JESIEŃ
IMMUNOLOGICZNA

4th Interdisciplinary Scientific Conference "Jesień Immunologiczna"

PROGRAM | ABSTRACTS

20th-22nd November 2024
Rzeszów

University of Rzeszów

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INTRODUCTION

Ladies and Gentlemen,

The 4th Interdisciplinary Scientific Conference "Jesień Immunologiczna" was an exceptional academic event organized by the Student Scientific Club of Immunology at the Institute of Medical Sciences, College of Medical Sciences of the University of Rzeszów, the Institute of Human Immunology at the Institute of Medical Sciences of the University of Rzeszów, and the International Federation of Medical Students' Associations-Poland (IFMSA-Poland), Rzeszów Division. The conference was directed at students, researchers, and professionals passionate about immunology and related scientific disciplines.

This year's conference continued our mission to create a platform for the exchange of knowledge and innovation in immunology and interdisciplinary sciences. Over three days, participants attended scientific sessions featuring the latest research, expert lectures by renowned specialists, and interactive workshops focused on subcutaneous immunoglobulin administration.

The event also provided valuable networking opportunities, fostering collaborations among participants from various regions and institutions.

On behalf of the Scientific and Organizing Committees, we thank you for your participation. We are pleased to present this book of abstracts as a lasting resource and source of inspiration.

Professor Jacek Tabarkiewicz
Chairman of the Scientific Committee

Julia Trojniak
Chairwoman of the Organizing Committee

DETAILED PROGRAM

1st day of the Conference - 20.11.2024 r.

11:00-11:30 – **Ceremonial opening of the Conference**

11:30-12:00 – Inaugural lecture - **prof. Valentina Di Felice** (University of Palermo, Italy) – **„Heat Shock Protein 60 as an immunomodulator"**

12:15-12:45 – **Dr Gonzalo Sánchez-Duffhues** (Health Research Institute of Asturias, Spain) – **"Repurposed small molecules targeting non-canonical signaling for the treatment of Fibrodysplasia ossificans progressive"**

12:45-13:15 – **Dr Xi Wang** (Harvard Medical School, USA) – **"FOXP3 recognizes microsatellites and bridges DNA through multimerization"**

13:30-16:45 – **"Original papers" – 1st session of student presentations**

2nd day of the Conference - 21.11.2024 r.

10:30-11:00 – **Prof. Przemysław Juszczyński** (Institute of Hematology and Transfusion Medicine, Poland) – **"Function of Hodgkin lymphoma -associated macrophages: lessons from single-cell transcriptomics"**

11:00-11:30 – **Prof. Tomasz Stokłosa** (Medical University of Warsaw, Poland) – **"Modern genetics as necessary tool to diagnose and treat hematological malignancies"**

11:30-12:00 – **Dr Krzysztof Szade** (Jagiellonian University, Poland) – **"A Matter of Blood - hematopoietic stem cells in health, aging and malignancy"**

12:15-15:30 – **"Review papers" – 2nd session of student presentations**

15:30-16:20 – **"Poster session" – 3rd session of student presentations**

18:00 – **Gala Dinner for Speakers and Active Participants with certificate and award ceremony (Hotel Prezydencki)**

3rd day of the Conference - 22.11.2024 r.

Workshops

11:00-13:00 – **mgr Patrycja Nalepa (Takeda, Poland) - "A practical aspects of hyaluronidase-supported subcutaneous immunoglobulin delivery"**

13:00-13:30 – **Dr Tomasz Wróbel** (Medical University of Lublin, Poland) – **"Non-steroidal CYP17A1 inhibitors in prostate cancer"**

13:30-14:00 – **Dr Urszula Radzikowska** (Swiss Institute of Allergy and Asthma Research, Switzerland) – **"Epithelial immunity in asthma exacerbations and COVID-19"**

14:15 – **Closing of the Conference**

1. ORIGINAL PAPERS

"Immune Storm: The Case of a Child with Anaplastic Lymphoma and Hemophagocytic Syndrome" – **Karolina Mazur**, Kamila Krycia, Natalia Olbrot

"Neuromyelitis optica spectrum disorder - a case study of a female patient treated with satralizumab" – **Weronika Bargiel**

„Chronic myocarditis of undetermined etiology - description of a patient with experimental interleukin-1 receptor antagonist therapy" – **Adrianna Antoszewska**

Body composition, lifestyle and dietary habits influencing IL-1β levels in obese individuals" – **Julia Lasek**, Ewelina Polak-Szczybyło

Investigation of the role of Grainyhead-like genes in various disorders through big data analysis" – **Alicja Sikorska**

"Biotinylated and/or glicydylated PAMAM G4 dendrimers as promising drug delivery system for glioma and liver cancer therapy" – **Magdalena Twardowska**, Żaneta Szymaszek, Łukasz Uram

"γδ T lymphocytes are key mediators of the antibacterial response in type 2 diabetes complicated by diabetic foot" – **Natalia Lehman**, Wojciech Suchodolski, Karol Jakubik, Tsan-Shin Huang, Michał Zarobkiewicz, Agnieszka Bojarska-Junak

"Can Galectin-9 Be a Novel Biomarker in Chronic Lymphocytic Leukemia?" – **Przemysław Piwowarczyk**, Agata Szymańska, Sylwia Chocholska, Michał Zarobkiewicz, Justyna Woś, Waldemar Tomczak, Jacek Roliński, Agnieszka Bojarska-Junak

"The analysis of dysregulation of metalloproteinases (MMPs) and their tissue inhibitors (TIMPs) levels in regards to increased collagen deposition in house dust mite (HDM)-induced experimental asthma models" - **Kamil Kamiński**, Bartosz Hanczaruk, Adrian Janucik, Agnieszka Tarasik, Alicja Walewska, Marlena Tynecka, Marcin Moniuszko, Andrzej Eljaszewicz

"Cytokine-induced modulation of Mesenchymal Stem Cells (MSC) functionality and immunosuppressive properties in response to IL-1β, IFN-γ, and TNF" – **Alicja Walewska**, Marlena Tynecka, Sylwia Księżak, Agnieszka Tarasik, Małgorzata Rusak, Joanna Reszeć, Milena Dąbrowska, Marcin Moniuszko

"Use of mesenchymal stromal cells (MSCs) secretome components as an alternative to cells in regulating neutrophilic inflammation in an experimental asthma model" – **Aleksandra Roszko**, Kamil Kamiński, Sylwia Księżak, Adrian Janucik, Agnieszka Tarasik, Marlena Tynecka, Marcin Moniuszko, Andrzej Eljaszewicz

"Assessment of the Therapeutic Potential of Novel Skin-Derived Acellular Dermal Matrices from Abdominoplasty in the Management of Chronic Diabetic Wounds" – **Bartosz Hanczaruk**, Krystian Czołpiński, Adrian Janucik, Jordan Holl, Dawid Groth, Alicja Walewska, Marlena Tynecka, Hady Razak Hady, Marcin Moniuszko

2. REVIEW PAPERS

"The review of neonatal receptor inhibitors (FcRn) in the treatment of autoimmune diseases" – **Katarzyna Koszarska**

"EBV induced myositis- from common infection to rare autoimmune disease" – **Martyna Sarzyńska**

"Influence of serotonin in gastrointestinal diseases" – **Wiktor Marek**, Paulina Wyszkowska, Olga Ficek

"JAK inhibitors in the treatment of autoimmune arthritis - summary of clinical trials results" – **Kinga Polityńska**

"Immunometabolism: Bridging Immune Function and Metabolic Health in Disease and Therapy" – **Kamil Płoch**

"The role of caplacizumab in the treatment of patients with thrombotic thrombocytopenic purpura - literature review" – **Natalia Ziaja**

"Intersections of physics and immunology - finding methods to capture remyelination" – **Maja Mejza**

"Sleep Deprivation: Unmasking the Silent Saboteur of Immune Health" – **Karolina Czerkiewicz**

"Innovative Approaches in Immunological Treatment for Crohn's Disease" – **Martyna Muda**

"Identifying the culprit. Examining the role of gut dysbiosis in Parkinson's disease" – **Maja Międlar**

"Leaky Gut Syndrome and Food Allergy: A Systematic Review of the Role of Intestinal Barrier Dysfunction in Food Allergy Pathogenesis" – **Wojciech Michał Jankowski**, Aleksandra Tarasiuk-Zawadzka, Jakub Fichna, Marcin Kurowski

"The Role of BCAA and Amino Acids in Early Detection of Obesity-Related Complications: Insights from Metabolomics" – **Anna Skowronek**, Marta Jaskulak, Katarzyna Zorena

3. POSTER SESSION

"The impact of physical activity on the immune system - current scientific research" – **Aleksandra Gałuszka**, Maja Gałuszka

"The relationship between stress and the immune system based on current scientific research" – **Maja Gałuszka,** Aleksandra Gałuszka

"Astaxanthin as a modulator of the immune response against cancer: mechanisms and therapeutic potential" – **Kinga Dyndał**

"The role of the immune system in the pathogenesis of atherosclerosis" – **Elisabetta Pierzga**

"IL-6 Signaling: A Key to Enhancing Cancer Immunotherapy" – **Laura Berc**

"Immunological Perspectives on Emerging Treatments for Juvenile Idiopathic Arthritis: A literature review" – **Szymon Pacek**

"Connections between polycystic ovary syndrome and Hashimoto Thyroiditis" – **Paweł Koziuk**, Katarzyna Wąchała

"Scedosporium apiospermum - identification of a rare etiological factor of otitis externa in immunocompromised individuals" – **Magdalena Sukar**

"Small Interfering RNA Therapeutic in Hypertension" – **Aleksandra Kotlińska**

LIST OF AWARDEES RECOGNIZED BY THE SCIENTIFIC COMMITTEE

1st Session of Student Presentations – Original Papers

1st place: ***"Biotinylated and/or Glycidylated PAMAM G4 Dendrimers as a Promising Drug Delivery System for Glioma and Liver Cancer Therapy"*** **– Magdalena Twardowska** (Student Biotechnology Club INSERT, Rzeszów University of Technology, Rzeszów, Poland; Department of Inorganic and Analytical Chemistry, Rzeszów University of Technology, Rzeszów, Poland)

2nd place: ***"Assessment of the Therapeutic Potential of Novel Skin-Derived Acellular Dermal Matrices from Abdominoplasty in the Management of Chronic Diabetic Wounds"*** **– Bartosz Hanczaruk** (Center for Regenerative Medicine, Medical University of Białystok, Białystok, Poland)

2nd place: ***"Cytokine-Induced Modulation of Mesenchymal Stem Cell (MSC) Functionality and Immunosuppressive Properties in Response to IL-1β, IFN-γ, and TNF"*** **– Alicja Walewska** (Center for Regenerative Medicine, Medical University of Białystok, Białystok, Poland)

Distinction: ***"γδ T Lymphocytes as Key Mediators of the Antibacterial Response in Type 2 Diabetes Complicated by Diabetic Foot"*****– Natalia Lehman** (Department of Clinical Immunology, Medical University of Lublin, Lublin, Poland)

Distinction:***"Can Galectin-9 Be a Novel Biomarker in Chronic Lymphocytic Leukemia?"*** **– Przemysław Piwowarczyk** (Department of Clinical Immunology, Medical University of Lublin, Lublin, Poland)

Distinction:***"Neuromyelitis Optica Spectrum Disorder: A Case Study of a Female Patient Treated with Satralizumab"*** **– Weronika Bargiel** (Student Scientific Club of Neurology, Medical College of Rzeszów University, Rzeszów, Poland)

2nd Session of Student Presentations – Review Papers

1st place: ***"Intersections of Physics and Immunology – Finding Methods to Capture Remyelination"*** **– Maja Mejza** (Student Neurology Club at University Clinical Hospital No. 1, Medical University of Łódź, Faculty of Medicine, Łódź, Poland)

2nd place:***"Identifying the Culprit: Examining the Role of Gut Dysbiosis in Parkinson's Disease"*** **– Maja Międlar** (Student Scientific Club of Immunology, Faculty of Medicine, University of Rzeszów, Rzeszów, Poland)

3rd place: ***"Sleep Deprivation: Unmasking the Silent Saboteur of Immune Health"*** **– Karolina Czerkiewicz** (Student Scientific Club of Biochemists "URCell," Medical College of Rzeszów University, Rzeszów, Poland)

3rd Session of Student Presentations – Poster session

1st place: ***"Astaxanthin as a Modulator of the Immune Response Against Cancer: Mechanisms and Therapeutic Potential"*** **– Kinga Dyndał** (Student Science Club "URCell," Medical College of Rzeszów University, Rzeszów, Poland)

2nd place: ***"The Role of the Immune System in the Pathogenesis of Atherosclerosis"*** **– Elisabetta Pierzga** (Cardio-Oncology Student Research Group, University of Rzeszów, Rzeszów, Poland)

3rd place: ***"Small Interfering RNA Therapeutics in Hypertension"*** **– Aleksandra Kotlińska** (Student Scientific Club of Biochemists "URCell," University of Rzeszów, Rzeszów, Poland)

GRAND PRIX Award

Winner:***"Intersections of Physics and Immunology – Finding Methods to Capture Remyelination"*** **– Maja Mejza** (Student Neurology Club at University Clinical Hospital No. 1, Medical University of Łódź, Faculty of Medicine, Łódź, Poland)

ORIGINAL PAPERS

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Title of presented paper: Immune Storm: The Case of a Child with Anaplastic Lymphoma and Hemophagocytic Syndrome

Authors: Karolina Mazur[1], Kamila Krycia[1], Natalia Olbrot[1]

Supervisor: Małgorzata Mitura-Lesiuk, MD, PhD[2]

Affiliation: 1. Student Scientific Association of the Department of Pediatric Hematology, Oncology and Transplantology, Medical University of Lublin, Lublin, Poland
2. Department of Pediatric Hematology, Oncology and Transplantology, Medical University of Lublin, Lublin, Poland

Type of the paper: Case report

Introduction: Anaplastic large cell lymphoma (ALCL) is a rare cancer that accounts for 5-20% of all Non-Hodgkin's Lymphoma in the pediatric population. The occurrence of malignant neoplasms, especially lymphomas and leukemias, may contribute to the development of hematogocytic lymphohistocytosis (HLH).

Case report: 2-year-old boy was admitted to the Department of Paediatric Hematology,
Oncology and Transplantology for the diagnosis and treatment of lymphadenopathy. Physical examination revealed a hard, non-movable packet, changing the contour of the neck. Imaging studies also revealed numerous nodal lesions in many areas of the body, accompanying general symptoms. As a result of the research performed, together with the presence of general symptoms and involvement of the supra- and subdiaphragmatic areas,diagnosed ALCL in stage IV. The treatment was complicated a.o. bone marrow aplasia. After several days, due to the presence of features of the HLH, steroids and cyclosporine were introduced. Despite treatment, the boy's condition deteriorated. He was transferred to the intensive care unit, where multi-organ failure progressed and the boy died.

Conclusion: Due to the potential for hyperactivation of the immune system during ALCL treatment, attention should be paid to the level of relevant laboratory parameters and the clinical manifestations. Despite the rapid HLH-specific treatment, it is possible that the desired effect is not achieved, resulting in treatment failure.

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Title of presented paper: Neuromyelitis optica spectrum disorder - a case study of a female patient treated with satralizumab

Authors: Weronika Bargiel[1]

Supervisor: Marcin Wiącek, MD, PhD[2]

Affiliation: 1. Student's Scientific Club of Neurology, Medical College of Rzeszow University, Rzeszow, Poland
2. St. Jadwiga the Queen Clinical Regional Hospital No. 2, Rzeszow, Poland

Type of the paper: Case report

Introduction: Neuromyelitis optica spectrum disorder-NMOSD (also called Devic's syndrome) is a rare autoimmune condition affecting the central nervous system, characterized by the presence of specific antibodies directed against aquaporin-4. The antibody attack causes inflammation and degeneration of the myelin surrounding the nerves. The disease often presents with inflammation of the spinal cord and optic nerves.

Case report: The author of this paper presents a case report of a 47-year-old female patient diagnosed with NMOSD-AQP+. In 2017, the patient was hospitalized in the Neurology Clinic due to spinal cord inflammation. During the diagnostic process, positive antibodies against aquaporin-4 were detected and diagnosis of Devic's syndrome was made. Two years later, the patient developed inflammation of the optic nerve. In 2023, the patient was admitted to the Neurology Clinic due to an exacerbation of the disease process, manifesting as quadriparesis and reduced sensation from the level of Th4. In 2024, a decision was made to qualify the patient for biological treatment using satralizumab.

Conclusion: This case is presented to highlight the autoimmune nature of NMOSD and to emphasize the potential use of new therapies involving biological treatments with humanized antibodies.

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Title of presented paper: Chronic myocarditis of undetermined etiology - description of a patient with experimental interleukin-1 receptor antagonist therapy

Authors: Adrianna Antoszewska[1]

Supervisor: Wojciech Tarała, MD[2]

Affiliation: 1. Medical College of Rzeszow University, Rzeszow, Poland
2. Department of Pediatrics and Pediatric Gastroenterology with Pediatric Cardiology Subdivision, St. Jadwiga the Queen Clinical Regional Hospital No. 2, Rzeszow, Poland

Type of the paper: Case report

Introduction: Myocarditis (MI) is defined as an inflammatory disease involving cardiomyocytes, interstitial tissue, vessels and sometimes the pericardium. Treatment should focus mainly on inhibiting damage to cardiomyocytes.

Case report: In the following paper, the author presents the case of an 18-year-old patient with chronic myocarditis of undetermined etiology, ventricular arrhythmia and linear psoriasis. The patient had been hospitalized several times over the years for follow-up cardiovascular evaluation. The patient's condition repeatedly required modification of treatment due to progressive impairment of systolic and diastolic myocardial function, worsening of cardiac arrhythmias and progressive conduction disturbances. The patient developed complications of treatment-osteoporosis and mild corneal fingering. The patient was treated with biologic therapy and immunomodulatory therapy.

Conclusion: The following case is presented because of the extremely advanced and difficult to treat course of chronic myocarditis, which requires special attention and care. The author's goal is to highlight the possibility of using biologic treatment therapy and to emphasize the important pathophysiological role of interleukin receptors in the treatment of myocarditis.

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Title of presented paper: Body composition, lifestyle and dietary habits influencing IL-1β levels in obese individuals

Authors: Julia Lasek[1], Ewelina Polak-Szczybyło[2]

Supervisor: Prof. Jacek Tabarkiewicz, MD, PhD[3]

Affiliation: 1. Clinical Dietetics Student Scientific Club, Institute of Health Sciences, Medical College of Rzeszow University, Rzeszow, Poland
2. Department of Dietetics, Institute of Health Sciences, Medical College of Rzeszow University, Rzeszow, Poland
3. Centre for Innovative Research in Medical and Natural Sciences, College for Medical Sciences, University of Rzeszow, Rzeszow, Poland

Type of the paper: Original paper

Introduction: Low-grade inflammation is a factor in the development of many obesity-related diseases. Factors that can potentially modify the level of this interleukin are the content of adipose tissue in the body, lifestyle and diet, including nutrients.

Aim of the work: We hypothesized that IL-1β levels are increased in association with the amount of adipose tissue in obese individuals and are influenced by dietary factors, lifestyle, and obesity-related diseases.

Materials and methods: 84 obese adult subjects were tested by BIA and concentration of IL-1β. The subjects completed survey with the FFQ-6 food consumption frequency questionnaire, life-style questions and the food diary.

Results: Obese patients with hypothyroidism and atherosclerosis showed higher levels of IL-1β compared to healthy individuals with excessive body weight. Frequent consumption of processed red meat promotes reduced levels of IL-1β in the study group. A similar relationship was demonstrated by the content of amino acids in the diet such as arginine, alanine and glycine and the glycaemic index. High consumption of maltose and galactose was positively associated with the level of IL-1β. Factors such as body composition, age, physical activity, stimulants did not show any relationship with the level of this interleukin.

Conclusions: Level of IL-1β is not dependent on the amount of adipose tissue, but dietary factors and some diseases affect its level in the group of obese patients.

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Title of presented paper: Investigation of the role of Grainyhead-like genes in various disorders through big data analysis

Authors: Alicja Sikorska[1]

Supervisor: Prof. Tomasz Wilanowski, PhD[1]

Affiliation: 1. Institute of Genetics and Biotechnology, Faculty of Biology, University of Warsaw, Warsaw, Poland

Type of the paper: Original paper

Introduction: The genes belonging to the Grainyhead-like family (GRHL1-3) encode transcription factors that play essential roles in various biological processes. Alterations in their expression levels caused by genetic mutations are associated with numerous disorders. However, many functions of the GRHL genes remain unexplored.

Aim of the work: The primary objective of my research is to identify previously uncharacterized associations between the GRHL gene family and specific pathological conditions.

Materials and methods: Comprehensive big data analyses were conducted, utilizing diverse bioinformatics methods. Databases such as GWAS were employed to identify genetic loci associated with diseases, GEO for profiling gene expression patterns, Expression Atlas for analyzing gene expression, ArrayExpress for functional genomics data analysis, and the UCSC Genome Browser for examining genomic sequences.

Results: Through the application of these analytical techniques, a correlation between GRHL2 and longevity (beyond 95 years) was discovered. It was demonstrated that the offspring of long-lived individuals are more likely to inherit specific allelic variants that confer protection against age-related diseases (e.g., coronary artery disease, Alzheimer's disease).

Conclusions: This study emphasizes the role of GRHL genes in biological processes. Nonetheless, further investigation into the roles of GRHL genes is necessary, offering potential insights for future therapeutic strategies.

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Title of presented paper: Biotinylated and/or glicydylated PAMAM G4 dendrimers as promising drug delivery system for glioma and liver cancer therapy

Authors: Magdalena Twardowska[1,2], Żaneta Szymaszek[2], Łukasz Uram[2]

Supervisor: Łukasz Uram, PhD[2]

Affiliation: 1. Student Biotechnology Club INSERT, Rzeszow University of Technology, Rzeszow, Poland
2. Department of Inorganic and Analytical Chemistry, Rzeszow University of Technology, Rzeszow, Poland

Type of the paper: Original paper

Introduction: Chemotherapy remains the most effective approach to treating cancer, but due to side effects, great attention has been given to targeted therapies. Biotin is a nutrient necessary for cell growth and proliferation. Some cancer cells overexpress receptors involved in vitamin internalisation. One of these is sodium multivitamin transporter. Dendrimers are highly promising drug delivery systems, unfortunately highly toxic. Therefore, modifications could increase their biocompatibility.

Aim of the work: The purpose of this work was to investigate the influence of native (G4), biotinylated (G4B), glicidylated (G4gl) or biotinylated and glicidylated (G4Bgl) PAMAM dendrimers on U-118 MG, and HepG2 cancer cells and comparable on immortalized HaCaT cells. Toxicity against *Caenorhabditis elegans* was also evaluated.

Materials and methods: The cytotoxicity of the tested compounds was assessed using the XTT test. Proliferation was evaluated by measuring DNA content. *In vivo* effect on *C. elegans* was determined.

Materials and methods: The cytotoxicity of the tested compounds was assessed using the XTT test. Proliferation was evaluated by measuring DNA content. *In vivo* effect on *C. elegans* was determined.

Results: G4 and G4B caused significant decrease of cell viability (20-100%) and inhibition of proliferation (up to 50%). G4gl and G4Bgl were less toxic, and showed no effect on proliferation. All conjugates were biocompatible against *C. elegans.* Biotin increased activity of G4gl against cancer cells, especially glioma.

Conclusions: Glicydol-loaded and biotinylated dendrimer (G4Bgl) is a promising drug delivery system for glioma and liver cancer therapy.

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Title of presented paper: γδ T lymphocytes are key mediators of the antibacterial response in type 2 diabetes complicated by diabetic foot

Authors: Natalia Lehman[1], Wojciech Suchodolski[1], Karol Jakubik[1], Tsan-Shin Huang[1], Michał Zarobkiewicz[1], Agnieszka Bojarska-Junak[1]

Supervisor: Prof. Agnieszka Bojarska-Junak, PhD[1]

Affiliation: 1. Department of Clinical Immunology, Medical University of Lublin, Lublin, Poland

Type of the paper: Original paper

Introduction: Obesity and type 2 diabetes (T2D) are global health issues. Diabetic foot ulcers lead to complications such as infections, amputations, and death. Common bacteria causing infections include Staphylococcus aureus and Pseudomonas aeruginosa. γδ T lymphocytes, divided into Vδ1 and Vδ2, respond to bacterial infections by recognizing HMBPP and producing bacteriostatic substances like granulysin. In S. aureus infections, they detect abnormalities in the mevalonate pathway.

Aim of the work: This study aimed to assess differences between Vδ1 and Vδ2 cells, exploring the potential use of selectively expanded Vδ2 cells as treatment for foot ulcers.

Materials and methods: Seventy patients were divided into three groups: T2D, T2D with diabetic foot (DF), and non-T2D individuals. Flow cytometry was used to evaluate γδ T cell frequency, activation markers (CD69, CD56), and senescence markers (CD57). Cytokine expression in γδ T cells and Vδ2 cells was analyzed. PBMCs were stimulated with S. aureus and P. aeruginosa lysates to assess expression of CD25, HLA-DR, CD137, and CD154 on Vδ1 and Vδ2 cells.

Results: T2D patients had lower CD57 expression, a marker of replicative senescence, and higher γδ T cell activation in DF patients (CD69). Diabetic patients' γδ T cells secreted more IL-17A, though this diminished after Vδ2 expansion.

Conclusions: The lower responsiveness of Vδ2 cells suggests functional exhaustion in DF patients.

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Title of presented paper: Can Galectin-9 Be a Novel Biomarker in Chronic Lymphocytic Leukemia?

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Type of the paper: Original paper

Introduction: Galectins (Gal) are a family of carbohydrate-binding proteins with a common carbohydrate-recognition domain (CRD) that specifically bind to galactose β-linked to N-acetyl glucosamine. Gal-9 is expressed in numerous cell types, including T-cells, B-cells, myeloid-derived suppressor cells (MDSCs), and tumor cells. Gal-9 signaling comes through T-cell immunoglobulin and mucin domain 3 (TIM-3). Interactions between Gal-9 and its ligand affect immune control, such as cell apoptosis, promoting Treg differentiation, and influencing macrophage activity. Gal-9 promotes the expansion and differentiation of MDSCs in the tumor microenvironment. Gal-9 also contributes to the development and progression of various types of leukemia, including chronic lymphocytic leukemia (CLL).

Aim of the work: The study aims to provide insights into the combination of Gal-9 analysis with other disease parameters.

Materials and methods: The potential role of Gal-9 was investigated by analyzing the level of the soluble form Gal-9 in plasma using ELISA and expression of Gal-9 in B-cells using flow cytometry. Results were compared with high-risk factors in CLL.

Results: Elevated Gal-9 levels in plasma and increased Gal-9 expression in B cells are associated with poor prognostic.

Conclusions: Disease activity of CLL patients could be further aided by the analysis of Gal-9 expression in leukemic B-cells and Gal-9's plasma levels.

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Title of presented paper: The analysis of dysregulation of metalloproteinases (MMPs) and their tissue inhibitors (TIMPs) levels in regards to increased collagen deposition in house dust mite (HDM)-induced experimental asthma models

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Type of the paper: Original paper

Introduction: Airway remodeling is defined as a set of pathological changes within the lung structure, namely increased protein deposition to extracellular matrix (ECM), goblet cell hyperplasia, and smooth muscle hypertrophy. However, the molecular mechanism underlying those features remains elusive. Importantly, the increased collagen (Col) deposition seems to be the result of an imbalance between the metalloproteinases (MMPs) and their tissue inhibitors (TIMPs) activity.

Aim of the work: Therefore, we aimed to investigate the role of MMPs and TIMPs in house dust mite (HDM) extract-induced experimental asthma models.

Materials and methods: C57BL/6 mice were challenged with 10 μg or 100 μg of HDM extract to induce mixed and neutrophilic airway inflammation, respectively. The lungs were collected for histochemistry, transcriptome analysis, immunohistochemistry, and western blotting.

Results: Firstly, we confirmed increased airway inflammation and total collagen deposition in both models. Transcriptomic profiling revealed the dysregulation in the expression of genes clustered in Col, Mmps, and Timps. We found an increase in deposition of Col1a1, Col3a1, and Col4a1. More importantly, we noted increased levels of MMP-12 in both models, while MMP-2 was uniquely elevated in neutrophilic inflammation.

Conclusions: In summary, we confirmed that the HDM extract-induced experimental asthma model is suitable for analysis of MMPs & TIMPs deregulation. Moreover, we found that various inflammatory profiles might differentially regulate the levels of MMPs &TIMPs.

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Title of presented paper: Cytokine-induced modulation of Mesenchymal Stem Cells (MSC) functionality and immunosuppressive properties in response to IL-1β , IFN-γ, and TNF

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Type of the paper: Original paper

Introduction: Lung resident Mesenchymal Stem Cells (lrMSC), primarily located in perivascular regions, play an essential role in regulating immune response and tissue regeneration. However, their function in persistent inflammatory microenvironments, such as chronic lung diseases, remains elusive.

Aim of the work: The study aimed to evaluate the effects of lung inflammatory microenvironment on MSC's activity and functions.

Materials and methods: An experimental asthma model was induced in C57BL6/cmdb mice by intranasal application of 100ug protein of house dust mite (HDM) extract for 14 days. The number and immunosuppressive properties of lrMSC were assessed using flow cytometry. Moreover, MSCs were stimulated in vitro with supernatants obtained from PBMCs stimulated with HDM or were directly treated with IL-1β, IFN-γ, and TNF for 24h. Differentiation ability was evaluated by confocal microscopy, cytokine levels were measured by ELISA, and gene expression was analyzed by qPCR.

Results: A reduction in lrMSC number and their differentiation capacity was observed. In vitro stimulated MSCs showed an enhanced immunoregulatory response. We found upregulated IDO and IL-6 gene expression, among others. IFN-γ treatment of MSCs significantly impaired their differentiation ability.

Conclusions: The inflammatory microenvironment profoundly alters MSC properties, with proinflammatory cytokines playing a critical role in modulating their functionality.

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Title of presented paper: Assessment of the Therapeutic Potential of Novel Skin-Derived Acellular Dermal Matrices from Abdominoplasty in the Management of Chronic Diabetic Wounds

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Type of the paper: Original paper

Introduction: Chronic wounds in diabetic patients represent a significant global health challenge. Our scientific group has developed a novel human acellular dermal matrix (hADM) that might be utilized for addressing persistent epidermal damage.

Aim of the work: Here, we aimed to evaluate the hADM dressings in managing chronic diabetic wounds in the experimental model.

Materials and methods: Skin samples from post-bariatric patients underwent decellularization using three methods: **hADM1:** 1M NaCl with sodium dodecyl sulfate (SDS); **hADM2:** 2M NaCl with SDS **hADM3:** trypsin with Triton X-100. The integrity of the extracellular matrix (ECM) and cellular removal were assessed using immunohistochemical and histochemical staining. Immunogenicity was evaluated via T-cell proliferation assay. In vivo analyses involved wild-type (WT) and leptin receptor knockout (db/db) mice, employing the three hADMs. Wound healing was monitored daily, followed by gene profiling analyses.

Results: All decellularization methods preserved ECM integrity; however, hADM1 induced the lowest immunogenic response. In vivo study showed comparable effects in the inflammatory phase, while hADM1 accelerated healing kinetics in the proliferation phase and upregulated expression of healing-associated genes, namely Col5a1, Col5a2, Itga6, Itgb3, and Mmp9.

Conclusions: In summary, our results indicate that hADM1 dressing may be a promising therapeutic approach for persistent wounds. However, further studies followed by clinical trials are necessary to validate its efficacy in human patients.

The research was conducted under the project "Student Scientific Clubs Create Innovations" (No. SKN/SP/569995/2023) funded by the Ministry of Science and Higher Education.

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Title of presented paper: Use of mesenchymal stromal cells (MSCs) secretome components as an alternative to cells in regulating neutrophilic inflammation in an experimental asthma model

Authors: Aleksandra Roszko[1], Kamil Kamiński[1], Sylwia Księżak[1], Adrian Janucik[1], Agnieszka Tarasik[2], Marlena Tynecka[1], Marcin Moniuszko[1], Andrzej Eljaszewicz[1]

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Type of the paper: Original paper

Introduction: The immunosuppressive properties of mesenchymal stromal cells (MSCs) have been successfully demonstrated in numerous preclinical studies involving chronic inflammatory diseases, including asthma. Unfortunately, scientific efforts showing MSC efficacy did not result in therapy optimization. Therefore, we developed an alternative approach utilizing MSC-derived extracellular vesicles (EVs) reflecting the properties of the whole cell, while minimizing safety concerns.

Aim of the work: Here, we aimed to assess the effectiveness of MSC-derived extracellular vesicles in regulating neutrophilic inflammation in the house dust mite (HDM) induced experimental asthma model.

Materials and methods: C57BL/6 mice were challenged with HDM extract (100mg) for 5 consecutive days in each of 2 weeks to induce neutrophilic lung inflammation. Moreover, on the 13th day of the experiment, mice were administrated EVs isolated from unstimulated MSC culture media mixture or pre-educated with inflammatory cytokines (pr-EVs).

Results: Firstly, we confirmed that both EVs limit neutrophilic airway inflammation. Moreover, analysis of canonical and noncanonical pathways revealed the downregulation in arachidonic acid metabolism and lipid metabolism using both MSCs and EVs. Interestingly, in contrast to MSCs only EVs administration caused the decrease in the levels of Th2-driven cytokines and certain CXCL and CCL chemokines in BAL.

Conclusions: In summary, we confirmed that MSC-derived EV may reflect the beneficial effects of MSCs in neutrophilic airway inflammation.

The research was conducted under the project "Student Scientific Clubs Create Innovations" (No. SKN/SP/602497/2024) funded by the Ministry of Science and Higher Education.

REVIEW PAPERS

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Title of presented paper: The review of neonatal receptor inhibitors (FcRn) in the treatment of autoimmune diseases.

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Type of the paper: Review paper

Introduction: In autoimmune diseases such as Myasthenia gravis (MG), Chronic Inflammatory Demyelinating Polyneuropathy (CIDP) or Immune Thrombocytopenia (ITP), overproduction of autoimmune IgG antibodies leads to tissue and organ damage. High serum IgG levels and long half-life largely depend on reuptake and recirculation via the neonatal receptor (FcRn).

Problem description: FcRn mediates the transport of maternal IgG to the fetus across the placenta, but is also expressed throughout life in the liver, kidney, muscle and vascular endothelium. The effect of new drugs based on blocking this receptor is the lysosomal degradation of IgG-class antibodies, thereby eliminating their pathogenic character. This group of drugs includes the following monoclonal antibodies or their fragments: Efgartigimod alfa, Rozanoliksizumab, Batoclimab and Nipokalimab. Based on clinical trials, Rozanolixizumab was approved by the FDA in 2023 for the treatment of generalized myasthenia gravis, while Efgartigimod alfa has had this registration since 2021, and this year it was also approved for the treatment of CIDP.

Conclusions: Strategies to prevent FcRn from binding to IgG produce effects similar to plasmapheresis in removing pathogenic IgG, but with greater potential for long-term maintenance therapy, moreover, sparing the other types of immunoglobulins (only IgGs have affinity for the receptor), resulting in fewer side effects. Studies are still underway to register these drugs in more than 10 autoimmune diseases.

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Title of presented paper: EBV induced myositis- from common infection to rare autoimmune disease

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Type of the paper: Review paper

Introduction: Epstein-Barr virus (EBV) infects over 90% of the global population and is usually linked to mild conditions like infectious mononucleosis. However, EBV can sometimes lead to chronic active EBV infection (CAEBV) and trigger autoimmune diseases, including rare forms of myositis. This review examines the association between EBV and myositis, ranging from polymyositis to dermatomyositis, highlighting its role in autoimmune mechanisms.

Problem description: Myositis, such as polymyositis and dermatomyositis, has been linked to EBV in both direct muscle damage and immune-mediated pathways. CAEBV may lead to generalized myositis that mimics classical forms but often shows poor response to immunotherapy. Complications, such as coronary artery dilation or nasopharyngeal carcinoma, are also reported, particularly in those with elevated EBV DNA loads or specific antibodies. Pediatric cases present unique challenges in diagnosis and management. Additionally, drug use or infections may trigger EBV-related myositis, complicating the clinical picture.

Conclusions: EBV-induced myositis is a distinct, often severe condition requiring early diagnosis. In patients with progressive, treatment-resistant myositis, underlying EBV infection should be considered, particularly with atypical features like lingual or orbital involvement. Clinicians should remain vigilant in identifying and managing this rare yet serious form of myositis to improve outcomes.

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Title of presented paper: Influence of serotonin in gastrointestinal diseases

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Type of the paper: Review paper

Introduction: Recent studies have shown the influence of 5-HT on the body's immunity via several mechanismes. This neurotransmitter may play a crucial role in a couple of diseases associated with serotonin pathway. This topic will be introduced in this work. The mechanism of this process includes neutrophil recruitment, regulatory B cells inducement or Mast cells
activation.

Problem description: In this study we will introduce the influence of 5-HT itself on several diseases which cause the inflammation response. Firstly we'll overview recent findings about the molecular pathway of this influence. One of the diseases we find really interesting in this matter is colitis ulcerosa where 5-HT induces regulatory B-cells. On the other hand serotonine plays a significant role in maintaining one's microbiome in both normal conditions and pathologies of the digestive system.

Conclusions: These findings allow us to invent new ways of diagnosis and is essential to invent new methods of treatment of numerous diseases such as Crohn's disease, Inflammatory Bowel
Disease and ulcerative colitis. In this study there will be presented many clinical and
preclinical trials that offer promising treatment strategies.

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Title of presented paper: JAK inhibitors in the treatment of autoimmune arthritis - summary of clinical trials results

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Type of the paper: Review paper

Introduction: Autoimmune arthritis is group of chronic inflammatory disorders. The most common types are rheumatoid arthritis (RA), ankylosing spondylitis (AS), and psoriatic arthritis (PsA). Studies show a disruption in the intracellular pathways mediated by multiple cytokines in autoimmune arthritis. One of the drugs that modulate intracellular inflammatory processes are Janus kinase (JAK) inhibitors. They are increasingly used to reduce symptoms of autoimmune arthritis.

Problem description: The latest trial compared the effectiveness of upadacitinib (UPA) versus methotrexate (MTX) in RA by the achievement of reemission as determined by CDAI (Clinical Disease Activity Index) after 5 years of treatment. In the group treated with UPA 15/30 mg, 53/59% of patients attained remission versus 43% with MTX. The next study shows that about 50% of tofacitinib-treated patients with AS versus about 5-20% with placebo experienced improvements ≥ 30% in pain and ≥ 1.1 points in ASDAS (Ankylosing Spondylitis Disease Activity Score) after 1 month. Significant reduction of symptoms a.o. morning stiffness, fatigue, peripheral joints swelling, and pain were noticed. In another study, the percentage of PaS patients who had at least a 20% improvement (ACR20) was 70.6/78.5% with 15/30 mg UPA, 36.2% with placebo, and 65.0% with adalimumab after 12 weeks.

Conclusions: Clinical studies have shown that JAK inhibitors can be effectively and safely used in autoimmune arthritis, such as RA, AS, PaS.

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Title of presented paper: Immunometabolism: Bridging Immune Function and Metabolic Health in Disease and Therapy

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Type of the paper: Review paper

Introduction: Immunometabolism, the intricate interaction between cellular metabolic pathways and immune functions, has become a vital area of study. Key processes such as glycolysis, oxidative phosphorylation, and fatty acid oxidation influence immune responses in macrophages, T cells, and dendritic cells. These pathways are especially relevant to understanding chronic diseases like cancer, obesity, diabetes, and autoimmune conditions, where immune cell function is deeply impacted by metabolic shifts.

Problem description: This review explores the critical metabolic pathways that regulate immune cell activation and differentiation. It discusses the role of immunometabolism in chronic diseases, focusing on how dysregulated metabolism contributes to immune evasion in cancer, insulin resistance in obesity, and sustained inflammation in autoimmune diseases. The review also examines novel therapeutic approaches targeting metabolic pathways to restore immune balance and enhance immune-based treatments.

Conclusions: Understanding the intricate link between metabolism and immunity provides new opportunities for therapeutic innovation. Modulating metabolic pathways can potentially improve cancer immunotherapy, reduce chronic inflammation in metabolic disorders, and better manage autoimmune diseases. Further research is essential to refine these therapies and optimize patient outcomes.

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Title of presented paper: The role of caplacizumab in the treatment of patients with thrombotic thrombocytopenic purpura - literature review

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Type of the paper: Review paper

Introduction: Thrombotic thrombocytopenic purpura (TTP) is a rare disease caused by the presence of antibodies against the metalloproteinase ADAMTS 13. Despite plasmapheresis therapy, the survival prognosis is not promising and new therapeutic methods are being sought. The aim of the study is to review the literature on the role of caplacizumab in the treatment of patients with TTP.

Problem description: A systematic review of Pubmed articles from 2014-2024 was carried out, using keywords: caplacizumab, thrombotic thrombocytopenic purpura. The inclusion criterion was publication within the past 10 years. Articles without full text or over 10 years old were excluded. The analyses included the multicentre, randomised, controlled phase 2 TITAN study and randomised controlled phase 3 HERCULES study. The role of caplacizumab in patients with TTP resulted in the reduction of time to normalise blood platelets, faster remission of acute TTP episodes with shorter hospitalisation and plasmapheresis duration. Thrombotic events were similar in caplacizumab and placebo groups, but bleeding was observed more frequently in the caplacizumab group. Relapse of TTP occurred 30 days after discontinuation of treatment.

Conclusions: Studies have shown the benefits of the use of caplacizumab in TTP treatment. However, the number of multicentre randomised controlled trials is still insufficient.

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Title of presented paper: Intersections of physics and immunology - finding methods to capture remyelination

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Type of the paper: Review paper

Introduction: Inflammatory Demyelinating Diseases (IDDs) of the CNS are the major causes of disability among young adults. Myelin regeneration in IDD becomes ineffective, leading to permanent axonal damage. There is an increasing interest in research on drugs able to stimulate regeneration of myelin. Unfortunately, we lack techniques that enable imaging of remyelination process. This has provoked interest in the development of new methods of visualization using magnetic resonance imagining (MRI).

Problem description: MRI excels in showing acute lesions and therefore, has become a standard in diagnosing IDDs. Multiple advanced MRI techniques were established to image myelin changes, some of which are clinically possible. First investigations into diffusion tensor imaging, myelin water fraction, and magnetization transfer ratio were not considered satisfactory. Nevertheless, their performance increased with the recent use of novel equipment, biomarkers and synthetic methods. The latest innovative strategies, such as magnetic susceptibility mapping, have highlighted the need for further exploration.

Conclusions: The search for new strategies to visualize processes of myelin regeneration is crucial for the individualization and progress of IDDs therapy. For this we needed to fully understand the processes of remyelination itself. Pioneering MRI sequences can help make a breakthrough in this field.

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Title of presented paper: Sleep Deprivation: Unmasking the Silent Saboteur of Immune Health

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Type of the paper: Review paper

Introduction: Sleep deprivation is a prevalent issue in modern society with significant health implications. It modulates the immune system, contributing to the pathogenesis of various diseases. This study aims to synthesize current knowledge on the impact of sleep deprivation on immune function and its association with disease.

Problem description: A comprehensive review of literature from Pubmed/MEDLINE and Embase (2021-2024) was conducted, focusing on studies examining the relationship between sleep deprivation and immune responses. Survey research (N= 555; 404 women, 151 men in the age range 15 - 30; 23 questions in total) were conducted by the author of this study. A review of studies has shown that chronic sleep deprivation leads to immune dysregulation, characterized by increased pro-inflammatory cytokines, impaired T and B cell activity. These changes heighten susceptibility to autoimmune diseases, infections, cardiovascular diseases, and cancers. As many as 47% of our respondents noticed a decrease in immunity during periods of sleep deprivation. Immunity is one of the 4 most frequently mentioned factors by respondents that can be affected by lack of sleep.

Conclusions: Sleep is vital for immune system health. Improving sleep quality and quantity could be an effective strategy for preventing and treating immune-related diseases. Further research is needed to understand the mechanisms underlying these relationships and develop effective interventions.

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Title of presented paper: Innovative Approaches in Immunological Treatment for Crohn's Disease

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Type of the paper: Review paper

Introduction: Crohn's disease (CD) is a persistent inflammatory condition that affects the gastrointestinal tract and falls under the umbrella of inflammatory bowel disease (IBD). It predominantly impacts individuals with a genetic predisposition, while various environmental influences and the gut microbiome also play significant roles in its development. This condition is marked by an exaggerated immune response in the mucosal layer of the intestines, leading to imbalances in cytokine production.

Problem description: My presentation focuses on the mechanisms, pathways, and targeted therapies in Crohn's disease that involve the IL23/IL17 signalling pathway. The aim is to highlight the role of IL23 and IL17 in the pathophysiology of the disease, as well as to discuss novel therapeutic approaches specifically targeting these cytokines. Based on a comprehensive review of recent studies sourced from PubMed, I discuss the potential of IL23 and IL17 inhibitors to reduce inflammation and improve clinical outcomes.

Conclusions: The IL23/IL17 axis represents a promising therapeutic target, offering new avenues for more effective treatment and management of Crohn's disease.

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Title of presented paper: Identifying the culprit. Examining the role of gut dysbiosis in Parkinson's disease

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Type of the paper: Review paper

Introduction: In as early as 2003 a thesis that vulnerable neuronal types may be subject to neuroinvasion by a yet unknown pathogen was suggested. That pathogen was said to have had the ability to pass the mucosal barrier of the gastrointenstinal tract and penetrate into the central nervous system. This was said to have been one of the causes underlying Parkinson's disease (PD).

Problem description: Since then, the role of ileal microbiota has been explored and linked to the pathogenesis of PD. In this study, I summarise how gut dysbiome could serve as source of toxic metabolites, which serve as pro-inflammatory agents and penetrate to the mesencephalon by permeating the blood-brain-barrier. I also identify the specific immunological pathways, focusing on differentiation and activation of Th17 cells, which contribute to the development of PD.

Conclusions: The aim of this work is to emphasise the opportunity of alternative forms of treatment and diagnosis in PD. Basing that conclusion on several case studies revolving around faecal matter transplants being proof that the transfer of a younger, better-balanced, eubiotic gut microbiota can stop the progression of PD and even to some extent reverse the detrimental effects of the disease. I also propose several hypothetical biomarkers linked to gut dysbiosis which can serve as screening even in the prediagnostic and prodromal stages of the disease.

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Title of presented paper: Leaky Gut Syndrome and Food Allergy: A Systematic Review of the Role of Intestinal Barrier Dysfunction in Food Allergy Pathogenesis

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Type of the paper: Review paper

Introduction: Food allergy (FA) is a pathological, excessive immune response triggered by the ingestion of specific protein antigens that are harmless to most of the population. It affects about 10% of adults and 8.5% of children worldwide, and its prevalence is on an upward trend. Increasing evidence suggests that leaky gut syndrome plays a key role in FA pathogenesis, allowing undigested food particles, toxins, and microorganisms to pass into the bloodstream.

Problem description: Current studies indicate increased intestinal permeability, involving both paracellular and transcellular transport, in patients with FAs. Persistent increased intestinal permeability is observed even after several months on an elimination diet, suggesting that it may contribute to the development of allergies, rather than simply being a consequence. The extent of disruption to the intestinal barrier is found to correlate with the severity of symptoms and frequency of anaphylaxis experienced by individuals with similar levels of IgE.
The cytokines IL-9 and IL-33, which are produced during intestinal barrier damage, appear to play a specific role in the pathogenesis of FAs.

Conclusions: Intestinal barrier dysfunction is directly linked to the pathogenesis of FAs. Therapies targeting intestinal barrier repair and modulation of the immune response may be a promising strategy for treating these conditions. However, further research is needed for an accurate understanding of the subject.

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Title of presented paper: The Role of BCAA and Amino Acids in Early Detection of Obesity-Related Complications: Insights from Metabolomics

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Type of the paper: Review paper

Introduction: Obesity, a growing global health issue, is associated with numerous compllications, including metabolic and cardiovascular diseases. Metabolomics, the new field of science which studies the metabolic prosesses, holds the promise of identifying early biomarkers for these obesity-related conditions. Recent studies have focused on the role of adipokines, amino acids (AA) and branched-chain amino acids (BCAA), as these metabolites may represent early, sensitive indicators of the risk of obesity-related complications.

Problem description: Numerous studies indicate that BCAAs, particularly leucine, isoleucine, and valine, have strong correlations with type 2 diabetes (T2DM) and metabolic-associated fatty liver disease (MAFLD). However, the effectiveness of these biomarkers may vary depending on factors such as gender, age, and ethnicity. There is also a dearth of studies examining the impact of these biomarkers in children and adolescents, who are experiencing an increasing number of obesity-related health problems.

Conclusions: For metabolomics to be effectively integrated into routine diagnostic procedures, it is essential to establish standardized test panels that include BCAA, AA, and traditional disease markers. Expanding testing to younger groups may lead to early diagnostic strategies, potentially preventing serious obesity-related complications such as liver fibrosis.

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Title of presented paper: The impact of physical activity on the immune system - current scientific research

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Type of the paper: Poster – review paper

Introduction: The relationship between physical activity and the proper functioning of the immune system is confirmed by many studies. During physical exercise, the number of cells responsible for immunity increases. During training, the concentration of IgG and IgM proteins in the blood increases, which constitute the humoral response of the immune system. During physical exercise, the body temperature increases, which also supports the immune system. Physical activity generates the release of cortisol and catecholamines, which leads to an increase in the number of some cells of the immune system and changes in the humoral system.

Problem description: Current studies show that the effect of physical exercise on the mechanisms of the immune response is different and depends on whether it is intense and short-term exercise, or moderate and regular. Short-term, high-intensity physical exercise leads to a significant but unstable increase in the number of neutrophil granulocytes. Within a few hours after physical exercises, the number of neutrophils increases again. The rate of their growth depends on the duration and intensity of physical exercise. It has been observed that during intense physical exercise, there is an increase in pro-inflammatory monocytes compared to monocytes occurring in resting conditions.

Conclusions: Moderate physical exercise undertaken regularly has a stimulating effect on the immune system. However, studies have noted that repeated very intensively, it can cause increased susceptibility to infections.

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Title of presented paper: The relationship between stress and the immune system based on current scientific research

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Type of the paper: Poster – review paper

Introduction: Stress is an excessive response of the body to stress. The relationship between the work of the nervous system and the immune system is known in science.

Problem description: The main system regulating this cooperation is the hypothalamic-pituitary-adrenal cortex (HPA) axis. The HPA axis is activated by stress and is responsible for the long-term response to a stress factor. Stimulation of the hypothalamus leads to the release of acetylcholine (ACTH) by the anterior pituitary gland, which stimulates the adrenal cortex to secrete cortisol - a hormone that increases blood sugar levels and metabolism. This allows for maintaining long-term activity, but at the cost of reduced activity of the immune system. Activation of the sympathetic-adrenal system (SAM) during stress leads to increased secretion of catecholamines, mainly adrenaline. High levels of adrenaline can lead to mental disorders such as anxiety, depression or insomnia, and can also weaken the immune system (chronic elevated adrenaline levels). The impact of stress on immune processes is related to the duration, type and intensity of stress. Stress can inhibit or stimulate the immune response.

Conclusions: The relationship between the central nervous system and the immune system is realized by means of two axes: the hypothalamus-pituitary-adrenal (HPA) and the sympathetic-adrenal system SAM, and the current understanding of the mechanisms of signal transmission within these systems allows for neutralization of the effects of stress on the immune system.

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Title of presented paper: Astaxanthin as a modulator of the immune response against cancer: mechanisms and therapeutic potential

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Type of the paper: Poster – review paper

Introduction: The intestinal flora plays a key role in the development of tumors and the regulation of the immune system. It has a significant impact on the body's anti-tumor immune response and it has become a topic of research in recent years to augment the effect of tumor therapy by regulating the intestinal flora. Astaxanthin (ATX) is a naturally occurring nutrient found in certain marine organisms that has strong antioxidant capacity, anti-cancer and immunomodulatory effects.

Problem description: The review paper was prepared through a literature review, by analyzing research and review articles from the Pubmed and ScienceDirect databases published over the last 5 years. The results of clinical researches and preliminary clinical trials indicate that Astaxanthin has been shown to have several positive effects on gut microbiota for example effectively prevent intestinal mucosa from these damage, including reduced levels of oxidative stress, increased IgA secretion. These modulation of gut microbiota plays a crucial role in the mechanism by which astaxanthin impacts the body's immune response against tumors.

Conclusions: Astaxanthin shows promise as a natural compound with anti-cancer effects through its antioxidant, anti-inflammatory, and immune-modulating properties. Astaxanthin holds potential as an adjuvant in cancer therapy by enhancing immune response, reducing side effects, and potentially increasing the effectiveness of standard treatments.

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Title of presented paper: The role of the immune system in the pathogenesis of atherosclerosis

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Type of the paper: Poster – review paper

Introduction: Atherosclerosis is a chronic vascular disease characterized by the accumulation of atherosclerotic plaques in the arterial walls, leading to their narrowing and loss of elasticity. The pathogenesis of atherosclerosis is a complex process in which not only dyslipidemia but also the immune system and chronic inflammation play key roles. Macrophages, T lymphocytes, and dendritic cells play a crucial role in the formation and progression of atherosclerotic plaques, while pro-inflammatory cytokines such as interleukin-1β (IL-1β), interleukin-6 (IL-6), and tumor necrosis factor (TNF-α) amplify the inflammatory response. This could lead to not only atherosclerosis-based cardiac diseases but also link to cancer development. Currently, research is being conducted on new therapies aimed at modulating the inflammatory response, which could open new avenues for the treatment of atherosclerosis.

Problem description: This presentation summarizes the findings of the latest studies published in scientific articles about atherosclerosis from PubMed and Google Schoolar.

Conclusions: Research into new therapies targeting inflammatory responses in atherosclerosis such as IL-1β inhibitors, is opening up new possibilities for treating and preventing cardiovascular and cancer diseases. Effective control of chronic inflammation could significantly reduce the number of heart attacks and strokes, marking a new direction in therapeutic strategies.

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Title of presented paper: IL-6 Signaling: A Key to Enhancing Cancer Immunotherapy

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Type of the paper: Poster – review paper

Introduction: Chronic inflammation has been recognized as a canonical cancer hallmark. It is orchestrated by cytokines, which are master regulators of the tumor microenvironment (TME) as they represent the main communication bridge between cancer cells, the tumor stroma, and the immune system.

Problem description: Cytokines from the IL- 6 family, including IL-6, oncostatin M, leukemia inhibitory factor, and others, have been shown to promote tumor growth by modulating the TME, making them promising therapeutic targets. Immune checkpoint blockade (ICB) immunotherapies have transformed the outcomes for some cancers, such as melanoma, lung, and renal cancers, though they face challenges and limited efficacy in other solid tumors. Recent studies suggest that chronic inflammation and IL-6 signaling contribute to resistance against immunotherapy. This review summarizes preclinical and clinical data on the role of IL-6-related cytokines in regulating the immune TME and response to ICB, along with the potential benefits of combining ICB with therapies targeting IL-6 cytokines.

Conclusions: In conclusion, the interactions between chronic inflammation, IL-6 cytokines, and the immune TME are crucial in cancer progression and treatment resistance. Exploring these relationships may lead to more effective strategies, particularly through the combination of ICB and targeted therapies against IL-6 cytokines, ultimately improving cancer treatment outcomes.

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Title of presented paper: Immunological Perspectives on Emerging Treatments for Juvenile Idiopathic Arthritis: A literature review

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Type of the paper: Poster – review paper

Introduction: Juvenile idiopathic arthritis is a disease of unknown aetiology that affects joints, resulting in decreased mobility, pain, and inflammation. Since the origin is unknown, treatment options are highly limited. In their quest to identify the most promising targets, the researchers have come across drugs classified under other circumstances or not registered under any other therapeutic category.

Problem description: This review aims to provide prospective future treatments for juvenile idiopathic arthritis and highlight the most promising targets that may help researchers in the future. In order to find clinical trials, meta-analyses, and randomized controlled trials from the previous five years, we have examined the literature from the PubMed database. The most scientific articles were found using the keywords we decided upon, giving us optimism for our article's future development.

Conclusions: When it comes to therapy, an illness with an unclear etiology can provide significant challenges. Years of study can frequently provide scant results. For this reason, it is imperative that research be done. Therapies such as surgical treatment, biological treatments and physiotherapy are highly promising to be registered as treatment for juvenile idiopathic arthritis. Nevertheless, it's crucial to continue studies and develop new possibilities of treatment.

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Title of presented paper: Connections between polycystic ovary syndrome and Hashimoto Thyroiditis

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Type of the paper: Poster – review paper

Introduction: Polycystic ovarian syndrome is the most common endocrinopathy affecting women, associated with menstrual disorders and infertility in women, while Hashimoto's disease is the most common cause of thyroid insufficiency associated with thyroxine and triiodothyronine deficiency.

Problem description: In recent years, links have been observed between polycystic ovarian syndrome (PCOS) and Hashimoto's disease. In patients with PCOS, the incidence of Hashimoto thyroiditis is higher than in women without this endocrinopathy. The co-occurrence of these two disorders may result in more serious metabolic complications such as insulin resistance, impaired glucose tolerance, weight gain and infertility than either. A strong association between anti-thyroid antibodies and PCOS e.g. anti-TPO and anti-thyroglobulin antibodies has been demonstrated. Inflammatory processes in these diseases are exacerbated by chronic stress. The inflammatory cascade mechanisms are activated: TNF-α, IFNγ and Il-6.

Conclusions: Chronic stress leads to excessive generation of free oxygen radicals, and consequently to oxidative stress, which leads to the synthesis and release of immune and inflammatory molecules. A significant genetic predisposition to the co-occurrence of PCOS and Hashimoto's disease has been identified. These are polymorphisms in FBN3 – a gene associated with TGF-β activity, the level of Treg cells; CYP1B1, a gene involved in E2 metabolism; and GNRHR.

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Title of presented paper: Scedosporium apiospermum – identification of a rare etiological factor of otitis externa in immunocompromised individuals

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Type of the paper: Poster – review paper

Introduction: Scedosporium apiospermum is a common mold in temperate climates. It causes opportunistic infections most often involving the skin, soft tissue, respiratory tract, and less frequently otitis externa. Due to the fact that this fungus is a difficult-to-detect etiological factor and due to its natural resistance to many antifungal drugs, infections caused by it still pose a major clinical challenge.

Problem description: People most at risk of otitis externa caused by Scedosporium apiospermum include immunocompromised patients. Symptoms of this infection, such as severe earache and headache, can persist for years. Due to the possibility of rapid spread of infection through the vascular route and the development of complications in the form of inflammation of the skull base, this infection is characterized by a high mortality rate. Case reports from recent years indicate that the correct diagnosis was most often made only after antibiotic therapy had failed, when the symptoms were severe and the first complications of the disease appeared. The cause of this is considered to be identical symptoms and results of imaging tests in patients with both bacterial and fungal infections, as well as difficulty in collecting the right material for culture.

Conclusions: Otitis externa caused by Scedosporium apiospermum poses a significant risk to immunosuppressed patients.

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Title of presented paper: Small Interfering RNA Therapeutic in Hypertension

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Type of the paper: Poster – review paper

Introduction: Nowadays, the problem of hypertension is becoming more and more widespread, despite the access to a wide range of antihypertensive drugs it is estimated that up to 80% of patients do not reach the target recommended by the guidelines. Insufficient treatment effect as well as significant fluctuations in blood pressure values are the main risk factors for cardiovascular mortality and progression of kidney disease.

Problem description: Zilebesiran is an investigational therapeutic agent using RNA interference, which involves the degradation or inhibition of the expression of a target transcript by exogenous introduction or endogenous synthesis of dsRNA. The use of this technology allowed the production of a small interfering RNA (siRNA) with low immunogenicity associated with N-galactosidase (Gal-NAc). GalNAc siRNAs bind to a receptor (ASGPR) that is expressed exclusively in the liver at high abundance, so that it quickly transports siRNAs to endosomes. These serve as a depot for messenger RNA (mRNA) knockdown, to which siRNAs can recycle. Knockdown leads to reduced AGT generation and, as a consequence, renin-mediated angiotensin synthesis.

Conclusions: Previous studies have shown that treatment with Zilebesiran was associated with a clinically meaningful reduction in SBP compared to placebo. These data support further research into Zilebesran as a therapeutic strategy in patients with hypertension.