardiography revealed severe systolic left ventricular dysfunction with apical akinesia and diffuse hypokinesia, B lines of pulmonary congestion. CPR continued for 2 hours and 30 minutes and ended with a fatal outcome. Laboratory tests revealed high levels of cocaine and metabolites in the urine. The pathological diagnosis was narcotic intoxication with complications of interstitial lymphocytic myocarditis, myocardial interstitial fibrosis, pulmonary edema, and cerebral edema. **Conclusion:** The presented clinical case illustrates a fatal complication of cocaine intoxication with acute myocardial infarction in a young patient without underlying atherosclerotic coronary disease.

Keywords: *cocaine intoxication, acute myocardial infarction, ventricular tachycardia, ventricular fibrillation*

DILATED CARDIOMYOPATHY – CURRENT CONCEPTS

Tajmohammed Hussainzay[1], Jo Gerrit Wildenhain[1], Riyadh Riki Mondal[1], Dolina Gencheva[2]

1. Medical University of Plovdiv
2. First Department of Internal Diseases, Medical University of Plovdiv

Dilated cardiomyopathy (DCM) is a disease primarily affecting the heart muscle characterized by progressive reduction in contractility and enlargement of chambers. It is the most common type of cardiomyopathy with an estimated prevalence of 1:2500 people and can affect all ages, including children and neonates. DCM is a diagnosis of exclusion – ruling out other causes of low ventricular ejection fraction such as ischemic heart disease, valvular disease, myocarditis, etc. is needed before confirming it. Etiology is predominantly idiopathic with the possible identification of genetic causes, but it can also be due to alcohol abuse, viral myocarditis, autoimmune diseases, medications, illegal drugs, endocrinological and electrolyte disturbances among others. The progression rate varies greatly and is depended on the underlying etilogy. The condition might remain undetected for years or even be misdiagnosed as there are no pathognomonic signs or symptoms. Clinical presentation is dominated by the manifestations of heart failure and arrhythmias, while in some cases sudden cardiac death can be the first event. Findings from the clinical exam, electrocardiogram and even echocardiography are mostly non-specific as well, but more advanced techniques such as cardiac magnetic resonance and genetic testing can establish the diagnosis with certainty. Despite treatment advances in many other cardiological disorders, specific treatment for idiopathic, post-viral or genetic DCM has not yet been discovered. Management currently coincides with the management of heart failure with low left ventricular ejection fraction and arrythmias. DCM remains one of the most common causes for heart transplantation, especially in children and young adults.

Keywords: *dilated cardiomyopathy, cardiology, heart failure*

APICAL HYPERTROPHIC CARDIOMYOPATHY – PITS AND FALLS

Dolina Gencheva[1,2], Ivan Kuchmov[2], Sonam Dendupp[3], Fedya Nikolov[1,2]

1. *First Department of Internal Diseases, Cardiology Section, Medical University of Plovdiv*
2. *Cardiology Clinic, University Hospital "St. George" LLC, Plovdiv*
3. *Medical University of Plovdiv*

Apical hypertrophic cardiomyopathy, also known as Yamaguchi cardiomyopathy, is a rare variant of hypertrophic cardiomyopathy. It usually manifests with the clinic of heart failure: shortness of breath and fatigue. We present the case of an 81-year-old patient who was referred to our clinic with symptoms heart failure and stenocardic syndrome. In the past, three selective coronary angiographies were performed due to diffuse ST-segment changes, and a drug-eluting stent was implanted in the right coronary artery during the last one. However, the intervention did not lead to alleviation of symptoms. Transthoracic echocardiography revealed apical left ventricular hypertrophy, preserved left ventricular ejection fraction and no significant valvular lesions. One year later, after optimization of drug therapy, the patient had no signs of decompensated heart failure. In early 2025, he was again hospitalized in our Clinic due to an episode of persistent atrial fibrillation, associated with thyroid pathology. Rhythm control was achieved after transesophageal echocardiography and anticoagulant and antiarrhythmic preparation. Yamaguchi syndrome is often underdiagnosed or misdiagnosed because its symptoms could be similar to those of acute coronary syndrome. As clinicians are less familiar with this form of hypertrophic cardiomyopathy, diagnosis and treatment could be delayed. Pathophysiology and management of the disease are discussed.

Keywords: *Hypertrophic Cardiomyopathy; Heart Failure; Yamaguchi Syndrome; Acute Coronary Syndrome*

LEAFLET THROMBOSIS AFTER TRANSCATHETER AORTIC VALVE REPLACEMENT – A SUCCESSFUL RESOLUTION USING INTRAVENOUS THROMBOLYSIS AND ORAL ANTI-COAGULATION: A CASE REPORT

Evgenia Marinova[1], Spas Kitov[2], Velina Doctorova[3], Kamen Stanev[3], Georgi Goranov[2]

1. Faculty of Medicine, Medical University of Plovdiv
2. First Department of Internal Medicine, Section of Cardiology, Faculty of Medicine, Medical University of Plovdiv
3. First Department of Cardiovascular Surgery, Faculty of Medicine, Medical University of Plovdiv

Background: Transcatheter aortic valve replacement (TAVR) is indicated for treating symptomatic severe aortic valve stenosis (AS) with intermediate-to-high surgical risks. Few reports are available on managing leaflet thrombosis after TAVR with worsening heart failure. **Case summary:** A 78-year-old female patient with severe AS received a successful TAVR with Myval valve. Two weeks later, the patient developed a worsening heart failure with pulmonary congestion. Transthoracic echocardiographic assessment (TTE) revealed an increased transvalvular peak velocity from 2.6 m/s 3 days after TAVI to 4.3 m/s with an increase in mean trans-aortic valve pressure gradient to 48 mmHg and newly occurred moderate aortic regurgitation (AR). Multislice computed tomography (MSCT) demonstrated hypo-attenuated thrombus and thickened leaflets and reduced leaflet motion (RLM) of one leaflet. An attempt to resolve the thrombus with intravenous infusion of alteplase was made. After thrombolytic treatment acenocoumarol with a target international normalized ratio (INR) of 2.5–3.5 was added on top of the con-current single antiplatelet. A series of follow-up echocardiograms showed a progressive decrease in trans-aortic valve pressure gradient to 17 mmHg and reduction in AR. Three months after the anticoagulation treatment started, MSCT confirmed resolution of the hypo-attenuated thrombus, normalization of leaflet motion and thickened leaflets. Symptoms of heart failure were also improved gradually. **Discussion:** Clinical valve thrombosis is relatively uncommon after TAVI but has serious clinical implications including a risk for thrombo-embolic events and heart failure. Oral

anticoagulation and intravenous low-dose thrombolytic therapy may resolve clinically significant valve thrombosis after TAVI when oral antiplatelet regimens have failed.

Keywords: *transcatheter aortic valve replacement (TAVR), leaflet thrombosis, thrombolysis, oral anticoagulation, case report*

PRIMARY SJÖGREN'S SYNDROME WITH LUNG INVOLVEMENT – A CASE REPORT

Zain Ulhassan, Abdulrahman Imran, Vesela Blagoeva

Medical University of Plovdiv

Sjögren's syndrome (SS) was described in 1933 by Dr Henrik Sjögren. Its incidence is approximately 6–8 per 100 000 of the population annually and is the second most common autoimmune disorder after RA. SS is more common in women between the ages 40–60. It affects predominantly the eyes and salivary glands. Pulmonary involvement is seen in 9–20% of patients with SS – interstitial pneumonia and tracheobronchial disease are the most common. In this study, the case of a female patient with primary SS is presented. She was diagnosed 5 years ago, at the age of 55. Initial presentation was with dry, itching eyes and swelling of the parotid glands. Primary SS was diagnosed based on presence of 4 out of 6 criteria – dry eyes with a positive dye staining, parotid gland swelling and positive anti-Ro/SSA, and anti-La/SSB. Due to persistent dry cough, a HRCT was performed, showing lung involvement with HSIP/LIP (non-specific interstitial pneumonia) pattern on CT and characteristic cyst formation. In order to assess lung function, spirometry was performed, which documented mild reduction in lung diffusion capacity. The ABG was within the reference range. The patient was started on Rituximab. She was followed up with lung CTs once a year and serial functional testing. Last follow-up was performed in December, 2023. The lung CT showed no deterioration as disease remained limited to the lung bases. Functional testing indicated mild reduction of diffusion capacity and ABG – no signs of respiratory failure.

Keywords: *Sjögren's syndrome*

CAN INFLUENZA B PNEUMONIA BE THE SOLE CAUSE OF DIFFUSE ALVEOLAR HEMORRHAGE?

Zdravko Ivanov[1], Kostadin Ketev[2], Ivanka Karavelikova[3], Mariya Spasova[3]

1. Department of Pediatrics, University Hospital "St. George", Plovdiv
2. Department of Pediatrics, Medical University of Plovdiv; Medical Simulation Training Centre at Medical University of Plovdiv
3. Department of Pediatrics, Medical University of Plovdiv

Diffuse alveolar haemorrhage (DAH) is a potentially fatal condition caused by disruption of the alveolo-capillary membrane resulting in accumulation of blood in the alveoli and hindered gas exchange. The usual clinical constellation includes anaemia, dyspnea, fever and hypoxic respiratory failure. DAH can be immune or non-immune-mediated with the Influenza virus being a notable causative agent for the latter. A 15-year-old boy is reported that was admitted at the Clinic of Pediatrics of University Hospital "St. George", Plovdiv due to pneumonia and persisting episodes of hemoptysis despite the ongoing therapy during the past two days. The patient presented in an unsatisfactory general condition, with high-grade fever, symptoms of respiratory failure, and hemoptysis. The physical examination of the lungs revealed diminished vesicular breathing with isolated crepitations at both lung bases. No other abnormalities in the somatic status were found. Chest X-ray displayed infiltrative opacities in both lung bases. The blood gas analysis was dominated by hypoxia with respiratory alkalosis. Several hours after hospitalization, the child experienced syncope, arterial hypotension, tachycardia, and worsening respiratory failure, necessitating transfer to the intensive care unit, where PCR confirmed Influenza B from nasopharyngeal swab. Paraclinical tests did not show significant abnormalities, except for elevated liver enzymes and ferritin. Echocardiography revealed normal cardiac structure and function. The follow-up chest X-ray demonstrated a significant increase in the infiltrative changes. Computed tomography of the chest confirmed our suspicion of DAH. The authors discuss the differential diagnosis relevant to the patient and the algorithm for managing DAH.

Keywords: *Diffuse alveolar hemorrhage, Influenza B virus, pneumonia, hemoptysis*

NEUROMYELITIS OPTICA – A RARE MANIFESTATION OF NEUROPSYCHIATRIC SYSTEMIC LUPUS ERYTHEMATOSUS OR TWO OVERLAPPING DISORDERS? A CASE REPORT

Ivaylo Sokolov[1,2], Vesela Hristeva[1,2], Ivan Yanakiev[1,2], Teodora Kehayova[2], Mariela Geneva-Popova[1,2]

1. Rheumatology Clinic, University Hospital St. George, Plovdiv
2. Medical University of Plovdiv

Devic's disease, also referred to as neuromyelitis optica (NMO), is an uncommon relapsing disorder primarily affecting the optic nerves and spinal cord. The hallmark clinical features include optic neuritis, which may progress to blindness, along with neurological impairment stemming from spinal cord involvement, most commonly transverse myelitis leading to paraparesis. A distinctive serological marker of the disease is the presence of autoantibodies targeting the aquaporin-4 (AQP4) water channel protein, predominantly expressed on astrocytes. These antibodies, classified as IgG, are known as aquaporin-4 antibodies. In a subset of patients diagnosed with NMO, additional non-organ-specific autoantibodies can be detected in the serum, most frequently antinuclear antibodies characteristic of systemic lupus erythematosus (SLE). Furthermore, overlapping clinical manifestations of both conditions may be observed in affected individuals, raising questions about their potential coexistence. We present the case of a 32-year-old woman who initially developed unilateral optic neuritis, with a relapsing course that gradually evolved into the characteristic clinical spectrum of NMO – bilateral, irreversible optic nerve damage and paraparesis. As the disease progressed, involvement of other organ systems became evident, including cutaneous and mucosal lesions, hematological abnormalities, and renal impairment, ultimately fulfilling the classification criteria for SLE. From a clinical standpoint, an initial presentation with predominant neurological involvement in lupus patients is uncommon. Conversely, features of overlap syndromes may emerge over the course of other autoimmune diseases, further complicating the differential diagnosis.

Keywords: *Neuromyelitis optica, Optic neuritis, Transverse myelitis, Systemic lupus erythematosus, Overlap syndrome.*

HYPERTROPHIC CARDIOMYOPATHY – A CAUSE OF HEART FAILURE WITH PRESERVED EJECTION FRACTION

Ivan Kuchmov[1], Dolina Gencheva[1,2], Ivan Manolov[1,2], Iliya Yanev[3], Bistra Dobreva-Yatseva[1,2]

1. *Cardiology Clinic, University Hospital "St. George" LLC, Plovdiv*
2. *First Department of Internal Diseases, Cardiology Section, Medical University of Plovdiv*
3. *Cardiac Surgery Clinic, University Hospital "St. George" LLC, Plovdiv*

Hypertrophic cardiomyopathy is the most common monogenic heart disease with an estimated incidence of 1 in 500 patients. About 60% of patients with HCM have a gene mutation of the sarcomere or sarcomere-related genes, and obtaining a detailed family history is crucial to help in risk stratification for affected patients. Myocardial thickening can affect any of the walls of the heart, including the right ventricle. It was first described as "idiopathic hypertrophic subaortic stenosis" more than 50 years ago by Professor Braunwald's team. Over the last twenty years, management has changed dramatically with the advent of multimodal imaging and genetic analysis. However, the diagnosis is often missed or delayed. The main symptoms are shortness of breath, fatigue and arrhythmia. There are several mechanisms for the development of heart failure: diastolic dysfunction, dynamic gradient in left ventricle outflow tract, SAM-phenomenon with mitral regurgitation, myocardial ischemia. The most common arrhythmia in these patients is atrial fibrillation. Non-sustained ventricular tachycardia occurs in about 25% of patients. Ventricular dysrhythmias can progress to ventricular fibrillation, which is the main cause of sudden cardiac death in these patients. Early diagnosis and treatment improves the quality of life in these patients and opens the possibility to initiate cascade screening of first-line relatives, due to the frequent autosomal dominant mode of inheritance

Keywords: *Hypertrophic cardiomyopathy; Heart failure with preserved ejection fraction*

CARDIOVASCULAR CHANGES AFTER SARS-COV2 INFECTION

Ivan Manolov[1], Fedya Nikolov[1], Petar Nikolov[1]

1. *First Department of Internal Diseases, Section of Cardiology, Medical University of Plovdiv*

Background: The long-term cardiovascular consequences of COVID-19 remain a growing concern, with emerging evidence suggesting myocardial involvement irrespective of disease severity. This study **aimed** to evaluate structural and functional cardiac changes in patients recovering from COVID-19. **Methods:** We conducted a comprehensive cardiovascular assessment in 11 patients with post-COVID-19 cardiac manifestations, including arrhythmia and heart failure. Our evaluation included cardiac MRI, echocardiography with speckle tracking, arterial stiffness measurements, standard ECG, and Holter-ECG monitoring. **Results:** Our findings indicate that myocardial alterations were present regardless of the severity of the initial SARS-CoV-2 infection. Imaging revealed structural and functional myocardial changes, while electrophysiological assessments detected arrhythmias and conduction abnormalities. Notably, speckle tracking echocardiography and cardiac MRI suggested subclinical myocardial involvement in patients without overt symptoms. **Conclusion:** These results highlight the need for routine cardiovascular evaluation in post-COVID-19 patients, even in those who experienced mild or moderate acute illness. Further studies with larger cohorts are essential to understand the long-term implications of COVID-19 on cardiac health.
Keywords: *COVID-19, MRI, cardiovascular disease, imaging*

POLYARTERITIS NODOSA – A TRULY RARE ENTITY

Ivan Yanakiev[1], Vesela Hristeva[1], Ivaylo Sokolov[1],
Yasin Dzhasim[2], Mariela Geneva-Popova[1]

1. *Department of Propedeutics of Internal Diseases, Faculty of Medicine, Medical University of Plovdiv;*
   Clinic of Rheumatology, General Hospital "Sv. Georgi", Bulgaria
2. *Student, Medical University of Plovdiv*

Polyarteritis nodosa is a rare type of vasculitis with potentially fatal consequences. The hallmark of the disease is the development of necrotic changes in wall of the medium to small calibre arteries, thus affecting all organs and systems. With and annual incidence of 3.5 to 4 patients per 100 000, this vasculitis is rare and often misdiagnosed. The main clinical features of the disease include constitutional symptoms such as fatigue, weight loss, fever. Typically skin manifestations occur at the beginning – rash, livedo reticularis, erythema nodosum etc. All other organs and systems may become affected – most commonly kidneys, peripheral nerves, heart, central nervous system, GI-tract. Specific diagnostic criteria are used for diagnosing and classifying this disease. We present the case of a 62-year-old woman who initially had only constitutional symptoms – fatigue and weight loss. Later on she started presenting livedo reticularis and skin ulcers on both of her legs. She was admitted for hospital treatment when she developed multiple mononeuritis. As the disease progressed, she suffered kidney damage with impaired GFR. Diagnose was put on the basis of the classification criteria and specific treatment was started. She was given high doses of corticosteroids and immunosuppressive drugs in order to decrease the disease activity. From a clinical standpoint this case shows how polyarteritis nodosa can mimic a lot of other diseases and it is common to have a late diagnose. We hope that throughout this case we will bring a better recognition for the disease.
Keywords: *Rheumatology, Immunology, Poliarteritis nodosa, Vasculitis*

CASE OF TRANSIENT VISION LOSS IN INFECTIVE ENDOCARDITIS OF THE AORTIC VALVE

Kalin Krastev[1], Darina Yovanovska[1], Rafiela Chitak[1,2], Mariya Tokmakova[1,2]

1. Cardiology Clinic, UMHAT "Sveti Georgi", Plovdiv
2. First Department of Internal Medicine, Section of Cardiology, Faculty of Medicine, Medical University of Plovdiv

Transient vision loss represents a temporary, partial, or complete disruption of vision, manifested as blindness, blurred vision, or double vision. A common cause is retinal embolism, caused by small blood clots. The causes for this are varied – heart diseases, infections, malignant neoplasms, and others. Infective endocarditis is a disease of the endocardium of the heart and the endocardium of large vessels, where the infection affects the heart valves, subvalvular structures, and also the presence of permanent intracardiac devices or catheters. A frequent complication is peripheral septic embolization. The embolic risk is highest at the beginning of the disease, with fifty percent of all embolic complications occurring within the first 20 days of symptom onset. We present the case of a 45-year-old male who, after undergoing root canal treatment, presented with fever up to 40°C. A few days later, he experienced sudden vision loss in his left eye while driving. Fundoscopy revealed thrombosis of the temporal branch of the retinal artery. Due to persistent fever and pronounced inflammatory constellation, the patient was consulted with cardiologist. Transthoracic and transesophageal echocardiography registered vegetations on the aortic valve. The patient was hospitalized in a cardiology clinic with a diagnosis of confirmed infective endocarditis. Antibiotic treatment was initiated according to current recommendations for infective endocarditis treatment. The patient was discharged without significant valvular destruction, and with restored vision. Embolic complications in infective endocarditis are common and sometimes life-threatening. In cases of embolization with unclear etiology and accompanying fever, infective endocarditis should be considered.

Keywords: *retinal embolism, infective endocarditis*

EMERGING TREATMENTS FOR ANDROGENETIC ALOPECIA

Lidiya Todorova

Medical University of Plovdiv

Androgenetic alopecia (AGA) is the most common cause of hair loss in both men and women, significantly affecting self-esteem and quality of life. Recent advancements in AGA treatment have introduced new pharmacological and non-invasive therapeutic options. This article reviews the latest approaches, including oral and topical antiandrogens, mesotherapy, botulinum toxin, RNA-based treatments, and exosome therapy. A literature search was conducted using PubMed and Google Scholar to assess recent clinical studies and emerging treatments. Oral bicalutamide and dutasteride have demonstrated efficacy in blocking androgenic effects on hair follicles, with mesotherapy providing a viable alternative for patients unable to tolerate oral treatments. Although botulinum toxin has shown some theoretical promise in improving scalp circulation, recent studies indicate limited efficacy. RNA-based therapies, such as small interfering RNA (siRNA) and SAMiRNA, are currently in development and show potential in inhibiting androgen receptors. Exosome therapy, which utilizes extracellular vesicles to promote follicular regeneration, represents a novel approach in regenerative medicine. The combination of these therapies may enhance treatment outcomes for AGA. Further research is required to optimize protocols and assess long-term safety and efficacy.
Keywords: *androgenetic, alopecia, treatment, therapy, aga*

ASSOCIATION BETWEEN COMPONENTS OF METABOLIC SYNDROME AND THYROID MALIGNANCY

Liuboslav Dimov[1], Emanuela Vasileva[2], Elena Chobankova[1], Rossen Dimov[3], Boyan Nonchev[1]

1. *Department of Endocrinology, Faculty of Medicine, Medical University of Plovdiv; Clinic of Endocrinology and Metabolic Diseases, University Hospital "Kaspela", Plovdiv*
2. *Department of Propedeutics of Internal Diseases, Faculty of Medicine, Medical University of Plovdiv*
3. *Department of Special Surgery, Faculty of Medicine, Medical University of Plovdiv; Department of Surgery, University Hospital "Kaspela", Plovdiv*

Aim: To compare levels of thyroid function markers and metabolic parameters between patients with benign thyroid disease (BTD) and malignant thyroid disease (MTD) indicated for total thyroidectomy (TT). **Patients and Methods**: This pilot study included 62 patients indicated for TT (15 males, 47 females, mean age 51.38 ± 9.59 years). The studied population consisted of 15 patients with MTD confirmed postoperatively (4 males, 11 females, mean age 51.33 ± 8.04 years) and 47 patients with BTD (11 males, 36 females, mean age 51.50 ± 10.02, p = 0.953). Thyroid function markers (TSH, FT3, FT4, FT3/FT4 ratio, MAT and TAT) and metabolic profile (cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, CRP, ASAT, ALAT, GGT) were measured. Oral glucose tolerance test performed included fasting plasma glucose levels, 60 and 120 minutes after glucose intake as well as immune-reactive insulin (IRI). **Results:** Patients with MTD have higher TSH and lower FT3 level compared with the patients with BTD [(2.34 mU/L; IQR = 1.18) vs. (1.12 mU/L; IQR = 1.30), p = 0.017 for TSH and (4.80 pmol/L; IQR = 1.80) vs. (5.44 pmol/L; IQR = 1.33) p = 0.010 – FT3]. None of the other parameters included in the study showed statistically significant difference in the two subgroups. **Conclusion:** Results of this study confirm data from literature that the risk for MTD increases with TSH elevation. Data for lower T3 in the subgroup require further research. Our results didn't show association between carcinogenesis, cancer's aggressiveness and metabolic profile of the patients. One possible explanation might be the number of patients included yet.

Keywords: *thyroidectomy, thyroid cancer, metabolic profile*

SEVERE SYSTEMIC SARCOIDOSIS – A RARE CASE PRESENTATION

Maritza Chterev[1], Vesela Blagoeva[2]

1. Medical University of Plovdiv
2. First Department of Internal Medicine, Section of Pulmonology and Tuberculosis, Medical University of Plovdiv

Background: Sarcoidosis is a systemic disorder of unknown etiology, characterized by formation of non-caseating granulomas in the affected tissues and organs. The incidence varies from 5–10/100,000 in North America and Australia to 11–15/100,000 in Scandinavia. The organs and systems most commonly involved are the skin, the lymph nodes and lungs, however, the heart, kidneys, CNS and eyes can also be affected. **Aim:** Our aim is to present a rare case of severe systemic sarcoidosis with involvement of the lymph nodes, skin, joints, and lungs. **Case presentation:** A 66-year-old female patient presented with a case of severe sarcoidosis with skin, joint, diffuse lymph nodes and lung involvement. The diagnosis was based on HRCT showing hilar and mediastinal lymph node enlargement, parenchymal diffuse bilateral nodules with peri-bronchial location, fibrotic lesions and traction bronchiectasis. Additionally, to exclude tuberculosis and other ILDs, lymph node and lung biopsy were performed with the finding of typical non-caseating granulomas. The patient was started on steroids, leading to remission, but 10 years later suffered a recurrence, complicated by a pneumothorax. At present, her HRCT shows diffuse lung fibrosis with traction bronchiectasis and limited areas of ground glass opacities. Spirometry is characterized by the typical restrictive pattern with severely reduced FVC and diffusion capacity. ABG is that of severe hypoxemia and moderate hypercapnia. **Conclusion:** We present a rare case of severe systemic sarcoidosis of the lymph nodes, joints, skin, and lungs with recurrence and complications 10 years later.

Keywords: *sarcoidosis, recurrence*

HYPERANDROGENISM IN ATHLETES: PREVALENCE OF HYPERANDROGENISM IN FEMALE OLYMPIC ATHLETES AND IMPLICATIONS FOR REPRODUCTIVE HEALTH AND PHYSICAL PERFORMANCE

Maria Maridaki, Maria Ilieva-Gerova

Medical University of Plovdiv

Introduction: Hyperandrogenism, characterized by elevated androgen levels, is increasingly inspected in sports due to its impact not only on female reproductive health, but also on physical performance. **Objective:** To analyze the prevalence of hyperandrogenism in female Olympic athletes and its involvement for reproductive health and physical results. **Materials and methods:** More than 50 studies assessing androgen levels in outstanding female athletes were reviewed, with particular focus on sport-specific prevalence, performance impacts and reproductive health outcomes. Regulations by government organizations were also analyzed for ethical and medical considerations. **Results and discussion:** Hyperandrogenism is more prevalent in female athletes (e.g., 4.7% at IAAF World Championships) compared to the general population (0.1%), particularly in strength- and endurance-based sports. Elevated androgen levels are linked to increased muscle mass and composition, strength, hemoglobin levels, conferring a potential performance advantage. However, this advantage has sparked debate, leading to regulations that limit testosterone levels in female athletes, raising ethical concerns. Reproductive health implications include menstrual irregularities, fertility issues, and long-term risks such as metabolic disorders, osteoporosis, polycystic ovary syndrome (PCOS). **Conclusion:** Hyperandrogenism represents a challenging issue in sports, overlapping fairness, health, and ethical concerns. While androgen regulation aims to ensure fair competition, prioritizing athlete well-being and individualized care is essential. Addressing this condition requires a balanced approach that integrates medical expertise and respect for athletes' autonomy.

Keywords: *hyperandrogenism, female athletes, reproductive health*

TPEAK-TEND INTERVAL IN NEWLY DISCOVERED METABOLIC SYNDROME

Maria-Florance Kitova[1], Spas Kitov[2], Boyan Nonchev[3], Vesela Krasteva[4], Lyudmila Kitova[2]

1. Faculty of Medicine, Medical University of Plovdiv
2. Cardiology Clinic, UMBAL "St. George"; Faculty of Medicine, Medical University of Plovdiv
3. Clinic of Endocrinology and Metabolic Diseases, UMBAL "Kaspela"; Medical University of Plovdiv
4. Institute of Biophysics and Biomedical Engineering – BAS, Section: Processing and Analysis of Biomedical Signals and Data, Sofia

Cardiomyocyte changes induced by metabolic and proinflammatory factors impair repolarization, exacerbate the heterogeneity of the transmural dispersion of repolarization, and prolong the Tpeak-end interval (Tpe). There are few data in the literature about the rhythmogenic potential of the Tpe interval in metabolic syndrome. The purpose of the study was to evaluate automatically measured Tpe interval for arrhythmogenic burden in this population. **Methods:** 71 patients with newly diagnosed metabolic syndrome, aged 35–55 years, were studied. All patients underwent a 48-hour Holter ECG recording. Based on the latter, they were divided into two groups – with a high arrhythmogenic load – 38 patients (53.5%) (includes supraventricular or ventricular tachycardia, atrial fibrillation/flutter, ventricular extrasystoles over 10%, frequent supraventricular extrasystoles > 500/24 h) and with low arrhythmogenic load – 33 patients – 46.5% (includes no significant rhythm disturbances). In all patients, an electrocardiogram was performed at baseline with a 12-channel ECG. Tpe interval are measured automatically at the Bulgarian Academy of Sciences. **Results:** In the high arrhythmogenic burden group, we found statistically significant higher levels of the Tpe interval compared to the low arrhythmogenic burden group ($p < 0.001$) as well as in terms of Tpe_cB(ms) ($p < 0.0001$) and Tpe_cF(ms) ($p < 0.0001$). There was no statistical difference between the two groups regarding the QT interval. ($p > 0.05$) **Conclusion:** With the data of this study, it can be concluded that the Tpe interval in the high-risk population of patients with newly diagnosed metabolic syndrome can be used to estimate the arrhythmogenic burden.

Keywords: *Tpeak-Tend interval, metabolic syndrome, electrocardiographic, arrhythmogenicity*

Acknowledgements: Project ДПДП-09/2023 of Medical University, Plovdiv, Bulgaria

COGNITIVE IMPAIRMENTS – A SYMPTOM OF POST-COVID SYNDROME IN THE CONTEXT OF A GLOBAL PANDEMIC

Miroslava Hristova, Lyubomir Chervenkov, Radka Massaldjieva, Penka Atanassova

Medical University of Plovdiv

Introduction: Although the acute phase of the COVID 19 pandemic is over, there is a rising number of reports, concerning its long-lasting, residual symptoms, defined by the World Health Organization (WHO) as Post-acute COVID syndrome (PACS). Clinically the condition presents itself with non-specific, heterogenous symptoms, most common of which are shortness of breath, fatigue, and cognitive dysfunction, including impaired concentration and forgetfulness. **Aim:** The aim of our study is to assess the incidence and the type of cognitive impairments, among a group of patients with no prior neuro-psychiatric conditions. **Methods:** We tested a group of 102 subjects, using a detailed clinical interview and a computer-based neuro-psychological test – the Cog State Brief Battery, assessing four core cognitive domains: processing speed, attention, visual learning and working memory. Of all 102 participants, 68 were retested, approximately 6 months later and 39 underwent a non-contrast magnetic resonance imaging (MRI) brain scan. **Results:** MRI brain scans revealed structural abnormalities in 48.7% of participants, whereas 62,7% of them reported persisting neuro-psychological complaints. Data analysis of neuro-psychological test results showed impaired attention among subjects with persisting complaints and impaired working and visual memory among those without. **Conclusions:** Therefore, we can assume that PACS could be associated with objective findings, detected by using non-contrast MRI to assess slight structural changes of the brain, as well as sensitive neuropsychological tests to evaluate cognitive functions, thus providing better diagnosis and prophylaxis.

Keywords: *cognitive functions, computer-based neuropsychological test, post – COVID syndrome, MRI changes*

Disclosure: The study was funded by Medical University of Plovdiv under grant number № ДПДП-12/2022

A CLINICAL CASE OF AN INFANT WITH IDIOPATHIC INFANTILE HYPERCALCEMIA WITH A PREVIOUSLY UNDESCRIBED GENETIC MUTATION

Pamela Boykova[1], Zeyra Halil[2], Hristo Ivanov[2], Petya Markova[2]

1. Medical University of Plovdiv
2. Faculty of Medicine, Medical University of Plovdiv

Introduction: The SLC34A1 gene encodes the renal Na-P co-transporter, located in the proximal tubule, which plays a crucial role in calcium-phosphorus homeostasis. Mutations in SLC34A1 are associated with a range of phenotypic manifestations, including infantile hypercalcaemia, renal Fanconi syndrome, and hyperphosphatemic nephrolithiasis. **Objective:** To present a novel, previously unreported mutation in SLC34A1 associated with the clinical presentation of infantile hypercalcaemia. **Materials and methods:** We report the case of a 4-month-old female infant, born from a third pregnancy, with a history of intrauterine growth restriction and prenatally diagnosed hydronephrosis. In the postnatal period, medullary nephrocalcinosis of the left kidney, hypercalciuria, hyperphosphatemia, low parathyroid hormone levels, and elevated 1,25$(OH)_2$ vitamin D_3 levels were identified. Genetic panel sequencing for nephrocalcinosis-associated genes revealed a heterozygous mutation which is a variant of uncertain significance. Based on the overall clinical presentation, the mutation was interpreted as pathogenic. **Discussion:** The described clinical case meets the criteria for infantile hypercalcemia, with the identified SLC34A1 mutation likely playing a key role in the pathogenesis. **Conclusion:** In infants with nephrocalcinosis, infantile hypercalcemia should be considered in the differential diagnosis. Genetic analysis of SLC34A1 may be crucial for diagnosis and the individualization of therapeutic approaches.

Keywords: *infantile hypercalcaemia, nephrocalcinosis, SLC34A1 mutation*

RARE CASE OF COMBINATION BETWEEN ASTHMA, URTICARIA AND ANGIOEDEMA

Petar Paskalev[1], Petya Deleva[1], Svetlan Dermendzhiev[1], Kaloyan Ruev[2]

1. Department of Occupational Diseases, Clinical Allergology and Toxicology, Faculty of Medicine, Medical University of Plovdiv
2. Faculty of Medicine, Medical University of Plovdiv

Background: Asthma is chronic allergic inflammation of the airways, characterized by variable obstruction of the airflow (expiratory dyspnea) and bronchial hyperresponsiveness. Acute urticaria is mostly immunoglobulin E-mediated allergic reaction, manifested with the triad of erythema, edema and papule. Angioedema is transient subcutaneous or submucous swelling that could be induced by histamine or bradykinin. **Aim:** To prove the possibility of combination between these three allergic diseases in a single patient. **Materials and methods:** For description of the clinical case are used data from the medical history, clinical picture and paraclinical investigations. **Results and discussion:** Clinical and paraclinical examination shows an association between asthma, urticaria and angioedema in terms of activity of the allergic inflammation, evidenced by increased levels of blood eosinophils and total immunoglobulins E. The management of the asthmatic attack with systemic corticosteroids and bronchodilators, together with antihistamines, leads to resolution of urticaria and angioedema. The auspicious therapeutic influence of these three diseases is also an argument in favor of the common allergic mechanisms by which they occur and develop. **Conclusion:** The unique combination between asthma, urticaria and angioedema in a single patient is a contribution to the theory and practice of immunopathology and allergology and is of paramount importance given the presence of common pathogenetic mechanisms and overlapping triggers. Here is why an optimization of diagnostic-therapeutic algorithms is necessary in terms of timely and accurate diagnosis of these three conditions, which will increase the effectiveness of the therapy and the control over the allergic activity in these three diseases.

Keywords: *asthma, urticaria, angioedema, eosinophils, immunoglobulins E*

OPTIMIZATION OF GFR ESTIMATION FOR CHEMOTHERAPY DOSING IN PEDIATRIC ONCOLOGY

Petya Markova[1], Mariya Spasova[1], Antonya Yaneva[2], Kostadin Kostadinov[3]

1. Department of Pediatrics, Medical University of Plovdiv
2. Medical Informatics, Biostatistics and eLearning, Medical University of Plovdiv
3. Department of Social Medicine and Public Health, Medical University of Plovdiv

Introduction: Accurate estimation of glomerular filtration rate (GFR) is critical in the monitoring and management of pediatric patients receiving potentially nephrotoxic agents, such as those undergoing chemotherapy. The Schwartz formula, a widely adopted method for estimating GFR (eGFR) in children, relies on serum creatinine concentration and patient height. However, due to the dependence of serum creatinine on muscle mass, this formula may overestimate true GFR in pediatric oncology patients, potentially leading to the administration of inappropriately high doses of chemotherapeutic agents. **Objective:** To compare GFR values estimated using the standard Schwartz formula, a body surface area (BSA)-adjusted Schwartz formula, and the Brandt formula in pediatric oncology patients. **Materials and methods:** The study included 40 pediatric patients undergoing a total of 116 chemotherapy cycles. For each cycle, eGFR was calculated using all three formulas both prior to and 12 hours after chemotherapy administration. **Results and discussion:** The analysis demonstrated that the standard Schwartz formula significantly underestimated eGFR in patients with impaired renal function (−46%, $p < 0.001$) and overestimated eGFR in cases of hyperfiltration (+49%, $p < 0.001$). In patients with normal renal function, inter-formula differences were smaller but remained statistically significant in certain instances. The BSA-adjusted Schwartz and Brandt formulas yielded comparable results, particularly in the context of reduced renal function (0% difference, $p > 0.99$). **Conclusion:** These findings highlight the limitations of the standard Schwartz formula in accurately reflecting renal function in pediatric oncology patients. Both the BSA-adjusted Schwartz and Brandt formulas provide more reliable and statistically consistent eGFR estimations, supporting their preferential use in clinical oncology settings to enhance nephrotoxicity surveillance and optimize dosing accuracy.

Keywords: *Children with cancer, Glomerular filtration rate, Chemotherapeutic agents*

ATTENTION DEFICIT AND MEMORY FUNCTION IN CHILDREN WITH BRONCHIAL ASTHMA: A SYSTEMATIC REVIEW AND META-ANALYSIS WITH TRIAL SEQUENTIAL ANALYSIS

Plamen Penchev[1], Kostadin Ketev[2], Lyubomir Gaydarski[3], Petar-Preslav Petrov[4], Daniela Milanova-Ilieva[5]

1. Faculty of Medicine, Medical University of Plovdiv
2. Department of Pediatrics, University Hospital "St. George", Plovdiv; Medical Simulation Training Center, Medical University of Plovdiv
3. Department of Anatomy, Histology and Embryology, Medical University – Sofia
4. Department of Anatomy, Histology and Embryology, Medical University of Plovdiv
5. Department of Pediatrics, University Hospital "St. George", Plovdiv

Introduction: Asthma is a chronic respiratory disease affecting approximately 5 million children in the US. Rodent models suggest psychiatric effects and worsened quality of life (QoL), but its impact on children's attention and memory remains unclear. Many studies have limitations, including small sample sizes and a focus on psychiatric and QoL outcomes rather than cognitive function. This systematic review and meta-analysis aimed to assess attention deficit and memory function in children with bronchial asthma. **Methods:** A systematic search was conducted in PubMed, Web of Science, and Cochrane for studies evaluating attention deficit and memory function in children with bronchial asthma. Statistical analysis was performed using R 4.3.1. Heterogeneity was assessed with the I^2 statistic and Cochrane Q test. Standardized mean difference (SMD) was calculated using a random-effects model. **Results:** Seven studies with 104,975 patients were included, of whom 10,200 (9.72%) had bronchial asthma. Children with asthma had a worsened attention deficit compared to healthy controls (SMD 0.29 [0.07; 0.51], 95% CI, $p = 0.01$, $I^2 = 92.6\%$). However, no significant difference in memory function was observed between groups (SMD -0.24 [-1.81; 1.33], 95% CI, $p = 0.77$, $I^2 = 96.3\%$). **Conclusion:** This meta-analysis suggests that children with asthma have an increased attention deficit compared to healthy children, while memory function remains unaffected. Further research is needed to explore underlying mechanisms and clinical implications.

Keywords: *ADHD, bronchial asthma, memory function, attention deficit, children*

ACCIDENTAL DETECTION OF LEFT ATRIAL THROMBOSIS – CHALLENGES

Rafiela Chitak[1,2], Ivan Kuchmov[1], Donka Ruseva[3], Mariya Tokmakova[1,2]

1. Cardiology Clinic, UMHAT "Sveti Georgi", Plovdiv
2. First Department of Internal Medicine, Section of Cardiology, Faculty of Medicine, Medical University of Plovdiv
3. Multidisciplinary Transport Hospital Plovdiv

Clinical case: Presentation We present a clinical case of a 67-year-old woman who was admitted to the emergency internal department with complaints of shortness of breath, chest heaviness, and upper dyspeptic syndrome. A computed tomography (CT) scan of the chest and abdomen with contrast material was performed, accidentally revealing a thrombus in the left atrium. According to anamnesis, the patient has a history of atrial fibrillation for 3 months and has been taking a direct oral anticoagulant in an inadequate dose. The patient was referred to a clinic of cardiology for diagnostic and therapeutic clarification. Complete laboratory tests, electrocardiography, and transthoracic echocardiography were performed, revealing atrial fibrillation and a dilated left atrium, but no left atrial thrombosis was detected. However, transesophageal echocardiography visualized a thrombosis lining the left atrial appendage. Anticoagulant therapy was initiated with low molecular weight heparin twice daily for several days, followed by an oral indirect anticoagulant with target INR values between 2.5 and 3.5 for thirty days. Control transesophageal echocardiography after one month showed a thrombosis-free left atrium, allowing for planned restoration of sinus rhythm. **Conclusion:** This clinical case presents the challenges of accidental detection of left atrial thrombosis and subsequent diagnostic and therapeutic management. This is of crucial importance when deciding on the regularization of atrial fibrillation.

Keywords: *thrombus, left atrium, atrial fibrillation, anticoagulant*

UNCOMMON CASES OF PARAPROTEINEMIA IN LYMPHOMAS

Slaveya Chilova[1], Krum Enchev[2], Gabriela Raicheva[2,3], Ivanka Nenova[2,3]

1. Central Clinical Laboratory, UMHAT "Sv. Georgi", Plovdiv
2. Clinic of Medical Oncology, UMHAT "Sv. Georgi", Plovdiv
3. Department of Clinical Oncology, Medical University, Plovdiv

Introduction: Paraproteinemia is a parameter for diagnosis and treatment effects in plasma cell dyscrasias. Its role in other lymphomas is still under investigation. **Aim:** Analysis of cases with a Non-Hodgkin's lymphoma and paraproteinemia. **Patients and methods:** 197 patients with Non-Hodgkin's lymphomas have been studied for five years in the Clinic of medical oncology UMHAT "Sv. Georgi". Myeloma and Waldenstrom's macroglobulinemia have been excluded. The methods for detecting paraproteinemia included serum electrophoresis /Central clinical laboratory, UMHAT "Sv. Georgi"/ and immunofixation electrophoresis /SBALHZ – Sofia/. **Results:** The incidence of paraproteinemia in patients is 7.10% – 3 with chronic lymphocytic leukemia, 1 diffuse large B-cell lymphoma, 6 marginal zone lymphomas, 1 mantle cell lymphoma, 2 follicular lymphomas and 1 T cell lymphoma. There was a tendency for its coincidence with unfavourable factors such as advanced clinical stage, extranodal and bone marrow infiltration, ki67 ≥ 30%. Paraproteins were IgA and IgM. Achieving remission was accompanied by a significant reduction of paraproteinemia. **Discussion:** According to the literature, the incidence of paraproteinemia in Non-Hodgkin's lymphomas is within a wide range. It is discussed as a factor for poor prognosis. Classical methods for paraproteinemia are electrophoresis and serum free light chain assay. Modern methods are based on mass spectrometry. **Conclusion:** Monitoring paraproteinemia in Non-Hodgkin's lymphomas could be a potential indicator of therapeutic efficacy.

Key words: *Paraproteinemia; Non-Hodgkin's lymphomas; serum electrophoresis*

WAIST CIRCUMFERENCE AND PROARRHYTHMOGENICITY IN METABOLIC SYNDROME

Spas Kitov[1], Evgenia Marinova[2], Mari-Florance Kitova[2], Mariana Bazalova[3]

1. *First Department of Internal Diseases, Section of Cardiology, Faculty of Medicine, Medical University of Plovdiv*
2. *Faculty of Medicine, Medical University of Plovdiv*
3. *Department of Physiology, Faculty of Medicine, Medical University of Plovdiv*

Multiple metabolic and proinflammatory factors in metabolic syndrome disrupt repolarization and cause proarrhythmogenicity. The **purpose** of the study was to investigate the relationship between the various indicators of visceral fat tissue assessment and arrhythmogenicity. Using the InBody medical analyzer for weight measurement and segmental analysis of body composition at the Department of Physiology of MU-Plovdiv, kilograms, height, body mass index, waist/hip ratio, waist/height ratio, percentage of fat, level of visceral fat. **Methods:** 71 patients with newly diagnosed metabolic syndrome, aged 35–55 years, were studied. Ischemic heart disease was excluded in all patients with stress test cycle ergometry, CT-angiogdraphy or selective coronary angiography. All patients underwent a 48-hour Holter ECG recording. Based on the latter, they were divided into two groups – with a high arrhythmogenic load – 38 patients (53.5%) (includes supraventricular or ventricular tachycardia, atrial fibrillation/flutter, ventricular extrasystoles over 10%, frequent supraventricular extrasystoles > 500/24 h) and with low arrhythmogenic load – 33 patients – 46.5% (includes no significant rhythm disturbances). **Results:** No statistically significant difference was found between the two groups in terms of age, gender, total cholesterol, triglycerides, HDL-cholesterol, LDL-cholesterol, Apolipoprotein-B, Apolipoprotein-A1, uric acid, blood sugar, immunoreactive insulin, NOMA index , glycated hemoglobin, body mass index, waist-to-hip ratio, fat percentage, visceral fat level ($p > 0.05$) Only for waist circumference is a statistically significant one found ($p < 0.001$). **Discussion:** Waist circumference assesses the amount of visceral adipose tissue and the results show that it is the most informative marker of proarrhythmogenicity. Simple, accessible and reproducible, it indirectly assesses metabolic inflammation in obesity.

Keywords: *Waist circumference, proarrhythmogenicity, metabolic syndrome*

Acknowledgments: Project ДПДП-09/2023 of Medical University, Plovdiv, Bulgaria

COEXISTENCE OF PAPILLARY THYROID CANCER AND RECURRENT PRIMARY HYPERPARATHYROIDISM – A CLINICAL CASE

Spaska Nacheva, Ivaylo Mourdjev, Maria Orbetsova

Department of Endocrinology, Medical University of Plovdiv

Primary hyperparathyroidism with parathyroid adenoma is the most common cause of hypercalcemia, with a prevalence rate of 3.6% – 13.9% in the European population. The combination of primary hyperparathyroidism and non-toxic thyroid nodules is quite common in the clinical practice. The synchronous combination of primary hyperparathyroidism with papillary thyroid carcinoma is rare, with a limited number of cases reported in the literature. Several retrospective studies indicate the existence of a common pathological relationship between the two endocrinopathies. The aim of this report is to describe an accidental finding of thyroid cancer during surgery for parathyroid adenoma, highlighting a rare phenomenona of recurrent hyperparathyroidism, probably caused by thyroid cancer. The case presented is of 80- years old female patient with non-toxic polynodosis struma and primary hyperparathyroidism, diagnosed with 99mTc MIBI scintigraphy with SPECT/CT – adenoma of the upper right parathyroid gland, referred for surgical treatment, as intraoperatively is presented a dense formation with a hard cartilaginous consistency, intimately growing and related to the trachea, with the impossibility of total extirpation. Subsequently, histological verification proved the presence of poorly differentiated papillary thyroid carcinoma with the presence of microinvasion in the surrounding tissue and an enlarged regional lymph node. Postoperatively, the patient is also objectified with rare presentation of persistent evidence of hyperparathyroidism. The patient is sent for staging, percutaneous radiotherapy and metabolic brachytherapy with 131-Iodine. This report emphasizes on the importance of a complete and comprehensive preoperative and intraoperative assessment of possible combined endocrinopathies in the cervical region.

Keywords: *primary hyperparathyroidism, papillary thyroid carcinoma, parathyroid adenoma*

APPLICATION OF INFRARED THERMOGRAPHY AND COLD STIMULATION TEST TO STUDY PATIENTS WITH PRIMARY AND SECONDARY RAYNAUD

Teodor Aleksiev, Zlatina Ivanova, Nina Vutova, Maria Rodopska, Hristo Dobrev

Medical University of Plovdiv

Introduction: Infrared thermography (IRT) is a non-invasive, contactless technique that allows for measuring and visualizing infrared radiation emitted by the human body. This technique is used to study patients with microcirculation disturbances of the skin, inflammatory diseases, benign and malignant skin tumors, and other conditions. **Materials and methods:** A total of 14 consecutive subjects were studied. They were divided into two groups: 6 patients with primary RP and 8 patients with secondary RP (connected with progressive systemic sclerosis, systemic lupus erythematosus, and mixed connective tissue disease). Standardized CST consisting of exposure of both hands to water with a temperature of 10°C for 5 minutes was performed. Changes in skin temperature of both wrists and 2–5 fingers were measured using a thermographic camera. Measurements were made before and 5, 10, 15, 20, 25, and 30 minutes after cold stimulation. The recovery time for baseline temperature of all fingers below 15 minutes was considered normal. **Results:** The CST was normal in 2 (33.3%) of the patients with primary RP, and in 6 (75.0%) of the patients with secondary RP. The rest patients in both groups showed pathological CST. The average complete recovery time for primary RP patients was 25 min, while the average complete recovery time for secondary RP patients was 12.5 min. **Conclusion:** Our results suggested that skin microcirculation is more disturbed in patients with primary RP than in patients with secondary RP. CST in combination with Infrared thermography could be successfully used to study skin microcirculation in patients with RP.

Keywords: *Raynaud, thermography, cold stimulation test, microcirculation*

HE4 AND CA-125 – KEY BIOMARKERS FOR OVARIAN CANCER DETECTION

Teodor Stanev[1], Valya Angelova[2]

1. Medical College, Medical University of Varna
2. Medical College, Medical University of Pleven

Introduction: Ovarian cancer is a leading cause of mortality among gynecological oncological diseases, mainly due to the lack of reliable methods for early diagnosis. HE4 (human epididymal protein 4) and CA-125 (carbohydrate antigen 125) are the two main serum biomarkers used for the detection and monitoring of the disease. **Objective:** The present study aimed to evaluate the diagnostic value of HE4 and CA-125, both alone and in combination, for the early detection of ovarian cancer and the differentiation of benign from malignant tumors. **Materials and methods:** Blood samples from patients with ovarian cancer, benign tumors, and healthy control subjects were studied. HE4 and CA-125 were measured by enzyme-linked immunosorbent assay (ELISA). The sensitivity, specificity and predictive value of both markers were analyzed using ROC curves. **Results and discussion:** HE4 showed higher specificity than CA-125 in differentiating malignant and benign lesions, especially in premenopausal women. CA-125 was more sensitive but less specific, especially in inflammatory diseases. The combination of HE4 and CA-125 increased diagnostic accuracy and reduced false positive results. **Conclusion:** The combined use of HE4 and CA-125 improves the early diagnosis of ovarian cancer. Their inclusion in routine clinical practice may lead to more effective treatment and a better prognosis for patients.

Keywords: *Ovarian cancer, early diagnosis, HE4 (human epididymal protein 4), CA-125 (carbohydrate antigen 125), Serum biomarkers*

URINARY TRACT INFECTIONS IN TRANSGENDER PATIENTS AFTER MALE-TO-FEMALE GENDER AFFIRMATION SURGERY WITH PENILE INVERSION VAGINOPLASTY

Matteo Pacini[1,2]

1. *Department of Translational Research and New Technologies in Medicine and Surgery, University of Pisa, Pisa, Italy*
2. *Department of Urology and General Medicine, Medical University of Plovdiv, Bulgaria*

Introduction: Gender Affirmation Surgery (GAS) is crucial for aligning phenotype with self-perception in gender dysphoria. However, evidence on postoperative UTIs after external genital and urethral reconstruction in male-to-female (MtF) GAS remains limited. **Aim:** The aim is to evaluate the impact of GAS on the incidence of post-operative UTIs. **Materials and methods:** Nineteen patients were enrolled (January 2019 – December 2021) to assess UTIs after estrogen therapy and after MtF-GAS. They were grouped by neovagina reconstruction: standard Penile Inversion Vaginoplasty (PIV) vs. PIV with peritoneal flap. Sexual intercourses/months were recorded, and uni-/multivariate analyses identified risk factors for frequent UTIs (> 1/year). **Results:** During preoperative estrogen therapy, no UTIs occurred. Of the 19 patients, 11 (57.9%) underwent standard PIV, and 8 (42.1%) PIV with peritoneal flap. After a mean follow-up of 3.8 years, 14 (73.6%) experienced at least one UTI episode, with a median of 2 (0–3) UTIs/year. Escherichia coli was isolated in>90% of cases. Patients reported a median of 5 (0–20) intercourses/month, with a higher UTI rate in standard PIV (median 2.5, IQR 1–3) than in PIV with a peritoneal flap (median 0.5, IQR 0–1, p = 0.03). At univariable analysis peritoneal flap was protective, while>10 intercourses/month was a risk factor for > 1 UTI/year. Multivariate analysis confirmed > 10 intercourses/month as an independent risk factor (OR: 20.6, 95% CI 1.29–328.2). **Conclusions:** Preoperative estrogen therapy doesn't increase UTI risk. MtF-GAS appears to elevate UTI incidence, particularly after standard PIV. Engaging in more than 10 sexual intercourses/month is an independent risk factor for recurrent UTIs.

V. Public Health and Health Management Session

MEDICAL SIMULATIONS IN OBSTETRICS AND GYNAECOLOGY – A TECHNOLOGICAL APPROACH TO THE TRAINING OF FUTURE HEALTHCARE PROFESSIONALS

Aleksandra Umlenska[1], Martin Voynov[2], Teodora Dimcheva[3], Milena Sandeva[4], Kristina Kilova[3]

1. *Faculty of Mathematics and Informatics, Sofia University "St. Kliment Ohridski"*
2. *Faculty of Telecommunications and Management, University of Telecommunications and Post*
3. *Department of Medical Informatics, Biostatistics and E-learning, Faculty of Public Health, Medical University of Plovdiv*
4. *Department of Midwifery Cares, Faculty of Public Health, Medical University of Plovdiv*

Introduction. The rapid development of technology and the need to ensure increasingly high standards of patient safety make it a priority to train healthcare professionals with innovative methods and approaches. One of these methods is simulation training, which allows future medical professionals to acquire practical knowledge and skills by simulating real-life situations and medical procedures. Obstetrics and gynaecology are particularly suitable for the implementation of simulation techniques and software, as they require not only knowledge and skills for diagnosis and treatment, but also the ability to respond quickly and accurately to critical conditions. The **aim** of this review is to examine the main types of simulation techniques and software used in the training of specialists in obstetrics and gynaecology and midwives, including mathematical models. **Material and methods.** A keyword search was done in the bibliographic databases of PubMed, Scopus, Google scholar and Web of Science for the main types of simulation techniques and software used in the training of specialists in obstetrics and gynaecology and midwives. **Results and discussion.** An analysis of the main types of simulation techniques and software used in the training of specialists in obstetrics and gynaecology and midwives was made, including mathematical models

implemented in various specialized software solutions. Their advantages and limitations were analysed. **Conclusion.** Simulation training is developing as an effective and safe alternative to traditional methods of training specialists. Combining simulation methods with traditional clinical training in obstetrics and gynaecology can significantly improve the quality of health care and reduce risk to patients.
Keywords: *simulation training, obstetrics and gynaecology, midwives, simulation techniques, simulation software*

PATIENT ASSESSMENT OF THE ROLE OF THE NURSE IN DIABETIC FOOT TREATMENT WITH HYPERBARIC OXYGEN

Vasilka Gyurova-Kancheva[1], Daniela Taneva[1],
Angelina Kirkova-Bogdanova[2], Hristo Bozov[3]

1. Department of Nursing Care, Faculty of Public Health, Medical University of Plovdiv
2. Department of Medical Informatics, Biostatistics and E-learning, Faculty of Public Health, Medical University of Plovdiv
3. University "Prof. D-r Assen Zlatarov" – Burgas

Introduction: Hyperbaric oxygenation is an established adjuvant therapy in the treatment of difficult-to-heal wounds, particularly diabetic ulcers, and as such, requires the participation of a multidisciplinary team. The nurse is part of it and has a teaching, clinical and managerial role during hyperbaric oxygen therapy. **Objective:** The study aims to determine the patient's assessment of the nurse's functions during sessions in a hyperbaric chamber. **Material and methods:** An anonymous questionnaire was conducted based on the author's questionnaire. Fifteen patients (10 men and 5 women) participating in a pilot study of diabetic foot therapy with hyperbaric oxygen responded. Results and discussion: The assessment of the nurse's functions during the treatment of diabetic foot is not affected by the factorial variables: gender, age, place of residence and education. The assessment of the nurse's role in the treatment in a hyperbaric chamber is defined as "extremely important". The interventions she performed during the sessions were also examined. **Conclusion:** The nurse's role in carrying out the sessions in a hyperbaric chamber is crucial for the correct and incident-free course. As part of a multidisciplinary team, the nurse assumes the role of observer and assessor of the evolutionary state of diabetic ulcers. More extensive studies are needed to prove the importance of the functions of healthcare professionals in this type of specific therapy.

Keywords: *hyperbaric oxygenation, diabetic foot, nursing care*

BENEFITS AND RISKS OF SOCIAL MEDIA USAGE AS HEALTH PROMOTION TOOL

Venika Belova, Tsonka Miteva-Katrandzhieva

Medical University of Plovdiv

In the last years social media has become a major part of our life, and its impact is constantly growing. Social media is defined as interactive online platforms, where users share information, knowledge and opinions. The digital health promotion and prevention has become a significant part of the social media content and naturally questions arise such as: do non-specialists have the right to publish health related content, who should control the quality of the information, is there a need for medical professionals to increase their awareness and activity in using digital tools, what are the benefits and risks of using social networks as a source of health information? Scientific databases PubMed, ScienceDirect and Google Scholar were searched using “social media”, “health promotion”, “digital privacy”, “health misinformation” as keywords. We concluded that social media could have an enormous impact as health promotion tool and major benefits are eased access to information and health specialists, health advising, promoting good health behavior, etc. Medical specialists can easily promote health using short videos, posts and showing good examples, without talking to the patients individually. Unfortunately, there are challenges like the difficulty of evaluating information quality and reliability in cases proposed not by a professional, as misinformation can be dangerous and harmful. Basic risks are related also to patients’ personal data management. Therefore, health specialists need to become more active and competent in using online tools for health promotion and prevention.

Keywords: *Social media, Digital health promotion, health misinformation, data privacy*

POSTPARTUM RECOVERY PROGRAM FOR PHYSICAL ACTIVITY BASED ON THE PILATES METHOD

Gergana Koleva-Tashkova, Samuela Kirova, Petya Kasnakova

Medical University of Plovdiv

Introduction: Pregnancy, childbirth, and the postpartum period are significant events in a woman's reproductive life. The postpartum period affects the functional state of all organs and systems in the female body. The inclusion of physical activity through kinesitherapy is an integral part of the overall postpartum recovery process. **Objective:** To determine the impact of a developed physical therapy program based on the Pilates method on the physical condition of postpartum women and to propose practical guidelines for the complete recovery of the body. **Discussion and results:** Physical exercises increase the elasticity, contractile ability, and strength of both skeletal and smooth muscles, improving uterine tone and the condition of other abdominal organs. The core of the movement program is functional training aimed at normalizing motor patterns, restoring torso and limb muscles, and improving posture. This is done in relation to daily activities involving childcare while preventing strain from routine movements such as lifting, feeding the baby, carrying a stroller, and others. Comprehensive rehabilitation is linked to the effects of exercises on bone mineral density, nutritional status and weight loss, cardiovascular health, and strategies for optimizing health promotion before, during, and after pregnancy. **Conclusion:** A physical activity program based on the Pilates method improves functional parameters, has both general and localized effects on the body during the postpartum period, and enhances overall psycho-emotional well-being.

Keywords: *physical activity, Pilates, postpartum period*

REGIONAL DISPARITIES AND DYNAMICS IN THE AVAILABILITY OF PHYSICAL THERAPY AND REHABILITATION IN BULGARIA

E. Razheva, K. Kostadinov, G. Iskrov, T. Miteva-Katrandzhieva, R. Stefanov

Medical University of Plovdiv

Background: Physical therapy and rehabilitation enhance recovery and quality of life, but regional disparities in Bulgaria limit access, requiring analysis to guide policy and ensure equitable healthcare. Aim: To analyze regional trends in physical therapy and rehabilitation access in Bulgaria (2010–2023), focusing on specialists and medical facilities across the country. **Materials and methods:** Secondary data from the National Statistical Institute and National Health Insurance Fund were analyzed for Bulgaria's 28 regions, including population size and the number of inpatient and outpatient medical providers. Regional disparities were evaluated using descriptive, trend, and modified Gini coefficient. **Results:** The annual growth rate of specialized physical therapy and rehabilitation doctors (2010–2023) was 2.13%, reaching 667 by 2023. Inpatient services funded by the National Health Insurance Fund were available in 176 (54.82%) of 321 medical establishments, covered by 10 (3.73%) of 268 approved clinical pathways. Outpatient specialized facilities comprised 13.9% (n = 310) of all outpatient establishments. The highest territorial inequalities were in specialized outpatient services (Gini = 0.142), followed by specialists' distribution (Gini = 0.098). The lowest disparities were observed in inpatient medical providers (Gini = 0.020). **Conclusion:** Significant regional disparities in Bulgaria's physical therapy and rehabilitation persist, especially in outpatient care and specialist distribution. Policymakers should reallocate resources, incentivize specialists in underserved areas, and expand clinical pathways to improve health outcomes and reduce disability. This study provides a foundation for future research and policy interventions.

Keywords: *physical therapy; rehabilitation; access; Bulgaria; Coverage*

ADVANTAGES AND CHALLENGES OF ELECTRONIC SYSTEMS IN PHARMACY PRACTICE

Elena Stoykova[1], Antonya Yaneva[2], Anna Mihaylova[3]

1. *Student, Public Health and Health Management, Faculty of Public Health, Medical University of Plovdiv*
2. *Department of Medical Informatics, Biostatistics and e-Learning, Faculty of Public Health, Medical University of Plovdiv*
3. *Department of Health Care Management, Faculty of Public Health, Medical University of Plovdiv*

Introduction: Electronic systems in pharmacy practice have been implemented to automate and digitize processes related to drug sales, prescription processing, and communication with healthcare institutions. Their integration with the national healthcare information systems allows pharmacists to efficiently manage data, process and verify electronic prescriptions, report dispensed medications to health funds, automatically apply reimbursements and support other functions with enhanced precision and efficiency. **Aim:** This systematic review aims to examine the advantages and disadvantages of electronic systems in pharmacy practice, comparing their implementation and impact in countries within and outside the European Union. **Materials and methods:** The systematic review followed PRISMA guidelines, searching PubMed, Elsevier, and Google Scholar for peer-reviewed articles published between 2020–2024, as well as specialized official websites of regulatory agencies and ministries of health. **Results:** The implementation of electronic systems improves efficiency by automating inventory management, prescription handling, and financial operations, reducing the time required for manual processing. Electronic prescribing and medication verification help minimize dosage errors and drug incompatibilities. Better inventory management is achieved through real-time stock tracking and low-quantity alerts, while transaction recording facilitates control and prevents misuse. Challenges include dependence on internet and technical infrastructure, risks of cyberattacks and data breaches, and the need for staff training, which can be time-consuming. **Conclusion:** Electronic systems in pharmacy enhance efficiency, traceability, and medication safety, contributing to better patient outcomes and satisfaction. Their adoption is hindered

by technical challenges, cybersecurity concerns, and system complexity. To ensure their successful implementation, standardized regulations, robust infrastructure, and training programs are necessary.
Keywords: *electronic system, pharmacy practice, electronic prescriptions, medication dispensing*

THE SOCIOECONOMIC BURDEN OF END-STAGE CHRONIC KIDNEY DISEASE

Elizabet Dzhambazova[1], Georgi Iskrov[1,2]

1. *Department of Social Medicine and Public Health, Faculty of Public Health, Medical University of Plovdiv*
2. *Institute for Rare Diseases, Plovdiv*

Introduction: End-stage chronic kidney disease is associated with a significant socioeconomic burden. This burden is expressed both in direct costs within the health system and in indirect costs related to loss of productivity and work capacity by those affected and their immediate caregivers. **Objective:** To provide an overview of the socioeconomic burden of end-stage chronic kidney disease and its associated dialysis treatment in the EU and US. **Materials and methods:** We searched the PubMed database for original articles using a combination of keywords. Studies from the EU and US after 2010 were included. **Results and discussion:** We identified a total of 27 publications that met the specified inclusion criteria. The studies were conducted in 9 countries in the EU and US. They involved patients, their relatives, and health professionals. Research focused mostly on three aspects: (1) the need for specialized training and counseling of healthcare professionals in dialysis; (2) the cost-effectiveness of peritoneal hemodialysis; and (3) the psychological impact on patients and their caregivers. **Conclusion:** Measuring and assessing the socioeconomic burden of end-stage chronic kidney disease allows health authorities and payers to optimize the processes of prioritizing and allocating resources in healthcare. We recommend conducting a cost-of-illness study of this chronic condition in Bulgaria.

Keywords: *end-stage chronic kidney disease, socio-economic burden, health-related quality of life, productivity loss, psychological impact*

MEDIATION AS A TOOL FOR CONFLICT RESOLUTION BETWEEN PHYSICIANS AND PATIENTS

Kostadin Dimitrov, Tsonka Miteva-Katrandzhieva

Department of Social Medicine and Public Health, Faculty of Public Health, Medical University of Plovdiv

Introduction: Mediation is an alternative dispute resolution method that is voluntary, flexible, and confidential. A neutral third party (the mediator) assists the disputing parties in reaching a consensus without court involvement. The mediator's role is to help clarify issues, explore interests, and create a safe, trusting environment for discussing emotionally challenging matters. The mediator does not make decisions or take sides and must remain impartial. **Objective:** The objective of this study is to assess the applicability of mediation for conflict resolution in healthcare. **Materials and methods:** A literature search was conducted using PubMed, Google Scholar, Web of Science, and Scopus databases. **Results and discussion:** Mediation is highly effective in resolving conflicts between patients and physicians, often arising from miscommunication. Unlike litigation, mediation offers a quicker, more cost-effective solution while maintaining the doctor-patient relationship. A key benefit of mediation in healthcare is its ability to provide a structured, confidential space for open dialogue. Patients can express concerns, while physicians clarify decisions and address misunderstandings. This process fosters mutual understanding and can lead to resolutions that satisfy both parties. Mediation also helps maintain trust in the healthcare system by prioritizing collaboration over blame. It offers patient-centered solutions that address both medical and emotional aspects of conflicts, contributing to better long-term relationships between patients and healthcare providers. **Conclusion:** Mediation is an effective, patient-centered approach to resolving conflicts in healthcare. By improving communication and trust, it offers a cost- and time-efficient alternative to litigation while strengthening the doctor-patient relationship.

Keywords: *healthcare mediation, physician-patient conflict, physician-patient communication, alternative dispute resolution methods*

A RAPID REVIEW OF HEALTH OUTCOMES ASSOCIATED WITH THE FOOD ENVIRONMENT IN CITIES

Kostadin Kostadinov[1,2,3], Donka Dimitrova[2,3,4], Marco Helbich[2,3,5], Angel Burov[2,3,6], Angel Dzhambov[2,3]

1. *Department of Social Medicine and Public Health, Faculty of Public Health, Medical University of Plovdiv, Plovdiv, Bulgaria*
2. *Health and Quality of Life in a Green and Sustainable Environment Research Group, Strategic Research and Innovation Program for the Development of MU-Plovdiv, Medical University of Plovdiv, Plovdiv, Bulgaria*
3. *Environmental Health Division, Research Institute at Medical University of Plovdiv, Medical University of Plovdiv, Plovdiv, Bulgaria*
4. *Department of Health Management and Health Economics, Faculty of Public Health, Medical University of Plovdiv, Plovdiv, Bulgaria*
5. *Department of Human Geography and Spatial Planning, Faculty of Geosciences, Utrecht University, the Netherlands*
6. *Department of Urban Planning, Faculty of Architecture, University of Architecture, Civil Engineering and Geodesy, Sofia, Bulgaria*

Introduction: The food environment is possibly associated with certain health behaviours and choices. Understanding how the food availability, accessibility, and quality affect dietary patterns and health is essential for guiding public health and city planning policies. **Aim:** To synthesize recent evidence on the relationship between the food environment and health outcomes. **Materials and methods:** A literature search was conducted in PubMed for studies published in English from January 2021 to January 2025. The search strategy was developed using DeepSeek, and Rayyan was employed for screening and classifying the articles. **Results:** In total, 1,417 records were identified and screened, followed by data charting and a narrative synthesis. Findings showed that 1) unhealthy food environments, characterized by high fast-food outlet density and limited access to fresh produce, were associated with increased diabetes incidence; 2) Cardiovascular health outcomes were linked to food availability, with healthier environments corresponding to reduced disease risk; 3) Exposure to ultra-processed food and food deserts was associated with dietary choices that may contribute to weight gain and obesity; and 4) Some studies suggested that pregnancy-related outcomes, including gestational diabetes and hypertensive disorders, may be associated with food

environment-related dietary patterns. However, studies showed considerable heterogeneity in terms of exposure definitions and study designs. **Conclusion:** Geographical access to food outlets and the availability of healthy and affordable food influences peoples' dietary choices. Integrating food environments into urban policy and planning incentives may improve public health. Future research should prioritize natural experiments to clarify causal relationships and guide effective measures.
Keywords: *Food environment, Dietary behaviors, Health outcomes, Food accessibility, Urban planning*

GENETIC NEONATAL SCREENING: PERSPECTIVES AND ETHICAL CHALLENGES

Lilia Tsenkova-Toncheva, Georgi Iskrov, Rumen Stefanov

Department of Social Medicine and Public Health, Faculty of Public Health, Medical University of Plovdiv

Introduction: Genetic and genomic diagnostics can significantly enhance neonatal screening programs by enabling early disease detection and personalized treatment strategies. Integrating these technologies into routine screening could improve health outcomes through earlier interventions. **Aim:** This review examines the implementation of genetic and genomic diagnostics in neonatal screening programs across European countries and the United States. It focuses on their effectiveness, challenges, and ethical considerations. **Materials and methods:** A literature review was conducted in PubMed, including original studies published after 2010 on genetic neonatal screening in Europe and the United States. Studies were selected based on their relevance to implementation, clinical outcomes, and policy frameworks. **Results and discussion:** A selection of 12 studies met the inclusion criteria, including two that described pilot programs integrating genomic sequencing into neonatal screening. The main challenges identified include issues with informed consent, cost-effectiveness, and healthcare infrastructure. Ethical concerns, such as incidental findings, genomic data storage and usage, as well as parental anxiety, were frequently discussed. Several studies also highlight the role of AI-assisted newborn screening, biochemical profiling, and pilot programs in optimizing diagnostic accuracy. Despite challenges, genetic screening showed potential for improved diagnostics and early treatment opportunities. **Conclusion:** Further research is needed to evaluate the perspectives of healthcare professionals and patients, particularly in Bulgaria, on genetic neonatal screening. Understanding their expectations and concerns will be key to shaping future policies and ensuring the ethical integration of these technologies.

Keywords: *genetic neonatal screening, genetic newborn screening, genomic newborn screening, ethical challenges*

EXTENDED REALITY SIMULATION TRAINING IN MEDICINE AND HEALTHCARE

Marine Aslanidze[1], Zhaklin Kozhuharova[1], Angelina Kirkova-Bogdanova[2], Zhivko Peychev[2], Kristina Kilova[2]

1. *Faculty of Telecommunications and Management, University of Telecommunications and Post*
2. *Department of Medical Informatics, Biostatistics and E-learning, Faculty of Public Health, Medical University of Plovdiv*

Introduction: The advent of new technologies such as extended reality (XR), including virtual reality (VR), augmented reality (AR) and mixed reality (MR), as well as the development of wearable devices – glasses and displays, are changing the way medical education is delivered and innovations are implemented in medicine and healthcare. These technologies offer benefits but also raise questions about how best to preserve the core values of medical education. This study aims to explore and analyse the opportunities for applying augmented reality in the education and practice of medical professionals. **Material and methods:** The PubMed, Web of Science, Scopus and Google Scholar databases were explored and analysed for the application of augmented reality in the education of medical professionals. **Results and discussion:** It was found that simulation training with augmented reality in medical education offers a unique opportunity to improve the knowledge and skills of medical professionals in a simulation environment, facilitate procedures and overcome the limitations imposed by traditional training methods. The advantages and limitations of using these technologies in simulation training and healthcare have been analysed. **Conclusion:** Augmented reality has enormous potential in the healthcare industry and training by improving medical education and improving patient care quality.

Keywords: *extended reality, augmented reality, virtual reality, medical education, healthcare professionals*

ADVANCES IN HPV PREVENTION: INTEGRATING VACCINATION, SCREENING, AND PUBLIC HEALTH STRATEGIES TO REDUCE INFECTION RISK AND DISEASE BURDEN

Meri Hristamyan

Department of Epidemiology and Disaster Medicine,
Faculty of Public Health, Medical University of Plovdiv

Human papillomavirus (HPV) is a prevalent sexually transmitted infection linked to various cancers, including cervical, oropharyngeal, and anogenital cancers, as well as genital warts. Preventive strategies are essential to mitigating HPV transmission and its associated health risks. These strategies include: Vaccination: Prophylactic HPV vaccines have demonstrated high efficacy in preventing infections with high-risk HPV types. There are bivalent, quadrivalent, and nonavalent vaccines, with the latter offering broader protection. Clinical trials have shown these vaccines to be safe, immunogenic, and effective. Implementing vaccination programs within national screening initiatives is likely to be cost-effective and significantly reduce the HPV-related disease burden. Safe Sexual Practices: Public health measures aimed at promoting condom use, reducing the number of sexual partners, and encouraging safer sex strategies have been employed to reduce HPV transmission. While condoms do not provide complete protection, they are the most effective barrier method for reducing transmission. Researchers have also explored the potential of certain carrageenan-based lubricants to inhibit HPV transmission. Screening and Early Detection: Regular cervical screening through Pap smears and HPV DNA testing enables early detection of precancerous lesions, facilitating timely intervention. HPV screening is not currently recommended for men, but certain high-risk groups may benefit from targeted screening. Educational Interventions: Educational programs have been effective in increasing HPV vaccination uptake and improving knowledge about HPV and its associated risks. School-based educational interventions and participatory action research have positively influenced adolescents. In conclusion, a multifaceted approach is essential for the effective prevention of HPV infections and their associated diseases.

Keywords: *Human papillomavirus (HPV), Vaccination, Screening, Public health interventions, Prevention strategies*

PREVALENCE OF VIRAL HEPATITIS B AND HEPATITIS C AMONG PEOPLE LIVING WITH HIV/AIDS IN SOUTHERN BULGARIA (PRELIMINARY DATA)

Nikoleta Pamukova[1], Elitsa Golkocheva-Markova[2], Ivan Baltadzhiev[3], Mery Hristamyan[4], Ani Kevorkyan[4]

1. Student, Faculty of Medicine, Medical University of Plovdiv
2. NRL Hepatitis Viruses, Virology Department, NCIPD, Sofia, Bulgaria
3. Department of Infectious Diseases, Parasitology and Tropical Medicine, UMHAT "St. George", Plovdiv
4. Department of Epidemiology and Disaster Medicine, Faculty of Public health, Medical University of Plovdiv

Viral hepatitis caused by hepatitis B virus (HBV) and hepatitis C virus (HCV) remains one of the most common infections among people living with HIV/AIDS all over the world and share similar transmission routes. The present study aims to evaluate the prevalence of HBV and HCV infection in HIV-positive cohort. **Materials and methods:** The serum samples were collected between April to December 2024 at the University hospital "St. George", Plovdiv. The serological markers for HBV (HBsAg, HBsAb, HBcAb) and HCVAb of 169 stored baseline serum samples from HIV-positive patients were measured retrospectively. Out of these 169 samples, 66 were also tested for HBV DNA and HCV RNA. Standard descriptive statistics were used. **Results:** The median age of the patients was 40.7 years and an established ratio of 4.12:1 male to female. From all of the tested patients, HBsAg was found in 5.3%, 25.4% were positive for HCVAb, and only 1.8% were positive for HBsAg and HCVAb. Serological markers for previous HBV infection among HBsAg-negative patients were detected in 44%. Out of the tested for HBV DNA samples, 9% were positive for resent HBV infection. HBV DNA was detected in three HBsAg negative patients, resulting in a prevalence of 4.5% for occult HBV infection. Only 2% were positive for HCV RNA from all the tested HBV DNA samples. **Conclusions:** High HCV and HBV prevalence and diverse HBV serological patterns are observed in HIV-positive patients. A follow-up and a referral for treatment by a gastroenterologist are required.
Keywords: *HBV, HCV, occult HBV, HIV-positive patients*

ANALYSIS OF DATA FROM THE NATIONAL HEALTH INFORMATION SYSTEM OF BULGARIA

Svetlana Chepilska, Kristina Pavlova Kilova

Faculty of Public Health, Medical University of Plovdiv

Introduction: The digitalization of healthcare systems provides an opportunity to enhance decision-making and policy development through comprehensive data analysis. This study focuses on analysing data from the National Health Information System (NHIS) of Bulgaria to evaluate public health trends and resource utilization. The **aim** is to identify patterns in healthcare access, disease prevalence, and resource distribution, offering insights for evidence-based policy-making. **Materials and methods:** Anonymized datasets from the NHIS were analysed using statistical methods. Data visualization techniques were applied to highlight regional disparities and temporal trends during different years from 2021 to present days. Key indicators such as examinations, prescribed and dispensed prescriptions, immunizations and referrals, disease incidence rates, and healthcare resource allocation were assessed. **Results and discussion:** The results reveal significant regional inequalities in healthcare access, with rural areas showing limited availability of services compared to urban regions. Resource allocation analysis highlights inefficiencies, particularly in underutilized healthcare facilities. These findings underscore the importance of integrating advanced analytics into the management of national healthcare systems. **Conclusion:** Addressing regional disparities and optimizing resource allocation could significantly improve health outcomes. Future work will focus on developing predictive models to support proactive health management and policy implementation.

Keywords: *National Health Information System, public health, healthcare access, data analysis*

THE IMPACT OF CANNABIDIOL ON ANXIETY AND PANIC ATTACKS

Tanya Gesheva[1], Anna Mihaylova[2]

1. *Student, Faculty of Public Health, Medical University of Plovdiv*
2. *Department of Healthcare Management, Faculty of Public Health, Medical University of Plovdiv*

Introduction: CBD (cannabidiol) is increasingly being used as an alternative treatment for anxiety and panic attacks. A review of scientific literature identifies dozens of controlled studies involving thousands of patients, documenting the safety and efficacy of CBD to varying degrees in the treatment of chronic anxiety and panic attacks. **Aim:** To conduct a literature review from scientific databases on studies examining the application of CBD in various forms for patients suffering from anxiety and panic attacks. **Materials and methods:** A review of scientific literature was conducted using the databases PubMed, ScienceDirect, and Google Scholar. A systematic review was performed with keywords: CBD, anxiety, panic attacks, sedatives and medical cannabis. **Results and discussion:** Randomized studies have found that 63% of the participants included using CBD or medical cannabis as an alternative therapy instead of their prescribed traditional sedatives and opioids, which often lead to dependency. Patients suffering from chronic anxiety and panic attacks report reduced discomfort and improved quality of life after one year of CBD use without experiencing significant side effects. CBD can be used for various forms of anxiety. For panic attacks, it has been proven that CBD has a calming and anti-anxiety effect through the activation of CB1 and CB2 receptors in the brain. **Conclusion:** The analyzed data from the systematic review indicate that CBD as an alternative therapy provides patients with prolonged relief from anxiety and panic attacks in the long term, without causing addiction or significant adverse side effects.

Keywords: *CBD, anxiety, panic attacks, sedatives, medical cannabis*

NEW OPPORTUNITIES FOR SCREENING FOR LUNG DISEASES VIA A TELEMEDICINE STATION – RESULTS OF A PILOT STUDY CONDUCTED IN BULGARIA

Hristo Buchkov[1], Nonka Mateva[1], Blagoi Marinov[2], Antoniya Yaneva[1], Irena Hambarova[1]

1. *Department of Medical Informatics, Biostatistics and E-learning, Faculty of Public Health, Medical University of Plovdiv*
2. *Department of Pathophysiology, Faculty of Medicine, Medical University of Plovdiv*

Introduction: In modern medicine, telemedicine is established as an effective tool for providing health services and monitoring patients, especially in conditions of limited access to specialized care. Pulmonary diseases are one of the most common diseases worldwide. They represent a significant part of the global burden of chronic diseases, with early diagnosis and screening being crucial for the successful management of these conditions. The main **objective** of this study is to assess the potential of telemedicine technologies for early detection of pulmonary and comorbid diseases, and to provide reliable data for future application of this approach for preventive programs of the national health system. **Material and methods:** A pilot study was conducted in the period April 1, 2024 – November 28, 2024 in seven cities in Bulgaria. 352 people were surveyed in the field by trained nurses. A certified telemedicine station (CE certificate, Medical Device Directive 93/27) was used, which automatically collects and processes the data. **Results:** The following parameters were measured: height; weight; temperature; oxygen saturation; heart rate; forced vital capacity and forced expiratory volume in one second. An electrocardiogram was performed. The data were recorded in a digital system, providing the possibility of future analysis. **Conclusion:** Screening programs based on telemedicine technologies reveal new prospects for effective prevention and monitoring of both lung diseases and a number of socially significant diseases.

Keywords: *telemedicine, screening, lung diseases*

THE IMPACT OF SOCIAL MEDIA IN THE VACCINE DECISION MAKING PROCESS AMONGST PREGNANT WOMEN: ANALYZING INFLUENCES AND MISINFORMATION

Jeevana Sai Veeraraghavapuram, Anna Jims, Adeena Amaf,
Sandra Merin Sobin, Shalini Selvaranchithakumar

Medical University of Plovdiv

Maternal immunisation is a crucial public health strategy aiming to provide protection to both mother and the foetus. Currently, pregnant women are recommended to receive vaccines for pertussis, RSV, influenza and COVID-19. Despite it being proven to be an extremely beneficial public health measure, there is growing hesitancy within the general population, particularly among pregnant women. A major factor contributing to this is the spread of misinformation online via anti-vaccination groups, which pose a major threat to the success of a highly effective vaccination program. The aim of this study is to analyze the impact of social media and the growing scepticism on the vaccine decision making for pregnant women by analysing the online database of more than 50 studies published in the last 5 years. Fake news has a significant impact on vaccine hesitancy among pregnant women, highlighting the pivotal role of internet access in influencing vaccination decisions. Proposed strategies to address these challenges include enhancing digital literacy among pregnant women to empower them to discern reliable information sources and developing targeted communication campaigns that specifically address their concerns and clarify doubts about vaccine safety and efficacy. Vaccine hesitancy among pregnant women is a growing global concern, and requires impactful measures to increase the vaccine coverage for better maternal and fetal health.

Keywords: *Vaccine hesitancy, social media, pregnant women, immunisation and maternal health*

APPLICATION OF ARTIFICIAL INTELLIGENCE IN PHARMACOVIGILANCE – A SYSTEMATIC REVIEW

Panagiotis Koletsas[1], Evelina Gavazova[2], Radiana Staynova[2], Daniela Kafalova[2]

1. Faculty of Pharmacy, Medical University of Plovdiv
2. Department of Organization and Economics of Pharmacy, Faculty of Pharmacy, Medical University of Plovdiv

Introduction: Pharmacovigilance is the science of detecting, assessing, and preventing adverse drug reactions (ADRs) and medication errors. It is critical for ensuring patient safety and optimizing drug efficacy. The integration of artificial intelligence (AI) aims to enhance the efficiency, accuracy, and scope of pharmacovigilance activities. Emerging technologies such as Machine Learning (ML), Natural Language Processing (NLP), Robotic Process Automation (RPA), and Deep Learning are revolutionizing pharmacovigilance and healthcare data analysis. **Aim:** To evaluate the current applications and future prospects of AI in pharmacovigilance. **Materials and methods:** A systematic search was conducted across electronic databases using keywords such as “pharmacovigilance”, “artificial intelligence”, “AI”, “adverse reactions”, and “deep learning”. Articles published after 2019 in English were included in the review, following the PRISMA guidelines. **Results and discussion:** A total of 12 articles were selected for review. Machine learning (ML) facilitates the prediction of ADRs, signal detection, and data classification. NLP aids in extracting mentions of adverse events from unstructured text sources, including social media, call center logs, and medical literature. RPA streamlines workflows by automating repetitive tasks, such as case entry and reporting, improving overall efficiency. Collectively, these technologies enhance the accuracy, speed, and decision-making processes in healthcare data management. **Conclusion:** Despite their recent development, AI technologies hold the potential to significantly transform and advance the field of pharmacovigilance.

Keywords: *Pharmacovigilance, Artificial Intelligence, Adverse Effects, Machine Learning, Deep Learning*

MICROINVASIVE AESTHETIC MANAGEMENT OF DENTAL FLUOROSIS IN CHILDHOOD: A CASE REPORT

Alis Dimitrova[1], Stella Kostadinova[1], Irina Uzunova[2], Ani Belcheva[2], Tanya Nihtyanova[2]

1. Student, Faculty of Dental Medicine, Medical University of Plovdiv
2. Department of Pediatric Dentistry, Faculty of Dental Medicine, Medical University of Plovdiv

Introduction: Dental fluorosis is a disease caused by excessive endogenous fluoride intake during tooth formation. Teeth erupt with defects that are chalky white, yellowish or brown in color, depending on the degree of fluorosis. Carious infiltration is one of the minimally invasive methods for aesthetic treatment of such lesions. The aim of this report is to present two clinical cases of microinvasive treatment of fluorosis in childhood. **Clinical cases:** The first case is a 12-year-old girl with moderate fluorosis of the front teeth (Dean grade III). The second case is a 17-year-old girl also with moderate fluorosis, but affecting the entire dentition. The main complaint is the presence of chalky white spots on the teeth and a desire for aesthetic treatment. In both cases, in order to avoid operative treatment, a microinvasive technique of resin infiltration was chosen. The manufacturer's recommended clinical protocol for infiltration of non-carious lesions with low-viscosity ICON Vestibular resin was used. Follow-up examinations were scheduled at 1-st week, 6-th, 12-th, and 24-th month. Although minor hypomineralized white spots remained in the cervical areas of the teeth, patients and parents were satisfied with the results. In both cases, excellent aesthetic appearance was observed after 2 years of follow-up. **Conclusion:** Carious infiltration is a safe and effective method for the aesthetic treatment of dental fluorosis in childhood. The results are easily predictable, and the clinical protocol is particularly suitable for children.

Keywords: *Icon, infiltration, fluorosis, microinvasive treatment*

APPLICATION OF BOTULINUM TOXIN IN PATIENTS WITH SLEEP BRUXISM AND ASSOCIATED OBSTRUCTIVE SLEEP APNEA

Anastasiya Zheleva[1], Todor Georgiev[2], Aneliya Draganova[2], Boyan Vladimirov[1], Kiril Terziyski[2]

1. Department of Maxillofacial Surgery, Faculty of Dental Medicine, Medical University of Plovdiv
2. Department of Pathophysiology, Faculty of Medicine, Medical University of Plovdiv

Introduction: Sleep bruxism (SB) is a disorder, characterized by repetitive activity of the masticatory muscles during sleep. It often coincides with Obstructive sleep apnea (OSA), though a protective effect of SB on the severity of the latter has been hypothesized. Thus, treatment with botulinum toxin may hypothetically worsen sleep apnea, but the problem has not been thoroughly studied. **Aim:** The aim of this study is to examine the effects of botulinum toxin treatment in patients with SB and OSA. **Patients and methods:** Six patients with severe bruxism and various degree of OSA (2 severe, 2 moderate and 2 mild) underwent clinical examination and polysomnography before and 4 weeks after the treatment with botulinum toxin type A injections into the masseter and temporal muscles. **Results and discussion:** All patients experienced a reduction in facial pain intensity, improved functional movements of the masticatory muscles, and a decrease in temporomandibular joint dysfunctions. The Bruxism Index did not always correlate with the positive clinical response, likely due to changes in the strength of the muscle contractions rather than their frequency. The effect of the application of botulinum toxin resulted in the respiratory parameters, usually presenting with a decreased apnea-hypopnea index. Interestingly, patients with increased AHI were those having decreased bruxism index. **Conclusion:** The therapy of bruxism with botulinum toxin is well tolerated, effective and safe in patients with concomitant OSA. Future studies with a larger number of patients with sleep apnea and bruxism are needed.

Keywords: *Bruxism, Obstructive Sleep Apnea, Botulinum Toxin Type A*

STUDY OF THE ORAL HEALTH OF ACTIVELY PLAYING SPORTS CHILDREN – FOOTBALL PLAYERS

Aleksandar Atanasowski[1], Velina Stoeva[2]

1. *Department of Pediatric Dentistry, Faculty of Dental Medicine, Medical University of Plovdiv*
2. *Department of Epidemiology and Disaster Medicine, Faculty of Public Health, Medical University of Plovdiv*

Oral health is extremely important for all people, including child athletes. The low oral health and the presence of risk among this group have been proven and this requires the definition and preparation of a program for prevention and prophylaxis. **Aim:** To study the oral health of actively playing sports child football players and to determine guidelines for their prophylaxis. **Materials and methods:** The prospective study included a total of 400 child football players in 10 age groups. The Greene Vermillion Oral Hygiene Index (OHI-S) was used to determine the oral hygiene status. The data were statistically processed with SPSS v.19. **Results:** in eight-year-olds, the highest relative share with plaque index 0–1, (52.50%). 35.00% is the relative share of children with grade 1.1–2 and 12.50% is the relative share of children with grade 2.1–3. In nine-year-old children, the distribution is approximately even, for 0-1 the relative share is 30.00%, for 1.1–2 the value is 37.50% and 32.50% is the relative share for degree 2.1–3. **Conclusion:** Knowing, monitoring and reducing risk factors is crucial for oral health. The consequences of neglecting these risk factors can affect the oral and general health of children and their performance in sports.
Keywords: *oral health, oral hygiene index, prevention*

SELF-ASSEMBLING PEPTIDES – A NEW APPROACH TO ENAMEL BIOREMINERALISATION

Veselina Todorova[1], Kostadin Georgiev[1], Neshka Manchorova[1], Ivan Filipov[1], Ivan Panayotov[2]

1. Faculty of Dental Medicine, Medical University of Plovdiv, Bulgaria
2. Laboratoire de Bioingénierie et Nanoscience (LBN), Montpellier University, France

Introduction: In recent years, the term "biomimetic remineralisation" of enamel has been discussed in the scientific literature. Biomimetic remineralisation mimics the natural mineralisation process. Various remineralisation systems have been developed based on amelogenin, peptides, amino acids and calcium phosphate nanoparticles. Self-assembling peptides are among the most studied biomimetic remineralisation agents. **Aim:** The aim of this study is to describe and review a novel technology for enamel remineralisation through a biomimetic approach using the self-assembling peptide P11-4. **Materials and methods:** A keyword search of literature sources in PubMed for the last 10 years was performed. Of the 87 articles found, 35 in vitro, in vivo and clinical studies were used as appropriate in the current review. **Results and discussion:** Analysis of the data showed that the self-assembling peptide P11-4 diffuses into the subsurface lesion, assembles into scaffolds throughout the lesion, and supports the nucleation of de novo hydroxyapatite nanocrystals, resulting in an increased mineral density of enamel. Most of the studies reviewed elucidate the mechanism of action, safety, clinical applicability and efficacy of P11-4. **Conclusion:** Since the ideal approach to enamel regeneration would be to replace the degraded enamel matrix with a biomimetic matrix that promotes in-depth remineralisation of enamel lesions, P11-4 has a great potential in the non-invasive treatment of initial caries lesions.

Keywords: *enamel bioremineralisation, P11-4, self-assembling peptide*

Acknowledgements: Scientific Research Fund "Bilateral cooperation programmes – Bulgaria – France Rila Programme – 2021", Contract No. KP-06-Rila/11 dated 16.12.21.

PROFILING OF DENTAL PULP STEM CELLS AS POTENTIAL FOR REGENERATION

Mariya Lyubenova-Sultanova, Neshka Manchorova

Operative Dentistry and Endodontics, Faculty of Dental Medicine, Medical University of Plovdiv

Introduction: Much effort has been spent to understand the fine composition of tissues and the cellular and molecular mechanisms that mediate the cross talk between stem cells and their environment to drive regenerative process. **Aim:** The aim of the study is to present a literature review about cellular and molecular composition of the stem cells in the dental pulp. **Material and methods:** A keyword search of literature sources in Pub Med for the last 10 years was performed respected filter including dental pulp stem cells, molecular composition and signalling and regeneration potential. A total of 114 articles were found. 19 in vivo, in vitro and clinical studies were used. **Results and discussions:** Analyses of the data shows that 15 clusters of cells were isolated. The variety of the population include MSCs, fibroblasts, odontoblasts, endothelial cells (ECs), immune cells and erythrocites. Age did not affect mesenchymal characteristics of dental pulp stem cells for various age groups. **Conclusion:** The diversity and heterogeneity in the dental pulp stem cells made them a promising source of cells for application in regenerative medicine, tissue engineering and stem cell therapy.

Keywords: *pulp stem cells, regeneration, profiling*

EXPRESSION OF GFRA3+ IN HUMAN PULP WITH AGEING-A PILOT STUDY

Mariya Lyubenova-Sultanova[1], Neshka Manchorova[1], Margarita Gueneva[2], Mina Pencheva[3]

1. *Department of Operative Dentistry and Endodontics, Faculty of Dental Medicine, Medical University of Plovdiv*
2. *Laboratory Haematopathology and Immunology, National Specialised Hospital for Haematological Diseases, Sofia*
3. *Department of Medical Physics and Biophysics, Faculty of Pharmacy, Medical University of Plovdiv*

Objectives: Nerve fibres are crucial elements of stem cell niches as they regulate MSCs' function and fates. Two distinct clusters of ScCs are formed in the dental pulp – myelinating MBP+ ScCs- Localised mostly around major nerve fibres and nonmyelinating GFRA3+-ScCs mostly in the subodontoblastic region. **Aim:** The aim of the study is to examine the age dependent immunohistochemical distribution of GFRA3+expressed by the niches of Schwan-cells in the dental pulp. **Materials and methods:** Twelve intact teeth of healthy individuals were enrolled in the study and arranged in four groups (n = 3 in each group) regarding the patients' age: tooth germs with young pulp (14–16 years old), adult pulp (18–35 years old), mature pulp(36–50 years old) and senescent pulp (51–75 years old). All teeth were freshly extracted due to orthodontic indications (dental germs of third molars), difficult eruption (third mollars) and periodontal bone lost (premolars and incisors). The specimens were fixed overnight in 10% buffered paraformaldehyde, decalcified in a 3% hydrochloric acid (HCl) for 6 hours and paraffin embedded. For immunohistochemistry polyclonal antibody GFRA3+ was used. **Preliminary results and discussion:** Analysis of the data showed that the distribution of Schwann-cells shows uniform and stable immunolabeling in all ages and the mesenchymal stem cells were evident in young pulp and senescent specimens as well. **Conclusion:** Within the limitation of our study aged dental pulp expresses well preserved Schwann cells and shows potential for regenerative response.

Keywords: *GFRA3+, ScCs, potential for regeneration, ageing*

EFFICACY OF MOUTHWASHES IN SCHOOL-AGE PATIENTS WITH FIXED ORTHODONTIC APPLIANCES: A LITERATURE REVIEW

Mihaela Evtimova[1], Tanya Zalamova[2], Tanya Nihtyanova[2], Blagovesta Yaneva[3], Ani Belcheva[2]

1. Student, Faculty of Dental Medicine, Medical University of Plovdiv
2. Department of Pediatric Dentistry, Faculty of Dental Medicine, Medical University of Plovdiv
3. Department of Periodontology and Oral Mucosa Diseases, Faculty of Dental Medicine, Medical University of Plovdiv

Introduction: Mouthwashes are readily available and effective adjuncts to personal oral hygiene, especially for children with fixed orthodontic appliances. **Objective:** The present study aimed to systematically review and synthesize the available randomized controlled trials investigating the effects of mouthwashes on gingival inflammation in orthodontically treated children. **The results** of this review should be useful in guiding clinical decision-making and further research in this area. **Methods:** 30 randomized controlled trials were analyzed comparing the efficacy of mouthwashes versus controls on Streptococcus Mutans (SM), periodontal pathogen count, gingivitis presence and level of oral hygiene. **Results:** Of the 30 studies identified, only 16 remained to be de-gelled after applying certain criteria. Studies show that mouthwashes significantly reduce plaque and gingival inflammation. The combination of mechanical oral hygiene with the addition of mouthwashes gives the best results in the context of oral hygiene in orthodontic patients. **Conclusion:** The present studies provide a basis for recommending mouthwashes to mechanical oral hygiene, especially in children undergoing orthodontic treatment. Different ingredients offer different benefits in reducing plaque and inflammation.
Keywords: *mouthwashes, gingivitis, orthodontic treatment in children*

THE INFLUENCE OF THE MICROENVIRONMENT ON THE DIFFERENTIATION OF GINGIVAL MESENCHYMAL STEM CELLS IN PERIODONTAL REGENERATION: LITERATURE REVIEW

Mihaela Evtimova[1], Blagovesta Yaneva[2]

1. *Student, Faculty of Dental Medicine, Medical University of Plovdiv*
2. *Department of Periodontology and Oral Mucosa Diseases, Faculty of Dental Medicine, Medical University of Plovdiv*

Introduction: Gingival mesenchymal stem cells (GMSCs) are a key element in regenerative medicine due to their ability to differentiate and regenerate periodontal tissues. However, the effectiveness of this process depends on the microenvironment, which includes mechanical, chemical, and biological factors. Understanding these interactions is essential for optimizing therapies. **Objective:** To investigate the influence of the microenvironment on the differentiation of gingival mesenchymal stem cells, focusing on key factors that support or hinder periodontal regeneration. **Methods:** Fifteen scientific articles from the last ten years were reviewed, examining how the mechanical properties of the environment, biochemical signals, oxygen levels, extracellular matrix components, and inflammatory processes affect the development of gingival mesenchymal stem cells. Data from studies conducted mainly in laboratory conditions and on animal models, as well as from a limited number of clinical studies, were analyzed. **Results:** It was found that the microenvironment plays a crucial role in determining the differentiation pathways of gingival mesenchymal stem cells. Reduced oxygen levels (hypoxia) keep the cells in an undifferentiated state, while normal oxygen conditions stimulate their development into specific cell types. The presence of growth factors, such as TGF-β and BMP, and components of the extracellular matrix, such as collagen and fibronectin, significantly enhance regenerative potential. **Conclusion:** The microenvironment has a complex and significant influence on the differentiation of GMSCs, highlighting the need for controlled modification in regenerative applications. A better understanding of these mechanisms could lead to the development of more

effective strategies for periodontal regeneration and personalized therapeutic approaches.

Keywords: *Gingival mesenchymal stem cells, differentiation, periodontal regeneration, extracellular matrix*

THE EFFECT OF GLYCERIN ON THE SURFACE HARDNESS AND ROUGHNESS OF COMPOSITES

M. Tsanova-Stamatova[1], M. Lyutsov[2], B. Krastev[1], V. Todorova[1]

1. *Department of Operative Dentistry and Endodontics, Faculty of Dental Medicine, Medical University of Plovdiv*
2. *Student, Faculty of Dental Medicine, Medical University of Plovdiv*

Introduction: Polymerization of dental composites is a chain reaction initiated by free radicals. When composites are exposed to air during this process, the oxygen in the air reduces the excitability of the photoinitiator and stabilizes the free radicals, causing polymerization to be disrupted or delayed. As a result, an oxygen inhibition layer (OIL) forms on the surface of cured composites. The OIL affects the prognosis of composite restorations by reducing the surface hardness, wear resistance and marginal adaptation of composite restorations. The OIL can be reduced by curing the last part of the composite through a layer of glycerin. **Objective:** The aim of this review was to determine the effect of glycerin on the surface hardness and roughness of composite restorations. The null hypothesis of the study was that the surface properties of composites wouldn't change with or without the application of glycerin. **Materials and methods:** A comprehensive electronic data search was conducted using the Google Scholar and PubMed search engines to identify articles discussing the effect of glycerin on the surface hardness and roughness of composites. Only original studies and review articles were included in the following systematic review. **Results and discussion:** Based on the full-text articles evaluation, the application of glycerin can be considered as an effective method to reduce the formation of oxygen inhibition layer in composite restorations. **Conclusion:** Curing the last portion of composite through a layer of glycerin can improve some of the properties of the composite restorations and is recommended for the clinical practice.

Keywords: *glycerin, composite, oxygen, inhibition*

EVALUATION OF THE EFFECTIVENESS OF AN INNOVATIVE MOUTHWASH ON GINGIVAL INFLAMMATION IN A SCHOOL-AGED PATIENT WITH FIXED ORTHODONTIC APPLIANCES – A CLINICAL CASE REPORT

S. Isakova[1], T. Zalamova[2], T. Nihtyanova[2], B. Yaneva[3], A. Belcheva[2]

1. *Student, Faculty of Dental Medicine, Medical University of Plovdiv*
2. *Department of Pediatric Dentistry, Faculty of Dental Medicine, Medical University of Plovdiv*
3. *Department of Periodontology and Oral Mucosal Diseases, Faculty of Dental Medicine, Medical University of Plovdiv*

Objective: The present study aims to evaluate the effectiveness of a test mouthwash on gingival inflammation in a patient with fixed orthodontic appliances. **Materials and methods:** A 12-year-old patient undergoing treatment with fixed orthodontic appliances and exhibiting signs of gingival inflammation reached out for a consultation at the Department of Pediatric Dentistry, Faculty of Dental Medicine, Medical University – Plovdiv. The patient reported bleeding during tooth brushing. The medical history revealed that orthodontic treatment had been ongoing for one year. A clinical examination indicated unsatisfactory oral hygiene, as evidenced by an Orthodontic Plaque Index (OPI) score of 4, plaque-associated gingivitis with a Full Mouth Bleeding Score (FMBS) of 33.3%, and a Full Mouth Plaque Score (FMPS) of 57.69%. Professional oral hygiene was performed using an ultrasonic scaler and Air-Flow. The patient received motivation and training in personal oral hygiene, along with the prescription of a mouthwash containing cetylpyridinium chloride, aloe vera, and inulin for a period of 21 days. Follow-Up At the 21-day and three-month follow-up evaluations, all parameters showed significant improvement compared to the initial values (OPI 2, FMPS 12,5%, FMBS 9,38%). **Conclusion:** Gingival inflammation parameters in patients with fixed orthodontic appliances improve through motivation and training in proper personal oral hygiene, combined with the use of a plaque-inhibiting chemical agent.
Keywords: *mouthwashes, gingivitis, orthodontic treatment in children.*

THE USE OF GAMIFICATION TO MOTIVATE DIETARY HABITS AND ORAL HYGIENE IN CHILDREN

T. Esho[1], M. Shindova[2], Ts. Miteva-Katrandzhieva[3]

1. *Student, Faculty of Dental Medicine, Medical University of Plovdiv*
2. *Department of Paediatric Dentistry, Faculty of Dental Medicine, Medical University of Plovdiv*
3. *Department of Social Medicine and Public Dental Health, Faculty of Public Health, Medical University of Plovdiv*

Introduction: The key determinants of an individual's oral health are dietary habits and oral hygiene practices. Gamification offers a means of providing proper education and motivation to promote a healthy diet and influence oral hygiene behaviours. **Aim:** To evaluate and compare the effect of a newly designed mobile learning game application on dietary habits and oral hygiene knowledge and practices in 6–12-year-old schoolchildren. **Materials and methods:** The engagement in oral health practices of 6–12-year-old children in the UK and Bulgaria using a mobile learning game application was compared. A total of 60 children were randomly divided into two subgroups according to their home country. Children played a game-based oral health education program, "Pearly Whites: Clean Catch". Before and after the game, children filled out the same questionnaire about healthy and unhealthy foods and oral hygiene products under the supervision of their parents. **Results and discussion:** There was a significant reduction in the preferences of lollipops, donuts, burgers, chocolate, sweets, and pizza in both groups. Statistically significant increase in the preferences for milk, water, mouthwash, toothpaste, floss, and toothbrushes was demonstrated among all participants ($p < 0.05$). No differences were found in the answers of children from two different countries. **Conclusion:** Gamification in oral health care shows potential as an innovative approach to promote positive health behaviors. It can be successfully used to educate children on the importance of healthy dietary habits and subconsciously alter children's perspectives on different types of foods and dental care products.

Дни на медицинската наука

Days of Medical Science

РЕЗЮМЕТА

ABSTRACTS

Аудиторен комплекс, МУ-Пловдив

Auditorium complex, MU-Plovdiv

9.05.2025

Научна област на изследването: Медико-биологична
Договор: Проект № НО-01/2022

Тема: „Митохондриална функция и клетъчен метаболизъм като параметри за оценка на терапевтичния ефект при ревматоиден артрит“

Ръководител на проекта: проф. д-р Виктория Сарафян, дмн[1,2]; проф. д-р Анастас Баталов, дм[3,4]
Водещ изследовател: Валентина Михайлова, докторант[1,2]
Членове на изследователския екип: д-р Божидар Вергов[1]; д-р Згуро Баталов, дм[3,4]; проф. д-р Росица Каралилова, дмн[3,4]; проф. Мария Казакова, дб[1,2]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по медицинска биология*
2. *Научноизследователски институт*
3. *Медицински факултет, Катедра по пропедевтика на вътрешните болести*
4. *УМБАЛ „Каспела“, Клиника по ревматология*

Цел: Целта е да се оценят метаболитния статус и ключови параметри на митохондриалната функция при пациенти с ревматоиден артрит (РА) на лечение с две различни терапевтични схеми (метотрексат и JAK-инхибитори).

Материал и методи: В изследването са включени 20 пациенти с РА. След физикален преглед, ултрасонография и лабораторни изследвания, пациентите са разпределени в две групи според назначената терапия – метотрексат и JAK-инхибитори.

Резултати: След изолиране на периферни кръвни мононуклеарни клетки от всички пациенти преди и след терапия, е проведен метаболитен тест за оценка на митохондриалната функция. Установени са повишено производство на АТФ и спад в протонното изтичане при пациенти с РА след проведено лечение с JAK- инхибитори. При пациентите лекувани с метотрексат, са отчетени понижение на производство на АТФ и максималния респираторен капацитет. Открита е корелация между ESR и CRP (z = 0,600, p = 0,009**). Доказана е значима връзка между ESR и DAS28 (z = 0,486, p = 0,03*). CRP корелира с RF (z = 0,685, p = 0,001**) и

ултразвукови находки като DAS28 (z = 0,600, p = 0,005**) и GUS7 (z = 0,520, p = 0,019*).

Заключение: Установява се, че повишените стойности на АТФ в групата пациенти, лекувани с JAK-инхибитори, корелират с подобрение в клиничните и лабораторни тестове като: ESR, anti-CCP, CRP, RF, както и с ултрасонографските данни след терапия. Това предполага, че количеството произведен АТФ може да служи като индикатор за мониторинг на хода на заболяването.

Приложение в практиката: Клетъчните метаболитни индикатори и ултразвуковата находка се променят в различна степен според проведената терапия, подчертавайки бъдещите перспективи за мониториране на лечението при РА въз основа на паралелен анализ на митохондриалната функция, ултрасонография и клинико-лабораторни параметри.

Научни публикации:

1. Mihaylova, V., Kazakova, M., Batalov, Z., Karalilova R., Batalov A., Sarafian V. JAK inhibitors improve ATP production and mitochondrial function in rheumatoid arthritis: a pilot study. Rheumatol Int, (2024) 44,57–65, https://doi.org/10.1007/s00296-023-05501-4 (IF = 4.0; Q2)
2. Mihaylova, V., Karalilova, R., Batalov, Z., Kazakova, M., Batalov, A., & Sarafian, V. Inflammation, mitochondrial and lysosomal dysfunction as key players in rheumatoid arthritis?. International immunopharmacology, (2024) 141, 112919. https://doi.org/10.1016/j.intimp.2024.112919 (IF = 4.8; Q2)

Научна област на изследването: Медико-биологична
Договор: Проект № НО-02/2022

Тема: „Диагностична и прогностична роля на нови биомаркери при остри инфекции на централната нервна система“

Ръководител на проекта: проф. Мария Казакова, дб[1]
Водещ изследовател: гл. ас. д-р Йордан Калчев, дм[2]
Членове на изследователския екип: проф. д-р Виктория Сарафян, дмн[1]; ас. Цветомира Иванова, дб[1]; гл. ас. д-р Петя Аргирова, дм[3]; Хаффан Имитияз[4]; Валентин Дичев, дб[1]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по медицинска биология*
2. *Медицински факултет, Катедра по медицинска микробиология и имунология „Проф. д-р Елисей Янев“*
3. *Медицински факултет, Катедра по инфекциозни болести, паразитология и тропическа медицина*
4. *Медицински факултет, студент*

Цел: да се проучат диагностичната и прогностична роля на YKL-40 и LAMPs протеините при остри инфекции на ЦНС с установена и неизяснена етиология.

Материал и методи: В хода на проекта са изследвани 35 пациента с инфекции на централната нервна система (ЦНС), приети за лечение в клиниката по инфекции към УМБАЛ „Св. Георги“ и 6 клинично здрави индивида, са селектирани като контролна група. Осъществена е клинична оценка на общото състояние. Ликвор е взет/събран *postmortem* от клинично здрави внезапно починали лица.

Резултати: Установи се понижена експресия на LAMPs при пациенти с инфекции на ЦНС в сравнение с контролите. Доказа се положителна корелация между стойностите на LAMP-1 и LAMP-2-fold change. Концентрацията на LAMP-1 в плазмата и цереброспиналната течност при пациентите са със значително по-високи нива в сравнение с контролната група. Открити са ниски плазмени концентрации на LAMP-2, докато нивата в ликвор са по-високи при пациентите в сравнение с контролната група.

Нашите резултати показват, че нивата на иРНК на YKL-40 са значително понижени в левкоцитите на пациенти с инфекции на ЦНС в сравнение с контролите. Плазмените концентрации на YKL-40 са по-високи, отколкото в контролната група. В допълнение, нивата на гликопротеина в церебрсоспинаната течност са значително по-високи в сравнение с плазмените нива.

Заключение: Сигнификантно по-високите стойностите на протеина YKL-40 при вирусни невроинфекции спрямо тези с бактериален произход, предполага използването му като молекула, която отразява патофизиологията на заболяването.

Приложение в практиката: Приложната значимост на проекта се изразява във възможността да се подпомогне клиничното наблюдение и ранната стратификация на пациенти с остри инфекции на ЦНС.

Научни публикации:

1. Kazakova M, Y. Kalchev, P. Argirova, M. Murdjeva, V. Sarafian. YKL-40 and LAMPs as possible markers in neuroinflammation and autophagy during central nervous system infections, Biotechnology & Biotechnological Equipment. 2024; doi.org/10.1080/13102818.2024.2360541**; IF=1,4, Q3**
2. Kazakova M, Y. Kalchev, V. Dichev, P. Argirova, K. Simitchiev, M. Murdjeva, V. Sarafian. Proteins YKL-40, LAMP-1, and LAMP-2 in central nervous system infections. Microbiology Spectrum (under review)

Научна област на изследването: Медико-биологична
Договор: Проект № НО-04/2022

Тема: „Проучване на тъканния тропизъм на ACE2, регулаторни механизми за експресията му и значението им за COVID-19“

Ръководител на проекта: проф. д-р Нешка Манчорова-Велева, дмн[1]
Водещ изследовател: гл. ас. Мина Пенчева, дб[2]
Членове на изследователския екип: доц. д-р Мария Атанасова, дм[3,7]; гл. ас д-р Йордан Калчев, дм[3,7]; д-р Георги Русинов[4]; гл. ас. Донка Кескинова, дм[5]; Дейвид Барух[6]
Базова организация: Медицински университет – Пловдив

1. *Факултет дентална медицина, Катедра по оперативно зъболечение и ендодонтия*
2. *Фармацевтичен факултет, Катедра по медицинска физика и биофизика*
3. *УМБАЛ „Св. Георги“, Лаборатория по вирусология*
4. *УМБАЛ „Св. Георги“, Клиника по инфекциозни болести*
5. *ПУ „Паисий Хилендарски“, Философско-исторически факултет, Катедра по приложна и институционална социология*
6. *СУ „Св. Климент Охридски“, Факултет по математика и информатика, Катедра по софтуерно инженерство*
7. *Медицински факултет, Катедра по медицинска микробиология и имунология „Проф. д-р Елисей Янев“*

Цел: Целта на осъщественото проучване беше да се анализират нивата на ангиотензин-конвертиращия ензим 2 (ACE2), металопротеаза 17 (ADAM17), интерлевкин-17A (IL-17A), трансмембранна серинова протеаза 2 (TMPRSS2), апелин (AP) и витамин D (VD) като биомаркери.

Втората ни цел беше да се определят нивата на изследваните маркери в назофарингеален тампон (NPS), серум и слюнка, което да позволи да се направи зависимост между промяната на стойностите им и здравословното състояние на индивидите.

Резултати: Сравнявайки нивата на изследваните маркери в слюнката, ние открихме значително повишени стойности на ACE2 при ваксинирани пациенти, последвани от тези с тежка форма на COVID-19, в сравнение със здрави, преболедували и групата с лек COVID-19. За TMPRSS2, IL-17A, ADAM-17 и AP се наблюдава

значителна разлика между здрави индивиди и другите групи. Серумните нива на витамин D са ниски във всичките пет изследвани групи. Нивата на Апелин също показаха значителни разлики, като най-високи нива бяха отчетени при здрави индивиди. Анализът на данните за маркерите в слюнката, NPS и серума разкриват положителна корелация между NPS и серума, слюнката и серума, както и между слюнката и NPS за всички изследвани маркери.

Заключение: Наблюдението на промените в биомаркерите, присъстващи в слюнката, е обещаващо като предсказуем инструмент за различни заболявания. Този подход позволява ранното прилагане на превантивни мерки и защитни стратегии, подобрявайки методите за предсказване промени в здравният статус.

Приложение в практиката: Разработка на неинвазивни тестове и мониторинг на имунния статус чрез анализ на слюнка.

Научни публикации:

1. Pencheva, M.; Manchorova-Veleva, N.; Baruh, D.; Rusinov, G.; Vangelov, L. Analysis of Biomarker Levels in Nasopharyngeal Swabs, Serum, and Saliva Across Different Health Con-ditions. Life 2025, 15, x. https://doi.org/10.3390/xxxxx (IF:3.2, Q1)
2. Pencheva, M.; Manchorova_Veleva, N. Regulatory mechanisms of angiotensin-converting enzyme 2 and their significance in the development of severe COVID-19. Probl Infect Parasit Dis 2024, 51 (2), 5-10. https://doi.org/10.58395/cvkyan65 (SJR)
3. Pencheva Mina, Manchorova-Veleva Neshka, Rusinov Georgi, Baruh David. IL-17A as a biomarker for outcome from severe COVID-19. Ways of Science Development in Modern Crisis Conditions: Proceedings of the 4th International Scientific and Practical Internet Conference, June 8-9, 2023. FOP Marenichenko V.V., Dnipro, Ukraine, 24-27 p. ISBN 978-617-8293-06-2.

Научна област на изследването: Медико-биологична
Договор: Проект № НО-05/2022

Тема: „Биологична ефективност на поток от ускорени електрони в сравнение с гама-лъчи и поток от ускорени протони оценена според нивото на *in vitro* индуцирани структурни хромозомни аберации“

Ръководител на проекта: гл. ас. Екатерина Зайцева, дб[1]
Водещ изследовател: гл. ас. Виктор Йотов, дб[1]
Членове на изследователския екип: гл. ас. Райна Ардашева, дб[1]; Станислав Божиков[2]; Карина Митарова[2]; Филипа Василева[2]; Андрей Ардашев[3]
Базова организация: Медицински университет – Пловдив

1. *Фармацевтичен факултет, Катедра по медицинска физика и биофизика*
2. *УМБАЛ „Св. Иван Рилски“, Отделение по лъчетерапия*
3. *Фармацевтичен факултет, студент*

Цел: Да се оцени биологичната ефективност на електронен сноп (линеен ускорител VARIAN TRUEBEASM STX), прилаган за лъчева терапия, според индукцията на структурни хромозомни аберации в човешки лимфоцити и да се направи сравнителен анализ с ефектите от въздействие на γ-лъчение и сноп ускорени протони.

Материал и методи: Приложен бе микроскопски анализ на структурни хромозомни аберации в лимфоцити от проби кръв (8 доброволци), *in vitro* облъчени с поток ускорени електрони с енергия 9 MeV в дозен диапазон от 1 до 5 Gy.

Резултати: Относителната биологична ефективност (ОБЕ) беше изчислена спрямо цитогенетични тестове: процент от клетки с хромозомни аберации, общ брой на структурни хромозомни аберации в клетките, количество на дицентрици и центрични пръстеновидни хромозоми, брой на интерстициални делеции, хромозомни фрагменти. ОБЕ на поток ускорени електрони спрямо количество увредени клетки, както и броя на дицентрични и центрични пръстеновидни хромозоми е 0,94 ± 0,02, обаче спрямо броя на интерсициални делеции е само 0,6 ± 0,22.

Средната стойност на ОБЕ е 0,84 ± 0,11. Изчислените F-, G- и H-ratio доказват по-малка ефективност на електронното лъчение при индуциране на вътрехтомозомни обменни аберации в сравнение с междухромозомните обмени.

Заключение: Ускорените електрони имат същата ефективност в индуциране на летални междухтомозомни обменни аберрации, сравнени с γ-лъчение и протони с изходна енергия 170 MeV и по-малка, в индуциране на потенциално летални вътрехромозомни такива.

Приложение в практиката: Получените данни дават възможност за по-добра оценка на радиационен риск при провеждане на лъчетерапия, космически полети и прецизиране на биодозиметрията за ефективно противодействие при аварийно облъчване.

Научни публикации: –

Научна област на изследването: Медико-биологична
Договор: Проект № НО-06/2022

Тема: „Изследване на пребиотичния потенциал и антиоксидантни свойства на ензимно гликозилирани полифенолни съединения от червена боровинка (*Vaccinium vitis-idaea* L.)“

Ръководител на проекта: доц. Диана Карчева-Бахчеванска, дф[1]
Водещ изследовател: доц. Диана Карчева-Бахчеванска, дф[1]
Членове на изследователския екип: доц. Нико Бенбасат, дф[1]; ас. Ваня Налбантова, дф[1]; Даниела Сейменска[1]; проф. Илия Илиев[2]; гл. ас. Мариана Николова[2]; доц. Тонка Василева[2]; Станимира Ангелова[2]
Базова организация: Медицински университет – Пловдив
1. *Фармацевтичен факултет, Катедра по фармакогнозия и фармацевтична химия*
2. *ПУ „Паисий Хилендарски“, Биологически факултет, Катедра по биохимия и микробиология*

Цел: Да се проследи влиянието на ензимно гликозилирани полифеноли върху метаболитния профил на пробиотични щамове лактобацили в условията на *in vitro* гастроинтестинален тракт (ГИТ).

Материал и методи: Получени са тотални и твърдо-фазови екстракти от *Vitis idaeae fructus*, на които е определено количество общи полифеноли (TPC) (Singleton & Rossi, 1965) и общи мономерни антоцианини (TAC) (Lee *et al.*, 2005). Идентифицирани са отделни компоненти чрез HPTLC и HPLC анализи. Изолираните полифеноли са гликозилирани посредством гликозилтрансфераза (GTF) и фруктозилтрансфераза (FTF). Определена е ензимната активност на пробиотични щамове лактобацили (Lasrado & Gudipati, 2013), както и антиоксидантната активност на гликозилираните полифеноли (CUPRAC и DPPH).

Резултати: TPC в изследваните екстракти е в диапазона 207.5 ÷ 262.4 mg GAE/100 g fw, а TPA – 6.5 ÷ 14.5 mg C3GE/100 g fw. Аналитичният HPTLC подход доказа присъствието на цианидин-3-арабинозид, цианидин-3-глюкозид и делфинидин-3,5-

диглюкозид, което беше потвърдено и при HPLC анализа. Установени са оптимални условия за гликозилиране на изолираните полифеноли с помощта на GTF и FTF. След инактивиране на трансферазната реакция, продуктът беше лиофилизиран. Проверена е преживяемостта на изследваните пробиотични щамове в присъствие на лиофилизирания продукт. Определен е метаболитният и ензимен профил на пробиотични лактобацили, култивирани в присъствие на гликозилирани полифеноли, в условията на *in vitro* ГИТ. Установени са 50% инхибиращите и 50% ефективните концентрации на гликозилираните полифеноли спрямо DPPH радикала и по CUPRAC метода, съответно.

Заключение: Проучен е пребиотичният потенциал на ензимно гликозилирани полифеноли, определено е влиянието им върху метаболитния и ензимен профил на пробиотични щамове лактобацили, култивирани в *in vitro* ГИТ условия.

Приложение в практиката: Фитопродукт с пребиотичен ефект.

Научни публикации:

1. Karcheva-Bahchevanska, D., Nikolova, M., Iliev, I. Inhibitory Potential of Different Bilberry (*Vaccinium myrtillus* L.) Extracts on Human Salivary *α*-Amylase. Molecules 2023, 28 (15), 5820.
https:// doi.org/10.3390/molecules28155820

Научна област на изследването: Медико-дентална
Договор: Проект № НО-07/2022

Тема: „Роля на биокомпозитните материали в имплантатно-мекотъканния интерфейс – съвременни стратегии за превенция на периимплантита“

Ръководител на проекта: доц. Бисера Пиличева, дф[1]
Водещ изследовател: д-р Божидар Пиличев, докторант[2]
Членове на изследователския екип: д-р Николай Каназирски, дм[2]; ас. Пламен Кацаров, дф[1]; ас. Николай Захариев, дф[1]; доц. Михаил Петров, дм[3]; д-р Зоя Рачковска[3]; д-р Виктор Хаджигаев, дм[4]
Базова организация: Медицински университет – Пловдив

1. *Фармацевтичен факултет, Катедра по фармацевтични науки*
2. *Факултет по дентална медицина, Катедра по дентална, орална и лицево-челюстна хирургия*
3. *Медицински факултет, Катедра по медицинска микробиология и имунология „Проф. д-р Елисей Янев“*
4. *Факултет по дентална медицина, Катедра по протетична дентална медицина*

Цел: Да се установи възможността за повлияване на бактериалната колонизация на супраструктурата след използване на модифицирана надстройка с биокомпозит на базата на хитозан и хлорхексидин.

Материал и методи: Пациентите са разделени в две групи: Първа група – „тестова група“ от 30 пациенти. В тази група на втория етап от процедурата се поставя предварително подготвена надстройка с биологично покритие: Подгрупа А – на 15 пациенти се поставя предварително подготвена надстройка с биологично покритие, изградено от хитозан 1% + хлорхексидин 2%. Подгрупа Б – на 15 пациенти се поставя предварително подготвена надстройка с биологично покритие, изградено от хитозан 2%. Втора група – „контролна група“, съставена от 20 пациента, при които надстройката е без биологично покритие.

Резултати: Пациентите от група А показват статистическа значима редукция на бактериалния товар относно 19 вида микроорганизми, установени на базово ниво, като резултатите

доказаха, че при базите от група А се формират филми със средна дебелина 32,19 микрона. Пациентите от група Б , показват статистически значима редукция на бактериалното натоварване относно 17 вида микроорганизми, а средната дебелина на биокомпозита е 22,62 микрона. Групите А и Б показват значимо по-голяма редукция в бактериалния товар спрямо контролната група, като при група Б се установи малко по-голяма успеваемост относно редукция на бактериалното натоварване, в сравнение с група А, но без значимост на разликата.

Заключение: Биокомпозитните покрития намират приложение в контрола и редукцията на бактериалния товар с цел превенция от периимплантни заболявания.

Приложение в практиката: Приложение на биокомпозитни покрития и системи за контролирано освобождаване на лекарства в домена на денталната имплантология.

Научни публикации:

1. Роля на биокомпозитните покрития в имплантатно-мекотъканния интерфейс , Пиличев. Б, Ченчев И., Иванова В, Ченчев Л., Гавраилов Т., Павлов Б., Русев М.
2. Сравнителен микробиологичен анализ на бактериалното натоварване в периимплантния сулкус при използване на модифицирана надстройка с биопокритие от хитозан 1% и хлорхексидин 2 %

Научна област на изследването: Медико-клинична
Договор: Проект № НО-08/2022

Тема: „VAC (vacuum assisted closure) терапия при трудно заздравяващи рани – подходи и варианти“

Ръководител на проекта: д-р Катя Калинова, дм[1]
Водещ изследовател: д-р Катя Калинова, дм[1]
Членове на изследователския екип: проф. д-р Заприн Въжев, дм[2]; д-р Неджат Юсуф, дм[1,3]; д-р Петър Учиков, дм[1,3]; д-р Христо Шипков[1]; д-р Ивайло Мурджев[1,3]; д-р Христо Стоев[2]; д-р Константин Димитров[2]; д-р Стоян Богоев[2]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по специална хирургия*
2. *Медицински факултет, Катедра по сърдечна и съдова хирургия*
3. *УМБАЛ „Св. Георги“, Клиника по специална хирургия*

Цел: Да се сравни скоростта и качеството на зарастване на трудни рани лекувани с VAC система, посредством централна аспирация или преносим апарат.

Материал и методи: Обхванати са 107 пациенти с трудно зарастващи рани, разпределени в 3 групи според приложената методика. Оценени са продължителността и стойността на VAC терапията, пролежаването, степента и времето за оздравяване.

Резултати: Проследени са 38 жени и 69 мъже на възраст 39 – 76 години с 29 остри и 78 хронични рани с давност между 20 дни и 10 години. При 63 пациенти е използвана централна аспирация, при 34 – преносима помпа, и при 32 – двете методики.

Заключение: Няма значима разлика в средната продължителност и успеваемост на лечението между трите методики, но прилагането на VAC на централна аспирация е 3 до 5 пъти по-евтино, сравнено с преносима помпа. Съчетаването на двете методики намалява лечебните разходи само с 10%.

Приложение в практиката: VAC терапията посредством централна аспирация е лесно осъществима с различни превързочни материали и евтина, но възможна само в болнични условия. Затова е подходяща за обездвижени пациенти – политравматични, вентилирани и др., както и за начално лечение. Преносимите

устройства са удобни, но изискват предварително обучение, а консумативите са скъпи и нереимбурсирани. Съчетаването на способите е полезно, но намаляването на общата стойност на лечението е несъществено.

Запознаването с методиката бе включено в редовната семинарна програма по хирургия за стажант-лекарите в МФ на МУ-Пловдив от 2023 г., а обучение по прилагането и като курс за специалисти в програмата за СДО-2025: „Вакуум-асистирана технология за лечение на рани“.

Научни публикации:

1. Katya Ilinova Kalinova, Ivaylo Mourdjev, Nedzhat Ali, Petar Uchikov, Stoyan Bogoev, Hristo Stoev, Konstantin Dimitrov, Zaprin Vazhev. How Can We Improve Cost-Effectiveness of Vacuum Assisted Therapy for Problematic Wounds. Full Text Book 12th BAPRAS Congress, Konya. OP 034: 97, 2023. https://www.balkanplasticsurgery.org/wp-content/uploads/2023/09/BAPRAS_Full_text-Book.pdf
2. К. Калинова. VAC терапия при трудно зарастващи рани – теория и практика. – под печат

Научна област на изследването: Обществено здраве
Договор: Проект № НО-10/2022

Тема: „Провеждане на скрининг за превенция и ранно откриване на остеопороза сред лица в активна възраст от български и ромски произход“

Ръководител на проекта: доц. Даниела Танева, дм[1]
Водещ изследовател: преп. Веселина Букова[1]
Членове на изследователския екип: гл. ас. Мариета Тодорова, дм[1]; ст. преп. Ангелина Киркова-Богданова, дм[2]
Базова организация: Медицински университет – Пловдив
1. *Факултет по обществено здраве, Катедра по сестрински грижи*
2. *Факултет по обществено здраве, Катедра по медицинска информатика, биостатистика и електронно обучение*

Цел: Целта на настоящия проект е да се разработи и приложи модел за изследване на рискови фактори за развитие на остеопороза, свързани с начина на живот и да се проведе здравно обучение при жени в активна възраст от две етнически групи: българи и роми.

Резултати: Проучването анализира социално-демографските и поведенческите фактори, влияещи върху риска от остеопороза сред 417 жени в трудоспособна възраст, разделени в две целеви групи – 223 българки и 194 ромки. Данните показват значителни различия между двата етноса по отношение на образованието, заетостта и начина на живот, свързани с риска от остеопороза. Физическата активност е съществен фактор за поддържане на костното здраве. Резултатите показват значително по-ниска физическа активност и по-нисък прием на калций и витамин D сред ромките, което оказва влияние върху костната плътност. **Освен това ранната менопаузата е значително по-честа сред тях в сравнение с българките, което** допълнително повишава риска от остеопороза. Поведенческите фактори, като тютюнопушенето и приемът на кафе не показват значими разлики между двете групи. Резултатите от ултразвуковата остеоденситометрия

установяват намалена костна плътност при 11% от жените на възраст 41 – 50 години, без значима разлика между етносите.

Заключение: Проучването подчертава необходимостта от целенасочени превантивни мерки за намаляване на риска от остеопороза, включително насърчаване на физическата активност, балансирано хранене и контрол на фактори.

Приложение в практиката: Проучването предоставя информация за различията в рисковите фактори за остеопороза между българските и ромските жени. Тези данни могат да се използват като основа за допълнителни изследвания на уязвимите групи и подобряване на профилактиката.

Научни публикации:

1. Тодорова М, Танева Д, Киркова-Богданова А, Букова В. Превенция на остеопорозата, рискови фактори и сестрински грижи. Управление и образование 2022; 18 (5): 70-78.
2. Танева Д, Тодорова М, Букова В, Киркова-Богданова А. Скринингова остеодензитометрия сред здрави жени в активна възраст. Управление и образование, 2023; 19(6): 152-155.
3. Taneva D, Kirkova-Bogdanova A, Todorova M, Bukova V. An osteoporosis knowledge assessment instrument – development and validation. Folia Med (Plovdiv) 2024; 66(2):264-268.
4. Танева Д, Тодорова М, Киркова-Богданова А, Букова В. Изследване на рискови фактори за оценка на костното здраве сред жени в активна възраст от български и ромски произход. Управление и образование, 2024; 20 (5): 35-40.
5. Букова В, Тодорова М, Киркова-Богданова А, Танева Д. Остеопения при жени в активна възраст от ромски и български произход – рискова предиспозиция. Управление и образование, 2024; 20 (5): 23-29

Научна област на изследването: Медико-биологична
Договор: Проект № НО-11/2022

Тема: „Съвременни насоки и фармакоаналитични подходи при допинг превенция“

Ръководител на проекта: доц. Калин Иванов, дф[1]
Водещ изследовател: Ваня Кожухаров, дф[1]
Членове на изследователския екип: доц. Станислава Иванова, дф[1]; ас. Велислава Тодорова[1]; ас. Станислав Дянков[1]; ас. Зоя Джакова[1]; ас. Александар Маринков[2,3]; доц. Диана Карчева-Бахчеванска, дф[1]
Базова организация: Медицински университет – Пловдив

1. *Фармацевтичен факултет, Катедра по фармакогнозия и фармацевтична химия*
2. *Медицински факултет, Катедра по пропедевтика на вътрешните болести*
3. *УМБАЛ „Каспела“*

Цел: Оценка на връзката между непредумишления допинг и приема на хранителни добавки (ХД), установяване на честотата на недекларирани субстанции в хранителни добавки и разработване на хроматографски методи за мониторинг на необявени субстанции.

Материал и методи: Газова хроматография с масспектрометрия (GC-MS), течна хроматография с фотодиоден детектор (LC-PDA) и високоефективна тънкослойна хроматография (HPTLC).

Резултати: Направена е оценка на риска от непредумишлен допинг при прием на хранителни добавки. Систематизирани са субстанциите, които най-често присъстват в хранителните добавки. За мониторинг на сибутрамин са разработени два подхода: GC-MS и HPTLC. Разработен е LC-PDA метод за мониторинг на хигенамин в екстракти и хранителни добавки. Всички методи демонстрират висока чувствителност и селективност, което ги прави подходящи за рутинен контрол.

Заключение: Хранителните добавки представляват съществен риск за непредумишлен допинг. Много от ХД на пазара

съдържат необявени фармакологично активни субстанции, което се асоциира с много рискове за потребителите.

Приложение в практиката: Разработените методи могат да бъдат приложени при рутинни анализи за качеството на хранителни добавки преди да бъдат включвани в диетата на професионални спортисти.

Научни публикации:

1. Kozhuharov VR, Ivanov K, Ivanova S. Dietary Supplements as Source of Unintentional Doping. Biomed Res Int. 2022: 8387271. doi: 10.1155/2022/8387271
2. Kozhuharov VR, Ivanov K, Karcheva-Bahchevanska D, Prissadova N, Ivanova S. Development and Validation of Gas Chromatography–Mass Spectrometry Method for Quantification of Sibutramine in Dietary Supplements. Processes. 2023; 11(8): 2337. https://doi.org/10.3390/pr11082337
3. Kozhuharov VR, Chakarov D, Ivanova S, Ivanov K. Development and validation of a high-performance thin-layer chromatography method for detection of sibutramine in dietary supplements. Folia Med. 2024; 66(2): 255-263. doi: 10.3897/folmed.66. e121218.

Научна област на изследването: Медико-биологична
Договор: Проект № НО-12/2022

Тема: „Роля на възпалението и автофагията в клетъчната резистентност към терапия при колоректален карцином (КРК)“

Ръководител на проекта: проф. д-р Виктория Сарафян, дмн[1,2]
Водещ изследовател: ас. Цветомира Иванова, дб[1,2]
Членове на изследователския екип: проф. Мария Казакова, дб[1,2]; доц. Николай Мехтеров, дб[1,2]; гл. ас. Йордан Сбирков, дб[1,2]; д-р Дориян Диков, дм[3]; доц. д-р Николай Белев, дм[4,5]; д-р Диана Моландър, дм[1,2]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по медицинска биология*
2. *Научноизследователски институт*
3. *Jossigny Hospital, Department of Pathology, Jossigny, Франция*
4. *УМБАЛ „Еврохоспитал“*

Цел: Да се проучи ролята на автофагията и възпалението в механизмите за клетъчна резистентност при КРК.

Материал и методи: Изследвани са биологични проби от клинично и хистологично диагностицирани 46 пациенти с КРК. Чрез имунохистохимични, ELISA и qPCR анализи в тъканни и в кръвни проби е оценена експресията на YKL-40, LAMP1и LAMP2.

Резултати: Открихме специфична модулация в тъканната експресия на YKL-40, LAMP1 и LAMP2 при КРК, като значително по-високи нива са отчетени в туморния фронт. Експресията на изследваните сигнатури във фронта на туморната инвазия, заедно с туморното пъпкуване и очевидната връзка между budding и клинико-патологичните характеристики като инвазия в лимфните и кръвоносните съдове, показват възможна роля на тези гликопротеини в туморната прогресия. Оценихме транскрипционните и белтъчни нива на изследваните маркери. Генните транскрипти на всички молекули са значително свръхекспресирани в КРК спрямо контролите. Докато плазмените нива на YKL-40 и LAMP1 са по-високи в пациентската група, секреторните нива на LAMP2 са значително завишени в здравите индивиди.

Заключение: Представяме нови данни за експресията на YKL-40, LAMP1 и LAMP2 и туморното пъпкуване при КРК, които предполагат, че тези гликопротеини с различни функции могат да бъдат свързани с агресивността на тумора и резистентността към терапията.

Приложение в практиката: Модулацията в пространствената тъканна експресия на YKL-40, LAMP1 и LAMP2 и туморното пъпкуване, наред с белтъчните и експресионни нива в кръвни проби, предлагат нов поглед върху клиничното значение на идентифицираните сигнатури и могат да служат като прогностични маркери за разработването на по-ефективни терапевтични схеми при КРК.

Научни публикации:

1. Tsvetomira Ivanova, Yordan Sbirkov, Maria Kazakova, Victoria Sarafian. Lysosomes and LAMPs as autophagy drivers of drug resistance in colorectal cancer. Cells 2025, 14-3507449.
2. Tsvetomira Ivanova, Dorian Dikov, Diana Molander, Yordan Sbirkov, Angel M. Dzhambov, Valentin Dichev, NIkolay Mehterov, Tatyana Todorova,Tatyana Damianova, Elitza Tanova, Nikolay Belev, Boyko Atanasov, Maria Kazakova, Victoria Sarafian. Implication of LAMP proteins and autophagy markers in colorectal cancer aggressiveness. JCB 2025.in press.

Научна област на изследването: Медико-биологична
Договор: Проект № ДПДП-12/2022

Тема: „Нива на адипокини (хемерин и резистин) в серум и синовиална течност при пациенти с ревматоиден артрит и остеоартрит на колянна става“

Ръководители на проекта: проф. д-р Росица Каралилова, дмн[1,2]; доц. д-р Боян Нончев, дм[3,4]
Водещ изследовател: д-р Емануела Василева, докторант[1]
Членове на изследователския екип: гл. ас. Теодора Станкова, дб[5]; гл. ас. Радиана Стайнова, дф[6]; доц. д-р Николай Николов, дм[7]; гл. ас. Гинка Делчева, дб[5]; д-р Константин Баталов[1,2]; гл. ас. Катя Стефанова, дб[5]; Ивет Толева[8]; проф. д-р Анастас Баталов, дм[1,2]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по пропедевтика на вътрешните болести*
2. *УМБАЛ „Каспела“, Клиника по ревматология*
3. *Медицински факултет, Катедра по ендокринология*
4. *УМБАЛ „Каспела“, Клиника по ендокринология и болести на обмяната*
5. *Фармацевтичен факултет, Катедра по медицинска биохимия*
6. *Фармацевтичен факултет, Катедра по организация и икономика на фармацията*
7. *УМБАЛ „Георги Странски“, Клиника по ревматология*
8. *Медицински факултет, студент*

Цел: Да се определи връзката между нивата на хемерин и резистин в серум и в синовиална течност при пациенти с ревматоиден артрит (РА) и остеоартрит (ОА) като потенциален маркер за диагностика и оценка на болестната активност и тежест.

Материали и методи: Изследвани са общо 113 лица (54 с РА, 28 с ОА, 31 контролна група). Клиничните данни включват: BMI, серумен и синовиален хемерин и резистин, СУЕ, CRP, пикочна киселина (ПК), DAS28-ESR скала, US7 score, OMERACT score.

Резултати: Серумният резистин показа значимо най-висока стойност при болните с РА (13.34 ± 6.18 ng/ml), спрямо контролната група (7.04 ± 2.09 ng/ml) и пациентите с ОА (12.03 ± 5.64 ng/ml), $p < 0.001$. В групата с РА отчетохме значимо по-висок синовиален резистин (11.08 ± 12.40 ng/ml), в сравнение с групата с ГА (4.93 ±

7.93 ng/ml), p = 0.006. В групата с РА се установиха следните корелации: между серумния хемерин и СУЕ (rs = 0.649, p = 0.002), CRP (rs = 0.546, p = 0.013), РФ (rs = 0.465, p = 0.039), DAS28 (rs = 0.807, p < 0.001), както и между серумния резистин и TNF-alpha (rs = 0.398, p = 0.044). Отчете се корелация на ПК със синовиалния резистин (rs = -0.833, p = 0.003). В групата болни с ОА не се установиха значими корелации.

Заключение: Резистинът в серум и синовиална течост е понадежден диагностичен показател за РА. Нивата на хемерин и резистин в серум и ставен пунктат биха могли да служат за оценка на тежест и активност при РА.

Приложение в практиката: Предлага се нивата на хемерин резистин да се използват за диагностика, оценка на тежест и активност за РА в панел с други показатели.

Научни публикации:

1. Vasileva, Emanuela, Teodora Stankova, Konstantin Batalov, Radiana Staynova, Boyan Nonchev, Anelia Bivolarska, and Rositsa Karalilova. "Association of serum and synovial adipokines (chemerin and resistin) with inflammatory markers and ultrasonographic evaluation scores in patients with knee joint osteoarthritis – a pilot study." Rheumatology International 44, no. 10 (2024): 1997-2005.

Научна област на изследването: Медико-биологична
Договор: Проект № НО-16/2022

Тема: „Когнитивните нарушения като симптом на пост-ковид синдрома при български пациенти в условията на глобална пандемия“

Ръководител на проекта: проф. д-р Пенка Атанасова, дмн[1,7]; проф. Радка Масалджиева, дм[2]
Водещ изследовател: д-р Мирослава Христова-Танева, докторант[1,7]
Членове на изследователския екип: доц. д-р Любомир Червенков, дм[3]; доц. Ралица Райчева, дм[4]; преп. Даниела Кантарева[5]; д-р Костадин Чомпалов, дм[1,7]; д-р Борислава Атанасова[1,7]; д-р Ерай Халил[1,7]; доц. д-р Иван Балтаджиев, дм[6]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по неврология*
2. *Факултет по обществено здраве, Катедра по управление на здравните грижи*
3. *Изследователски комплекс по транслационна невронаука*
4. *Факултет по обществено здраве, Катедра по социална медицина и обществено здраве*
5. *Факултет по обществено здраве, Катедра по сестрински грижи*
6. *Медицински факултет, Катедра по инфекциозни болести, паразитология и тропическа медицина*
7. *УМБАЛ „Св. Георги“, Клиника по неврология*

Цел: Да се проучат лонгитудинално когнитивните нарушения при пациенти в зряла възраст след преболедуване на COVID 19.

Материал и методи: Клинично интервю и компютърно невропсихологично изследване (CogState Battery) на 102 преболедували COVID-19 пациенти.

Резултати: Участниците на средна възраст 40,16 г. (SD = 11,007) бяха разделени на 2 групи: 18 – 49 г. – 73,5% и 50 – 69 години – 26.5%. Преобладаваха жени – 70.6%, мъжете бяха 29.4%. Времето от острата COVID 19 инфекция в месеци беше M = 15,23 (SD = 7,577). При 64 (62.7%), имаше оплаквания – резидиуални симптоми. Преобладаващата част от участниците (n = 68, 66.7%) нямаха коморбидности, само при 33.3% се установиха придружаващи заболявания. С магнитно-резонасна томография

на главен мозък бяха изследвани 39 пациента, като при 19 (48.7%) се установиха МРТ-доловими структурни промени на мозъчния паренхим. При останалите 51.3% (n = 20) не се регистрираха данни за патологични промени на мозъчните структури. При 67 (65.68%) се проведе проследяване след поне 6 месеца, с CogState Battery. Между възрастовите групи се установиха статистически значими различия при справянето със субтестовете ($p < .001$), с изключение само на два показателя. При контрол на придружаващите заболявания, сравнението на двете възрастови групи, без придружаващи заболявания, показа статистически значими различия в справянето по 6 от 10 показателя от субтестовете (Mann-Whitney test, $p < .05$).

Заключение: До момента в проучването се установиха резидиуални симптоми при повече от половината изследвани, структурни промени на мозъчния паренхим при 49% и възрастов ефект върху справянето с невропсихологични задачи след преболедуване от COVID-19. Резултатите са в процес на обработка.

Приложение в практиката: След завършване на анализите на данните, това проучване ще допринесе за изясняване на обхвата и патогенезата на когнитивния дефицит при Пост-COVID синдром.

Научни публикации:

1. Христова, М. Когнитивните нарушения като симптом на пост-ковид синдрома в условията на глобална пандемия. Българска неврология 2023; 24 (2): 43-47
2. Hristova, M., Massaldjieva, R. Cognitive impairments as a symptom of post-covid syndrome among the Bulgarian population in the context of a global pandemic: an ongoing study, MEDIS – Medical Science and Research. 2023; 2(2): 25-28. doi: 10.35120/medisij020225h UDK: 364.622:[616.98:578.834(497.2)
3. Hristova, M., Massaldjieva, R.,Chervenkov, L., Atanassova, P. Cognitive functions in a series of patienta after acute COVID 19 infection – case-series. Psychological Applications and Trends. 2024; 694-698, p-ISSN: 2184-2205 e-ISSN: 2184-3414 ISBN: 978-989-35106-6-7 © 2024
4. Hristova, M., Massaldjieva, R.,Chervenkov, L., Atanassova, P. Cognitive functions in a 29-year-old male with post-COVID syndrome and long-term psoriasis – a case study. Folia Medica 66(4): 587-591. https://doi.org/10.3897/folmed.66.e124311

Научна област на изследването: Дентална медицина
Договор: Проект № ДПДП-15/2022

Тема: „Компютърно-томографско изследване на качеството на ендодонтското лечение при премолари с атипична анатомия“

Ръководител на проекта: д-р Костадин Георгиев, дм[1]
Водещ изследовател: д-р Александра Печева-Стоева, дм[1]
Членове на изследователския екип: д-р Елена Бояджиева, дм[1]; д-р Любомир Вангелов, дм[1]; д-р Ирина Ангелова, дм[2]
Базова организация: Медицински университет – Пловдив

1. *Факултет по дентална медицина, Катедра по оперативно зъболечение и ендодонтия*
2. *Факултет по дентална медицина, Катедра по образна диагностика, дентална алергология и физиотерапия*

Цел: Целта на изследването е да се оцени чрез компютърна томография качеството на обтуриране на корено-каналната система по метода хидравлична кондензация и три метода на препарация, на принтирани 3Д реплики на човешки премолари с конфигурация тип III, IV и V по Vertucci.

Материал и методи: Принтираните 3D реплики на човешки премоларни зъби (n = 45) са разпределени в три групи, в зависимост от морфологията на корено-каналната им система:

Група 1: 15 образци с конфигурация тип III, IV и V по Vertucci (по 5 за всяка конфигурация), по стандартна техника за препарация с коничност .02.

Група 2: 15 образци с конфигурация тип III, IV и V по Vertucci (по 5 за всяка конфигурация), по Crown down техника за препарация с коничност .06.

Група 3: 15 образци с конфигурация тип III, IV и V по Vertucci (по 5 за всяка конфигурация), по хибридна техника за препарация. Всички коренови канали на всички образци са обтурирани по метода на хидравличната кондензация. Направените компютърни томографии на обтурирани ендодонтски пространства са сравнени, чрез HOROS софтуер.

Резултати: Качеството на корено-каналната заплънка не се различава съществено в трите изследвани групи, като 3Д обтурирането е с най-високи резултати в група 3 от изследваните.

Заключение: Обтурирането на премолари с атипична анатомия по метода хидравлична кондензация дава добри резултати при три метода на препарация на корено-каналната система.

Приложение в практиката: При ендодонтско лечение на премолари с атипична анатомия се предлага използването на хибридна техника за препарация на кореновите канали, съчетана с хидравлична кондензация като метод на избор при обтуриране на ендодонтското пространство.

Научни публикации:

1. Георгиев К., Бояджиева Е., Печева-Стоева А., Вангелов Л., Ангелова И. Компютърно-томографско изследване на качеството на обтуриране при премолари с атипична анатомия. Journal of IMAB (под печат).

Научна област на изследването: Медико-биологична
Договор: Проект № ПМД-02/2022

Тема: „Персонализиран миРНК профил при пациенти с папиларен тиреоиден карцином“

Ръководител на проекта: проф. д-р Виктория Сарафян, дмн[1]
Водещ изследовател: доц. Николай Мехтеров, дб[1]
Членове на изследователския екип: доц. д-р Боян Нончев, дм[2]; проф. д-р Росен Димов, дм[3]; гл. ас. Мария Гевезова, дб[1]; Елица Танова[1]; Татяна Дамянова[1]; Вяра Ангелова[4]; Любослав Димов[2]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по медицинска биология*
2. *Медицински факултет, Катедра по ендокринология и болести на обмяната*
3. *Медицински факултет, Катедра по пропедевтика на хирургическите болести*
4. *Медицински факултет, студент*

Цел: Установяване на персонализиран транскрипционен профил на миРНКи в биологичен материал, получен чрез тънкоиглена аспирационна биопсия (ТАБ) от здрава, бенигнена, малигнена и метастатична тъкани от пациенти с папиларен тиреоиден карцином (ПТК).

Материал и методи: *Биоинформатични методи*: На базата на The Cancer Genome Atlas (TCGA) е създаден панел от 10 миРНК, за които се предполага клинично значение при ПТК. *Молекулярно-биологични методи*: Проведено е изследване на експресията на миРНК в тъканен материал, получен чрез ТАБ под ехографски контрол от доброкачествени, злокачествени и метастатични тъкани на пациенти с ПТК (n = 38), като резултатите са сравнени със здрава тъкан.

Резултати: Получените резултати показват, че let-7b-5p, miR-146b-5p, miR-182-5p, miR-339-3p, miR-423-5p, miR-450b-5p, miR-484, miR-874-3p и miR-142-3p имат променена експресия между нормална и туморна тъкан. Освен това, miR-142-3p, miR-146b-5p, let-7b-5p, miR-182-5p и miR-484 показват значителни разлики в експресията между доброкачествени и злокачествени възли.

Сумарната експресия на панела от 10 миРНК притежава диагностични свойства и може да се използва като биомаркер за разграничаване на туморна от нормална тъкан с AUC = 0,984, чувствителност = 92% и специфичност = 97%.

Заключение: Изследваният панел от миРНК може да служи като надежден диагностичен инструмент при папиларен тиреоиден карцином (ПТК), подпомагайки персонализирания клиничен и терапевтичен подход.

Приложение в практиката: Идентифицирането на нов, специфичен миРНК профил при ПТК може да предостави допълнителна информация за малигнения и инвазивния потенциал на тумора, както и за неговите хистологични характеристики, допълвайки рутинната диагностика. Наличието на корелация между транскрипционния профил на всеки пациент би могло да има предиктивна стойност за отговора към лечението и прогнозата на заболяването.

Научни публикации:

1. Mehterov N., Sacconi A., Pulito C., Vladimirov B., Haralanov G., Pazardjikliev D., Nonchev B., Berindan-Neagoe I., Blandino G., Sarafian V. A novel panel of clinically relevant miRNAs signature accurately differentiates oral cancer from normal mucosa. Frontiers in Oncology, 2022; 12, art. no. 1072579., doi: 10.3389/fonc.2022.1072579, IF= 4.7, Q2

Научна област на изследването: Медико-биологична, Терапевтична
Договор: Проект № ПМД-03/2022

Тема: „Мултимодално мониториране на интракраниалната хипертензия и свързаните с нея специфични морфологични характеристики при пациенти след претърпяна тежка черепно-мозъчна травма“

Ръководител на проекта: проф. д-р Чавдар Стефанов, дмн[1,4]
Водещ изследовател: д-р Ивайло Минев, дм[1,4]
Членове на изследователския екип: проф. д-р Иво Кехайов, дм[2]; доц. д-р Атанас Даварски, дм[2]; д-р Мариета Пейчева, дм[3]; д-р Полина Маврева[2]; д-р Андреас Хадзиянис[4]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по анестезиология, спешна и интензивна медицина*
2. *Медицински факултет, Катедра по неврохирургия*
3. *Медицински факултет, Катедра по неврология*
4. *УМБАЛ „Св. Георги“, Клиника по анестезиология и интензивно лечение*

Цел: Да се изследва диагностично-терапевтичното значение на мултимодалното мониториране на интракраниалната хипертензия при пациенти с тежка черепно-мозъчна травма (ТЧМТ).

Материал и методи: Изследвани са данните от компютъртомографски(КТ) и ултразвукови изследвания (УЗИ) и от интракраниалната сонда (ИКС) при пациенти с ТЧМТ. Съгласно създадения протокол, след зареждане на КТ образите в ултразвуковия апарат Philips EPIQ Elite, на базата на три интракраниални маркера и посредством софтуер PercuNav, се проведе Ultrasound Fusion Imaging (UFI). Транскраниалното УЗ цветово-кодирано изследване се извърши през транстемпоралния костен прозорец.

Резултати: Проследи се динамиката в неврологичния статус и се оцениха се възможностите на UFI като хибридна образна диагностика и метод за мониториране на специфични морфологични характеристики и функционални промени в мозъчния кръвоток асоциирани с ИКХ. Пространствената морфологична чувствителност към паренхимната контузия се определи чрез

сравнителен анализ на съответните зони при UFI и съпостави с данните от ИКС. Получените резултати улесниха процеса на взимане на решение и намалиха влиянието на субективни фактори. Оценката на интрапарехнимните контузии, мезенцефалон, цереброспиналните цистерни и участъци от предна, средна и задна мозъчни артерии, се осъществи само чрез транстемпорален достъп, тъй като положението по гръб и рискът от съпътстваща шийна травма се дефинираха като допълнителни ограничения при избор на костен прозорец.

Заключение: Приложението на мултимодално мониториране повишава надеждността и съвпадението на оценките на различните изследователи, което е от ключово значение на ефективното имплементиране на подхода.

Приложение в практиката: Протокол за провеждане на КТ при пациенти с ТЧМТ с последващо проследяване посредством UFI.

Протокол за клинично приложение на ИКС и UFI за мониториране на мозъчния кръвоток и морфологичните промени при ТЧМТ.

Научни публикации: –

Научна област на изследването: Медико-биологична
Договор: Проект № НО-05/2023

Тема: „Оценка на ефективността и дълготрайното задържане на знания при участници в симулационна програма за обучение по ендоскопска ретроградна холангиопанкреатография година след приключването ѝ“

Ръководител на проекта: проф. д-р Таня Денева, дм[1]
Водещ изследовател: доц. д-р Никола Боянов, дм[2,3]
Членове на изследователския екип: д-р Десислава Димитрова[4]; д-р Георги Горанов[5]; д-р Красимир Джинсов[2,6]; доц. д-р Милена Сандева, дм[2,7]; д-р Стоилка Туфкова[2,8]; д-р Катина Щерева[3]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по клинична лаборатория*
2. *Медицински тренировъчен симулационен център*
3. *УМБАЛ „Пълмед“, Отделение по гастроентерология*
4. *МБАЛ „Св. Каридад“, Отделение по гастроентерология*
5. *Медицински факултет, Първа катедра по вътрешни болести, Секция по кардиология*
6. *УМБАЛ „Св. Георги“, Отделение по инвазивна кардиология*
7. *Факултет по обществено здраве, Катедра по акушерски грижи*
8. *УМБАЛ „Св. Георги“, Клиника по клинична токсикология*

Цел: Да се оцени дълготрайното задържане на знания при участници в симулационна програма за обучение по ендоскопска ретроградна холангиопанкреатография година след приключването ѝ.

Материал и методи: 30 участника от предходното проучване, които са придобили базови умения и знания в областта на ендоскопската ретроградна холангиопанкреатография (ERCP) – специалисти или специализанти по гастроентерология

Резултати: В това проучване ние измервахме едновременно амилазата в слюнката, хромогранин А в слюнката и кортизола в слюнката, всички те са биомаркери на стрес, във възпроизводима виртуална симулация. Биомаркерите за стрес на слюнката sAA, sCgA и sC надеждно корелират с психически стрес по време на обучение на ERCP симулатор. Най-точното предсказване на степента на промяна се получава от sAA. Освен това на всички

участници в експеримента бяха поставени т.нар. гривни „Емпатика“. Приспособлението допринесе за измерване на сърдечните стресови показатели. Записаната на устройството информация показва сърдечна честота (HR), вариабилност на сърдечната честота (HRV) и електродермална активност (EDA).

Заключение: Проучването показа че запознаването с ERCP симулатора значително намалява нивата на стрес, измерени както чрез трите биомаркера за стрес на слюнката, така и чрез сърдечните показатели посредством гривната „Емпатика“. Получените данни сочат, че обучението на ERCP симулатор е ефективно и знанията получени при него се запазват дълготрайно, дори без да е започнала активна работа в клиничната практика.

Приложение в практиката: Обученията на симулатори базирани на виртуалната реалност са полезен метод за установяване на базови познания и умения дори във сферата на високоспециализираните процедури и знанията и умения придобити чрез тях се запазват във времето.

Научни публикации:

1. Georgiou K, Boyanov N, Thanasas D, Sandblom G, Linardoutsos D and Enochsson L (2024) Saliva stress biomarkers in ERCP trainees before and after familiarisation with ERCP on a virtual simulator. Front. Surg. 11:1364195. doi:10.3389/fsurg.2024.1364195

Научна област на изследването: Обществено здраве
Договор: Проект № НО-12/2023

Тема: „Проучване удовлетвореността на пациентите от предоставената фармацевтична грижа, при отпускането на лекарствени продукти без лекарско предписание и други, които могат да се прилагат сред педиатричната популация“

Ръководител на проекта: ст. преп. Божидарка Хаджиева, дф[1]
Водещ изследовател: доц. Анна Михайлова, дф[2]
Членове на изследователския екип: доц. Кристина Килова, дм[3], Таня Гешева[4]
Базова организация: Медицински университет – Пловдив

1. *Медицински колеж, специалност „Помощник-фармацевт“*
2. *Факултет по обществено здраве, Катедра по управление на здравните грижи, Секция по педагогика и психология*
3. *Факултет по обществено здраве, Катедра по медицинска информатика, биостатистика и електронно обучение*
4. *Факултет по обществено здраве, студент*

Цел: Да се установи удовлетвореността на родителите от оказаната фармацевтична грижа, при закупуването на лекарствени продукти без рецепта и други за децата си.

Материал и методи: Проучвателната извадка се състои от 1305 родители. Инструментът на изследване е анкетна карта. Статистическият анализ на данните е извършен чрез софтуерен продукт SPSS v23.0

Резултати: От участниците най-многобройни са респондентите от Русе, които са 47.9% (n = 625) от всички анкетирани, следвани от Пазарджик (28.2%; n = 368) и Пловдив (28.2%; n = 211).

Най-често родителите купуват продукти за деца за грип и простуда (n = 944; 72.4%), следвани от тези за укрепване на имунната система (n = 933; 71.5%) и за кашлица (n = 890; 68.2%).

Открихме следните зависимости:

- Областен град * Фармацевтична грижа: Според Вас фармацевта има желание/нагласа да предостави фармацевтична грижа (да Ви консултира). Респондентите от Русе са по-

удовлетворени от предоставената фармацевтична грижа ($p < 0.05$).

- Образование * Фармацевтична грижа: Според Вас доколко е достъпен фармацевта (разполага ли с време, конфиденциално място). Респондентите с по-ниска образователна степен са по-удовлетворени от достъпността на фармацевта ($p < 0.001$), считат, че фармацевта има желание/нагласа да предостави фармацевтична грижа ($p < 0.01$) и се доверяват на препоръката на фармацевта ($p < 0.05$).

Полът на респондентите и възрастта на децата в педиатрична възраст не оказва влияние върху предоставената фармацевтична грижа ($p > 0.05$).

Заключение: Родителите са удовлетворени от предоставената фармацевтична грижа, като тези с по-висока степен на образование са по-взискателни.

Приложение в практиката:

- Проведен е подкаст на 15.05.2024 г. в платформата Zoom. Тема на подкаста: „Фармацевтичната грижа фокусирана върху специфичните потребности на децата“
- Отпечатани са информационни табла и брошури, предоставени на учебни заведения в страната.

Научни публикации:

1. Bozhidarka Radoslavova Hadzhieva, Anna Atanasova Mihaylova, Milen Ventsislavov Dimitrov, Kristina Pavlova Kilova, Changes in the list of over-the-counter drugs containing biologically active substances of plant origin which are intended to be applied among pediatric patients in Bulgaria. PHARMACIA. 2024; 71: 1-5. DOI 10.3897/pharmacia.71.e121793
2. Bozhidarka Hadzhieva, Anna Mihaylova, Tanya Gesheva, Kristina Kilova, Pharmaceutical care in the dispensing of over-the-counter medicines intended for children. MANAGEMENT AND EDUCATION. 2024; 20(6): 78-81.

Научна област на изследването: Медико-биологична
Договор: Проект № ДПДП-01/2023

Тема: „Разработване на алгоритъм за автоматизиран анализ на многопараметърни флоуцитометрични данни за В-лимфоцитни субпопулации“

Ръководител на проекта: проф. д-р Христо Тасков, дм[1]
Водещ изследовател: Теодора Калфова, докторант[2]
Членове на изследователския екип: д-р Александра Балджиева[2,3]; д-р Мартина Божкова[2,3]; доц. д-р Хасан Бурнусузов, дм[3]
Базова организация: Медицински университет – Пловдив

1. *Научноизследователски институт*
2. *Медицински факултет, Катедра по медицинска микробиология и имунология „Проф. д-р Елисей Янев“*
3. *УМБАЛ „Св. Георги“, Лаборатория по клинична имунология*

Цел: Разработване на автоматизиран метод за анализ на многопараметърни флоуцитометрични данни, насочен към идентифицирането на В-клетъчни субпопулации при различни патологични състояния (COVID-19, дОЛЛ).

Материал и методи: В настоящото проучване са използвани fcs файлове от флоуцитометрични проби от пациенти, диагностицирани с остра В-клетъчна лимфобластна левкемия (B-ALL) в детска възраст, пациенти, заразени с вируса SARS-CoV-2 (COVID-19) и контролна група от здрави лица. Софтуерът FlowJo е използван заедно с интегрирани приставки/плъгини (FlowAI, FlowClean, tSNE, UMAP, PhenoGrah, Xshift, FlowSOM, ClusterExplorer) за целите на предварителната обработка, намаляване на размерността, клъстеризация на клетъчните популации и анализ на клъстерите.

Резултати: Разработеният алгоритъм значително ускорява процеса на анализ, повишава прецизността на идентифициране на целевите клетъчни популации и увеличава възпроизводимостта на резултатите в сравнение с конвенционалните методи. FlowAI демонстрира забележителна ефикасност при обработката на обемни файлове с данни, което води до значително подобряване на качеството на данните. FlowSOM улеснява детайлно

картографиране на субпопулациите на В-клетките и изграждането на клъстерни дървета, като по този начин улеснява по-прецизното разграничаване на клетъчните субтипове и ускорява анализа на флоуцитометричните проби. ClusterExplorer позволява детайлен анализ на клъстерите и определяне на размера на клетъчните субпопулации. При пациенти, диагностицирани с дОЛЛ разработеният алгоритъм успешно разграничава бластните клетки от нормалните хематогонии, като по този начин улеснява по-точната и бърза диагноза.

Заключение: Автоматизираният анализ на многопараметърни флоуцитометрични данни подпомага по-бързата диагностика на таргетни клетъчни субпопулации, намалявайки времето за анализ значително.

Приложение в практиката: Предлага се прилагането на алгоритъма в рутинната практика, с цел подобряване на бързината на диагностиката на онкохематологични и имунни заболявания.

Научни публикации:

1. Baldzhieva A, Burnusuzov H, Andreeva H, Kalfova T, Petrov S, Dudova D, Vaseva K, Dimcheva T, Taskov H, Murdjeva M. Approaches for detection of minimal residual disease in childhood B-cell precursor acute lymphoblastic leukemia by FlowJo and Infinicyt softwares. Bulgarian Chemical Communications. 2023;55(Special Issue C):17-24. doi: 10.34049/bcc.55.C.0001.

Научна област на изследването: Медико-биологична
Договор: Проект № ДПДП-02/2023

Тема: „Митохондриална дисфункция и митофагия като потенциални биомаркери при разстройство от аутистичния спектър (РАС)“

Ръководител на проекта: гл. ас. Мария Гевезова, дб[1]
Водещ изследовател: ас. Елеонора Ковачева, дб[1]
Членове на изследователския екип: доц. Николай Мехтеров, дб[1]; Татяна Тодорова[1]; Елица Танова[1]; д-р Здравко Иванов[2]; проф. д-р Виктория Сарафян, дмн[1]; проф. д-р Иван Иванов, дм[2]; проф. д-р Илияна Пачева, дм[2]; гл. ас. д-р Ралица Козарева, дм[2]; Елена Тимова[2]; доц. д-р Златослав Арабаджиев, дм[3]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по медицинска биология*
2. *Медицински факултет, Катедра по педиатрия „Проф. д-р Иван Андреев“*
3. *Медицински факултет, Катедра по психиатрия и медицинска психология*

Цел: Да се установи патогенетичната роля на митофагията за отстраняване на увредените органели в хода на РАС и да се потърси корелация между биоенергетичните параметри и експресията на гени, кодиращи протеините LAMP1 и LAMP2 и панел от 4 миРНКи (миР-143-3р, миР-320а, миР-130-3р и миР-181а-5р), участващи в процеса.

Материал и методи: Събрани са 13 проби с РАС и 2 проби от здрави деца. Данните са валидирани в пациентска кохорта (n = 50) и контролна (n = 12) група проби.

Резултати: Резултатите показват, че PBMCs, изолирани от пациенти с РАС и контроли, имат сходно базално дишане. Максималното дишане и резервния дихателен капацитет при РАС са двукратно повишени спрямо контролната група. Не се открива статистически значима разлика в немитохондриалното дишане и изтичането на протони. Гликолитичната активност в групата с РАС е повишена спрямо контролната група. В допълнение, нивата на генна експресия на *LAMP1 и LAMP2* са значително по-

високи при пациенти с РАС в сравнение с контролите. Резултатите показват понижена експресия на miR-143-3p и miR-130a-3p при РАС пациенти, докато при miR-181a-5p и miR-320a не се открива разлика между изследваните групи.

Заключение: Установените данни представят нова научна информация и допълват знанията относно сложните патогенетични механизми на РАС.

Приложение в практиката: Получените резултати поставят фокус върху връзката между митохондриалната дисфункция и митофагията и по този начин очертават нови потенциални таргети за терапия.

Научни публикации:

1. Kovacheva, E., Gevezova, M., Mehterov, N., Kazakova, M., Sarafian, V. 2025. The intersection of mitophagy and autism spectrum disorder: a systematic review. International Journal of Molecular Sciences – под печат.

Научна област на изследването: Медико-биологична
Договор: Проект № ДПДП-03/2023

Тема: „Предиктивно и прогностично значение на PD-L1, CD4, CD8, FOXP3 и ACE2 при тройно негативните и HER2-low карциноми на гърдата“

Ръководител на проекта: доц. д-р Силвия Генова, дм[1]
Водещ изследовател: д-р Невена Илиева-Шипчанова, докторант[1]
Членове на изследователския екип: д-р Десислава Ташкова[1]; гл. ас. Мина Пенчева, дб[2]; д-р Елена Даскалова, дм[3]; д-р Христо Хаджиев[4]; Петър Георгиев[5]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по обща и клинична патология*
2. *Фармацевтичен факултет, Катедра по медицинска физика и биофизика*
3. *Медицински факултет, Катедра по анатомия, хистология, ембриология*
4. *Комплексен онкологичен център – Пловдив*
5. *Медицински факултет, студент*

Цел: Предоставяне на повече информация относно експресията на PD-L1 и ACE2 при тройно негативен рак на гърдата (ТНКГ).

Материал и методи: Прегледахме 88 случая на ТНКГ за периода 2021–2023 г. и оценихме експресията на HER2, Ki67, PD-L1 и ACE2 преди и след НАПХТ.

Резултати: Положителна експресия на PD-L1 беше установена при 44.3% от първичните тумори, като в 52.9% от първоначално положителните случаи наблюдавахме загуба в експресията след лечението. TILs бяха значително по-високи при PD-L1-положителните тумори (p = 0.001). При PD-L1-позитивния ТНКГ установихме по по- високи средни стойности за Ki-67 (p = 0.015). По-високите нива на Ki-67 (≥ 50%) бяха свързани с по-добри лечебни резултати, показвайки среден RCB резултат от 1.60 спрямо 3.16 при случаите с ниско Ki-67 (p = 0.022). HER2-отрицателните случаи имаха по-висока предразположеност към благоприятен патологичен отговор (54.5%) в сравнение с HER2-low туморите (25%, p = 0.048). По отношение на ACE2 при ТНКГ експресия в

туморние клетки наблюдавахме при 86.5% от случаите, а в стромалните клетки – при 74.1% от случаите, като по-висока експресия беше налице в резидуалните тумори. Това предполага потенциален механизъм на резистентност към терапия и вероятна нова терапевтична възможност чрез таргетиране на ACE2.

Заключение: Експресията на PD-L1 и ACE2 при ТНКГ показва значително несъответствие преди и след лечение, което подчертава необходимостта от допълнителни изследвания.

Приложение в практиката: Разминаването в експресията за PD-L1 преди и след терапия предполага, че експресията на PD-L1 трябва да бъде рутинно тествана на първичната биопсия. Експресията на ACE2 при ТНКГ може да бъде потенциален механизъм на резистентност към терапия.

Научни публикации:

1. Ilieva, N.; Pencheva, M.; Hadzhiev, H.; Tashkova, D.; Daskalova, E.; Georgiev, P.; Genova, S. Impact of Neoadjuvant Therapy on PD-L1 Expression in Triple-Negative Breast Cancer and Correlation with Clinicopathological Factors. Diagnostics 2024, 14, 2672. https://doi.org/10.3390/diagnostics14232672

Научна област на изследването: Дентална медицина
Договор: Проект № ДПДП-04/2023

Тема: „Анализ на оралната среда и микробния биофилм при черен налеп по зъбните повърхности на деца в предучилищна и ранна училищна възраст“

Ръководител на проекта: доц. д-р Мария Шиндова, дм[1]
Водещ изследовател: д-р Кристина Табутова, докторант[1]
Членове на изследователския екип: проф. д-р Ани Белчева, дм[1]; проф. д-р Георги Томов, дм[2]; д-р Станимира Милева[1]; д-р Лилияна Щерева, дм[1]; д-р Стела Ангелова, дм[1]; Лазарина Мирчева[3]
Базова организация: Медицински университет – Пловдив

1. *Факултет по дентална медицина, Катедра по детска дентална медицина*
2. *Център по лазерна дентална медицина към Научноизследователски институт*
3. *Факултет по дентална медицина, студент*

Цел: Да се проучи микробиологичният състав на черния налеп по зъбните повърхности, качествените и количествени параметри на слюнката и да се сравни ефектът от приложението на съвременни методи и средства за повлияването на появата му в детска възраст.

Материал и методи: Изследвани са 90 пациенти с черни налепи и 30 пациенти без налепи по зъбните повърхности. Направена е идентификация и съпоставка на специфичните бактерии в плаковия биофилм при пациенти с и без черни налепи. Проведени са клинични тестове за определяне количеството и качеството на слюнката във връзка с оценка на нейното количество, pH и буферен капацитет. Проведена е терапия с пробиотик „Bio Gaia® Prodentis“, фотодинамична терапия с лазер и професионална орална хигиена при пациентите с черни налепи.

Резултати: Сравнителният анализ на резултатите от микробиологичното проучване демонстрира определени преобладаващи видове Actinomycetes, Treponema и Neisseria в плаковия биофилм при пациенти с черни налепи. Между двете изследвани групи пациенти (с и без черни налепи) не се установи

статистически значима разлика по отношение на изследваните слюнчените показатели ($p > 0.05$). Приложените терапевтични техники доказват близка ефективност по отношение на повлияването на изследваната патология.

Заключение: Разликите в микробния състав и слюнчените параметри при деца с и без черни налепи изисква разработването на профилактична програма за предотвратяване на повторната поява на черните налепи след проведена терапия. Ефективни методи на лечение на черните налепи по зъбните повърхности са приложението на пробиотик „Bio Gaia® Prodentis" и фотодинамична терапия с лазер в комбинация с професионална орална хигиена.

Научни публикации:

1. Tabutova K., Shindova M. Black stain management in children. International scientific online Journal Science & Technologies. Medical biology studies, clinical studies, social medicine and health care. Volume XIII, 2023,182-186.
2. Tabutova K, Shindova M. Association between Black stain on primary teeth and high serum iron levels in a 5-year-old patient: a case report. Scientific Works of the Union of Scientists Plovdiv, Series G. Medicine, Pharmacy and Dental Medicine, vol. XXX, 2024, 119.
3. Tabutova K., Shindova M., Mircheva L., Mutafchieva M. Knowledge of dentists regarding black stain on tooth surfaces in children. International scientific online Journal Science & Technologies. Medical biology studies, clinical studies, social medicine and health care. Volume XIV, 2024,146-152.

Научна област на изследването: Медико-биологична
Договор: Проект № ДПДП-05/2023

Тема: „Роля на разстроения железен метаболизъм в синдрома на неспокойните крака при пациенти с ревматоиден артрит“

Ръководител на проекта: доц. д-р Кирил Терзийски, дм[1]
Водещ изследовател: д-р Красимир Аврамов, докторант[1]
Членове на изследователския екип: д-р Тодор Георгиев[1]; д-р Анелия Драганова, дм[1]; Снежана Терзийска[2]; д-р Александра Балджиева[3]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по патологична физиология*
2. *МЦ „Тримонциум“*
3. *Медицински факултет, Катедра по медицинска микробиология и имунология „Проф. д-р Елисей Янев“*

Цел: Да се изяснят измененията в железния метаболизъм при пациенти със синдром на неспокойните крака (СНК), който страдат и от ревматоиден артрит.

Материал и методи: Изследвани бяха 48 пациенти с РА, диагностицирани по критериите на ACR/EULAR (2010). Оценена беше болестната активност (DAS-28), възпалителните маркери и железният статус. Всички пациенти преминаха полисомнография с електромиография на долните крайници.

Резултати: СНК беше установен при 37,5% от пациентите. Те демонстрираха по-дълга латентност до заспиване, по-ниско качество на съня и по-висока честота на периодични движения на крайниците (94%). Обструктивната сънна апнея бе установена при 12,5% от пациентите. Отклонения в железния статус се наблюдаваха при 89% от пациентите със СНК. Тези пациенти показаха тенденция към по-високи DAS-28 стойности, както и по-високи маркери на възпаление.

Заключение: СНК е често срещано при РА и е свързано със значими нарушения на съня и променен железен статус. Липсата на достатъчно обективни данни в литературата подчертава необходимостта от полисомнографска оценка при тези пациенти.

Ранното разпознаване и лечение на СНК може да намали болестния товар и да подобри качеството на живот.

Приложение в практиката: Ранното разпознаване и лечение на СНК може да намали болестния товар и да подобри качеството на живот като позволи по-цялостен подход към пациента.

Научни публикации: –

Научна област на изследването: Медико-биологична
Договор: Проект № ДПДП-06/2023

Тема: „Протективни възможности на L-теанин и аеробна тренировка върху когнитивните нарушения при липополизахарид-индуциран експериментален модел на хронично невровъзпаление на плъхове“

Ръководител на проекта: проф. д-р Катерина Георгиева, дм[1]
Водещ изследовател: д-р Георги Хаджипетров[1]
Членове на изследователския екип: проф. д-р Николай Бояджиев, дм[1]; доц. д-р Петър Хрисчев, дм[1]; Десислава Крушовлиева[2]; Петя Иванова[2]; проф. д-р Яна Чекаларова, дм[2]
Базова организация: Медицински университет – Пловдив
1. *Медицински факултет, Катедра по физиология*
2. *Българска академия на науките, Институт по невробиология*

Цел: Да се проучат ефектите на L-теанина и аеробната тренировка за превенция на когнитивните нарушения, оксидативния стрес и невропластичността при липополизахарид (LPS)-индуциран експериментален модел на хронично невровъзпаление.

Материал и методи: Мъжки плъхове Wistar, бяха разделени в пет групи (n = 11): контролна; нетренирана с LPS; нетренирана с L-теанин и LPS; тренирана с LPS; тренирана с L-теанин и LPS. След 5 седмици третиране с L-теанин и тренировка на тредмил всички плъхове бяха подложени на тестове за физически работен капацитет, след което беше индуцирано хронично невровъзпаление с LPS. В края на опита бяха проведени поведенчески тестове и бяха определени невровъзпалителни маркери, пластични маркери и маркери за оксидативен стрес

Резултати: Аеробната тренировка повиши издръжливостта, спринтовата скорост и силата на захват в сравнение с останалите групи. Индуцираното невровъзпаление влоши пространствената работна памет, двигателната активност, краткотрайната памет и повиши TNF-α, IL-1β в хипокампа и серумния CRP. Предварителното третиране с L-теанин и тренировката поотделно предотвратиха установените когнитивни нарушения и намалиха нивата на

повишените невровъзпалителните маркери. Комбинираното приложение показа синергичен позитивен ефект само върху повишените нива на TNF-α. Хроничното невровъзпаление повиши маркерите за оксидативен стрес, а предварителното приложение на L-теанина и тренировката частично коригираха повишената липидна пероксидация. Невровъзпалението намали pCREB/CREB съотношението, показващо намалена синаптична пластичност и то беше предотвратено само от предварителната аеробна тренировка.

Заключение: Резултатите разкриват потенциала на L-теанина и аеробната тренировка за превенция на хроничното невровъзпаление и свързаните с него когнитивни дефицити.

Приложение в практиката: Предлага се използването на L-теанина и аеробното физическо натоварване като профилактична стратегия против развитието на невровъзпаление.

Научни публикации: –

Научна област на изследването: Медико-биологична
Договор: Проект № ДПДП-07/2023

Тема: „Сравнително фитохимично, токсикологично и неврофармакологично изследване на етерично масло и етанолов екстракт от *Tanacetum vulgare* L.“

Ръководители на проекта: проф. д-р Людмил Пейчев, дм[1]; доц. Нико Бенбасат, дф[2,3]
Водещ изследовател: ас. Борислава Лечкова, докторант[2,3]
Членове на изследователския екип: проф. д-р Пепа Атанасова, дм[4]; доц. Диана Карчева-Бахчеванска, дф[2,3]; доц. Калин Иванов, дф[2,3]; доц. Станислава Иванова, дф[2,3]; доц. Михаела Шишманова-Досева, дм[1,3]; доц. д-р Петър Хрисчев, дм[5]; гл. ас. Кремена Сарачева, дм[1,3]; гл. ас. инж. Живко Пейчев, дм[6]; ас. Димитър Терзиев[7]; Йоана Георгиева, дб[2]; Самира Къддо[8]; Рени Генчева[8]
Базова организация: Медицински университет – Пловдив

1. *Фармацевтичен факултет, Катедра по фармакология, токсикология и фармакотерапия*
2. *Фармацевтичен факултет, Катедра по фармакогнозия и фармацевтична химия*
3. *Научноизследователски институт*
4. *Медицински факултет, Катедра по анатомия, хистология и ембриология*
5. *Медицински факултет, Катедра по физиология*
6. *Факултет по обществено здраве, Катедра по медицинска информатика, биостатистика и електронно обучение*
7. *Медицински факултет, Втора катедра по вътрешни болести*
8. *Фармацевтичен факултет, студент*

Цел: Фитохимична, токсикологична и неврофармакологична оценка на етерично масло (ЕМ) и етанолов екстракт (ЕЕ) от *Tanacetum vulgare* L.

Материал и методи: Получени са ЕМ и ЕЕ от цветове на *Tanacetum vulgare.* Химичният им състав е охарактеризиран посредством газова хроматография/мас спектрометрия и високоефективна течна хроматография. Извършено е изследване на остра токсичност за определяне на LD_{50} при плъхове. Проведени са поведенчески тестове за оценка на когнитивни функции на интактни плъхове и при животни с модел на скополамин-индуцирана амнезия, третирани с двата извлека. Извършено е изследване на

под-остра токсичност – хистология на вътрешни органи и определяне на BDNF експресия в хипокамп.

Резултати: Главни компоненти в ЕМ са камфор и транс-хризантенилацетат. В ЕЕ са установени значителни количества рутин и хлорогенова киселина. При определяне на LD_{50} на двата извлека не бяха наблюдавани симптоми на остра токсичност и смъртност в дози над 5000 mg/kg per os. При интактните животни, третирането с ЕЕ прояви по-изразен ефект спрямо ЕМ и доведе до значимо подобряване на пространствената и разпознавателна памет, активното и пасивното обучение и памет. Установихме известно анксиолитично действие, без ефект върху двигателната активност. При модел на scopolamine-индуцирана амнезия, и двата извлека доведоха до подобряване на когнитивните функции. Тези ефекти се свързват с установената повишена експресия на BDNF в хипокампуса на интактни животни. Не се установиха хистологични промени във вътрешните органи.

Заключение: Двата извлека повишиха хипокампалната експресия на BDNF и оказаха положително влияние върху редица когнитивни домейни, с по-изразен ефект при моделите на скополаминова амнезия.

Приложение в практиката: Да послужи като основа за разработване на фитотерапевтик с ноотропна активност.

Научни публикации:

1. Lechkova B, Shishmanova-Doseva M, Benbassat N, Gevrenova R, Atanassova P, Penkova N, Peychev L, Hrischev P, Peychev Z, Ivanova S. Evaluation of the Influence of *Tanacetum vulgare* Extract on Cognitive Functions and Hippocampal BDNF Expression. Molecules. 2024 Dec 4;29(23):5723. https://doi.org/10.3390/molecules29235723
2. Борислава Лечкова, Михаела Шишманова-Досева, Нико Бенбасат, Живко Пейчев. Ефект на етерично масло от Tanacetum vulgare върху серумни биохимични показатели. Сборник Доклади от VIII-ми Национален конгрес по фармакология, клинична фармакология и терапия „Фармакологията – от експеримента към клиниката“, 15-17 ноември 2024 г. ISBN 978-954-756-354-4.
3. Борислава Лечкова, Нико Бенбасат, Живко Пейчев, Михаела Шишманова-Досева. Ефект на етанолов екстракт от *Tanacetum vulgare* върху когнитивни функции при експериментален модел на scopolamine-индуцирана амнезия. Сборник Доклади от VIII Национален конгрес по фармакология, клинична фармакология и терапия „Фармакологията – от експеримента към клиниката“, 15-17 ноември 2024 г. ISBN 978-954-756-354-4.

Научна област на изследването: Медико-биологична
Договор: Проект № ДПДП-08/2023

Тема: „Аналитично охарактеризиране и проучване на биологична активност на *Echinophora tenuifolia* subsp. *sibthorpiana*.“

Ръководител на проекта: доц. Станислава Иванова, дф[1]
Водещ изследовател: ас. Станислав Дянков[1]
Членове на изследователския екип: доц. Калин Иванов, дф[1]; доц. Нико Бенбасат, дф[1]; доц. Диана Карчева-Бахчеванска, дф[1]; ас. Ваня Налбантова, дф[1]; ас. Велислава Тодорова, дф[1]; Йоана Георгиева, дб[1]; доц. д-р Джевдет Чакъров, дм[2]; гл. ас. Райна Ардашева, дб[3]; гл. ас. Живко Пейчев, дм[4]
Базова организация: Медицински университет – Пловдив

1. *Фармацевтичен факултет, Катедра по фармакогнозия и фармацевтична химия*
2. *Медицински факултет, Катедра по пропедевтика на хирургичните болести*
3. *Фармацевтичен факултет, Катедра по медицинска физика и биофизика*
4. *Факултет по обществено здраве, Катедра по медицинска информатика, биостатистика и електронно обучение*

Цел: Да се предложат подходи за охарактеризиране и количествен анализ на екстракт от *E. tenuifolia* subsp. *sibthorpiana*. Да се определи биологичният потенциал на екстракт от *E. tenuifolia* subsp. *sibthorpiana*.

Материал и методи: Високоефективна течна хроматография, UV-Vis спектрофотометрия и нематоди от моделния организъм *Caenorhabditis elegans* (*C. elegans*).

Резултати: Приготвен е екстракт от надземни части на *Echinophora tenuifolia* subsp. *sibthorpiana* (*E. tenuifolia* subsp. *sibthorpiana*). Установени бяха количеството на общи феноли и съдържанието на индивидуални фенолни съединения в екстракта и е доказано наличието на хлорогенова киселина, *p*-кумарова киселина, ферулова киселина, салицилова киселина, рутин, хесперидин и розмаринова киселина, като най-висока концентрация е установена за рутин. Установено е, че екстрактът

притежава висока антиоксидантна активност *in vitro,* включително силни радикал-улавящи свойства и общ антиоксидантен капацитет. Екстрактът не показва токсични ефекти спрямо моделния организъм *C. elegans* и същевременно се установи, че има изразени адаптогенни свойства, които не са описани до сега. Установи се, че стимулира хемосензорната мрежа на нематодите и увеличава значително устойчивостта им към топлинен стрес и повишени нива на оскидативен стрес.

Заключение: Екстрактът от *E. tenuifolia* subsp. *sibthorpiana* е богат на фенолни съединения, притежава висока антиоксидантна активност и повлиява положително процесите на стареене в моделни организми (*C. elegans*).

Приложение в практиката: *E. tenuifolia* subsp. *sibthorpiana* се асоциира с висок терапевтичен потенциал, който тепърва предстои да бъде проучен. Ключовите направления, в които *E. tenuifolia* subsp. *sibthorpiana* би следвало да се изследва задълбочено и в последствие да намери практическо приложение включват: повлияване на процесите на стареене, увеличаване на естествената устойчивост на организма към стрес, невродегенеративни заболявания.

Научни публикации:

1. Ivanova S, Dyankov S, Ardasheva R, Ivanov K. Genus *Echinophora* – Biological Activity, Chemical Composition, and Future Perspectives. Plants. 2024; 13(12):1599.

Научна област на изследването: Медико-биологична
Договор: Проект № ДПДП-10/2023

Тема: „Сравнително проучване върху съвременни микробиологични методи за бърза етиологична диагностика на уроинфекции“

Ръководител на проекта: доц. д-р Михаил Петров, дм[1,2]
Водещ изследовател: д-р Милена Рупчева, докторант[1,2]
Членове на изследователския екип: д-р Петя Маркова[3]; д-р Виолета Желева[4]; д-р Костадин Костадинов[5]; Марица Щерев[6]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по медицинска микробиология и имунилогия „Проф. д-р Елисей Янев“*
2. *Научноизследователски институт*
3. *Медицински факултет, Катедра по педиатрия „Проф. д-р Иван Андреев“*
4. *Медицински факултет, Катедра по вътрешни болести, Секция по нефрология*
5. *Факултет по обществено здраве, Катедра социална медицина и обществено здраве*
6. *Медицински факултет, студент*

Цел: Да се извърши комплексен сравнителен анализ на бързите методи за етиологична диагностика при пациенти с уроинфекции.

Материал и методи: За периода септември 2023 – декември 2024 се изследваха материал урина от 76 пациента с инфекции на пикочните пътища. Сравнени бяха резултатите от мултиплекс PCR (Novaplex™ UTI панели 1 – 3) с рутинно културелно изследване и антибиограмите от Uroquattro, Alifax с дисково-дифузионния метод.

Резултати: Изследвани бяха 76 пациенти (средна възраст 50,99 г.; 74% жени). От културелните изследвания 45% демонстрираха бактериален растеж, основно от разред *Enterobacterales* (*E. coli, K. pneumoniae, P. mirabilis*) и *Enterococcus faecalis*. С mPCR патогени се откриха в 82% от пробите, като 79% бяха полимикробни. Разминаване между методите се наблюдава в 47%, вероятно поради труднокултивируеми бактерии, ниско

микробно число или предходна антибиотична терапия. Установена бе *Candida glabrata* в една проба. От 10 урини, изследвани с HB&L Uroquattro, 8 антибиограми бяха валидни и съпоставени с дисково-дифузионния метод при 69% съвпадение.

Заключение: Резултатите показват, че молекулярно-генетичните методи осигуряват значително по-бърза идентификация на патогените (в рамките на 24 часа), в сравнение с 48-72 часа при стандартните методи. Турбидиметричният анализ с Uroquattro скъсява времето за получаване на антибиограма с 24 – 48 часа. По-бързата диагностика позволява навременно и таргетно лечение, намалява болничния престой, нежеланите лекарствени реакции и появата на резистентни щамове.

Приложение в практиката: Изводите подчертават необходимостта от интегриране на бързи диагностични подходи в клиничната практика за по-ефективно управление на ИПП.

Научни публикации:

1. Рупчева М., Петров М. „Уроинфекции – съвременни микробиологични методи за бърза диагностика“, сп. Медицински преглед 01/2025:16-26 ISSN 1312-2193
2. M. Rupcheva, R. Tashev, V. Georgieva, M. Petrov, M. Murdjeva. Microbiological diagnosis and treatment strategy for invasive *Candida glabrata* infections. Science and Youth – 2024. In Scientific Reports, 2024:88-94 ISSN 1314-9229.

Научна област на изследването: Медико-биологична
Договор: Проект № ДПДП-11/2023

Тема: „Експериментален модел на полимерна матрица, натоварена с лекарствено вещество Simvastatin за изследване на влиянието и върху остеогенезата“

Ръководител на проекта: д-р Надежда Кадрева[1]
Водещ изследовател: д-р Надежда Кадрева[1]
Членове на изследователския екип: доц. д-р Надя Пенкова, дм[1]; проф. д-р Пепа Атанасова, дм[1]; доц. Бисера Пиличева, дф[2]
Базова организация: Медицински университет – Пловдив

1. *Медицински факултет, Катедра по анатомия, хистология и ембриология*
2. *Фармацевтичен факултет, Катедра по фармацевтични науки*

Цел: В настоящето проучване се цели да се установи ефекта на приложението на матрици от биоматериал – Poly-ε-Caprolactone (PCL), натоварени с лекарствено вещество – Simvastatin върху остеогенезата.

Материал и методи: В експеримента се използват мъжки плъхове Wistar, разпределени в 3 групи – Gpoly, GAn, G8w. Експерименталният модел е „critical sized bone defect model“ и се осъществява на принципа на направляваната костна регенерация с имплантиране в калварията на животните натоварен или ненатоварен със Simvastatin полимер. Получаването на матриците (scaffolds) се използва solvent casting – salt leaching метод. Оценяват се морфологичните и физико-химичните характеристики на матрицата. Снема се хистологичен материал за имунохистохимично изследване с антитела Osteocalcin, BMP-2, VEGF, рутинно хистологично изследване с хематоксилин и еозин и Трихромно оцветяване с Азан по метода на Хайденхайм.

Резултати: След 8-седмичен престой на полимерната матрица Poly-ε-Caprolactone в калварията на животните: GPoly-G8w се наблюдава пълно вграждане на импланта в костната структура на черепа. Периферията на импланта представлява цялостен слой от безструктурната материя около биополимера.

Централната зона на импланта е фрагментирана. При ИХХ, Азан и Х-Е оцветявания се наблюдават VEGF-позитивни клетки с фина кафява гранулация, изпълваща тяхната. Експресията на BMP-2, Osteocalcin се изявява с наличие на кафяви гранули, изпълващи цитоплазмата на клетките.

Заключение: Позитивирането на всички ИХХ реакции с горепоменатите антитела доказва наличие на активна остеогенеза в тъканите около матрицата.

Приложение в практиката: Приложение в ортопедията, ортопедичната и стоматологичната имплантология, хирургичната и пластичната медицина и фармакологията като метод за възстановяване на костни дефекти чрез използването на биоматериали за доставка на лекарствени молекули, за стимулиране, повлияване и ускоряване на заздравителните процеси в костната тъкан.

Научни публикации:

1. Nadezhda Kadreva, Nadya Penkova, Pepa Atanassova, Bissera Pilicheva, Cholung Limbu. ROLE OF SIMVASTATIN IN BONE TISSUE ENGINEERING AND OSTEOGENESIS, Научни трудове на Съюза на учените в България – Пловдив, серия Г. Медицина, фармация и дентална медицина, т. XXX, ISSN 1311-9427, ISSN 2534-9392 (On-line), 2024. Scientific works of the Union of Scientists in Bulgaria-Plovdiv, series G. Medicine, Pharmacy and Dental medicine, Vol. XXX, ISSN 1311-9427 (Print), ISSN 2534-9392 (On-line), 2024,105-109.
2. Nadezhda Kadreva, Nadya Penkova, Pepa Atanassova, Bissera Pilicheva RESEARCH ADVANCES OF POLYMERS AS MATERIALS FOR THE ACCELERATION OF BONE HEALING, Научни трудове на Съюза на учените в България–Пловдив, серия Г. Медицина, фармация и дентална медицина, т. XXX, ISSN 1311-9427, ISSN 2534-9392 (On-line), 2024. Scientific works of the Union of Scientists in Bulgaria-Plovdiv, series G. Medicine, Pharmacy and Dental medicine, Vol. XXX, ISSN 1311-9427 (Print), ISSN 2534-9392 (On-line), 2024,45-48.
3. Nadezhda Kadreva, Nadya Penkova, Pepa Atanassova, Bissera Pilicheva.In vivo стимулиране на остеогенезата от Poly-ε-Caprolactone матрица, натоварена със Simvastatin“. XII Международен Симпозиум по Клинична анатомия, Варна 10-13.10.2024г. Постер.
4. Nadezhda Kadreva, Nadya Penkova, Pepa Atanassova, Bissera Pilicheva. RESEARCH ADVANCES OF POLYMERS AS MATERIALS FOR THE ACCELERATION OF BONE HEALING. Xth International Conference of Young Scientists – Plovdiv 2024, 20–23 June 2024, Plovdiv Постер.
5. Nadezhda Kadreva, Nadya Penkova, Pepa Atanassova, Bissera Pilicheva. In vivo стимулиране на остеогенезата от Poly-ε-Caprolactone

матрица, натоварена със Simvastatin. XII Международен Симпозиум по Клинична анатомия, Варна 10-13.10.2024г. Постер.

6. Nadezhda Kadreva, Nadya Penkova, Pepa Atanassova, Bissera Pilicheva.Modified “critical sized bone defect” technique in rat calvaria for promoting osteogenesis. Дни на науката 2024, Съюз на учените в България – Пловдив. 23-24.11.2024г. Постер.

Научна област на изследването: Медико-биологична
Договор: Проект № ТГИ-01/2023

Тема: „Дистанционно проследяване на пациенти с вродени аномалии на ГИТ“

Ръководител на проекта: проф. д-р Пенка Стефанова-Пеева, дм[1]
Водещ изследовател: проф. д-р Пенка Стефанова-Пеева, дм[1]
Членове на изследователския екип: ас. д-р Димитър Дачев, дм[1]; ас. д-р Бисер Иванов, дм[1]; ас. д-р Стоян Лупанов, дм[1]; д-р Борислав Исаков[1]; д-р Николай Маврев[1]; Светла Иванова[1]
Базова организация: Медицински университет – Пловдив
1. *Медицински факултет, Катедра по пропедевтика на хирургичните болести, Секция по детска хирургия*

Цел: Създаване на мобилно приложение за дистанционно проследяване на пациенти с вродени аномалии на гастроинтестиналния тракт (ГИТ) и подпомагане на родителите в следоперативния период.

Материал и методи: Проучването е кохортно, ретроспективно и проспективно, включващо пациенти, родени с вродени аномалии на ГИТ, оперирани в Клиниката по детска хирургия. Ще се събира информация чрез мобилно приложение, което ще осигурява комуникация между родителите и медицинските специалисти. Дескриптивна статистика ще се използва за анализ на данните, включително демографски показатели и качество на живот.

Резултати: Очаква се разработването на ефективна платформа за телемедицинско проследяване, която ще подобри грижите за пациентите и ще намали усложненията.

Заключение: Телемедицината предлага иновативен подход за мониторинг на пациенти, който подобрява комуникацията между лекари и родители и осигурява своевременни медицински насоки.

Приложение в практиката: Приложението ще позволи навременно проследяване и ще подобри качеството на живот на пациентите, като намали нуждата от ненужни хоспитализации.

Научни публикации:

1 The necessity of online education for parents of surgically ILL
2. The necessity of sharing medical information in the virtual space regarding congenital GIT anomalies
3. Intermittent vacuum-assisted closure (VAC) therapy in sacral pilonidal cysts

Научна област на изследването: Обществено здраве
Договор: Проект № ТГИ-02/2023

Тема: „Концептуален модел за обучение по телемедицина и изкуствен интелект в здравното образование“

Ръководител на проекта: проф. Нонка Матева, дм[1]
Водещ изследовател: гл. ас. Ирена Карабова-Хамбарова, дм[1]
Членове на изследователския екип: гл. ас. Антония Янева, дм[1]; доц. инж. Кристина Килова, дм[1]; ст. преп. инж. Ангелина Кирковa-Богданова, дм[1]; гл. ас. Теодора Димчева, дм[1]; гл. ас. инж. Живко Пейчев, дм[1]; Христо Бучков, докторант[1]; Павлина Еленска[2]
Базова организация: Медицински университет – Пловдив

1. *Факултет по обществено здраве, Катедра по медицинска информатика, биостатистика и електронно обучение*
2. *Медицински факултет, студент*

Цел: Създаване на концептуален модел за обучение в повишаване компетенциите на студентите в медицинските висши училища в практиката им с телемедицински технологии.

Материал и методи: Проведено е анкетно проучване сред български и чуждестранни студенти от специалност „Медицина“ на Медицински университет – Пловдив, изследващо мнението им относно необходимостта от въвеждане на обучение по телемедицина, както и информираността им в тази област.

Резултати: Резултатите от проведеното анкетно проучване върху студентите по медицина показват, че студентите са с ниско ниво на информираност относно телемедицината, като по-голямата част от тях (62,20%) не са срещали информация в тази област. В нагласите, свързани с въвеждане на обучение по телемедицина, между българските и чуждестранните студенти беше открита сигнификантна разлика (P = 0.015), както и в намеренията им за бъдещо ползване на телемедицински услуги в тяхната практика (P = 0.017) – чуждестранните студенти демонстрират по-оптимистични нагласи. Интегрирането на учебен курс в програмата на специалност „Медицина“ би допринесло за познаване на етичните и регулаторните принципи, информираност и развиване на

комуникационни и технически умения за прилагане на телемедицина.

Заключение: Вграждането на телемедицината в учебната програма на медицинските университети може да помогне на студентите да разберат по-добре сложни етични, регулаторни и правни предизвикателства в допълнение към запознаването им с подходящи технологии. Стуктурираният курс по тази дисциплина би повишил информираността и увереността на бъдещите медици по отношение на телемедицината в предстоящата им професионална практика.

Приложение в практиката: След анализ на резултатите от нашите проучвания и установените липси в информираността на нашите студенти, бяха обособени тематични области за телемедицината като изучавана дисциплина в учебната програма по медицина.

Научни публикации:

1. Карабова-Хамбарова, И., Матева, Н., Янева, А. Дистанционно здравно консултиране – възможности и добри практики. Management and Education. 2024; 20(5): 179-186.
2. Карабова-Хамбарова, И., Матева, Н., Янева, А., Димов, Н., Форева, Г., Еленска, П. Телемедицина – бъдещо приложение и необходимост от обучение: анкетно проучване на български и чуждестранни студенти по медицина. Обща медицина /под печат/

Research area: Biomedical
Contract: Project № NO-01/2022

Project title: "Mitochondrial function and cellular metabolism as parameters for assessment of therapeutic effect in rheumatoid arthritis"

Project director: V. Sarafian[1,2]; A. Batalov[3,4]
Leading scientist: V. Mihaylova[1,2]
Research team: B. Vergov[1]; Z. Batalov[3,4]; R. Karalilova[3,4]; M. Kazakova[1,2]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Medical Biology*
2. *Research Institute*
3. *Faculty of Medicine, Department of Propaedeutics of Internal Diseases*
4. *University Hospital "Kaspela", Clinic of Rheumatology*

Aim: The aim is to evaluate the metabolic status and key parameters of mitochondrial function in patients with rheumatoid arthritis (RA) treated with two different therapeutics (methotrexate and JAK-inhibitors).

Material and methods: Twenty patients with RA were included in the study. Following a physical examination, ultrasonographic assessment and laboratory tests, the patients were divided into two groups according to the prescribed therapy.

Results: After the isolation of peripheral blood mononuclear cells from all patients before and after therapy, a metabolic test was performed to assess mitochondrial function. Increased levels of ATP production and a decrease in proton leak were found in RA patients after treatment with JAK-inhibitors. In patients treated with methotrexate, a decrease in ATP production and maximal respiratory capacity was reported. A positive correlation was found between ESR and CRP ($z = 0.600$, $p = 0.009^{**}$). A significant relationship between ESR and DAS28 was demonstrated ($z = 0.486$, $p = 0.03^{*}$). CRP correlated with RF ($z = 0.685$, $p = 0.001^{**}$) and ultrasound findings such as DAS28 ($z = 0.600$, $p = 0.005^{**}$) and GUS7 ($z = 0.520$, $p = 0.019^{*}$).

Conclusion: It was found that increased ATP values in the group of patients treated with JAK-inhibitors correlated with improvement in

clinical and laboratory tests such as: ESR, anti-CCP, CRP, RF, as well as with ultrasonographic data after therapy. This suggests that the amount of ATP produced can serve as an indicator for monitoring the course of the disease.

Practical applications: Cellular metabolic indicators, highlighting the future prospects for monitoring RA treatment based on parallel analysis of mitochondrial function, ultrasonography and clinical laboratory parameters.

Research area: Biomedical
Contract: Project № NO-02/2022

Project title: "Diagnostic and prognostic role of novel biomarkers in acute central nervous system infections"

Project director: M. Kazakova[1]
Leading scientist: Y. Kalchev[2]
Research team: V. Sarafian[1]; Ts. Ivanova[1]; P. Argirova[3]; H. Imithiyas[4]; V. Dichev[1]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Medical Biology*
2. *Faculty of Medicine, Department of Medical Microbiology and Immunology "Prof. Dr. Elissay Yanev"*
3. *Faculty of Medicine, Department of Infectious Diseases, Parasitology and Tropical Medicine*
4. *Faculty of Medicine, student*

Aim: To study the diagnostic and prognostic role of YKL-40 and LAMP proteins in acute CNS infections of established and unclear etiology.

Results: During the project, 35 patients with central nervous system (CNS) infections admitted for treatment at the Infectious Diseases Clinic at St. George University Hospital and 6 clinically healthy individuals were selected as a control group. A clinical assessment of the general condition was performed. Cerebrospinal fluid (CSF) was collected *postmortem* from clinically healthy suddenly deceased individuals.

A decreased expression of LAMPs was found in patients with CNS infections compared to controls. A positive correlation was demonstrated between the values of LAMP-1 and LAMP-2-fold change. The concentration of LAMP-1 in plasma and CSF in patients was significantly higher than in the control group. Low plasma concentrations of LAMP-2 were found, while CSF levels were higher in patients compared to controls.

Our results show that YKL-40 mRNA levels are significantly reduced in leukocytes of patients with CNS infections compared to controls. Plasma concentrations of YKL-40 are higher than in the control

group. In addition, CSF levels of the glycoprotein are significantly higher compared to plasma levels.

Conclusion: Protein levels were significantly higher in viral neuroinfections compared to those of bacterial origin, suggesting the use of YKL-40 as a molecule that reflects the pathophysiology of the disease.

Practical applications: The applied significance of the project lies in the possibility of supporting clinical surveillance and early stratification of patients with acute CNS infections.

Research area: Biomedical
Contract: Project № NO-4/2022

Project title: "Study of tissue tropism of ACE2, regulatory mechanisms for its expression and their significance for COVID-19"

Project director: N. Manchorova-Veleva[1]
Leading scientist: M. Pencheva[2]
Research team: M. Atanasova[3,7]; Y. Kalchev[3,7]; G. Rusinov[4]; D. Keskinova[5]; D. Baruch[6]
Organization unit: Medical University of Plovdiv

1. *Faculty of Dental Medicine, Department of Operative Dentistry and Endodontics*
2. *Faculty of Pharmacy, Department of Medical Physics and Biophysics*
3. *University Hospital "St. George", Virology Laboratory*
4. *University Hospital "St. George", Clinic of Infectious Diseases*
5. *University of Plovdiv "Paisiy Hilendarski", Faculty of Philosophy and History, Department of Applied and Institutional Sociology*
6. *Sofia University "St. Kliment Ohridski", Faculty of Mathematics and Informatics, Department of Software Engineering*
7. *Faculty of Medicine, Department of Medical Microbiology and Immunology "Prof. Dr. Elissay Yanev"*

Aim: The aim of the study was to analyze the levels of angiotensin-converting enzyme 2 (ACE2), metalloprotease 17 (ADAM17), interleukin-17A (IL-17A), transmembrane serine protease 2 (TMPRSS2), apelin (AP) and vitamin D (VD) as biomarkers.

Our second aim was to determine the levels of the studied markers in nasopharyngeal swabs (NPS), serum and saliva, which would allow for establishing a relationship between the change in their values and the health status of the individuals.

Results: Comparing the levels of the studied markers in saliva, we found significantly increased values of ACE2 in vaccinated patients, followed by those with severe COVID-19, compared to healthy, recovered, and mild COVID-19 groups. For TMPRSS2, IL-17A, ADAM-17 and AP, a significant difference was observed between healthy individuals and the other groups. Serum vitamin D levels were low in all

five studied groups. Apelin levels also showed significant differences, with the highest levels observed in healthy individuals. Analysis of the data for the markers in saliva, NPS and serum revealed a positive correlation between NPS and serum, saliva and serum, as well as between saliva and NPS for all studied markers.

Conclusion: Monitoring changes in biomarkers present in saliva is promising as a predictive tool for various diseases. This approach allows for the early implementation of preventive measures and protective strategies, improving methods for predicting changes in health status.

Practical applications: Development of non-invasive tests and monitoring of immune status through saliva analysis.

Research area: Biomedical
Contract: Project № NO-05/2022

Project title: "Biological effectiveness of an accelerated electron beam compared to gamma rays and an accelerated proton beam, assessed based on the level of in vitro induced structural chromosomal aberrations"

Project director: E. Zaytseva[1]
Leading scientist: V. Yotov[1]
Research team: R. Ardasheva[1]; S. Bozhikov[2]; K. Mitarova[2]; F. Vasileva[2]; A. Ardashev[3]
Organization unit: Medical University of Plovdiv

1. *Faculty of Pharmacy, Department of Medical Physics and Biophysics*
2. *University Hospital "Ivan Rilski", Department of Radiotherapy*
3. *Faculty of Pharmacy, student*

Aim: To evaluate the biological effectiveness of an accelerated electron beam, applied for radiation therapy using the induction of structural chromosomal aberrations in human lymphocytes, and to make a comparative analysis with the effects of exposure to γ-radiation and proton beams.

Material and methods: A microscopic analysis of structural chromosomal aberrations was performed on lymphocytes from blood samples of eight volunteers. The samples were irradiated in vitro with an accelerated electron beam at 9 MeV, with doses ranging from 1 to 5 Gy.

Results: The relative biological effectiveness (RBE) was calculated based on cytogenetic tests, including the percentage of cells with chromosomal aberrations, the total number of structural chromosomal aberrations, the yield of dicentric and centric ring chromosomes, the number of interstitial deletions, and chromosome fragments. The RBE of the accelerated electron beam, relative to the number of damaged cells and the number of dicentric and centric ring chromosomes, is 0.94 ± 0.02. However, based on the yield of intersegmental deletions, the RBE is only 0.6 ± 0.22. The average RBE value for accelerated electrons is 0.84 ± 0.11. The calculated F-, G-, and H-ratios prove a

lower efficiency of electron radiation in inducing intrachromosomal exchange aberrations compared to interchromosomal exchanges.

Conclusion: Accelerated electrons have the same efficiency in inducing lethal interchromosomal exchange aberrations as γ-radiation and protons with an initial energy of 170 MeV, but are less effective in inducing potentially lethal intrachromosomal ones.

Practical applications: The obtained data allow for a more precise assessment of radiation risk during radiotherapy and space flights, as well as the refinement of biodosimetry for effective countermeasures in cases of emergency radiation exposure.

Research area: Biomedical
Contract: Project № NO-06/2022

Project title: "Investigation of prebiotic potential and antioxidant properties of enzymatically glycosylated polyphenolic compounds from lingonberry (*Vaccinium vitis-idaea* L.)"

Project director: D. Karcheva-Bahchevanska[1]
Leading scientist: D. Karcheva-Bahchevanska[1]
Research team: N. Benbassat[1]; V. Nalbantova[1]; D. Seymenska[1]; I. Iliev[2]; M. Nikolova[2]; T. Vasileva[2]; S. Angelova[2]
Organization unit: Medical University of Plovdiv

1. *Faculty of Pharmacy, Department of Pharmacognosy and Pharmaceutical Chemistry*
2. *University of Plovdiv "Paisii Hilendarski", Faculty of Biology, Department of Biochemistry and Microbiology*

Aim: To investigate the effect of enzymatically glycosylated polyphenols on the metabolic profile of probiotic lactobacilli strains under *in vitro* gastrointestinal (GI) conditions.

Material and methods: Total and solid-phase extracts of *Vitis idaeae fructus* were obtained and quantified for total polyphenols (TPC) (Singleton & Rossi, 1965) and total monomeric anthocyanins (TAC) (Lee *et al.*, 2005). Individual components were identified by HPTLC and HPLC analyses. The isolated polyphenols were glycosylated by glycosyltransferase (GTF) and fructosyltransferase (FTF). The enzymatic activity of probiotic lactobacilli (Lasrado & Gudipati, 2013) and the antioxidant activity of glycosylated polyphenols (CUPRAC and DPPH) were determined.

Results: TPC in the extracts studied was in the range 207.5 ÷ 262.4 mg GAE/100 g fw and TPA – 6.5 ÷ 14.5 mg C3GE/100 g fw. HPTLC analysis showed the presence of cyanidin-3-arabinoside, cyanidin-3-glucoside and delphinidin-3,5-diglucoside, which HPLC also confirmed. Optimal conditions for glycosylation of the isolated polyphenols were established using GTF and FTF. After the transferase reaction inactivation, the product was lyophilized. The survival rate of the investigated probiotic strains in the presence of lyophilized product was verified. The metabolic and enzymatic profiles of probiotic

lactobacilli cultured in the presence of glycosylated polyphenols were determined. The 50% inhibitory concentrations relative to the DPPH radical and 50% effective concentrations determined by the CUPRAC method of glycosylated polyphenols were established.

Conclusion: The prebiotic potential of enzymatically glycosylated polyphenols was investigated and their influence on the metabolic and enzymatic profile of probiotic lactobacilli cultured *in vitro* in GIT was reported.

Practical applications: Development of a phytoproduct with a prebiotic effect.

Research area: Medicodental
Contract: Project № NO-07/2022

Project title: "The role of biocomposite materials in the implant-tissue interface – contemporary strategies for preventing peri-implantitis"

Project director: B. Pilicheva[1]
Leading scientist: B. Pilichev[2]
Research team: N. Kanazirski[2]; P. Katsarov[1]; N. Zahariev[1]; M. Petrov[3]; Z. Rachkovska[3]; V. Hadzhigaev[4]
Organization unit: Medical University of Plovdiv

1. *Faculty of Pharmacy, Department of Pharmaceutical Sciences*
2. *Faculty of Dental Medicine, Department of Dental, Oral and Maxillofacial Surgery*
3. *Faculty of Medicine, Department of Medical Microbiology and Immunology "Prof. Dr. Elissay Yanev"*
4. *Faculty of Dental Medicine, Department of Prosthetic Dentistry*

Aim: To evaluate the potential for modulating bacterial colonization of the superstructure following the use of a modified abutment incorporating a chitosan and chlorhexidine-based biocomposite coating.

Materials and methods: The patients were divided into two groups: Group One – "Test group" consisting of 30 patients. In this group, during the second stage of the procedure, a modified abutment with a biological coating was placed: Subgroup A – 15 patients received an abutment with a biological coating composed of 1% chitosan + 2% chlorhexidine. Subgroup B – 15 patients received an abutment with a biological coating composed of 2% chitosan. Group Two – "Control group", consisting of 20 patients, in whom the abutment did not have a biological coating.

Results: Patients in Group A showed a significant reduction in bacterial load, comprising 19 species of microorganisms, with results demonstrating that the biofilms had an average thickness of 32.19 microns Patients in Group B showed a statistically significant reduction in bacterial load , comprising 17 species of microorganisms, with the average thickness of the biocomposite being 22.62 microns. Both Group A and Group B showed a significantly greater reduction in

bacterial load compared to the control group. Furthermore, Group B exhibited a slightly higher success rate in bacterial load reduction compared to Group A, although the difference was not statistically significant.

Conclusion: Biocomposite coatings can be used to control and reduce bacterial load, helping to prevent peri-implant diseases.

Practical applications: The application of biocomposite coatings and drug delivery systems in dental implantology

Research area: Medical practice, Surgery
Contract: Project № NO-08/2022

Project title: "VAC (Vacuum-Assisted Closure) therapy for difficult wounds – modalities and variations"

Project director: K. Kalinova[1]
Leading scientist: K. Kalinova[1]
Research team: Z. Vazhev[2]; H. Shipkov[1]; N. Ali[1,3]; P. Uchikov[1,3]; I. Mourdjev[1,3]; H. Stoev[2]; K. Dimitrov[2]; S. Bogoev[2]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Special Surgery*
2. *Faculty of Medicine, Department of Cardiac and Vascular Surgery*
3. *University Hospital "St. George", Department of Special Surgery*

Aim: To compare the effectiveness of VAC therapy applied via a central aspiration system and by a portable device for the management of difficult wounds.

Material and methods: 107 patients with difficult-to-heal wounds were allotted into three groups according to the methodology applied. Duration and cost of VAC therapy, hospitalization length, healing quality, and time were assessed.

Results: 38 females and 69 males aged 39–76 years, with 29 acute wounds and 78 chronic wounds (present for 20 days to 10 years), were followed up. Wall suction was applied for 63 patients, a portable pump for 34, and both methods for 32.

Conclusion: The mean duration of VAC therapy and the healing rate did not differ significantly among the different modalities. A three- to five-fold cost reduction was achieved with wall suction compared to a portable pump. The combination of the two methodologies reduced treatment expenses by only 10%.

Practical applications: VAC therapy using wall suction is compatible with various dressing materials and is inexpensive but requires hospitalisation. It is therefore recommended for immobilized patients such as polytrauma or ventilated patients, as well as for initial treatment. Portable devices are convenient but require patient education; their consumables are specific, expensive, and non-reimbursed.

Combining the two methods is beneficial but results in only a minor reduction in treatment costs.

The methodology has been included in the Surgery seminar syllabus for sixth-year students in the Medical Faculty since 2023 and will be offered as a specialist course, “Vacuum-Assisted Technology for Wound Management”, in the 2025 Continuing Professional Education (CPE) Program of the Medical University of Plovdiv.

Research area: Public Health
Contract: Project № NO-10/2022

Project title: "Screening for the prevention and early detection of osteoporosis among working-age individuals of Bulgarian and Roma origin"

Project director: D. Taneva[1]
Leading scientist: V. Bukova[1]
Research team: M. Todorova[1]; A. Kirkova-Bogdanova[2]
Organization unit: Medical University of Plovdiv

1. *Faculty of Public Health, Department of Nursing*
2. *Faculty of Public Health, Department of Medical Informatics, Biostatistics and E-learning*

Aim: This project aims to develop and implement a model for studying lifestyle-related risk factors associated with the development of osteoporosis and to conduct health education among working-age women from two ethnic groups: Bulgarian and Roma.

Results: The study analyzed socio-demographic and behavioural factors influencing the risk of osteoporosis among 417 working-age women, divided into two target groups – 223 Bulgarian women and 194 Roma women. The data revealed significant differences between the two ethnic groups regarding education, employment, and lifestyle, which correlate with the risk of osteoporosis. Physical activity is an essential factor for maintaining bone health. Physical activity plays a crucial role in maintaining bone health. The results indicate significantly lower physical activity and reduced calcium and vitamin D intake among Roma women, negatively impacting bone density. In addition, early menopause is significantly more common among them than among Bulgarian women, further increasing the risk of osteoporosis. However, behavioural factors such as smoking and coffee intake did not differ significantly between the groups. Ultrasound osteodensitometry results identified reduced bone density in 11% of women aged 41–50, with no significant difference between ethnicities

Conclusion: The study highlights the importance of targeted preventive measures to reduce osteoporosis risk. These measures

include promoting physical activity, maintaining a balanced diet, and managing risk factors.

Practical applications: The study examines differences in osteoporosis risk factors between Bulgarian and Roma women. This information can serve as a foundation for further research on vulnerable groups and for improving prevention efforts.

Research area: Biomedical
Contract: Project № HO-11/2022

Project title: "Modern guidelines and pharmacoanalytical approaches in doping prevention"

Project director: K. Ivanov[1]
Leading scientist: V. Kozhuharov[1]
Research team: S. Ivanova[1]; V. Todorova[1]; S. Dyankov[1]; Z. Dzhakova[1]; A. Marinkov[2,3]; D. Karcheva-Bahchevanska[1]
Organization unit: Medical University of Plovdiv

1. *Faculty of Pharmacy, Department of Pharmacognosy and Pharmaceutical Chemistry*
2. *Faculty of Medicine, Department of Propaedeutics of Internal Diseases, Clinic of Rheumatology*
3. *University Hospital "Kaspela"*

Aim: To evaluate the relationship between unintentional doping and dietary supplement intake, determine the prevalence of undeclared substances in dietary supplements, and develop chromatographic methods for monitoring these substances.

Material and methods: Gas chromatography-mass spectrometry (GC-MS), liquid chromatography-photodiode array detection (LC-PDA), and high-performance thin-layer chromatography (HPTLC).

Results: An evaluation of the risk of unintentional doping associated with the use of dietary supplements was conducted. The most frequently detected substances in dietary supplements were identified and categorized. Two approaches were developed for the monitoring of sibutramine: GC-MS and HPTLC. An LC-PDA method was also developed for detecting higenamine in extracts and dietary supplements. All methods demonstrated high sensitivity and selectivity, making them suitable for routine quality control.

Conclusion: Dietary supplements pose a significant risk for unintentional doping. Many dietary supplements available on the market contain undeclared pharmacologically active substances, posing serious health risks to consumers.

Practical applications: The developed methods can be applied to routine quality analyses of dietary supplements before their inclusion in the diets of professional athletes.

Research area: Biomedical
Contract: Project № NO-12/2022

Project title: "Levels of adipokines (chemerin and resistin) in serum and synovial fluid in patients with rheumatoid arthritis and osteoarthritis of the knee joint"

Project directors: R. Karalilova[1,2]; B. Nonchev[3,4]
Leading scientist: E. Vasileva[2]
Research team: T. Stankova[5]; R. Stainova[6]; N. Nikolov[7]; G. Delcheva[5]; K. Batalov[1,2]; K. Stefanova[5]; I. Toleva[8]; A. Batalov[1,2]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Propaedeutics of Internal Diseases*
2. *University Hospital "Kaspela", Clinic of Rheumatology*
3. *Faculty of Medicine, Department of Endocrinology*
4. *University Hospital "Kaspela", Clinic of Endocrinology and Metabolic Diseases*
5. *Faculty of Pharmacy, Department of Medical Biochemistry*
6. *Faculty of Pharmacy, Department of Pharmacy Organization and Economics*
7. *University Hospital "Georgi Stranski", Clinic of Rheumatology*
8. *Faculty of Medicine, student*

Aim: To study the association between chemerin and resistin concentrations in serum and synovial fluid in patients with rheumatoid arthritis (RA) and osteoarthritis (OA) as potential markers for diagnosis and assessment of disease activity and severity.

Patients and methods: A total of 113 individuals were included (54 with RA, 28 with OA, 31 as a control group). Clinical data included BMI, serum and synovial chemerin and resistin, ESR, CRP, uric acid (UA), DAS28-ESR scale, US7 score, OMERACT score.

Results: Serum resistin showed the highest concentration in patients with RA (13.34 ± 6.18 ng/ml), compared to the control group (7.04 ± 2.09 ng/ml) and patients with OA (12.03 ± 5.64 ng/ml), $p < 0.001$. In the RA group, higher synovial resistin was found [(11.08 ± 12.40 ng/ml), vs. (4.93 ± 7.93 ng/ml) in the OA group, $p = 0.006$]. In the RA group, the following correlations were identified: between serum chemerin and ESR ($rs = 0.649$, $p = 0.002$), CRP ($rs = 0.546$, $p = 0.013$), RF ($rs = 0.465$, $p = 0.039$), DAS28 ($rs = 0.807$, $p < 0.001$), as well as between serum resistin and TNF-alpha ($rs = 0.398$, $p = 0.044$). A correlation was found between UA and synovial

resistin (rs = -0.833, p = 0.003). No significant correlations were found in the OA group.

Conclusion: Resistin is a more reliable diagnostic marker for RA. Both chemerin and resistin levels in serum and synovial fluid could serve as indicators for assessing RA severity and activity.

Practical applications: The measurement of serum and synovial concentrations of chemerin and resistin could be incorporated into diagnostic panels for evaluating disease severity and activity in RA patients, alongside other established indicators.

Research area: Biomedical
Contract: Project № NO-16/2022

Project title: "Role of inflammation and autophagy in therapy cell resistance in colorectal carcinoma (CRC)"

Project director: V. Sarafian[1,2]
Leading scientist: Ts. Ivanova[1,2]
Research team: M. Kazakova[1,2]; N. Mehterov[1,2]; Y. Sbirkov[1,2]; D. Dikov[3]; N. Belev[4]; D. Molander[1,2]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Medical Biology*
2. *Research Institute*
3. *Jossigny Hospital, Department of Pathology, Jossigny, Fance*
4. *University Hospital "Eurohospital"*

Aim: To investigate the role of autophagy and inflammation in the mechanisms of therapy cell resistance in CRC.

Material and methods: Biological samples from 46 clinically and histologically diagnosed CRC patients were analysed. The expression of YKL-40, LAMP1, and LAMP2 was assessed using immunohistochemistry, ELISA, and qPCR in both tissue and blood samples.

Results: A tumour-specific modulation in the expression of YKL-40, LAMP1, and LAMP2 was observed in CRC. Notably, their restricted and elevated expression at the tumour front, alongside tumour budding, correlated with clinicopathological features such as lymphatic and blood vessel invasion. This suggests a potential role for these glycoproteins in tumour progression. At both transcriptional and protein levels, all investigated molecules were significantly overexpressed in CRC compared to controls. While plasma levels of YKL-40 and LAMP1 were higher in CRC patients, LAMP2 secretory levels were notably elevated in healthy individuals.

Conclusion: This study presents novel findings on the expression of YKL-40, LAMP1, and LAMP2, as well as tumour budding in CRC. The results indicate that these glycoproteins, with diverse functions, may be associated with tumour aggressiveness and therapy resistance.

Practical applications: Modulation in spatial tissue expression of YKL-40, LAMP1 and LAMP2 and tumor budding, along with protein and gene expression levels in blood samples offers a new perspective on the clinical relevance of the identified signatures and may serve as prognostic markers for the development of more effective therapeutic regimens in CRC.

Research area: Biomedical
Contract: Project № DPDP-12/2022

Project title: "Cognitive impairments – a symptom of post-COVID syndrome in the context of a global pandemic"

Project director: P. Atanassova[1,7]; R. Massaldjieva[2]
Leading scientist: M. Hristova-Taneva[1,7]
Research team: L. Chervenkov[3]; R. Raycheva[4]; D. Kantareva[5]; K. Chompalov[1,7]; B. Atanasova[1,7]; E. Halil[1,7]; I. Baltadjiev[6]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Neurology*
2. *Faculty of Public Health, Department of Health Care Management*
3. *Research Complex for Translational Neuroscience*
4. *Faculty of Public Health, Department of Social Medicine and Public Health*
5. *Faculty of Public Health, Department of Nursing Cares*
6. *Faculty of Medicine, Department of Infectious Diseases, Parasitology and Tropical Medicine*
7. *University Hospital "St. George", Clinic of Neurology*

Aim: To longitudinally assess cognitive impairments in adult post-COVID-19 patients.

Material and methods: A clinical interview and computer-based neuropsychological testing (CogState Battery) were conducted on 102 post-COVID-19 patients.

Results: The participants, with mean age of 40.16 years, SD = 11.007), were divided into 2 groups: 18-49 years old – 73.5% and 50–69 years old – 26.5%. Women were predominant – 70.6%, while men were 29.4%. The post-COVID period was approximately 15 months (M = 15.23, SD = 7.577). From all subjects, 64 (62.7%) reported having persisting symptoms. The majority of participants (n = 68, 66.7%) had no comorbidities, with only 33.3% reporting accompanying diseases. Of all patients, 39 underwent magnetic resonance imaging of the brain, 19 of which, (48.7%) had MRI-detectable structural changes of the brain parenchyma. The remaining 51.3% (n = 20), had normal MRI scans. A follow-up neuropsychological testing was conducted in 67 (65.68%) subjects. Statistically significant differences in subtests performance were found between the two age groups ($p < .001$), on all outcome measures, except two. After excluding the subjects with

comorbidities, the comparison of the two age groups, showed statistically significant differences in test performance with 6 out of 10 outcome measures (Mann-Whitney test, $p < .05$).

Conclusion: The study has found residual symptoms in more than half of the studied subjects, structural brain parenchyma changes in 49%. The findings suggest a notable age effect on cognitive task performance following COVID-19 recovery. Data processing is ongoing.

Practical applications: Upon completion of data analysis, this study will help elucidate the scope and pathogenesis of cognitive deficits in Post-COVID Syndrome.

Research area: Dental medicine
Contract: Project № DPDP-15/2022

Project title: "Computed tomographic investigation of the quality of endodontic treatment in premolars with atypical anatomy"

Project director: K. Georgiev[1]
Leading scientist: A. Pecheva-Stoeva[1]
Research team: E. Boyadzhieva[1]; L. Vangelov[1]; I. Angelova[2]
Organization unit: Medical University of Plovdiv

1. *Faculty of Dental Medicine, Department of Operative Dentistry and Endodontics*
2. *Faculty of Dental Medicine, Department of Imaging Diagnostics, Dental Allergology and Physiotherapy*

Aim: This study aims to assess the quality of root canal obturation using computed tomography, focusing on the hydraulic condensation method combined with three different preparation techniques. The evaluation is conducted on 3D-printed replicas of human premolars with Vertucci type III, IV, and V canal configurations

Materials and methods: A total of 45 3D printed replicas of human premolar teeth were divided into three groups based on the morphology of their root canal system: **Gr1:** 15 samples with Vertucci type III, IV, and V configurations (5 for each configuration), prepared using the standard technique with a .02 taper. **Gr2:** 15 samples with Vertucci type III, IV, and V configurations (5 for each configuration), prepared using the crown-down technique with a .06 taper. **Gr3:** 15 samples with Vertucci type III, IV, and V configurations (5 for each configuration), prepared using a hybrid technique. All root canals in all samples were obturated using the hydraulic condensation method. The computed tomographies of the obturated endodontic spaces were compared using HOROS software.

Results: The quality of obturation did not show significant differences among the three groups, though Gr3 the best 3D obturation outcomes.

Conclusion: Obturation of premolars with atypical anatomy using the hydraulic condensation method provides good results across the three different root canal preparation techniques.

Clinical application: In endodontic treatment of premolars with atypical anatomy, it is recommended to use a hybrid preparation technique combined with hydraulic condensation as the method of choice for obturating the endodontic space.

Research area: Biomedical
Contract: Project № PMD-02/2022

Project title: "Personalized miRNA profile in patients with papillary thyroid carcinoma"

Project director: V. Sarafian[1]
Leading scientist: N. Mehterov[1]
Research team: B. Nonchev[2]; R. Dimov[3]; M. Gevezova[1]; E. Tanova[1]; T. Damyanova[1]; V. Angelova[4]; L. Dimov[2]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Medical Biology*
2. *Faculty of Medicine, Department of Endocrinology and Metabolic Diseases*
3. *Faculty of Medicine, Department of Propaedeutics of Surgical Diseases*
4. *Faculty of Medicine, student*

Aim: To establish a personalised transcriptional profile of miRNAs in biological material obtained via fine-needle aspiration biopsy (FNAB) from normal, benign, malignant, and metastatic tissues in patients with papillary thyroid carcinoma (PTC).

Materials and methods: *Bioinformatics Analysis:* Based on data from The Cancer Genome Atlas (TCGA), a panel of 10 miRNAs was identified as potentially clinically relevant for PTC. *Molecular Biology Methods:* miRNA expression was analyzed in tissue samples obtained via ultrasound-guided FNAB from benign, malignant, and metastatic thyroid nodules of patients with PTC (n = 38), and the results were compared with normal tissue.

Results: Our findings demonstrate that let-7b-5p, miR-146b-5p, miR-182-5p, miR-339-3p, miR-423-5p, miR-450b-5p, miR-484, miR-874-3p, and miR-142-3p exhibit altered expression between normal and tumor tissue. Additionally, miR-142-3p, miR-146b-5p, let-7b-5p, miR-182-5p, and miR-484 show significant expression differences between benign and malignant nodules. The cumulative expression of the 10-miRNA panel demonstrates diagnostic potential and can be used as a biomarker for distinguishing tumor from normal tissue with AUC = 0.984, sensitivity = 92%, and specificity = 97%.

Conclusion: The investigated miRNA panel represents a reliable diagnostic tool for PTC and could facilitate a personalized clinical and therapeutic approach.

Practical applications: The identification of a novel, specific miRNA profile in PTC could provide valuable insights into the malignant and invasive potential of the tumor, as well as its histological characteristics, thereby complementing routine diagnostics. Furthermore, the correlation between an individual's transcriptional profile and their clinical outcome may offer a predictive value for treatment response and disease prognosis.

Research area: Biomedical, Therapeutic
Contract: Project № PMD-03/2022

Project title: "Multimodal monitoring of the intracranial hypertension and the associated specific morphological characteristics in patients with severe traumatic brain injury"

Project director: Ch. Stefanov[1,4]
Leading scientist: I. Minev[1,4]
Research team: I. Kehayov[2]; A. Davarski[2]; M. Peycheva[3]; P. Mavreva[2]; A. Xatzigiannis[4]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Anesthesiology, Emergency and Intensive Care*
2. *Faculty of Medicine, Department of Neurosurgery*
3. *Faculty of Medicine, Department of Neurology*
4. *University Hospital "St. George", Clinic of Anesthesiology and Intensive Care*

Aim: To investigate the diagnostic and therapeutic significance of the multimodal monitoring of intracranial hypertension in patients with severe traumatic brain injury (STBI).

Materials and methods: Computer tomography (CT) and ultrasound (US) images along with data from intracranial probe were analyzed. In accordance with the developed protocol, following an upload of CT images on the Philips EPIQ Elite ultrasound machine and selection of three intracranial markers, Ultrasound Fusion Imaging (UFI) was performed by PercuNav software. Transcranial ultrasound color-coded images were obtained via transtemporal access.

Results: The UFI capabilities for monitoring specific morphological characteristics and functional changes in cerebral blood flow, associated with intracranial hypertension, were analysed in comparison with the dynamics of the neurological status. The spatial morphological sensitivity to cerebral contusion was evaluated through comparative analysis of the corresponding zones during UFI and juxtaposed with data from the intracranial probe. These results aided the decision-making process and reduced bias. Additional limitations for

transcranial access were identified, such as supine positioning and the risk of concomitant cervical spine injury. Consequently, the intraparenchymal contusions, mesencephalon, cerebrospinal cisterns, and segments of the anterior, middle, and posterior cerebral arteries were observed only via transtemporal access.

Conclusion: Multimodal monitoring enhances inter-rater reliability, which is crucial for the effective implementation of the proposed approach.

Practical applications: Protocol for CT scan procedure in patients with STBI followed up by UFI.

Protocol for clinical application of intracranial probes and UFI for monitoring of pathophysiological disorders in the cerebral blood flow and the morphological changes due to STBI.

Research area: Biomedical
Contract: Project № NO-05/2023

Project title: "Efficiency and knowledge retention in participants in ERCP simulation training a year after its completion"

Project director: T. Deneva[1]
Leading scientist: N. Boyanov[2]
Research team: D. Dimitrova[4]; G. Goranov[5]; K. Dzhinsov[2,6]; M. Sandeva[2,7]; S. Tufkova[2,8]; K. Shtereva[3]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Clinical Laboratory*
2. *Medical Training Simulation Center*
3. *University Hospital "Pulmed", Department of Gastroenterology*
4. *University Hospital "St. Karidad", Department of Gastroenterology*
5. *Faculty of Medicine, First Department of Internal Diseases, Section of Cardiology*
6. *University Hospital "St. George", Department of Invasive Cardiology*
7. *Faculty of Public Health, Department of Midwifery*
8. *University Hospital "St. George", Department of Clinical Toxicology*

Aim: To examine the level of knowledge retention in participants in ERCP simulation training a year after its completion.

Results: In this study, we simultaneously measured salivary alpha-amylase, Chromogranin A, and cortisol as stress markers during reproducible virtual simulation. The salivary biomarkers showed a reliable correlation with psychological stress experienced during ERCP simulation training, with salivary alpha-amylase emerging as the best predictor of stress. Additionally, all participants wore Empatica wrist devices, which measured cardiac stress indices, including heart rate (HR), heart rate variability (HRV), and electrodermal activity (EDA).

Conclusion: The study demonstrated that acquiring skills on the ERCP simulator significantly reduced stress, as measured by both salivary biomarkers and cardiac indices. The data also confirm that ERCP simulation training is effective, with knowledge and skills being retained even in the absence of active ERCP practice in clinical settings.

Practical applications: Education based on virtual reality simulators is a valuable method for acquiring fundamental knowledge and skills, even in highly specialized procedures such as ERCP. Moreover, these skills are retained over time, reinforcing the long-term benefits of simulation-based training.

Research area: Public health
Contract: Project № NO-12/2023

Project title: "Study of the patients' satisfaction with the provided pharmaceutical care with reference to over-the-counter medicines and others that can be applied among the pediatric population"

Project director: B. Hadzhieva[1]
Leading scientist: A. Mihaylova[2]
Research team: K. Kilova[3]; T. Gesheva[4]
Organization unit: Medical University of Plovdiv

1. *Medical College, Specialty „Assistant Pharmacist"*
2. *Faculty of Public Health, Department of Health Care Management*
3. *Faculty of Public Health, Department of Medical Informatics, Biostatistics and E-learning*
4. *Faculty of Public Health, student*

Aim: To assess parents' satisfaction with the pharmaceutical care provided when purchasing over-the-counter medicines and other medicinal products for their children.

Results: T The study sample consisted of 1,305 parents. The most frequently purchased paediatric products were: Medicines for influenza and colds (n = 944; 72.4%) followed by Immune system boosters (n = 933; 71.5%) and Cough treatments (n = 890; 68.2%).

The following statistically significant associations were identified:

- Regional city * Pharmaceutical care: In your opinion, the pharmacist has the desire/attitude to provide pharmaceutical care (to consult you). Respondents from Ruse are more satisfied with the pharmaceutical care provided ($p < 0.05$).
- Education * Pharmaceutical care: How accessible do you think the pharmacist is (in terms of available time and a private space)? Respondents with a lower level of education report higher satisfaction with pharmacist accessibility ($p < 0.001$), perceive the pharmacist as more willing to provide pharmaceutical care ($p < 0.01$), and place greater trust in the pharmacist's recommendations ($p < 0.05$).

No significant associations were found between respondents' gender or their children's age and their satisfaction with pharmaceutical care ($p > 0.05$).

Conclusion: Overall, parents are satisfied with the pharmaceutical care provided. However, those with higher education tend to have higher expectations and be more demanding.

Practical applications:

- On 15 May 2024, a podcast was conducted via the Zoom platform on the topic: "Pharmaceutical Care Tailored to the Specific Needs of Paediatric Patients".
- Information boards and brochures have been distributed to educational institutions across the country.

Research area: Biomedical
Contract: Project № DPDP-01/2023

Project title: "Development of an algorithm for the automated analysis of multi-parameter flow cytometric data on sub-populations of B-lymphocytes"

Project director: H. Taskov[1]
Leading scientist: T. Kalfova[2]
Research team: A. Baldzhieva[2,3]; M. Bozhkova[2,3]; H. Burnusuzov[3]
Organization unit: Medical University of Plovdiv

1. *Research Institute*
2. *Faculty of Medicine, Department of Medical Microbiology and Immunology „Prof. Dr. Elissay Yanev"*
3. *University Hospital "St. George", Laboratory of Clinical Immunology*

Aim: To develop an automated method for analyzing multiparameter flow cytometric data to identify B-cell subpopulations in various pathological conditions.

Materials and methods: This study utilized .fcs files from flow cytometric samples of patients diagnosed with childhood acute B-cell lymphoblastic leukemia (B-ALL), patients infected with the SARS-CoV-2 virus (COVID-19), and healthy controls. FlowJo software, along with integrated plugins (FlowAI, FlowClean, tSNE, UMAP, PhenoGraph, Xshift, FlowSOM, and ClusterExplorer), was used for data preprocessing, dimensionality reduction, and clustering of cell populations.

Results: The developed algorithm significantly accelerates the analysis process, enhances the precision of target cell population identification, and improves result reproducibility compared to conventional methods. FlowAI efficiently processes large data files, leading to a substantial improvement in data quality. FlowSOM enables detailed mapping of B-cell subpopulations and the construction of cluster trees, allowing for more accurate differentiation of cell subtypes. ClusterExplorer facilitates in-depth cluster analysis and precise determination of cell subpopulation sizes. In patients with B-ALL, the algorithm successfully distinguishes blast cells from normal hematogonia, enabling a more accurate and rapid diagnosis.

Conclusion: Automated analysis of multiparameter flow cytometric data enhances the speed and accuracy of identifying target cell subpopulations, significantly reducing analysis time.

Practical applications: Implementing this algorithm in routine practice can improve the efficiency of diagnosing oncohematological and immunological diseases.

Research area: Biomedical
Contract: Project № DPDP-02/2023

Project title: "Mitochondrial dysfunction and mitophagy as potential biomarkers in autism spectrum disorder (ASD)"

Project director: M. Gevezova[1]
Leading scientist: E. Kovacheva[1]
Research team: N. Mehterov[1]; T. Todorova[1]; E. Tanova[1]; Z. Ivanov[2]; V. Sarafian[1]; I. Ivanov[2]; I. Pacheva[2]; R. Kozareva[2]; E. Timova[2]; Z. Arabadzhiev[3]
Organization unit: Medical University of Plovdiv
1. *Faculty of Medicine, Department of Medical Biology*
2. *Faculty of Medicine, Department of Pediatrics "Prof. Dr. Ivan Andreev"*
3. *Faculty of Medicine, Department of Psychiatry and Medical Psychology*

Aim: To establish the pathogenetic role of mitophagy in the removal of damaged organelles in the course of ASD and to search for a correlation between bioenergetic parameters and the expression of genes encoding the LAMP1 and LAMP2 proteins and a panel of four miRNAs (miR-143-3p, miR-320a, miR-130-3p and miR-181a-5p) involved in the process.

Materials and methods: Thirteen samples from ASD patients and two samples from healthy children were collected. The data were validated in a patient cohort (n = 50) and a control (n = 12) group of samples.

Results: The results showed that PBMCs isolated from ASD patients and controls had similar basal respiration. Maximal respiration and spare respiratory capacity in ASD were twofold higher compared to the control group. No statistically significant difference was found in non-mitochondrial respiration and proton leak. Glycolytic activity in the ASD group was higher compared to the control group. In addition, gene expression levels of *LAMP1* and *LAMP2* were significantly higher in ASD patients compared to controls. The results showed decreased expression of miR-143-3p and miR-130a-3p in ASD patients, while no significant difference was found between the studied groups for miR-181a-5p and miR-320a.

Conclusion: The data provide new scientific information and extend the knowledge about the complex pathogenetic mechanisms of ASD.

Practical applications: The results focus on the association between mitochondrial dysfunction and mitophagy and thus outline new potential targets for therapy.

Research area: Biomedical
Contract: Project № DPDP-03/2023

Project title: "Predictive and prognostic significance of PD-L1, CD4, CD8, FOXP3, and ACE2 in triple-negative and HER2-low breast carcinomas"

Project director: S. Genova[1]
Leading scientist: N. Ilieva-Shipchanova[2]
Research team: D. Tashkova[1]; M. Pencheva[2]; E. Daskalova[3]; H. Hadzhiev[4]; P. Georgiev[5]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of General and Clinical Pathology*
2. *Pharmaceutical Faculty, Department of Medical Physics and Biophysics*
3. *Faculty of Medicine, Department of Anatomy, Histology, Embryology*
4. *Complex Oncology Center – Plovdiv*
5. *Faculty of Medicine, student*

Aim: Delivering insights into PD-L1 and ACE2 expression in TNBC.

Material and methods: We reviewed 88 TNBC cases for the period 2021–2023 and evaluated expression of HER2, Ki67, PD-L1 and ACE2 before and after NAPHT.

Results: PD-L1 positive expression was found in 44.3% of primary tumors, with 52.9% of initially positive cases losing expression post-treatment. TILs were significantly higher in PD-L1-positive tumors ($p = 0.001$). A notable correlation was found between PD-L1 expression and Ki-67 proliferation index, with PD-L1-positive tumors having a median Ki-67 of 64.49 compared to 52.86 in negative cases ($p = 0.015$). Higher Ki-67 levels (≥ 50%) were associated with better treatment outcomes, showing a mean RCB score of 1.60 versus 3.16 for lower levels ($p = 0.022$). HER2-negative cases had a higher prevalence of favorable pathological response (54.5%) compared to HER2-low tumors (25%, $p = 0.048$), because of the strong correlation with high proliferative index. The study found that ACE2 expression in triple-negative breast carcinomas occurs in 86.5% of tumor cells and 74.1% of stromal cells, with higher expression noted in residual tumors. This

suggests a potential resistance mechanism to therapy and indicates a new therapeutic opportunity through targeting ACE2.

Conclusion: In conclusion, PD-L1 and ACE2 expression in TNBC shows significant discordance post-treatment, highlighting the need for further research on predictive biomarkers.

Practical applications: Discordances between pre- and post- neoadjuvant PD-L1 expression suggest that PD-L1 expression should be routinely tested on primary samples. ACE2 expression in TNBC may represent a potential resistance mechanism.

Research area: Dental medicine
Contract: Project № DPDP-04/2023

Project title: "Analysis of the oral environment and microbial biofilm of black stain on the dental surfaces of preschool and school-age children"

Project director: M. Shindova[1]
Leading scientist: K. Tabutova[1]
Research team: A. Belcheva[1]; G. Tomov[2]; S. Mileva[1]; S. Angelova[1]; L. Shtereva[1]; L. Mircheva[3]
Organization unit: Medical University of Plovdiv
1. *Faculty of Dental Medicine, Department of Paediatric Dentistry*
2. *Center for Laser Dentistry in Research Institute*
3. *Faculty of Medicine, student*

Aim: To investigate the microbiological composition of black stain on dental surfaces, the qualitative and quantitative parameters of saliva, and to compare the effect of the use of contemporary methods and means for influencing its appearance in childhood.

Methods and materials: A total of 90 patients with black stain and 30 without black stain on the dental surfaces were studied. The specific bacteria in the plaque biofilm in patients with and without black plaque were identified and compared. Clinical tests were conducted to determine the quantity and quality of saliva – quantity, pH and buffer capacity. Therapy with probiotic "Bio Gaia® Prodentis", photodynamic therapy with a laser and professional oral hygiene of patients with black stain were performed.

Results: The comparative analysis of the results of the microbiological study demonstrated the identified predominant species of Actinomycetes, Treponema and Neisseria in the plaque biofilm in patients with black stain. No statistically significant difference was found between the two groups (with and without black stain) regarding salivary parameters ($r > 0.05$). The applied therapeutic techniques demonstrated similar effectiveness in influencing the investigated pathology.

Conclusion: The differences in the microbial composition and salivary parameters in children with and without black stain require a preventive program to reduce the recurrence of black stain after therapy. Effective treatment methods for black stain on dental surfaces include the probiotic BioGaia® Prodentis and photodynamic therapy with a laser, in combination with professional oral hygiene.

Research area: Biomedical
Contract: Project № DPDP-05/2023

Project title: "The role of disrupted iron metabolism in restless legs syndrome in patients with rheumatoid arthritis"

Project leader: K. Terziyski[1]
Lead researcher: K. Avramov[1]
Research team members: T. Georgiev[1]; A. Draganova[1]; S. Terziyska[2]; A. Baldzhieva[3]
Base organization: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Pathophysiology*
2. *Trimontium Medical Center*
3. *Faculty of Medicine, Department of Medical Microbiology and Immunology "Prof. Dr. Elisey Yanev"*

Aim: To clarify the alterations in iron metabolism in patients with restless legs syndrome (RLS) who also suffer from rheumatoid arthritis (RA).

Materials and methods: A total of 48 RA patients diagnosed according to the ACR/EULAR (2010) criteria were studied. Disease activity (DAS-28), inflammatory markers, and iron status were assessed. All patients underwent polysomnography with electromyography of the lower limbs.

Results: RLS was identified in 37.5% of the patients. These individuals exhibited longer sleep onset latency, lower sleep quality, and a higher frequency of periodic limb movements (94%). Obstructive sleep apnea was detected in 12.5% of the patients. Iron metabolism abnormalities were observed in 89% of patients with RLS. These patients tended to have higher DAS-28 scores as well as elevated inflammatory markers.

Conclusion: RLS is common in RA and is associated with significant sleep disturbances and altered iron status. The lack of sufficient objective data in the literature highlights the need for polysomnographic evaluation in these patients. Early recognition and treatment of RLS may reduce disease burden and improve quality of life.

Practical application: Early recognition and treatment of RLS can reduce disease burden and improve quality of life by enabling a more comprehensive approach to patient care.

Research area: Biomedical
Contract: Project № DPDP-06/2023

Project title: "Protective effects of L-theanine and aerobic exercise against cognitive impairment in a lipopolysaccharide-induced experimental rat model of chronic neuroinflammation"

Project director: K. Georgieva[1]
Leading scientist: G. Hadzhipetrov[1]
Research team: N. Boyadjiev[1]; P. Hrischev[1]; D. Krushovlieva[2]; P. Ivanova[2]; J. Tchekalarova[2]
Organization unit: Medical University of Plovdiv
1. *Faculty of Medicine, Department of Physiology*
2. *Bulgarian Academy of Science, Institute of Neurobiology*

Aim: To investigate the effect of L-theanine and aerobic exercise in preventing cognitive impairment, oxidative stress, and neuroplasticity deficits in a lipopolysaccharide (LPS)-induced experimental model of chronic neuroinflammation.

Materials and methods: The study examined 3-month-old male Wistar rats divided into five groups (n = 11): control; sedentary with LPS; sedentary with L-theanine and LPS; trained with LPS; trained with L-theanine and LPS. After five weeks of L-theanine treatment and treadmill training, all rats underwent physical performance tests, followed by the induction of chronic neuroinflammation with LPS. Behavioural tests were then conducted, and neuroinflammatory, plasticity, and oxidative stress markers were assessed.

Results: Aerobic training enhanced endurance, maximal sprint speed, and grip strength compared to the other groups. LPS-induced neuroinflammation impaired spatial working memory, motor activity, short-term memory, and increased TNF-α, IL-1β in the hippocampus, and serum CRP. Pre-treatment with L-theanine and exercise separately prevented these cognitive deficits and reduced elevated neuroinflammatory markers. Combined treatment showed a synergistic positive effect only on TNF-α levels. Chronic neuroinflammation increased oxidative stress markers (superoxide dismutase 1 and

malondialdehyde), while pre-treatment with L-theanine and exercise partially mitigated lipid peroxidation. Neuroinflammation reduced the pCREB/CREB ratio in the hippocampus, indicative of impaired synaptic plasticity, which was prevented only by prior aerobic exercise.

Conclusion: The findings reveal the potential of L-theanine and aerobic exercise as strategies for preventing chronic neuroinflammation and its associated cognitive deficits.

Practical applications: The use of L-theanine and aerobic exercise is proposed as a preventive strategy against neuroinflammation.

Research area: Biomedical
Contract: Project № DPDP-07/2023

Project title: "Comparative phytochemical, toxicological and neuropharmacological study of *Tanacetum vulgare* L. essential oil and ethanol extract"

Project director: L. Peychev[1]; Niko Benbassat[2,3]
Leading scientist: B. Lechkova[2,3]
Research team: P. Atanassova[4]; D. Karcheva-Bahchevanska[2,3]; K. Ivanov[2,3]; S. Ivanova[2,3]; M. Shishmanova-Doseva[1,3]; P. Hrischev[5]; K. Saracheva[1,3]; Zh. Peychev[6]; D. Terziev[7]; Y. Georgieva[2]; S. Kaddo[8]; R. Gencheva[8]
Organization unit: Medical University of Plovdiv

1. *Faculty of Pharmacy, Department of Pharmacology, Toxicology and Pharmacotherapy*
2. *Faculty of Pharmacy, Department of Pharmacognosy and Pharmaceutical Chemistry*
3. *Research Institute*
4. *Faculty of Medicine, Department of Anatomy, Histology and Embryology*
5. *Faculty of Medicine, Department of Physiology*
6. *Faculty of Public Health, Department of Medical Informatics, Biostatistics and E-Learning*
7. *Faculty of Medicine, Second Department of Internal Diseases*
8. *Faculty of Pharmacy*

Aim: To evaluate the phytochemical, toxicological, and neuropharmacological properties of Tanacetum vulgare L. essential oil (EO) and ethanol extract (EE).

Materials and methods: EO and EE were obtained from *Tanacetum vulgare* flowers. Their chemical composition was analysed by gas chromatography/mass spectrometry and high-performance liquid chromatography. An acute toxicity study was performed to determine LD_{50} in rats. Behavioral tests were conducted to assess cognitive functions in intact rats and in animals with scopolamine-induced amnesia, treated with both extracts. A sub-acute toxicity study was performed – histology of internal organs and determination of hippocampal BDNF expression.

Results: The main compounds in EO were camphor and trans-chrysantenyl acetate. Significant amounts of rutin and chlorogenic acid were detected in EE. No symptoms of acute toxicity and mortality were observed at doses above 5000 mg/kg per os when determining the LD_{50} of both extracts. In intact animals, treatment with EE was more effective compared to EO and led to a significant improvement in spatial and recognition memory, active and passive learning and memory. We found some anxiolytic effect, without effect on motor activity. In the model of scopolamine-induced amnesia, both extracts led to an improvement in cognitive functions. These effects are associated with the increased BDNF expression in the hippocampus of intact animals. No histopathological changes were discovered in the internal organs.

Conclusion: Both extracts increased hippocampal BDNF expression and impacted several cognitive domains positively, with a more pronounced effect in models of scopolamine amnesia.

Practical applications: for the development of a phytotherapeutic with nootropic activity.

Research area: Biomedical
Contract: Project № DPDP-08/2023

Project title: "Analytical characterization and investigation of the biological activity of *Echinophora tenuifolia* subsp. *sibthorpiana*"

Project director: S. Ivanova[1]
Leading scientist: S. Dyankov[1]
Research team: K. Ivanov[1]; N. Benbassat[1]; D. Karcheva-Bahchevanska[1]; V. Nalbantova[1]; V. Todorova[1]; Y. Georgieva[1]; Dzh. Chakarov[2]; R. Ardasheva[3]; Zh. Peychev[4]
Organization unit: Medical University of Plovdiv

1. *Faculty of Pharmacy, Department of Pharmacognosy and Pharmaceutical Chemistry*
2. *Faculty of Medicine, Department of Propedeutics of Surgical Diseases*
3. *Faculty of Pharmacy, Department of Medical physics and Biophysics*
4. *Faculty of Public Health, Department of Medical Informatics, Biostatistics and E-learning*

Aim: To propose approaches for the characterization and quantitative analysis of *E. tenuifolia* subsp. *sibthorpiana* extract. To evaluate the biological potential of *E. tenuifolia* subsp. *sibthorpiana* extract.

Results: An extract from the aerial parts of *Echinophora tenuifolia* subsp. *sibthorpiana* (*E. tenuifolia* subsp. *sibthorpiana*) was prepared. The amount of total phenols and the content of individual phenolic compounds in the extract were analyzed and the presence of chlorogenic acid, *p*-coumaric acid, ferulic acid, salicylic acid, rutin, hesperidin, and rosmarinic acid was determined. The highest concentration was observed for rutin. The extract exhibited high in vitro antioxidant activity, including strong radical-scavenging properties and total antioxidant capacity. The extract does not show toxic effects towards the model organism *C. elegans*, while it was found to have pronounced adaptogenic properties, which have not been described so far. Notably, the extract demonstrated pronounced adaptogenic properties – not previously described – by stimulating the nematodes' chemosensory network and significantly enhancing their resistance to heat stress and elevated oxidative stress levels.

Conclusion: The extract of *E. tenuifolia* subsp. *sibthorpiana* is rich in phenolic compounds, exhibits high antioxidant activity and positively influences aging processes in model organisms (*C. elegans*).

Practical applications: *E. tenuifolia* subsp. *sibthorpiana* is associated with a high therapeutic potential, which has yet to be studied. The key areas in which *E. tenuifolia* subsp. *sibthorpiana* should be studied thoroughly and subsequently find practical applications include influencing the aging processes, increasing the body's natural resistance to stress, and neurodegenerative disorders.

Research area: Biomedical
Contract: Project № DPDP-10/2023

Project title: "Comparative study of modern microbiological methods for rapid etiological diagnosis of urinary tract infections (UTIs)"

Project director: M. Petrov[1,2]
Leading scientist: M. Rupcheva[1,2]
Research team: P. Markova[3], V. Zheleva[4]; K. Kostadinov[5]; M. Chterev[6]
Organization unit: Medical University of Plovdiv

1. *Faculty of Medicine, Department of Medical Microbiology and Immunology "Prof. Dr. Elisey Yanev"*
2. *Research Institute*
3. *Faculty of Medicine, Department of Pediatrics "Prof. Dr. Ivan Andreev"*
4. *Faculty of Medicine, Department of Internal Diseases, Section of Nephrology*
5. *Faculty of Public Health, Department of Social Medicine and Public Health*
6. *Faculty of Medicine, student*

Objective: To conduct a comprehensive comparative analysis of rapid etiological diagnostic methods in patients with UTIs.

Materials and methods: Between September 2023 and December 2024, urine samples from 76 UTI patients were examined. Multiplex PCR (Novaplex™ UTI Panels 1,2,3) results were compared with routine culture methods, and antibiotic susceptibility testing (AST) from the Uroquattro device (Alifax) was compared with the disk diffusion method.

Results: A total of 76 patients (mean age: 50.99 years; 74% female) were studied. Bacterial growth was detected in 45% of cultures, predominantly **Enterobacterales** (*E. coli, K. pneumoniae, P. mirabilis*) and *Enterococcus faecalis*. Multiplex PCR identified pathogens in 82% of samples, with polymicrobial infections in 79%. Discrepancies between methods were noted in 47%, likely due to hard-to-culture organisms, low microbial counts, or prior antibiotic therapy. One sample tested positive for *Candida glabrata.* Out of 10 samples tested with **HB&L Uroquattro**, 8 yielded valid AST results, showing a 69% concordance with the disk diffusion method.

Conclusion: Molecular genetic methods provide significantly faster bacterial identification (within 24 hours) compared to standard methods (48–72 hours). Turbidimetric analysis with Uroquattro shortens AST turnaround time by 24–48 hours. Rapid diagnostics enable timely, targeted treatment, reducing hospital stay duration, adverse drug reactions, and the emergence of resistant strains.

Practical application: The findings highlight the importance of integrating rapid diagnostic approaches into clinical practice for more effective UTI management.

Research area: Biomedical
Contract: Project № DPDP-11/2023

Project title: "Experimental model of polymeric scaffold, loaded with Simvastatin for evaluation of its influence over osteogenesis"

Project director: N. Kadreva[1]
Leading scientist: N. Kadreva[1]
Research team: N. Penkova[1]; P. Atanassova[1]; B. Pilicheva[2]
Organization unit: Medical University of Plovdiv
1. *Faculty of Medicine, Department of Anatomy, Histology and Embryology*
2. *Faculty of Pharmacy, Department of Pharmaceutical Sciences*

Aim: The present study aimed to determine the effect of the application of biomaterial matrices – Poly-ε-Caprolactone (PCL) loaded with Simvastatin on osteogenesis.

Material and methods: Male Wistar rats were used in the experiment, divided into 3 groups – Gpoly, GAn, G8w. The experimental model is based on the "critical sized bone defect model" and is carried out as guided bone regeneration with implantation in the calvaria of animals. Solvent casting – salt leaching method is used to prepare the matrices (scaffolds). Morphological and physico-chemical characteristics of the matrix are assesed. Histological material is obtained for immunohistochemical examination with Osteocalcin, BMP-2, VEGF antibodies, histological examination with hematoxylin and eosin and trichrome staining with Azan (Heidenheim method).

Results: After 8 weeks the scaffold PCL/Sim in the calvaria complete incorporation of the implant into the bone structure of the skull was observed. The periphery of the implant is a layer of the structureless matter surrounding the biopolymer. The central area of the implant is fragmented. In IHC, Azan, and H-E stains, VEGF-positive cells are observed with brown granulation filling. The expression of BMP-2, Osteocalcin is manifested by the presence of brown granules filling the cytoplasm of the cells.

Conclusion: The positivity of all IHC reactions with the antibodies proves the presence of active osteogenesis in the surrounding tissues.

Application in practice: Application in orthopedic and dental implantology, surgical medicine and pharmacology as a method of restoring bone defects through the use of biomaterials for the delivery of medicinal molecules, to stimulate, influence and accelerate the healing processes in bone tissue.

Research area: Medical and Biological
Contract: Project № TGI-01 /2023

Project title: "Virtual school for parents of surgically ill children"

Project director: P. Stefanova-Peeva[1]
Leading scientist: P. Stefanova-Peeva[1]
Research team: D. Dachev[1]; B. Ivanov[1]; S. Lupanov[1]; B. Isakov[1]; N. Mavrev[1]; S. Ivanova[1]
Organization unit: Medical University of Plovdiv
1. *Faculty of Medicine, Department of Propedeutics of Surgical Diseases, Section of Pediatric Surgery*

Aim: To develop a mobile application for remote monitoring of patients with congenital gastrointestinal tract (GIT) anomalies and to support parents in the postoperative period.

Material and methods: The study is cohort-based, retrospective, and prospective, including patients born with congenital GIT anomalies who have undergone surgery at the Pediatric Surgery Clinic. Data will be collected via a mobile application that facilitates communication between parents and medical specialists. Descriptive statistics will be used to analyze demographic indicators and quality of life.

Results: The development of an effective telemedicine monitoring platform is expected to improve patient care and reduce complications.

Conclusion: Telemedicine offers an innovative approach to patient monitoring, enhancing communication between doctors and parents while providing timely medical guidance.

Application in practice: The application will enable timely follow-up and improve patients' quality of life by reducing unnecessary hospitalizations.

Research area: Public Health
Contract: Project № TGI-02/2023

Project title: "A conceptual model for telemedicine training and artificial intelligence in health education"

Project director: N. Mateva[1]
Leading scientist: I. Karabova-Hambarova[1]
Research team: A. Yaneva[1]; K. Kilova[1]; A. Kirkova-Bogdanova[1]; T. Dimcheva[1]; Zh. Peychev[1]; H. Buchkov[1]; P. Elenska[2]
Organization unit: Medical University of Plovdiv

1. *Faculty of Public Health, Department of Medical Informatics, Biostatistics and E-learning*
2. *Faculty of Medicine, student*

Aim: To develop a conceptual model framework for enhancing competencies in medical student training through the use of telemedicine technologies.

Material and methods: A survey was conducted, distributed among Bulgarian and foreign medical students of the Medical University of Plovdiv to explore their opinion regarding the need for training in telemedicine, as well as their awareness in this field.

Results: The findings indicate that students have a low level of awareness about telemedicine, with 62.20% of respondents not having encountered information on it. A significant difference was observed between Bulgarian and foreign students in their attitudes towards the introduction of telemedicine training (P = 0.015), as well as their intentions to use telemedicine services in their future practice (P = 0.017). Foreign students exhibited more optimistic attitudes. The results suggest that integrating a telemedicine course into medical university curricula would contribute to awareness of ethical and regulatory principles and the development of communication and technical skills for future telemedicine application.

Conclusion: Integrating a telemedicine course into medical university curricula would contribute to raising awareness of ethical and regulatory principles, as well as developing communication and technical skills for future telemedicine applications. A structured course in

this field would enhance future physicians' awareness and confidence regarding the use of telemedicine in their professional practice.

Practical applications: We identified gaps in our students' awareness and defined thematic areas for the telemedicine syllabus as a part of medicine education.