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SESSION I. Original papers

Immunoceutics and their potential

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Introduction: Increasing incidences of civilization diseases and cancer have led scientists to focus their research on modulating the immune system using natural compounds. A number of anticancer, anti-inflammatory, and antioxidant activities of immunoceuticals may result in increasing the immune response.

Problem description: Due to the accumulation of immune system cells in the gastrointestinal tract, studies have been conducted on the immunomodulatory effects of diet. Among the substances affecting the immune system, available in food products such as: fish, cereals, dairy products, fats, oils and milk substitutes for infants, the following positive results were obtained in the research: abscisic acid, conjugated linoleic acid, fatty acids, some vitamins, flavonoids, zinc, selenium, curcumin and resveratrol as well as building components from selected mushrooms.

Conclusions: There was a correlation between balanced nutrition, rich in dairy and grain products, as well as oils and fish, and immune function modulation. Research on immunoceuticals can be conducted using the data obtained, which may enhance their effectiveness in treating and preventing illnesses such as cancer and autoimmune diseases.

Lysozyme concentration and activity in healthy English bulldog dogs

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Introduction: Lysozyme (LZM) is an important element of innate immunity in humans, livestock and companion animals, which can be used to assess their health, especially in conditionally infectious and infectious diseases.

Aim of the study: Due to the lack of data in the literature on LZM in dogs of the English bulldog breed, studies were undertaken in dogs of this breed. These animals, due to the specific structure of the upper respiratory tract, have frequent health problems (infections) related to this part of the respiratory system.

Material and methods: The study was conducted using serum from 30 healthy English Bulldog dogs, which were taken from 14 female and 16 male dogs, aged 2 to 16 years, weighing 18 to 38 kg, and which were obtained from individual owners' dogs. The concentration of LZM in the tested serum was performed using the plate method by Hankiewicz *et al*., and the LZM index of activity according to Szmigielski. A standard curve prepared based on chicken egg LZM standard values with concentrations ranging from 32 mg/l to 0.125 mg/l was used to read LZM concentration, while the number of peripheral blood PMN cells, determined by a routine method, was used to evaluate LZM activity.

Results: The obtained values were averaged, thus in females the average value of LZM concentration was 0.58 mg/l, and the average LZM activity was 0.0077. In males the analogous values of the determined parameters were 0.75 mg/l and 0.0101.

Conclusions: The obtained results on the concentration and activity of LZM in the blood serum may constitute preliminary reference values for dogs of this breed.

Can the course of sepsis be predicted? Summary of knowledge about prognostic markers of sepsis

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Introduction: Sepsis, which leads to multiple organ failure, remains one of the leading causes of morbidity. The aim of the study is to summarize the knowledge about markers that potentially predict its course and prognosis, based on the analysis of seven articles.

Description of the problem: Compared to healthy people, the percentage of Vδ1T cells in the blood of sepsis patients was lower, an increased number of GITR, CTLA-4 and TIM-3 was observed on their surface, and the examination of the GSTO1, C1QA, RETN and GRN genes

showed their higher expression. The prognosis of patients with sepsis worsened with increases in lactic acid, cTnT and 5-HT levels.

Patients with delirium had higher postmortem levels of CRP, IL-6, TNF-α, neutrophils and CD14loCD16+ monocytes, and a lower C3 component of complement than in convalescents. The severe course was correlated with an increase in TNFSF14, OSM, IL-6, HGF, and a decrease in TRANCE, DNER and SCF. With the coexistence of COVID-19, high levels of anti-RBD IgA and low levels of IL-6, IL-10, granulisin and sFAS were found. Inhibition of M1 macrophage polarization and increased M2 polarization improved survival, ameliorated liver ischemia, and decreased serum levels of proinflammatory cytokines.

Conclusions: Considering the importance of this clinical problem, further research may contribute to the improvement of patient care and the development of diagnostic and therapeutic options, taking into account not only the actual, but also the foreseen condition of the patient.

The role of glioblastoma stem cells in immunotherapy resistance

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Introduction: Glioblastoma multiforme (GBM) is a neoplasm characterized by high recurrence rate and resistance to immunotherapy. GBM accounts for 14.3% of all primary central nervous system tumors. Five-year survival rate is only 6.8%.

Description of the problem: It is now widely accepted that the tumor's self-renewal ability is due to the presence of glioma stem cells (GSC). GSC regulates ongoing inflammatory processes among the tumor microenvironment (TME). TME contains a large population of regulatory T cells (Treg) which inhibit tumor infiltration by CD8+ cells and promote tumor escape from immune surveillance. GSC appears to be crucial in maintaining immunosuppressive TEM in GBM tumors. GSC treated with cyclin dependent kinase 9 inhibitor (CDK9i) demonstrated decreased expression of stemness markers. There was a decrease in the number of Treg cells, while the number of anti-cancer CD8+ cells increased. Most importantly, CDK9 inhibition improved response to immunotherapy *in vivo*. The combination of a CDK9i and an anti-PD-1 drug resulted in greater tumor regression compared to the groups that were treated with a single drug. Furthermore, the therapy resulted in the development of memory response against tumors.

Conclusions: Considering those results it seems justified to choose GSC as a therapeutic target. The development of the memory response may be of great importance due to the tendency of GBM to relapse. Improving the effectiveness of immunotherapy can significantly increase the survival rate of GBM patients.

Assessment of the influence of the Par2 receptor on the composition of stem and progenitor cells in a chronic model of neutrophilic asthma induced by house dust mite extract

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Introduction: Uncontrolled or poorly controlled chronic inflammation underlying asthma may cause irreversible changes in the lower respiratory tract known as remodeling. Especially in case of neutrophilic asthma insensitive to available treatment options.

Aim of the study: Determine the influence of the Par2 receptor on the number of stem and progenitor cells in an experimental neutrophilic asthma model.

Material and methods: The chronic model of neutrophilic asthma was induced by intranasal administration of house dust mite extract to C57BL6 and PAR2$^{-/-}$ mice for 12 weeks. The left lower lobes were dissociated and stained with panel of monoclonal antibodies. The numbers of lung resident cells were assessed based on classical gating strategy and t-SNE algorithm.

Results: The number of lrMSC and lrEPCs decreased in C57BL6 while PAR2$^{-/-}$ mice showed no decrease in mentioned populations. The number of lrFibro in C57BL6 mice was unchanged. In contrast, PAR2$^{-/-}$ mice showed a lower number of lrFibro in control group and after induction of inflammation. We observed a significant increase in the number of lrECs in the PAR2$^{-/-}$ mice with no change in their number in the C57BL6.

Conclusions: The Par2 receptor plays an important role in lung remodeling in the course of house dust mite induced neutrophilic asthma by influencing the number of lrFibro. More research is needed to better understand the role of the Par2 receptor in the course of neutrophilic inflammation and lung remodeling.

SESSION II. English language session

Synthesis of an aliphatic linker modified PD-1/PD-L1 inhibitor for conjugation with macromolecules

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Introduction: Overexpression of the PD-1 protein on T lymphocytes is a sign of their "exhaustion" – they then lose their effector functions and the ability to proliferate. This condition can be encountered during chronic diseases and the presence of malignant neoplasms – cancer cells, using the PD-L1 ligand, can overexpress the PD-1 protein in T lymphocytes and cause its "exhaustion", which leads to the escape of the tumor from immune surveillance.

Aim of the study: To synthesize the compound BMS-1166 and combine it with 3 aliphatic linkers. Then, the modified inhibitor was sent to the University of Gdańsk in order to combine it with chitosan and check whether the modified ELISA method – with a cheaper "counterpart" of the primary antibody – works.

Material and methods: In the developmental stage, there are many methods for diagnosing neoplasms in terms of PD-L1 protein expression. One of them is the ELISA method, which uses a number of specific and expensive antibody solutions. In the case of this method, the biggest problem on the way to its implementation into the healthcare system is the price.

Results: Work is currently underway to discover small molecule inhibitors that block these proteins. A compound worth mentioning is BMS-1166 – one of the milestones on the way to the synthesis of a potential drug.

Conclusions: Of the planned 3 final compounds, one was obtained, which in studies conducted by other people was found to have a similar affinity for the PD-L1 protein as the compound BMS-1166.

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Ayurveda and COVID-19: Where psychoneuroimmunology and the meaning response meet

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Introduction: The COVID-19 pandemic led to immense effects on the psychological conditions of the population in the world. The world population had more than over 2,400,000 cases and a lot of them suffered from mental health problems. The influence of the psychosocial factors on the immune system can lead to more susceptibility to upper respiratory infections. Accordingly there is a connection between the psychosocial factors and the immune system, so that the field of psychoneuroimmunology needs its attention on understanding for the prevention of infections.

Description of the problem: Because of stress, anxiety and depression during the pandemic, a lot of people have a compromised immune system. So that the Indian government started to introduce a treatment with the use of the ayurvedic, which is a traditional Indian medicine. The ayurvedic should work as an immune booster. There is a psychoneuroimmunologic effect which is based on the function between neuron, endocrine and immune system. For 5 of the used interventions were psychoneuroimmune effects as reducing stress, anxiety and depression. On the one hand, there are findings of cellular mechanisms which can be related to the psychoneuroimmune pathways but we have to mention that there is no direct evidence.

Conclusions: Overall the traditional ayurvedic brings positive aspects on the immune system by decreasing stress, anxiety and depression. In addition the ayurvedic can give an immune boost to defend against infections.

Photoimmunotherapy (PIT)

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Introduction: Photoimmunotherapy also known as PIT is a special treatment that combines both, photodynamic therapy, and immunotherapy.

Problem: This combination of treatment allows to target profound cancer and successfully destroy them, which would not be possible just with photodynamic therapy. This treatment is done with the help of antibodies. These antibodies are getting attached to the photosensitizer and form a photo-immunoconjugate, which can be injected into the body and reaches the targeting tumor. After the attachment of the photo-immunoconjugate to the cancer, the near-infrared light activates the photosensitizer and causes immediately destruction of the tumor cell.

Conclusions: Photoimmunotherapy can be used for eliminating deep tumors, with the help of antibodies and near-infrared light.

Inflammatory biomarkers in mental illness: prospective use of inflammatory signalling molecules as markers of depression and schizophrenia

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Introduction: Currently, the lack of objective and specific testing methods limits potentially relevant investigations into the aetiology and pathophysiology of neuropsychiatric diseases, as well as hampers the development of better therapeutic approaches. A growing body of evidence uncovers the relationship between inflammation and neuropsychiatric dysfunction. Particularly, certain inflammatory signalling molecules drew the attention of researchers, providing an explanation of the molecular basis of some mental disorders.

Specification: Herein, we introduce the newly emerging idea and use of biomarkers. Roles of some of these inflammatory mediators, mainly TNF-α, IL-6, and IL-1β, have been delineated in the pathogenesis and course of depression and schizophrenia. Although some proposed effects of these cytokines are described, their exact molecular and cellular action mechanisms remain largely unclear.

Conclusions: Inflammatory biomarkers pose great possible utility in the precise diagnosis and management of mental illnesses. The potential use of neuroimmune biomarkers combined with traditional assessment methods based on symptoms promises a better evaluation of disease risk, presence, state, and response to treatment. Moreover, investigation into their nature can prompt the development of better-targeted therapeutics. However, thorough studies are necessary to elucidate the precise functions of these mediators in the pathophysiology of neuropsychiatric disorders.

From development to characterization – Ketoprofen nanoemulsions for melanoma treatment

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Introduction: Among skin cancers, melanoma is the most lethal and many patients are not responsive or develop secondary resistance to treatments. Ketoprofen (KET) is a non-steroidal anti-inflammatory drug that has shown anti-proliferative activity in melanoma cell lines.

Description of the problem: Since KET is practically insoluble, our aim is to incorporate it in an oil-in-water (O/W) nanoemulsion for melanoma topical therapy.

Formulations were prepared by spontaneous emulsification. The oil phase was constituted by Lauroglycol™ 90, Transcutol® HP and Tween® 80, while the aqueous phase was water. After development, the nanoemulsions were characterised regarding droplet size, polydispersity index (PDI), KET solubility, droplet size, pH, zeta potential, osmolality and accelerated stability.

Overall, lower PDI values were obtained using increased quantities of Tween® 80 and Transcutol® HP. Comparing to water, we managed to increase KET solubility up to 930 times, being able to have 20 mg/ml of this molecule in one of the formulations.

Conclusions: Further characterisation of they nanosystems suggests that the formulations are compatible with topical application and that stability is not compromised with increased drug loaded concentration.

We were able to develop O/W nanoemulsions with high KET strength, which could lead to high skin bioavailability upon topical administration. Viscosity, long term real-time stability, *in vitro* drug release, *ex vivo* drug

permeation, and *in vitro* cytotoxicity assays will be further assessed.

Free enthalpy of the monocomponent micelle formation between cationic and anionic surfactants in water solution containing block copolymers

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Introduction: Micelles have a role in development of pharmaceutical formulations as transport systems. The possibility of surfactant-copolymer associates forming at concentrations lower than the critical micelle concentration reduces potential side effects and increases applicability.

Aim of the study: Determination of parameters in the micellar system of the cationic surfactant (1-tetradecyl) trimethyl ammonium bromide (TTABr) and anionic surfactant sodium tetradecyl sulphate (STS) in the presence of the copolymer.

Material and methods: The critical micelle concentrations of the surfactants, as well as the interaction parameters in the copolymer-surfactant system, were determined by spectrofluorimetry, conductometric measurements and tensiometry.

Results: In the presence of copolymers paralel processes of miccelar formation are replaced with association process between surfactants and the copolymer which creates a new equilibrium. Because CAC is at lower value than CMC obtained in tensiometry for STS, we can conclude that surfactant association to the copolymer is thermodynamically favourable compared to entropy-driven saturation of phase interface between water solution and air with surfactant molecules, while the opposite relation was observed with TTABr.

Conclusions: According to the calculated Gibbs free energy of micellization, surfactant water solutions containing poloxamer P188 form micelles that are more thermodynamically stable than solutions that do not contain the copolymer.

SESSION III. Case reports

Guillain-Barré syndrome at a patient after infection with Coxackievirus

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Introduction: The case refers to a 33-year-old patient with increasing tetraparesis after infection with the Coxsackievirus. The CSF examination confirmed the presence of protein-cell cleavage, which allowed for the diagnosis of inflammatory polyradiculoneuropathy. During the treatment patient's condition got worse and new neurological symptoms were added. Nevertheless, the immunoglobulin therapy was continued, which allowed for stabilization and subsequent improvement of the clinical condition.

Guillain-Barré syndrome (GBS) is classified as a rare neuromuscular disease of unknown etiology. In acute phase mortality of this syndrome ranges from 3.5% to 12%. The yearly incidence is 1-2/100,000. So far, GBS has not been described in the Polish literature after a Coxsackie infection, while only a few works have been published in the world.

Case report: After one week of symptoms like fever, cough, sore throat, tingling in legs and arms, high blood pressure, contact with a daughter suffering from HFMD.

Neurological examination revealed peripheral paralysis of VII nerve on the right side, flaccid tetraparesis with abolition of reflexes in the lower limbs and weakness in the upper limbs. After extensive diagnostics, the diagnosis of GBS was made. Immunoglobulins were included in the treatment.

Conclusions: The case described in the study proves that the early diagnosis and subsequent implementation of appropriate treatment reduces the risk of death and disability in this progressive disease.

Relapsing polychondritis as a diagnostic and therapeutic problem

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Introduction: Recurrent cartilage inflammation, RP is a rare autoimmune disease. The clinical picture consists of recurrent episodes of inflammation of cartilage tissue and proteoglycan-rich tissue. The exact mechanism of RP has not yet been fully elucidated and an immunological-inflammatory background is suspected.

Case presentation: 51-year-old patient treated for inflammatory symptoms with Dexaven followed by Naproskenem and Methypred, but without the intended therapeutic effect. In the following years progressive inflammation of the cartilage of the ear, nose and epiduritis involving the wrists.

In laboratory tests anemia and high CRP. Infectious diseases and immunodeficiencies were diagnosed. The temporarily switched-on MTX was converted to mycophenolic acid together with prednisone due to its adverse reactions, resulting in clinical improvement.

Conclusions: Patient met 4 of the 6 McAdam criteria – RP diagnosis. The initial diagnostic difficulties of RP related to the absence of typical symptoms of cartilage inflammation, which delayed the initiation of early therapy. Upper respiratory tract infections with fever recurred in the patient prior to the first relapse. There are studies in which infections are trigger-point recurrence. NSAIDs, GKS, MTX helped to relieve symptoms but did not slow the progression of the disease. Mycophenyl acid improved the clinical condition of the patient. Recent studies with TNF-α-antagonists show that infliximab affects the partial or complete remission of RP.

Paroxysmal dysarthria and ataxia as the first manifestation of multiple sclerosis? – a case report

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Introduction: Paroxysmal dysarthria and ataxia syndrome is a rare syndrome resulting from midbrain involvement. Dozens of cases of similar symptoms have been described, and most involved patients diagnosed with multiple sclerosis (MS). We present the case of a patient with PDA on the basis of demyelinating lesions, who was diagnosed with a clinically isolated syndrome.

Case description: A previously healthy 49-year-old patient suddenly developed recurrent episodes of slurred speech and left hand incapacitation (with prolapse of objects and impairment of manual activities) several times

a day. Neurological examinations between episodes showed no abnormalities. MRI of the brain showed 10 demyelinating foci in the cortical, periventricular and brainstem locations. Cerebrospinal fluid showed the presence of oligoclonal striations not found in the patient's serum. Treatment with steroids and levetiracetam was implemented. Complete resolution of the episodes was achieved within 12 weeks. An MRI scan after 6 months showed no progression of the lesions.

Conclusions: Non-epileptic motor and/or sensory paroxysmal symptoms with sudden onset, short duration and frequent recurrences may herald MS. Paroxysmal dysarthria and ataxia syndrome, described in only twenty-odd cases, is among the rarest of these. In addition to treatment of the disease causing the symptoms, antiepileptic drugs may be effective in these cases.

Uveitis as an extra-articular manifestation of rheumatoid diseases in two siblings

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Introduction: Non-infectious uveitis is an autoimmune disease. It may accompany systemic joint diseases as an extra-articular complication of these disorders.

Case description: A 12-year-old girl was admitted to the Children's Ophthalmology Department in May 2019 due to visual acuity impairment where uveitis in both eyes was diagnosed. Rheumatological diagnostics for juvenile idiopathic arthritis showed the presence of antibodies: antinuclear (titer of 1 : 640), anti-retinal and anti-*T. gondii*, no HLA-B27 antigen was detected. Due to the lack of improvement in the clinical condition, biological treatment was implemented. In the course of the disease following eye complications were developed: left eye retinal detachment requiring laser therapy, complicated cataracts and secondary glaucoma of both eyes which required surgical treatment.

The girl's 15-year-old brother was also admitted to the Children's Ophthalmology Department on October 19, 2020 due to the uveitis in the right eye. The patient complained of visual acuity impairment. The tests revealed the presence of the HLA-B27 antigen. Undifferentiated arthritis was diagnosed and methotrexate was administered. Six months later biological treatment with adalimumab was introduced. Glaucoma of the right eye was a complication that required surgical treatment.

Conclusions: Complications of chronic uveitis lead to structural damage that may be irreversible. Interdisciplinary approach and appropriate treatment make it possible to maintain good quality of vision.

Schnitzler syndrome – a rare cause of chronic urticaria

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Introduction: Chronic spontaneous urticaria (CSU) manifests as pruritic wheals on the skin, which may be accompanied by angioedema. Schnitzler syndrome (chronic urticaria with monoclonal gammapathy) should be taken into consideration in differential diagnosis. The pathogenesis of the disease remains unclear and involves excessive secretion of IL-1, IL-6 and IL-17. 150 cases of this medical condition have been described, mainly in Europe.

Case report: A 64-year-old man was admitted to the department urgently with worsening symptoms of chronic urticaria for more than a year. He had previously been treated with quadruple-dose of antihistamines, montelukast and inserts of systemic steroid therapy. Each reduction in steroid therapy was associated with a recurrence of complaints, impairing daily functioning. Laboratory tests revealed: leucocytosis with neutrophilia, CRP 15 mg/l, IL-6 30 pg/ml, IgM 3,08 g/l and a suggestion of monoclonal protein in the proteinogram, confirmed by immunofixation. The diagnosis was extended with a skin biopsy – neutrophilic urticarial vasculitis was found. The patient was referred urgently to the clinical immunology clinic for verification and qualification for biological treatment.

Conclusions: Each case of chronic urticaria, especially poorly responsive to standard treatment, requires a thorough differential diagnosis, so that rare conditions are not overlooked. Their identification provides an opportunity to implement an effective therapeutic management.

Treatment of severe rheumatoid arthritis and primary biliary cirrhosis – a case report

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Introduction: Rheumatoid arthritis (RA) is a chronic, inflammatory disease that leads to synovitis and joint destruction. Primary biliary cirrhosis (PBC) occurs in 1.8-5.6% of RA patients. Most drugs for RA are hepatotoxic and may worsen the course of PBC.

Case report: A 65-year-old patient with a history of RA from 44 years of age (2001). Treated from the beginning with synthetic disease-modifying drugs (DMARDs): chloroquine, methotrexate, sulfasalazine, leflunomide. With time, she qualified for biological treatment with a TNF-α blocker (2009). Adalimumab was given for a year – stopped due to no improvement. Rituximab was prescribed – no disease remission after the first cycle. In 2010 PBC was diagnosed. Methotrexate was stopped and cyclosporine was ordered. The patient was constantly taking chloroquine and glucocorticoids (GCs). In further observation there was no remission of the disease, the patient often increased the doses of GCs and NSAIDs. In imaging studies – joint destruction and active synovitis. In October 2020 etanercept was used, initially with improvement. After a year of treatment, the drug was discontinued due to the lack of an adequate clinical response. In January 2022 the first dose of tocilizumab was given. After six months, low disease activity was achieved and liver enzymes were normal.

Conclusions: The coexistence of RA and PBC requires an individual approach. The use of DMARDs should take account of the risk of hepatotoxicity. Biological drugs seem to be a safe alternative in RA and PBC patients.

A story of an insidious disease with a happy ending – a description of spontaneous thrombocytopenic purpura

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Introduction: Idiopathic thrombocytopenic purpura (immune thrombocytopenic purpura or immune thrombocytopenia) is one of the most common causes of thrombocytopenia. The substrate of the disease is often unknown, and its recurrent nature prompts periodic monitoring of platelet counts.

Case description: A 26-year-old man with symptoms of hemorrhagic diathesis was hospitalized at the Hematology and Bone Marrow Transplant Clinic in Kielce with a diagnosis of immune thrombocytopenia. The patient reports a history of hypertension. During his stay at the unit, he received steroid pulses (Avamys) and intravenous immunoglobulin (Rituximab). Due to the unsatisfactory results of treatment, the patient was qualified for treatment with Eltrombopag (Revolade). Given the refractory nature of thrombocytopenia and the patient's life-threatening nosebleeds, mycophenolate mofetil was added to the treatment. During hospitalization, a trepanobiopsy was performed, which didn't reveal any significant marrow pathology. After 2 months, treatment with Revolad was discontinued, later, as platelet counts stabilized, the doses of mycophenolate were reduced until the end of the treatment. The patient is currently in good general condition, with no features of fresh hemorrhagic diathesis.

Conclusions: The correct diagnosis of immune thrombocytopenia, as well as the vigilance of doctors and the correction of treatment, saved the patient from a life-threatening condition resulting from hemorrhage.

Recurrent anaphylactic reactions as a symptom of a rare disease

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Introduction: Anaphylaxis is a severe, life-threatening, generalized or systemic hypersensitivity reaction. The most common causes of it in adults are drugs, food, and Hymenoptera venom.

Case report: A 61-year-old patient was admitted to the Allergology Department due to recurring allergic systemic reactions for 10 years, with suspected food background. The physical examination revealed episodes of anaphylaxis without medical intervention, during which the predominant weakness was accompanied by reddening of the skin and excessive sweating. The deepening of the interview did not make it possible to clearly indicate the possible initiating factors. Laboratory tests revealed elevated levels of tryptase. The diagnostics was extended to include a skin segment – no abnormal number of mast

cells was found in the histopathological examination. The patient was referred for further haematological diagnostics, and the diagnosis of systemic mastocytosis was confirmed after a bone marrow biopsy was performed. Antihistamine treatment was implemented and the patient was secured with an anti-shock kit.

Conclusions: Recurrent anaphylactic reactions require a careful history and extensive differential diagnosis, including tests for mastocytosis. Due to the nature of this disease, patients must be trained in the emergency management of anaphylactic shock.

Two faces of immunotherapy – severe hepatotoxicity and long-term response – in patient with advanced melanoma

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Introduction: Immunotherapy (IT) has made significant progress in the treatment of various cancers. Despite the efficacy of IT, their mechanisms of action are also associated with immune-related adverse events (IRAEs) including severe courses of IR-hepatitis.

Case description: A 46-year-old man was diagnosed with cutaneous melanoma in 2019. After surgical excision of the lesion and regional lymph nodes, the stage pT4b pN1a cM0 was identified. Adjuvant IT with pembrolizumab was administered. Seven months after its completion, PET/CT scan showed focal lesions in the lungs and pancreas. EUS with pancreatic biopsy was performed and the presence of melanoma metastases confirmed. IT nivolumab + ipilimumab was implemented. After 3 doses, CTC grade G2 hyperthyroidism occurred, requiring pharmacotherapy. After the 4[th] dose, an increase in aminotransferases > 500 U/l (grade G3) was seen. High-dose steroid therapy was introduced, with no improvement after 4 days. Mycophenolate mofetil was used as a second-line treatment with normalization of liver parameters after 4 weeks. IT was definitely terminated. Follow-up imaging studies showed a complete response, sustained for about a year now.

Conclusions: IT is an innovative treatment, but it can cause life-threatening complications. Early diagnosis of adverse events and proper toxicity management is crucial. Even after treatment discontinuation, the patient may benefit in the long term, underscoring the value of IT in the treatment of cancer patients.

Merkel cell carcinoma (MCC) and hairy cell leukemia (HCL) – immunotherapy is also effective in the case of two primary malignancies

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Introduction: Merkel cell carcinoma (MCC) is a rare and aggressive skin cancer. In advanced disease, the prognosis and survival is poor. Avelumab significantly improves treatment outcomes in MCC.

Case report: In May 2021, a 66-year-old man was diagnosed with MCC. One month after the excision of the primary lesion in the skin of the thigh, local recurrence and inguinal lymph node metastases were found. Twelve years earlier the patient was diagnosed with hairy cell leukemia (HCL) and treated twice with 2CDA with long-term remissions. At the time of diagnosis of MCC, another HCL progression was noted. The patient was weakened, he felt severe pain in the recurrence tumor. Pancytopenia, lower limb edema caused by lymph nodes metastases, and thrombosis of the iliac vein have been reported. The performance status (PS) was defined as 3 according to ECOG. After a multidisciplinary consultation, the patient was given 2 cycles of 2CDA, with resolution of pancytopenia and splenomegaly and a slight improvement in PS. Then the radiotherapy of recurrence tumor and lymph nodes was performed and clinical benefit, pain relief and improvement of PS to level 1 were obtained. Treatment with avelumab was then started. After 5 months the patient achieved complete remission of MCC, HCL is in remission. He is continuing avelumab therapy over 10 months.

Conclusions: Multidisciplinary management and the optimal sequence of treatment methods, despite the initially difficult clinical situation, allowed for a significant clinical benefit and a 10-month PFS.

SESSION IV. Review papers

Mesenchymal dendritic cells in the treatment of autoimmune diseases

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Introduction: Differentiation, self-renewal and immunomodulation are all capabilities of mesenchymal stem cells (MSCs). In almost every tissue in the human body, they have been identified. Besides bone marrow, MSCs can also be obtained from fatty tissues, umbilical cord and gums. Their immunomodulatory properties make them particularly useful for treating autoimmune diseases.

Problem description: Multiple studies have demonstrated the effects of MSCs on NK cells, dendritic cells, macrophages, B lymphocytes, and T lymphocytes. As a result, there is an inhibition of activation, proliferation, and differentiation into effector cells. Due to the secretion of various immunological regulators, MSCs have the ability to reduce the inflammatory response, improve tissue repair and prevent infection.

Conclusions: In cell therapy, regenerative medicine, and tissue engineering, mesenchymal stem cells are widely used because of their immunomodulatory properties. They play a key role in regulating immunity and developing therapies for autoimmune diseases such as Sjögren's syndrome, systemic lupus erythematosus, rheumatoid arthritis, multiple sclerosis and nonspecific inflammatory bowel diseases.

Fungi inside neoplastic tumor

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Introduction: Recent studies have shown that neoplastic tumors contain many species of fungi. They vary depending on the type of tumor. Scientists tested 17,000 tissue, blood and plasma samples from patients with 35 types of cancer. The most common microorganisms were found inside cancer cells, cells of the immune system present in tumors.

Description of the problem: The researchers found that the growth of certain species of fungi may be correlated with poorer treatment outcomes. Breast cancer patients with Malassezia globosa tumors died more frequently than patients whose tumors did not contain Malassezia globosa. Moreover, some fungi were more common in breast cancer in elderly or smokers. In addition, it was found that Candida fungi are especially associated with gastrointestinal tumors, and Blastomyces are associated with lung tumors.

Conclusions: Scientists believe that the results will help in the earlier diagnosis of cancer, because the DNA of microorganisms in the blood of people with cancer and healthy people is different.

The impact of SARS-CoV-2 virus on the course of type 1 diabetes

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Introduction: Type 1 diabetes mellitus is an autoimmune disorder with a genetic basis, caused by autoreactive CD4+ and CD8+ T lymphocytes. Its development is also influenced by viral factors which through damage caused directly by the lytic effect of viral replication and the body's inflammatory response in the form of autoreactive T lymphocytes, can lead to damage pancreatic β cells.

Description of the problem: Diabetes is characterized by increased susceptibility to infections and their worse course, which is associated with hyperglycemia. Studies have shown that blood levels of some markers in diabetics with COVID-19 were normalized with optimal glycemic control. SARS-CoV-2 can cause diabetic ketoacidosis and prolong hospital stays, resulting in increased mortality. It is uncertain whether the harmful effects of this pathogen on pancreatic β-cells or the public's limited access to medical care during the pandemic are responsible for the increased incidence of type 1 diabetes. Previous observations suggest that episodes of acute hyperglycemia accompanied by diabetic ketoacidosis associated with SARS-CoV-2 infection, mostly resolved after some time or required treatment with oral hypoglycemic drugs.

Conclusions: Lack of optimal glycemic control along with concomitant cardiac and renal diseases prolong hospitalization, increase the risk of complications and mortality due to COVID-19. Research suggest that SARS-CoV-2 infection may be related to the onset of type 1 diabetes.

CRISPR/Cas gene therapy for the treatment of cancer

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Introduction: Cancer is the leading cause of disease-related deaths, despite rapid advances in diagnosis and treatment. Current cancer treatments include surgery, radiation therapy and the use of chemotherapeutics, which often kill healthy cells and cause toxicity in patients. With the emerging role of immunotherapy in cancer, conventional gene therapy methods, which have been researched for about 30 years, have been used to specifically influence the immune system.

Problem description: Despite the short history of CRISPR technologies, advances in the development of CRISPR systems have brought benefits for therapeutic applications against cancer. CRISPR/Cas systems have proven to be effective in modulating the genome, transcriptome and epigenome of cancer cells or immune cells, making them an indispensable technology for cancer gene therapy and immunotherapy.

Conclusions: The serious side effects of current immunotherapeutics have stimulated further research efforts. The use of gene therapy methods in this area improved the adverse reaction profile of immunotherapy to more acceptable levels and increased the efficacy of treatment. CRISPR/Cas systems offer several advantages over conventional systems, such as simple design and easy operation. Furthermore, CRISPR/Cas systems are currently the most promising and most important area of gene therapy for cancer.

Immunosenescence in shaping human maximum lifespan

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Introduction: Immunosenescence is a process associated with aging, defined as deterioration of the adaptive and innate immune system. The immune system is concerned about immune surveillance of tumors, maintaining balance of inflammation and preventing autoaggression. Inability to complete tasks is a cause of deaths in 65+ population and a weakened response to vaccination, leading to necessity of revaccination.

Description of the problem: Along with medicine development and improvement of quality of life, life expectancy increases, but without visible increase of individual lifespan. The reason for this conjuncture is the existence of factors limiting lifetime: shortening of telomeres, metabolic disorders, oxidative stress, contagium and impaired immune system, as the main limiting factor, without which the potential life expectancy could exceed 120-125 years. The successes in elimination of harmful factors, allowed to more than double the average life expectancy and time of life in health. Similar goal seems to be achievable by preventing immune aging.

Conclusions: Nowadays, it is possible to at least partially modulate the immunosenescence process by food intake control – increasing availability of nutraceuticals, symbiotics, micronutrients, vitamins and administration of growth factors, or inhibitors. A more detailed understanding of immunosenescence will ensure life extension, including disease-free survival.

Anti-PD-1 and anti-PD-L1 antibodies – differences and similarities and their role in immuno-oncology

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Introduction: Immunotherapy with monoclonal antibodies is one of the newest methods currently used in cancer therapies. Monoclonal antibodies can be directed

against specific tumor antigens or against molecules that modulate the immune response, causing it to increase. In addition, monoclonal antibodies can also inhibit tumor growth by blocking factors responsible for growing.

Description of the problem: Cancer cells develop mechanisms capable of impairing the normal functioning of the immune system, thereby weakening the immune response directed against the developing tumor. One of the main pathways leading to the reduce of lymphocyte activity is the PD-1/PD-L1 pathway. Blocking PD-1 or PD-L1 molecules with monoclonal antibodies enables the restoration of normal anti-tumor activity of the immune system.

Conclusions: Research studies on the use of anti-PD-1 and anti-PD-L1 antibody have found use in the treatment of many types of cancer, including melanoma, non-small cell lung cancer, breast cancer, squamous cell carcinoma of the head and neck and bladder cancer.

The usage of thymectomy in myasthenia gravis treatment – pros and cons

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Introduction: Myasthenia gravis is a rare condition, in it's pathogenesis the crucial pathological factors are autoantibodies, which affinity to the cholinergic receptors in the postsynaptic membrane of the neuromuscular synapse is responsible for the symptoms. Besides farmacological treatment (acetylcholinesterase inhibitors, steroid therapy), the procedure of thymectomy is becoming increasingly performed.

Description of the problem: Presence of the autoantibodies result in a characteristic symptom known as muscle tiredness, which is pathologically increased fatigue of the skeletal muscle leading to its general weakness. It leads to the symptom complex, such as poor vision, dysphagia, difficulty in motion and, in extreme cases, respiratory distress. Thymus plays a crucial role in autoantibodies generation and is a common treatment target. The aim of the thymectomy is to inhibit the autoantibodies generation. Frequently it provides a great improvement in the general state of the patient. However, because of complications, scientific scepticism is observed.

Conclusions: Myasthenia gravis is a serious disease, which greatly impairs patient's quality of life and lifespan and without proper treatment it leads to early death. Thymectomy enables to extend the lifespan and increase the quality of patient's life. It is crucial to remember about the serious complications of this procedure and carry out investigations on long-term consequences of this practice.

CAR-NK technology in the treatment of glioblastoma

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Introduction: Due to their location, aggressive growth, phenotypic heterogeneity and immunosuppressive tumor microenvironment (TME), gliomas constitute a great therapeutic challenge. In this work, we reviewed the possibility of using CAR-NK cells in the treatment of glioblastoma.

Description of the problem: The effectiveness of CAR immunotherapy largely depends on the identification of the correct target antigen. One potential antigen is the epidermal growth factor receptor (EGFR), which is overexpressed in 40-60% of glioblastoma cases, making it the most frequently expressed antigen in this tumor. In order to solve the problem of antigen heterogeneity in glioblastoma, the possibility of using synergistic therapy with the use of CAR-NK cells and the oncolytic virus OV-IL15C is being investigated. Another antigen to which CAR-NK cells can be targeted is the ErbB-2 tyrosine kinase (HER2) receptor. The anti-HER2 NK-92/5.28 cell line has been shown to be highly cytotoxic to glioblastoma cells, also under hypoxic conditions and in the presence of high concentrations of TGF-β. The CAR2BRAIN (NCT03383978) clinical trial is currently underway in Germany to assess the safety and tolerability of NK-92/5.28 cells in patients with HER2-expressing glioblastoma.

Conclusions: More research is needed into CAR-NK cells and the possibilities of synergistic therapy using CAR-NK cells and other therapeutic agents to increase the efficiency of CAR-NK therapy.

Bruton's tyrosine kinase inhibitors as modulators of myeloid-derived supressor cells

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Introduction: Myeloid-derived suppressor cells (MDSCs) are a heterogeneous population of immature cells originating from the bone marrow. Their appearance in the tumor microenvironment (TME) is conditioned by secretion of substances like VEGF, GM-CSF, IL-6 by cancer cells. One of the proteins engaged in maturing and function of MDSCs and secretion of immune suppressing factors by them is NF-κB. Moreover, MDSCs limit a reaction of the immune system to therapy based on checkpoint inhibitors PD-1/PD-L1. This way in TME develop favorable conditions to impede immune reaction which correlates with worse prognosis and poor response to therapy.

Description of the problem: Possible therapeutic option against MDSCs might be Bruton's Tyrosine Kinase inhibitors (BTKi). Bruton's Tyrosine Kinase is a part of the NF-κB signaling pathway. Usage of ibrutinib – BTK inhibitor *in vitro* leads to attenuation of migration MDSCs and limited mRNA synthesis for indoleamine 2,3-dioxygenase and nitric oxide. Furthermore, MDSCs differentiation to mature dendritic cells was observed. Dendritic cells are crucial in anticancer response. Potential usage of BTKi in combination therapy with checkpoint inhibitors might increase its effectiveness by decreasing MDSCs' immunosuppression.

Conclusions: Deployment of BTKi against cells immunosupressing TME may improve response for ongoing treatment or form nouvelle anticancer treatment.

The process of macrophage efferocytosis in atherosclerosis

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Introduction: In a macroorganism, damaged and dead cells arising from physiological as well as pathological processes must be continuously and safely removed. Failure or weakening of these reactions, leads to their accumulation and leakage of their contents, which leads to pathological conditions, including vascular atherosclerosis. The process of removing dead elements called apoptotic bodies is made possible by the phenomenon of efferocytosis, carried out mainly by macrophages, which have a specific mechanism for engulfing and digesting them.

Description of the problem: Vascular atherosclerosis for years has been one of the leading causes of morbidity and mortality worldwide, and the process of efferocytosis, is crucial in preventing it. Disturbed efferocytosis leads to the accumulation of apoptotic bodies and lipids and the formation of inflammatory cores, which threatens plaque rupture and the formation of a clot blocking blood flow in the vessels, resulting in myocardial infarction and stroke.

Conclusions: Data on the process of macrophage efferocytosis indicate that this phenomenon, is an important and key process in maintaining homeostasis in the vessels during the formation of atherosclerosis. It has been shown that any dysfunction in the process of efferocytosis poses a major threat to intravascular safety.

SESSION V. Posters

Immunology in surgery as an example of an interdisciplinary approach to a patient – a case report of a 68-year-old woman with a diagnosed hematoma in the left groin as a complication of ablation procedure

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Introduction: Ablation is a common cardiac procedure aimed at treating arrhythmias. The procedure is associated with the risk of complications, one of them is hematoma – a complication closely related to immune mechanisms.

Description of the case: We present the case of a 68-year-old woman diagnosed with numerous ventricular extrasystoles who underwent ablation procedure according to the CARTO system. The next day, there was a visible, painful swelling in the left groin. In the ultrasound of the lower left limb, a hematoma about 20 cm wide and about 7 cm thick was visible in the soft tissues of the upper, front part of the left thigh, descending to the area of the inguinal ligament to the level of 1/3 of the upper thigh. There are femoral blood vessels in the area of the hematoma, poorly visible – it was not possible to assess the flow.

In blood tests e.g.: increased concentration of white blood cells, decreased concentration of red blood cells and also low hemoglobin levels. One unit of blood was transported.

The next day, the hematoma was evacuated and two blood units were transfused. The next day, removal of the seton from the groin wound by a short intravenous route.

Conclusions: We should note that complications of this type are associated with subsequent surgical procedures, and this is associated with the risk of further complications, as well as the costs incurred by the ward. Developing research to master specific immune mechanisms could significantly assist in surgery.

When medical chemistry meets cancer immunotherapy...

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Introduction: The PD-1 protein, called the programmed cell death protein, belongs to the group of immune checkpoint proteins. It is expressed on the surface of cells of the immune system, including T lymphocytes.

The PD-1/PD-L1 signaling pathway is designed to regulate the degree of immune response. The combination of the PD-1 protein with its ligand, the PD-L1 protein, leads to a decrease in activity and ultimately to apoptosis of lymphocytes.

Problem description: Neoplastic cells are able to escape from immune control by presenting on their surface PD-L1 proteins, overexpression of which has been observed in a number of cancers.

Blocking the PD-1 or PD-L1 protein has been shown to be able to restore immune surveillance of cancer cells by harnessing T cells to fight cancer cells.

Current therapies use monoclonal antibodies. Unfortunately, they have a number of disadvantages, therefore small-molecule inhibitors are an awaited alternative in the scientific community.

Conclusions: The paper presents: the function and actions of the PD-1/PD-L1 signaling pathway and its role in the neoplastic process, therapeutic strategies and the action of various classes of inhibitors (monoclonal antibodies, macrocyclic peptides, BMS-type compounds [Bristol-Myers Squibb] and molecule-type compounds A [Arbutus Biopharma Inc.], Compound CA-170 [Aurigene Discovery Technologies]), as well as recent advances in optimizing the structure of inhibitors and their biological activity.

GLUT-1 protein overexpression

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Introduction: The aim of this literature review is to present the current state of knowledge on the basis of research on the structure, regulation and influence of GLUT-1 protein overexpression in the diagnosis and therapy of cancer. For this purpose, the search engine for information on the presented issue was searched in the PubMed online databases.

Description of the problem: As a result of the analysis, it was found that the basic feature of neoplastic cells is the acceleration of glucose metabolism combined with the inhibition of the oxidative phosphorylation process. The increased rate of glycolysis compensates for the slight increase in the energy of anaerobic respiration, which allows cancer cells to continue their processes of uncontrolled growth and proliferation. It is mediated by glucose transporters called GLUT-1 for increased cellular glucose uptake. Overexpression of GLUT-1 proteins, in particular those regulated by hypoxic states, has been described in many types of cancer.

Conclusions: Numerous reports indicate a correlation between the level of GLUT-1 expression and the degree of malignancy of the tumor. Regulation of GLUT-1 levels is a major factor influencing glucose metabolism in cancer cells, making it a potentialtarget of chemotherapy.

Heat-shock proteins in cancer immunotherapies

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Introduction: New antitumor treatment options have been sought for some time, and one of them is the use of heat shock proteins, which have the potential to become an effective therapeutic method in the future.

Problem description: Hsp proteins play an important role in maintaining cellular homeostasis both under physiological conditions and under stress or high temperature. Heat shock proteins are among the evolutionarily oldest protection systems in the cell. They are located in the cytoplasm, have the ability to bind to the cytoskeleton and are found in many cellular organelles.

In addition, they perform their function as DAMPs, or alarmins, which are endogenous molecules whose function is to signal danger and activate mechanisms of non-specific immunity through interaction with pattern recognition receptors (PRRs). They appear during cell death in the course of necrosis or pyroptosis.

They have an intracellular role in antigen presentation and expression of innate receptors, and an extracellular role in tumor immunosurveillance and autoimmunity.

Conclusions: In recent years, positive results have been shown in phase I-III clinical trials of a vaccine using complexes, consisting of HSPs and tumor-derived tumor peptides, which can be used in immunotherapies for cancers of various types.

The problem of differentiation musculoskeletal manifestations of sarcoidosis vs. sarcoid myositis: a case report

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Introduction: Sarcoidosis is a systemic granulomatous disease of unknown aetiology, that frequently affects the lungs. Diagnosis relies on compatible clinical and radiographic manifestations confirmed by biopsy showing granulomatous inflammation.

Case report: A 16-year-old man was reporting painful tumours on both legs, the posterior group of the thigh muscles, and the left triceps. The USG, MR examinations, and lab tests denied systemic diseases. Based on muscle's biopsy patient was diagnosed with unclassified isolated myositis. Additionally Lyme disease was diagnosed. Due to history of resected haemangioma of mediastinum we performed angio-MR examination, which excluded intramuscular haemangiomas. Patient was treated with the use of glucocorticoids (GCs) and methotrexate as well as ceftriaxone, because of Lyme disease. We weren't able to induce long lasting remission and exacerbation of symptoms following GCs reduction. Second biopsy was performed

and confirmed the diagnosis of sarcoid myositis. The other locations of sarcoidosis were excluded. Patient was treated with initial dose of 30 mg/day prednisone and 25 mg of methotrexate weekly. During exacerbation intravenous methylprednisolone and cyclosporine were used.

Conclusions: Isolated myositis may be an initial symptom of sarcoid myositis. Due to the heterogeneous clinical course and the rarity of the disease, treatment decisions should be personalized on the patient's pharmacogenomics and phenotype of sarcoidosis.

Food colours and their influence on human immunological system

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Introduction: Dyes belong to a group of compounds called food additives. Nowadays they are often used in food products to improve their appearance by making them more attractive to consumers.

Results: The consumption of artificial colours in food has an impact on the human body and the harmful effects of their action can be observed in both children and adults. The analysed studies show that synthetic dyes can interfere with the human immune system, influencing its operation and causing hypersensitivity reactions, allergies and even induction of the gastrointestinal cancer mechanism. Due to the undesirable effects resulting from the use of artificial dyes, alternative substances are sought that would fulfill their food functions, but would be devoid of negative effects. Such properties are demonstrated by natural dyes. They are not only safe for human health, but also often have favourable biological properties, which include antioxidant, anti-inflammatory and anti-cancer properties.

Conclusions: Food colours have an impact on human health and the immune system. Due to confirmed cases of harmful effects of artificial dyes, there is a tendency to replace them with natural food colours.

Intervertebral disc degeneration – immune mechanisms and antioxidant therapies

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Introduction: Intervertebral disc degeneration (IDD) is the basis of many degenerative diseases of the spine. The pathogenesis of IDD is very complex and involves many cellular activities and regulatory pathways.

Development: IDD is characterized by low back pain (LBP), which is a physical, mental and resource-intensive burden. Pathological processes in IDD seem to result, inter alia, from oxidative stress, matrix degradation, inflammatory response, apoptosis, abnormal proliferation, cell aging and autophagy. Oxidative stress and the inflammatory response (mediated by macrophages and cytokines *via* different signaling pathways) are a key link in the shift of disc cell phenotype from matrix anabolism to matrix catabolism and a pro-inflammatory phenotype. The imbalance between ROS production and clearance in degenerative discs initiates local and systemic oxidative stress, which favors a chronic inflammatory reaction that can exacerbate oxidative processes – thus creating a vicious circle mechanism. The reduction of oxidative stress with natural antioxidants (e.g. GSH, RSV and PQQ) is a promising perspective in the treatment of IDD. Knowledge about the role of inflammatory and oxidative processes becomes the basis for the development of new methods of IDD therapy.

Conclusions: A systematic review of the literature aimed at better understanding the pathophysiology of IDD and developing new therapeutic approaches requires a multidisciplinary approach combining knowledge of biochemistry, immunology, anatomy and pharmacology. The paper discusses the key role of oxidative stress and the inflammatory response in IDD, with an indication of potential new treatments.

Anti-neuron antibody syndrome: clinical and immunological characteristics

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Introduction: Research in the field of neuroimmunology has identified autoimmune neurological and psychiatric syndromes that may be associated with cancer.

Description of the problem: Anti-neuron antibody syndrome (ANAS) is the term for autoimmune diseases associated with the presence of antibodies against epitopes located in the nervous system. ANAS includes autoimmune encephalitis (AZM) and paraneoplastic neurological syndromes (NSA). T and B lymphocytes may participate in the pathogenesis of ANAS; it is accompanied by an inflammatory process that can be inhibited by the immunosuppressive cytokines: TGF-β1 and IL-10. The most frequently diagnosed neoplasms are: a) in patients with AZM are: lung cancer and ovarian cancer; b) in patients with CRC: lung cancer, breast cancer and others. Cancer may show up after the onset of a neurological syndrome. The prognosis in ANAS is good in approx. 70% of patients – worse in CHF than in AZM. The presence of anti-neuron antibodies makes it possible to distinguish mental and neurological diseases without an immune component from autoimmune diseases.

Conclusions: Detection of anti-neuron antibodies and classification of the syndrome as ANAS allows for the implementation of appropriate immunological therapy, taking steps to determine the location of the neoplasm and implementation of treatment.

Pathomorphology of autoimmune granulomatous lung diseases

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Introduction: Granulomatous lung diseases (GLDs) are a heterogeneous group of diseases with varied aetiology and clinical course. In pulmonary disease pathology, granulomas are very common, giving a non-specific clinical appearance.

Description of the problem: A granuloma is a papular aggregation of macrophages surrounded by a rim of lymphocytes. In its structure, it may contain cells of the immune system and extracellular matrix. Granulomas can be divided into infectious and non-infectious granulomas. The aetiological agent of infectious granulomas is a mycobacterium, fungus or parasite, while in non-infectious granulomas the aetiological agent causing the disease is often unknown. Immunological non-infectious granulomas arise from a persistent T-lymphocyte-induced immune response. Autoimmune granulomatous lung diseases include sarcoidosis, Churg-Struss syndrome, rheumatoid arthritis, granulomatosis with polyangiitis (GPA).

Conclusions: A common feature of the disease entities included in autoimmune granulomatous lung diseases is granulomatous type lesions in the lung. The localisation of granulomas within the lung is heterogeneous and may include subpleural areas, around bronchioles and vessels, under the pleura and in the pleura.

The importance of *Bifidobacterium* and *Lactobacilli* in dysbiosis leading to irritable bowel syndrome

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Introduction: Irritable bowel syndrome (IBS) is one of the most commonly diagnosed disorders in gastroenterology offices, however, making an accurate diagnosis is not the easiest thing to do. A big problem is the so-called IBS-like syndromes, the clinical picture of which can overlap with IBS. In the course of researching this disorder, however, scientists have concluded that a very important role in the course of this disease is played by dysbiosis of intestinal bacteria and, in particular, that concerning *Bifidobacterium* and *Lactobacilli*, the normalization of which can bring surprising results.

Description of the problem: Irritable bowel syndrome is a functional disorder categorized as a gut-brain interaction unit having 3 main types: with the presence of diarrhea, with constipation and of a mixed nature. Researchers have found that drugs that are synthetic agonists of peripheral opioid receptors μ, δ and κ are very helpful in treating this condition. The next stage of management is the use of a diet excluding so-called FODMAP's, that is, products containing oligo-, di- and monosaccharides. As a crowning treatment for this condition, the possibility of influencing and normalizing the gut microbiota should be mentioned here, however, this aspect is still under extensive research.

Conclusions: A look at the disease entity I am discussing is broad but the influence of *Bifidobacterium* and *Lactobacilli* levels seems to be the most relevant.

p53 protein and cancer

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Introduction: Abnormalities and disturbances in the p53 tumor suppressor gene are among the most common molecular events. p53 is one of the most studied proteins in modern biology, with over 20,000 articles written to date.

Description: In our work, we will present an overview of selected articles. The focus is on a small number of recent developments that are viewed in the context of new and modern p53 function models. Understanding new functions and processes in p53 molecular biology is possible with the use of analytical methods.

Conclusions: Currently, there is a need to acquire knowledge of biochemical and biophysical research, and biological and genetic analysis.

Face transplantation – current status and future developments

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Introduction: Facial injuries lead to serious impairments in its' appearance and functioning. Many patients don't have the main parts of it. It has influence on seeing, speaking, chewing and breathing. Latest progress in immunology and transplantology enables the performance of facial allograft (FAT).

The key to the FAT procedure is the regeneration of the nerves that are responsible for sensation and movement. A proven effect in regeneration has TAC, FK506, glial neurotrophic factor and stem cells.

Description: It was proven that sensation returns in the allograft as early as 3 months after the operation. It was noted that the drug tacrolimus quickens axonal regeneration.

The usage of immunosuppressants is proven to be effective. Most often anti-thymocyte globulin is being used. Patients must be post operation their whole live on immunosuppressants. As of today, it seems to be impossible for patients to have immune tolerance.

It is common to get infected with the opportunistic cytomegalovirus. Often many metabolic complications for example diabetes mellitus, hypertension and hypercholesterolemia occur. There are reports on the decrease in the function of patient's kidneys and the increase in having malignancies. Acute rejections happen very often and are treated with steroids.

Conclusions: Facial allografts improve the quality of life of patients. This option was made for people unsusceptible to traditional methods. Scientists should find a way to reduce the negative impact of immunosuppressants on the body.

The prevalence of primary central nervous system lymphoma in acquired immunodeficiency syndrome – the current state of knowledge

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Introduction: Advances in medicine make it possible to detect diseases in the early stages, which results in early decisions regarding treatment and translates into improved prognosis.

In the case of AIDS as a result of HIV infection, there is currently no effective pharmacotherapy. Further diseases, such as PCNSL, are relatively often diagnosed in AIDS patients.

Description of the problem: AIDS is a disease caused by the immunodeficiency virus. Currently, we do not have an effective therapy against this disease. PCNSL is a cancer that is a rare form of lymphoma, but if it occurs, the patient's prognosis is poor. PCNSL relatively often affects people with diagnosed AIDS. It is even 5 people who developed PCBSL out of 1000 diagnosed with AIDS. The average age of developing this disease in HIV positive people is 35 years, while in HIV negative people it is 55 years. An important problem, therefore, is to determine

the exact relationship and pathogenesis of PCNSL development in people with AIDS.

Conclusions: The presented information illustrates the relationship between HIV infection and the occurrence of PCNSL, for which the bonding link is most likely the EBV virus. It may be disturbing that the incidence of PCNSL, which is correlated with the presence of HIV in the patient's body, is constantly increasing, and the increase is much faster than in uninfected patients.

Association between a history of allergy and cancer occurrence

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Introduction: Cancers are the civilization diseases of the 21[st] century. They have genetic and environmental determinants and are increasingly linked to lifestyle. They pose a serious threat to the health of the population and are one of the most common causes of premature death. Much research has been done in search of a correlation between the immune system and the development of cancer.

Description: There is the concept of immune surveillance developed less than a century ago suggesting that the immune system seeks out and destroys cancer cells arising in the human body. A thesis was put forward proclaiming a link between a patient's history of allergies and the incidence of cancer. It is suggested that allergic patients may have an increased capacity for immune surveillance. The main diseases considered were asthma, allergic rhinitis and atopic dermatitis.

Conclusions: Many case-control studies have shown an inverse relationship between allergy and cancer although in some cancers i.e. lung cancer allergy correlates with its development. More research is needed to unequivocally assess the relationship between allergy and cancer, and existing scientific reports encourage more in-depth knowledge on the subject.

Photodynamic therapy in GBM

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Introduction: Glioma multiforme (GDM) is an atypical astrocytoma with variable histological formations, high cellular differentiation and intense mitotic activity, which makes it the highest possible grade of malignancy – IV.

Patients' survival time after the diagnosis averages a few months, only about 3-8% live longer than 3 years since they are diagnosed. Current therapy includes a maximal tumor resection and then both radio- and chemotherapy. Unfortunately, total resection is not possible due to multiple tumor infiltration and adhesions, in 80% cases the recurrences grow back in the place of surgical intervention.

The new photodynamic therapy (PDT) uses light energy that activates and catalyzes the production of singlet oxygen and the other reactive oxygen species, which are toxic to tumor cells causing their death.

Issues: The effectiveness of therapy depends on the used photosensitizer which produces a significant amount of ROS and does not need a long time of exposure. The important aspect is to minimize side effects and keep the patients' quality of life. The therapeutic effect depends on the interaction of PTD with previously chosen treatment schedule. Preclinical studies show a major impact of glucocorticosteroids (dexamethasone) and some of anti-epileptic drugs (phenytoin).

Conclusions: Implementing PDT can increase the chance of complete recovery for patients with glioma multiforme. The results of clinical trials are hopeful, nevertheless further research is necessary.

St. John's wort in immunology

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Introduction: St. John's wort is widely used in the treatment of various inflammatory, viral and neoplastic lesions. For the treatment of mild to moderate depression and other nervous conditions. It is a mixture composed of many components such as: Quercetin, Isoquercetin, Hypericin, Hyperforin, Chlorogenic acid, phenolic acid.

Description: Thanks to this, it has a number of properties: photodynamic, cytotoxic, antioxidant, anti-inflammatory, antibacterial. Hypericin is a potentially clinical anti-neoplastic agent due to its potent anti-neoplastic activity *in vivo* and *in vitro* after exposure to light. Today, Hypericin has been recognized as an important multifunctional active molecule that could find application in new therapies. In addition, it is photosensitive, therefore the photo-excitation properties of.

Conclusions: Hypericin are investigated, and thus to be used as a fluorescence diagnostic tool in the treatment of neoplasms with the use of photodynamic therapy.

Syndrome of aseptic breast abscesses as an example of neutrophilic dermatosis. Can an immunodeficiency cause the disease?

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Introduction: Aseptic breast abscess syndrome belongs to a group of rare neutrophilic dermatoses. It is characterized by recurrent skin abscesses caused by infiltration of multinucleated neutrophils. The purpose of this study is to evaluate immunity and especially neutrophil function. There are no publications in the literature on this subject.

Case summary: A 45-year-old patient was diagnosed with recurrent abscess-like lesions in the left breast. She was treated surgically and pharmacologically. Due to the ineffectiveness and recurrence, the differential diagnosis was expanded to include breast cancer, mycobacteriosis, actinomycosis, and ultimately immunodeficiency. Immune defects were ruled out as a potential pathomechanism of the lesions. Prednisone was administered, resulting in rapid clinical improvement, complete healing of the lesions and maintenance of remission for many months.

Conclusions: Although the patient had documented increased inflammatory markers, leukocytosis with a predominance of neutrophils, an immune defect could not be captured to explain the mechanism of nuclear cell activation. The disease has features of an autoimmune or autoinflammatory syndrome, but its pathomechanism is unknown. The most effective therapeutic option is the use of oral glucocorticoids and, in severe cases, TNF-α inhibitors. Neutrophils remain the main cells responsible for clinical symptoms.

Skin changes as the first manifestation of Susac's syndrome

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Introduction: Susac's syndrome (retinal-cochlear-cerebral vasculopathy, SuS) is a rare autoimmune endotheliopathy, with involvement of the pre-capillary arterioles of the brain, retina and inner ear. It manifests with a typical triad of hearing loss, encephalopathy and retinopathy. Skin changes, mainly livedo reticularis, have so far been described in only few cases.

Case presentation: A 39-year-old previously healthy man subacutelly developed a fine-spotted skin lesion on the trunk, excessive lethargy and non-specific general symptoms (weakness, fever, nausea, vomiting). Over the next several days, increasing bilateral hearing loss, aphasia, central facial nerve damage on the right side, and left lower limb paresis with positive Babinski's sign were observed. Treatment with plasmapheresis and steroid therapy gave some improvement of neurological deficits. Based on the typical triad of symptoms, after excluding other causes of symptoms, a diagnosis of SuS was made.

Conclusions: The typical triad of symptoms characteristic of SuS usually does not appear at the same time, which creates significant diagnostic difficulties and delays the implementation of effective treatment. Skin changes in the form of a fine-painted macular skin patch or livedo reticularis result from involvement of the skin endothelium and are extremely rare SuS manifestations.

Gut fermentation syndrome (GFS) – etiology, clinical picture, diagnosis and treatment

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Introduction: Enteric fermentation syndrome (GFS), otherwise known as autobarking syndrome (ABS), is a rare and still little-known disease state, the essence of which is the process of excessive alcoholic fermentation, carried out by the pathological microbiome of the gastrointestinal tract, less commonly the urinary tract, which causes symptoms of an inebriated state in affected individuals despite the absence of alcohol consumption.

Description of the problem: The etiology of GFS is the yeast *C. albicans* and *S. cerevisiae*, and less commonly the bacteria *E. faecalis* and *K. pneumoniae*. Factors contributing to the progression of ABS were examined, including: frequent antibiotic therapies, a diet rich in carbohydrates and simple sugars, as well as highly processed foods, frequent skipping of meals, chronic stress, lack of exercise, or exposure to the presence of mold in the environment. In addition, it has been investigated that compared to healthy people, patients with ABS experience more digestive ailments, such as worsening of gastrointestinal motility, frequent diarrhea, abdominal pain, nausea, vomiting and food hypersensitivity.

Conclusions: Enteric fermentation syndrome is a rare disease involving excessive fermentation of carbohydrate substrates mainly by yeast in various sections of the gastrointestinal tract. There is a need to raise awareness of ABS in both the medical community and the general population in order to improve the quality of life of patients.

PD-L1 as a predictive factor for immunotherapy of head and neck region cancer and bladder cancer

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Introduction: According to data from the National Cancer Registry (NCR), conducted by the National Cancer Institute on behalf of the Minister of Health, in 2019 there were 171.2 thousand new cancer cases and 100.3 thousand cancer deaths. It turns out that malignant tumors of the head and neck are diagnosed annually in about 7,000 people in Poland and account for about 5% of all malignant tumors, while bladder cancers account for almost 7% of malignant tumor cases in men and just over 2% in women.

Description: Malignant tumor cells use various methods of immune suppression to resist anti-tumor immunity. One of these methods is modification of the PD-1/PD-L1 pathway, which is referred to as an "immune checkpoint".

Programmed death protein 1 (PD-1) and its ligand programmed death 1 (PD-L1) are critical checkpoint proteins that are responsible for negatively regulating the stability and integrity of T cell immune function.

Conclusions: The purpose of this review was to determine the role of PD-L1 in immunotherapy for head and neck and bladder region cancers. Current immunotherapies for malignancies include therapeutic vaccines, adoptive transfer of T cells, cytokines and immune checkpoint inhibitors and immune modulators. The PD-1/PD-L1 immune checkpoint represents an accessible and promising pathway that can be blocked to reverse tumor-induced immunosuppression.

Nanocarriers in immunotherapy

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Introduction: Classic methods of cancer treatment are characterized by high toxivity or invasiveness and lack of selective action. There is need to search for targeted and selective methods of therapy. Immunotherapy is a new method of cancer treatment, using anticancer vaccines, immune checkpoint inhibitors, as well as T cell and oncolytic virus therapy. Due to the occurrence of immunotoxicity, nanoimmunotherapy was introduced into the treatment, using nanoparticles in combination with various types of ligands, which are characterized by the ability to selectively recognize and bind to receptors on the surface of target cells. Nanocarriers used as platforms for the delivery of biological drugs allow to place in them both small molecules of chemotherapeutic agents and large molecules of proteins or nucleic acids. Better solubility and biodistribution of drugs, as well as *in vivo* stability are other benefits of using nanocarriers in immunotherapy.

Description: The paper presents methods of using nanocarriers in immunotherapy and describes the advantages and disadvantages of their use.

Conclusions: The use of nanoimmune particles may be a promising alternative, replacing classic cancer treatments due to the ability shown in many preclinical studies to increase the activity of immunostimulating molecules in a safe and effective way, which shows the potential of their use in immuno-oncology.

Importance of neopterin as a marker of cellular response in clinical diagnosis

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Introduction: Neopterin, as a small-molecule pyrazine-pyrimidine compound belonging to the pteridine group, is a sensitive indicator of non-specific cellular-type immune response. Its synthesis is stimulated mainly by CD4+, CD8+ T lymphocytes and NK cells, which through the secretion of interferon γ (IFN-γ) have a stimulatory effect on monocytes, macrophages and dendritic cells responsible for its production.

Description: The concentration of neopterin can be determined in body fluids such as serum, urine, cerebrospinal fluid, joint fluid and saliva. Higher levels are found in children and the elderly, as well as in conditions with significant T-lymphocyte activation such as viral infections (e.g. AIDS), autoimmune diseases (e.g. rheumatoid arthritis, systemic lupus, Crohn's disease) and cancer. Neopterin has also become a widely accepted parameter to monitor the course of retroviral disease and the effectiveness of its treatment. In addition, the determination of neopterin levels has found application among organ transplant patients, mainly kidneys, as they are responsible for its removal from the body.

Conclusions: The exact physiological function of neopterin is not yet known and unspecified, however, according to current clinical data, it is known that there is a strong relationship between the synthesis of neopterin.

Where there's a will there's no way – immune system and infertility

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Introduction: The 21[st] century is a time of development, not only macroscopically, but also on microrock – more and more pairs are pushing reproduction into the background. What's next? Not only the prolonged exposure of the body to harmful external factors that can affect fertility, but also the later understanding of the couples that their own organism can become an enemy in reproduction.

Problem description: In addition to obvious factors such as hormonal disturbances or genetic mutations, infertility is also immune-caused (15%). The relationship of immunoglobulin classes and the resulting dependencies are also the subject of research. A source of infertility was also found in the semen fluid. It is important to stress the presence of anti-sperm antibodies also in women, and causes of infertility have also been found in immunological factors that are secreted from the endometrium during implantation, but also in those that affect them. The blastocyst is also not immunologically neutralized by producing IL-1, CSF-1, VEGF and the important tissue compatibility antigen HLA-G.

Conclusions: Infertility in couples is mainly due to antigen-antibody reaction, but also to the effect of free oxygen radicals and immune regulation disorders in the broadest sense. In men, the IgA class of immunoglobulins has been confirmed to play a key role in infertility, and studies on the imbalance of pro-inflammatory cytokines have identified inflammatory markers in semen: IL-6 and IL-8.

The role of ILC in autoimmune diseases

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Introduction: Innate lymphoid cells (ILC) is a group of cells that are morphologically similar to lymphocytes, but lack the TCR and BCR receptors typical of Th1, Th2 and Th17 lymphocytes, and are therefore referred to as ILC1, ILC2, and ILC3.

Description of the problem: Patients with systemic sclerosis have an increased number of ILC2 in the skin and peripheral blood compared to healthy controls. Patients with extensive pulmonary fibrosis showed the highest number of circulating ILC2. These cells secrete IL-4 and IL-13, which may increase the secretion of TGF-β from fibroblasts or keratinocytes, increasing fibrosis.

In the peripheral blood of SLE patients, an increase in the level of ILC1 and a decreased level of ILC2 and ILC3 were demonstrated. The greatest correlation was observed

in patients with moderate and severe disease. ILC1 may be involved in the response to inflammation, and ILC3 may be involved in the development of an autoantibody response in SLE.

A positive correlation was found between the number of CCR6 + ILC3 cells and the concentration of CCL20 in the synovial fluid of RA patients, suggesting that CCR6 + ILC3 may play a role in the pathogenesis of RA through the production of cytokines such as IL-17. ILC2 can counterbalance the pro-inflammatory effects of ILC1 by producing IL-13, which has an anti-inflammatory effect on synovitis in RA.

Conclusions: Abnormalities in the functioning of ILC may contribute to immune disorders and induce the formation of diseases of the immune system.

Pregnancy of a three-positive ginecological APS syndrome woman – case report

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Introduction: Antiphospholipid syndrome (APS) is a systemic autoimmune disease associated with the presence of specific antibodies, obstetric failures and venous or arterial thrombosis. APS can develop secondary to an other existing autoimmune disease, or it can be developed primary. This disease is more often detected in women, venous thromboembolism is the most common manifestation of the syndrome.

Case presentation: This abstract has a casuistic nature. It presents the medical history, diagnosis and treatment of a 33-year-old pregnant woman with a history of four obstetric failures, each up to 12 weeks, and concomitant diseases – hypothyroidism and diabetes in pregnancy. The woman was diagnosed with antiphospholipid syndrome with a high-risk profile for thrombotic complications. Her test results indicate triple positivity for this syndrome. The patient, while under close hospital observation, delivered her baby on time by cesarean section.

Conclusions: This paper aims to show the importance of physicians vigilance for the possibility of antiphospholipid syndrome in young women with recurrent miscarriages and to raise awareness of the interdisciplinary nature of this disease entity.

The use of anti-GITR and anti-CTLA4 antibodies in treatment of colorectal cancer

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Introduction: Colorectal cancer results from the uncontrolled division of cells in the intestinal epithelium. The most common histological type is adenocarcinoma, which accounts for 90% of colorectal neoplasms. The clinical course, symptoms, treatment and prognosis depend primarily on the location of the tumor in a specific section of the intestine. Men get sick more often, and the peak incidence is estimated at the 7[th] decade of life. In Poland, colorectal cancer ranks second in terms of the number of deaths from neoplastic causes. Screening for colorectal cancer allows for early detection of lesions and starting treatment, thus reducing the risk of premature death due to cancer progression.

Description: Screening tests include: colonoscopy, endoscopic capsule, and stool examination for occult blood. The test of low sensitivity and specificity is the assessment of cancer markers in the blood serum. In the treatment of advanced forms of colorectal cancer, a breakthrough came with the use of immunotherapy, which aims to mobilize the immune system to fight the cancer. The condition for its use is the sensitivity of cancer cells to the drug. The aim of the latest research is to show the effectiveness of the biospecific antibody GITR × CTLA-4 in immunotherapy of colorectal cancer. GITR is a type I transmembrane protein that belongs to the tumor necrosis factor receptor superfamily.

Conclusions: Based on studies in a mouse tumor model, the therapeutic activity of a GITR agonist is associated with the reduction and modulation of Treg cells in the tumor. It also strengthens the anti-cancer functions of CD8+ T cells. CTLA-4 is a membrane glycoprotein involved in the suppression of proliferation and cytokine production. After recognizing the ligands of tumor cells, it becomes their negative regulator. This enhanced synergistic anticancer effect highlights a promising approach to immunotherapy.

"Treat to target" strategy in the treatment of juvenile idiopathic arthritis

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Introduction: Treat to target (T2T) is a strategy that we use in the treatment of some chronic diseases, including childhood rheumatic diseases, which may improve the treatment outcomes of these diseases due to the limited availability of drugs in their scope and the effects of long-term immunosuppression. T2T is a therapy that defines a treatment goal, such as complete remission or low disease activity, and applies close monitoring through monthly visits to achieve this goal. This strategy was first used to treat rheumatoid arthritis in adults.

Description of the problem: T2T is used in the treatment of juvenile idopathic arthritis (JIA). Non-steroidal anti-inflammatory drugs and intraarticular corticosteroids are the mainstay of treatment for oligoarthritis, as well as disease-modifying drugs in polyathitis. In JIA, the T2T strategy is to remove inflammation and avoid long-term use of glucocorticosteroids. The T2T strategy has been shown to be effective in reducing disease activity, improving function, and reducing pain.

Conclusions: The implementation of the T2T strategy in pediatric autoimmune diseases requires collaboration between professionals, patients and their caregivers, and the effectiveness of this strategy could form the basis for improving outcomes in young people with JIA.

Psoriasis inveterate – case report

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Introduction: Psoriasis is a chronic skin disease associated with excessive epidermal proliferation. An undoubted role is played by the interaction of genetic factors (including polymorphism of the HLA-Cw6 gene), immunological (Langerhans cells and helper T lymphocytes, especially Th1 and Th17) and environmental factors. Psoriasis inveterata is one of the forms of psoriasis vulgaris, it often occurs in people who have not used proper skin care or have not received appropriate treatment.

Case presentation: A 22-year-old man admitted to the Department of Dermatology due to the aggravation of psoriasis vulgaris. The patient developed numerous erythematous-exfoliating foci with a thick, silvery scales on the skin of the whole body. The intensity of changes in the PASI scale was rated at 28.6 points. Skin lesions were especially severe on the lower limbs, thick scales on the scalp, pits nails, dystrophic toenails, tongue covered with white patches. Locally, deep and painful cracks were formed. Until now, the patient has not been treated systemically, he has only used an ointment purchased online.

Conclusions: We present the case because of the rarity of psoriasis inveterata, especially in the era of biological treatment. Although the prevalence of psoriasis ranges from 0.3% to 11.4% based on studies of different populations, knowledge about it should be more common.

Selumetinib – new prospects in the treatment of Recklinghausen syndrome

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Introduction: Recklinghausen's disease, also known as neurofibromatosis type 1 (NF-1), is one of the rare genetic diseases caused by mutations in the NF1 gene, which encodes neurofibromin 1. It is an autosomal dominantly inherited disease with a varied clinical course. One of the most problematic manifestations of NF-1 is plexiform neurofibromas, which occur in about 35% of patients. The aim of the study is to present a new – inoperable – method of treatment of patients with neurofibromas occurring in the course of Recklinghausen disease.

Description of the problem: The proliferation of plexiform neurofibromas often causes pressure on nerve structures which leads to silhouette deformity and neurological disorders that can impede patients' daily functioning. Previous treatment has been surgery, which can increase the risk of the tumor transforming into a malignant neoplasm of the peripheral nerve sheaths (MPNST). In 2022, the Food and Drug Administration (FDA), registered selumetinib, the world's first drug to modify the course

of the disease. Selumetinib is a MEK inhibitor which, inhibits the mitogen-activated protein kinase enzymes MEK1 and/or MEK2.

Conclusions: In the era of current research, selumetinub represents the only treatment option for patients with inoperable spotted neurofibromas. Phase II clinical trials have reported a reduction in tumor size growth in 70% of patients. A limitation of selumetinumab use is the high cost of therapy and numerous side effects.

Immune-mediated inflammatory phenomena related to SARS-CoV-2 vaccination from the perspective of rheumathological practice

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Introduction: The COVID-19 pandemic, which has spread all over the world in the recent years, has affected numerous medical fields. It is believed that SARS-CoV-2 virus hyperstimulates the immune system and therefore may lead to autoantibodies formation and triggering the autoimmune disorders. Global campaign of vaccinations against SARS-CoV-2 has limited the transmission of the virus, however, there are reports of post-inoculation flares and new onsets of diseases, including rheumatological ones.

Description: In the literature, cases of rheumatoid arthritis, reactive arthritis, other forms of arthritis and bursitis, Still's disease, polymyalgia rheumatica, lupus erythematosus and Henoch-Schönlein purpura in temporal and potentially causal relationship with SARS-CoV-2 vaccination were described. Their manifestation may result from immunological phenomena mediated by inactivated viruses or viral antigens produced by host cells based on mRNA, as well as vaccine adjuvants. Mechanisms of emergence of these immune-mediated adverse events have not been sufficiently explored yet but molecular mimicry and 'bystander activation' may play a role.

Conclusions: Although this type of adverse effects after SARS-CoV-2 inoculation is not common, it should be considered in rheumatological practice. The aim of the article is to bring awareness to these issues.

Neuroimmune interactions in irritable bowel syndrome

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Introduction: Irritable bowel syndrome (IBS) is a chronic functional disorder of the gastrointestinal tract characterized by recurrent abdominal pain and disturbed bowel movements. The pathophysiology of IBS is not fully understood, but is presumed to be due to dysregulation of the gut-gut axis and/or a disturbed interaction between the gut, autonomic and central nervous systems. The aim of the study is to discuss neuroimmune changes in the pathophysiology of IBS.

Description of the problem: Patients with IBS often have chronic inflammation in the intestinal wall and anatomical and physiological abnormalities in the functioning of the intestinal nervous system. Factors positively correlated with the occurrence of symptoms of hypersensitivity in patients with IBS include: increase in the density of nerve fibers in the intestinal mucosa; an increase in the number of lymphocytes, mast cells, and their mediators, which bind to the protease-activated receptor 2 (PAR2) and activate nerve signaling pathways; increase in expression of the capsaic TRPV1 receptor. Supernatants from colorectal biopsy samples taken from IBS patients have been shown to activate human submucosal neurons.

Conclusions: In order to gain a deeper understanding of the mechanisms underlying the activation of the immune system in IBS, further studies of immunological interactions as well as the role of the microbiota in patients in the early stages of the disease are necessary.