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THE EFFECT OF EPIDURAL SPINAL CORD STIMULATION ON NEUROLOGICAL RECOVERY IN PATIENTS WITH CHRONIC PHASE OF TRAUMATIC SPINAL CORD INJURY

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Introduction
Spinal cord injury (SCI) is a major cause of death and permanent disability amongst young individuals. Numerous therapies are being developed , both surgical and conservative, but none of them seems to be effective. Recently there has been some promising results of cell transplantation as well as spinal cord stimulation provided by implantable pulse generator.

Aim
Aim of this study was to evaluate the effectiveness of epidural spinal cord stimulation (SCS) adjacent to neurorehabilitation.

Material and methods
Four paraplegic males in chronic phase of SCI after clinical, neurophysiological and radiological examination were enrolled to the study. Two patients scored A, one B and one C according to ASIA. None of them presented any neurological improvement after 6 months of rehabilitation. All patients had SCS implanted. The best stimulation program for each individual was customized and used along neurorehabilitation for at least 6 months. Stimulation paradigms were optimized based on the clinical response. The effectiveness of stimulation was assessed regarding the number of repetition, time needed for completion of exercise and its intensity.

Results
We were able to evoke motor response in every patient. During the rehabilitation process patients moderately improved with intensity, number of repetitions and time spent especially on bike and parallel bar walk test. The response was different for each patient and was better in incomplete SCI patients. Additionally every patient decreased spasticity directly after stimulation.

Conclusions
SCS is safe and promising addition to neurorehabilitation and may be considered in therapy especially for incomplete SCI cases.

Keywords: spinal cord stimulation, spinal cord injury, neurorehabilitation

LINK BETWEEN ALTERATION OF HUMAN GUT MICROBIOTA AND DEVELOPMENT OF PARKINSON'S DISEASE – A SEARCH FOR NOVEL, RELIABLE BIOMARKER

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Introduction

Parkinson's disease (PD) is a neurodegenerative disorder influenced by both genetics and environmental factors. Gut microbiota is currently being studied as potential starting point of the disease. The microbiota-gut-brain axis is a long-recognized bidirectional communication system that might be a tract through which alterations in gut microbiota composition may initate and exacerbate the progression of PD. With the diagnosis of PD posing a diagnostic challenge, there is a need for new biomarkers that would allow for early diagnosis of this disease.

Objective

The aim of this systematic review is to analyze the results of current studies dealing with microbiome composition changes specific to PD and to assess their potential role as a PD biomarkers.

Methods

We selected and analyzed 16 case-control studies published from 2014 that reported altered microbial taxa in PD patients. Due to heterogeneity of laboratory protocols the metaanalysis was not performed.

Results

We have compiled reported results of selected studies in detailed tables. While multiple studies reported a reduction in bacteria which presence is connected to lower colonic inflammation and are considered neuroprotective, these results were not consistent across the data set. Various contradictory findings were also reported, which may partially be caused by differences in laboratory protocols, diagnostic methods and other confounding factors.

Conclusions

This study underlines need for creation of unified protocols for future, prospective studies. While promising, due to heterogeneity, the current data does not allow us to draw clear conclusions regarding the potential use of microbiota composition analysis as biomarkers of the disease.

ROLE OF HUMANIN IN PATHOGENESIS OF PARKINSON'S DISEASE

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Introduction

Humanin (HN) was first identified in the brain of a patient diagnosed with Alzheimer's disease. Recent studies revealed that HN activity is not confined only to neurons but it involves also other compartments of the brain as well as extraneural tissues. These results suggest that HNs may influence on other neurodegenerative disorders such as Parkinson's disease.

Aim
The aim of this study was to analyze correlation between genetic variability within humanin-encoding genes and the course of Parkinson's disease.

Methods
DNA was isolated from peripheral blood from 214 patients with diagnosed PD and 193 healthy adult individuals. Genotyping was performed on the 3130 xl Genetic Analyzer (Applied Biosystems).

Results
We have genotyped the not-known polymorphic variants of 13Thr- and 13Ile-HN10b (with threonine or isoleucine in amino acid position 13), encoded by HN gene in PD- diagnosed patients. Genotyping results have not shown any significant association between identified 13Thr- and 13Ile-HN10b polymorphic variants (38C > T) and the prevalence of Parkinson's disease. However we have demonstrated statistically significant higher frequency of C/T and C/C genotypes in comparison to T/T in patient with dementia (MMSE). Similar relation was observed in patients with more severe symptoms of PD progression (basing on Hoehn and Yahr as well as UPDRS rating scale).

Conclusion
This is the first report regarding the humanin in Parkinson Disease. Our results suggest that 13Thr- and 13Ile-HN10b polymorphic variants (38C > T) are not associated in development of PD. However we can speculate that T/T genotype can be considered as protective factor during development of symptoms of PD.

COMPARISON OF MOTOR EVOKED POTENTIALS PARAMETERS INDUCED WITH MAGNETIC FIELD (MEPS) SIMULTANEOUSLY RECORDED FROM MUSCLES AND NERVES IN HEALTHY SUBJECTS AND PATIENTS WITH DISC-ROOT CONFLICTS

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Background and aim
Motor evoked potentials induced with magnetic field (MEPs) recorded from muscles are widely used in clinical neurophysiology for evaluation of efferent transmission either from motor cortex or from motor centers at spinal level. The degenerative changes at the level of neuromuscular junction in patients with disc-root conflicts make sometimes recordings of MEPs difficult, although the transmission of neuronal impulses in nerves does not seem to be greatly disturbed. Presented study attempts to verify quality of two recording approaches, assuming that nerve recorded MEPs are more stable although characterized by different parameters of amplitudes and latencies than those recorded from muscles.

Material and methods
Twenty six healthy volunteers and forty three patients with disc-root conflict at lumbosacral level had recorded MEPs after transcranial or oververtebral magnetic stimulation, respectively.

Parameters of amplitudes, latencies and durations of MEPs recordings from nerves (femoral at femoral fossa – FN, peroneal nerve at knee – PN) vs muscles (rectus femoris – RM, tibialis anterior muscle – TM) with surface electrodes were compared.

Results
Mean amplitudes of MEPs recorded from FN (327μV in control, 652μV in patients) and PN (255μV in control, 348μV in patients) in comparison to recorded from RM (882μV in control, 1893μV in patients) and TM (1224μV in control, 553μV in patients) were about three time smaller at p = > 0.0000. The latencies of MEPs recorded from FN (17ms in control, 4ms in patients) and PN (25ms in control, 10ms in patients) in comparison to recorded from RM (20ms in control, 7ms in patients) and TM (28ms in control, 14 ms in patients) were about three milliseconds shorter at p = > 0.0000. Durations of MEPs recorded from FN (32ms in control, 34ms in patients) and PN (34ms in control, 31ms in patients) in comparison to recorded from RM (26.5 ms in control, 28ms in patients) and TM (32ms in control, 28ms in patients) were in general comparable with slight differences.

Conclusions
Although MEPs recorded from nerves are characterized with different values of amplitudes (smaller), latencies (shorter) and comparable durations than those from muscles, they seem to represent more stable physical variables, what is important for the diagnostic purposes. These variations are not depended from the site of MEPs induction.

Keywords: motor evoked potentials, recordings from muscles and nerves, methodology

PATENT FORAMEN OVALE AND SECONDARY ATRIAL SEPTAL DEFECT IN CRYPTOGENIC CEREBRAL STROKE AND MIGRAINE HEADACHES – A CASE OF 15-YEAR-OLD PATIENT

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Patent foramen ovale (PFO) is a remnant of fetal circulation and one of the most prevalent anomalies of cardiovascular system. Atrial septal defect (ASD) in turn is the most common acyanotic congenital heart defect (ACHD). Lack of integrity in septum creates a possibility of blood leak from left to the right side of heart according to the pressure gradient. Even though usually prognosis of affected patients is good, PFO and ASD might lead to several neurological disorders, as presented in case of 15-year-old boy.

To the Department of Paediatrics and Neurology of Developmental Age of John Paul II Upper Silesian Child Health Centre a 15-year-old patient got admitted after an episode of hemianopsia and hypaesthesia of upper limbs. Patient has already experienced similar disorders, namely severe migraines, loss of sight and hemiparesis of right body half. Previous cardiological examination discovered PFO, ASD II and hypertension secondary to renal dysfunction. Patient underwent EEG, head MRI and angioMR imaging head vessels to establish recurrent headaches etiology. Ischemic area and glial scar were identified anterior to left caudate nucleus. Ruling out the presence of vascular malformations, enabled diagnosis of cryptogenic cerebral stroke, simultaneously suggesting emotional factors impact on recurrent headaches.

Both PFO and ASD II are in most cases asymptomatic, although in some circumstances like increased pressure in right atrium, might lead to leak, which creates a risk of passing embolus to systemic circulation. Reaching the brain vessels, it may result in neurological disorders, such as migraine or cerebral stroke.

CHANGES IN THE EFFERENT TRANSMISSION OF IMPULSES FROM THE SPINAL CENTERS TO MUSCLES OF LOWER EXTREMITIES IN JET FIGHTERS

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Introduction and purpose
Overloads associated with the work of a jet fighter pilot can lead to changes in the biomechanics of the spine, cause changes in the transmission of nerve impulses in the fibers of spinal roots, and as a consequence, the generalized abnormalities in the transmissioon of nerve fibers peripherally. The aim of the study was to determine whether the above assumption of change can be diagnosed by clinical methods and using clinical neurophysiology studies in jet fighter pilots.

Subjects and methods
Fourteen pilots of jet fighters with an average flight experience of 1711.7 hours, an average age of 38.2 years, with similar anthropometric characteristics, were interviewed regarding duration of profession and physical activity. The transmission of nerve impulses in the proximal and distal motor nerves of the lower extremities was diagnosed bilaterally in electroneurographic studies (ENG, F and M wave evoked potentials). The efferent transmission from the level of the spinal center at the cervical and lumbosacral level to the muscles was studied using the motor evoked potentials induced with magnetic field method (MEP).

Results
ENG tests after electrical stimulation of peroneal nerves bilaterally, in 4 pilots showed statistically significant changes in the transmission of nerve impulses in motor fibers more peripherally than within the L5 spinal roots bilaterally at the significance level p = > 0.04–005. The MEP test showed slight deficits in the transmission of nerve impulses from the L4-L5 level to the quadriceps muscles and the extensors digitorum longus muscles on both sides at a significance level of p = > 0.02–0.05 in 5 of the 14 pilots tested.

Conclusions
The nature of the work of a jet fighter pilot exposed to significant overloads, in the light of the results from electroneurographic tests and motor evoked potentials studies show a statistically significant detection sensitivity of abnormalities in the transmission of nerve impulses in ventral root motor fibers at the lumbar level. The results of the study make it possible to specify the therapeutic effects of conservative treatment in the prevention of pain in the lumbosacral spine in jet fighter pilots.

Keywords: jet fighter pilots, overloadings, cervical pain, back pain, electroneurography, motor evoked potentials

SAGITTAL SPINE BALANCE IN LOW BACK PAIN

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The sagittal spine profile is an individual feature of each person. The characteristic features of the sagittal spine profile are:

1. alignment – position of the vertebrae in relation to each other,
2. balance – distribution of weight and stresses is present through the axial skeleton and enable maintenance stable and economic posture,
3. curvatures harmony – smooth shape of the curvatures and balanced relationships between them.

There are four radiological types of the sagittal spine profile distinguished by Roussouly *et al.,* based on shape and size of the lumbar lordosis and the inclination of the sacral slope. According to Rousolly et al. and following authors the types are associated with predispositions to specified mechanical loading patterns and diseases of the lumbar spine. The types with smaller lordosis are associated with susceptibility to the compression forces and predispose to the intervertebral disc disease, whereas the types with larger lumbar lordosis are associated with susceptibility to the shear forces and predispose to the spinal canal stenosis.

The causes of low back pain can be classified into three groups: 1) non-specific pain, 2) pain potentially related to radiculopathy or 3) spinal stenosis, pain potentially related to another specific cause (e.g. compressive fracture or cancer). Each type of low back pain disturb the sagittal spinal alignment and balance. It affects mostly the lumbar lordosis and provokes compensatory mechanisms of the body to restore spine balance. Thus, one of the most important part of the treatment is restoration of the individual proper spine sagittal alignment.

Keywords: sagittal spine balance, low back pain, sagittal spinal alignment

GENETIC BACKGROUND OF IDIOPATHIC SCOLIOSIS – CURRENT STATE OF KNOWLEDGE AND ROLE OF DNA METHYLATION

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Idiopathic scoliosis (IS) is a three-dimensional spine deformation, consisting of a side curve combined with sagittal plane deviation, axial rotation of vertebrae. It is one of the most common spinal disorders in adolescents. Idiopathic scoliosis is considered as a multifactorial disease with a significant genetic background, modulated by environmental factors. This theory is supported by a higher prevalence of IS in families with a member affected by the disease than in the general population. Candidate genes potentially associated with the occurrence and progression of IS were selected in studies, including evaluation of family linkage, SNPs (single nucleotide polymorphisms) and genes expression profile. Until now 7 genome-wide association studies (GWAS) concerning IS were performed. The biggest included 7956 cases and 88 459 controls evaluating 3 493 832 SNP. The most significant

polymorphism indicated in GWAS were in LBX1, GPR126, BNC2, SOX9, KCNJ2 and CHL1 genes.

However, the polymorphisms described to be associated with IS are commonly present in DNA of individuals without IS. It is suggested, that there are factors, which are the linkage between genome and environment. Among possible environmental impact on the DNA the most important are epigenetic modifications. The epigenetic modifications affect gene activity and expression, but do not alter the DNA sequence. The most well-known epigenetic modifications is a DNA methylation. Preliminary studies suggest important impact of the DNA methylation on the severity of idiopathic scoliosis IS. However, there is limited knowledge about importance of the DNA methylation in IS and further studies are needed.

Keywords: idiopathic scoliosis, epigenetics, DNA methylation

THE OCCURRENCE OF KINSBOURNE SYNDROME IN PATIENTS DIAGNOSED WITH THE NEUROBLASTOMA

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Introduction

Kinsbourne syndrome or Opsoclonus-myoclonus syndrome (OMS) is also called dancing feet syndrome and manifests by opsoclonus, myoclonus, and ataxia. What is more, in children, it provokes irritability, learning, and behavioral disturbances. It occurs more frequently in pediatric patients, and around 50% of cases are caused by neuroblastoma. Moreover, Kinsbourne syndrome could be consequence of an infection.

Aim of the study. The purpose of the investigation is to determine the incidence of OMS in children diagnosed with neuroblastoma.

Methods and materials

The data of the Department of Pediatric Oncology, Hematology and Transplantology of Poznań University of Medical Sciences from 2004 to 2019 was analyzed. The research group counts 119 patients below 18 years old.

Results

There are only 3 cases of OMS in the research group. The incidence of OMS in this analysis is equal to 2.52%. The children with OMS were in the age of 1 year, 17 months, and 3 years. One of them had the neuroblastoma localized in the adrenal gland, and two others paravertebrally. All of the patients had horizontal nystagmus. Two had balance disturbances, and two suffer from tremors.

Conclusion

Every case of OMS in children requires imaging to differentiate its cause with neuroblastoma. However, among patients with neuroblastoma, Kinsbourne syndrome is a rare manifestation.

CHANGES IN MOTOR FIBRES OF LOWER EXTREMITIES NERVES IN PATIENTS AFTER INCOMPLETE SPINAL CORD INJURY

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Objective and aim. Treatment and evidence-based rehabilitation methods that are easily comparable, and support functional regeneration of the spinal cord, are the future for people with incomplete spinal cord injury (iSCI). Currently, most of the tests applied to iSCI patients are based on subjective tests and scales. Therefore, any objective tests that verifies the effectiveness of a particular method is an important step in discovering the treatment of mobility deficits in patients with iSCI. Neurophysiological tests such as electromyography (EMG) and electroneurography (ENG), that can be applied before and after treatment, and compared with a control group, seems to be the reliable tool for the evaluation of effectiveness of the therapy.

The aim of this study is to present the results of EMG recordings from tibialis anterior, gastrocnemius, and extensor digiti muscles on both sides, and ENG M waves (CMAP) of evoked potentials recorded following stimulation of peroneal and tibialis nerves on both sides in 42 patients with C4 to Th12 iSCI. The tests were applied before and after the electrotherapy of nerves and compared to reference values from the control group of healthy volunteers. They indicate the changes in neural impulses in motor fibres of lower extremities nerves that have be further analysed and verified after the therapy.

Results and conclusions. Neurophysiological tests give the evidence of the changes in motor fibres of lower extremities nerves that have occurred in patients after iSCI. Such evaluation may help to investigate the method to prevent irreversible, consequential, atrophic changes in the nerves and muscles caused by the spinal cord injury.

Key words: incomplete spinal cord injury, electromyographic, electroneurographic, rehabilitation

PERIODONTITIS AND ITS CORRELATION WITH STROKE

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Systemic, peripheral infections may be a risk factor for common diseases of CNS with neurodegenerative, vascular and immunological background. Epidemiology of severe periodontitis in a Polish population is still unknown. Therefore, to explore a link between periodontitis and general diseases, we performed an analysis of periodontal status among post stroke patients and compare results with general healthy cohort.

Periodontitis is an inflammatory condition of the periodontium, even though bacterial plaque is the primary initiator of the response, systemic health may be significant risk factor that can create further destruction to the gingiva and alveolar bone. The aim of this case-control study is to investigate the role of periodontitis in the development of stroke. The test population comprises of 104 patients from the Department of Vascular Diseases of Nervous

System in Poznan University of Medical Sciences (female = > 61, male = > 33, age range from 20–79 years [average of 45.97 years]) diagnosed with stroke and 94 relatively healthy patients from the Department of Oral Surgery and Periodontology in Poznan University of Medical Sciences (female = > 45, male = > 59, age range from 33–92 years [average of 67.38 years]). Patients' periodontal indices (Bleeding on Probing [BOP] and Approximal Plaque Index [API]) were measured and recorded into histogram for visualization of data distribution. The data values were analyzed with biostatistical methods: box-plot and z-test. From the statistical analysis, there is a significant association between periodontal disease and stroke ($p < 0.01$) in both BOP and API scores.

LOW BACK PAIN PREVENTION

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Introduction

Low back pain (LBP) is a commonly occurring condition. It is estimated that about 80% of the population will experience back pain at some point of their lives. Prior research has shown that education programs incorporating physical exercises to be the most effective method of prevention. However, patient awareness of this subject is minimal. Both Europe and the USA have developed guidelines to help prevent onset of LBP.

Objective

Comparative assessment of European and American guidelines for prevention of LBP.

Materials

European Guidelines for Prevention in Low Back Pain and Guideline for the Evidence and the Informed Primary Care Management of Low Back Pain (USA).

Methods

Comparative analysis of both documents by means of substantive conformity.

Results

Effective preventative measures identified in the European guidelines are: physical activity, biopsychosocial education, and education programs incorporating physical exercises. Ineffective methods included: back school, insoles/orthoses, and manipulative therapy. Evidence for the effectiveness of specific chairs and mattresses, and childhood education on LBP was insufficient. There is also insufficient evidence to recommend physical ergonomic interventions as the solitary mode of prevention. American guidelines found physical activity and education to be effective. Insoles, orthoses, and lumbar supports were ineffective. Spine manipulation, risk factor modification, and ergonomic furniture demonstrated only questionable effectiveness.

Conclusion

European and American guidelines essentially agreed that physical activity and education are effective prevention methods, while manipulative treatment, back school, lumbar belts and supports, shoe insoles, orthoses, and ergonomic furniture were ineffective.

Keywords: low back pain, prevention, guidelines

IF LATENT TRIGGER POINTS ARE INTERESTING FOR SPORT NEUROSCIENCE?

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Introduction
Recently, there has been a significant increase in interest of reducing sports-related injuries. One particular area of interest explored in research is the effect of Latent Myofascial Trigger Points (LMTrPs) on the function and biomechanics of the musculuoskeletal system.

Objective
Review of current literature in the field of LMTrPs' influence on musculuoskeletal system's condition and functioning.

Methods
In order to gain access to the publications, PubMed, Google Scholar, ScienceDirect, PEDRo, BJSM have been used. Infrastructure databases have been searched from 2000 up to 2020. The following keywords were used: "latent trigger point", "soccer", "prevention", "basketball", "performance", "sport", "climbers", "strength".

Results
Having entered the keywords, the number of articles amounted to n = > 190. The further analysis resulted in 6 applicable articles. Three publications show that LMTrPs are associated with both antagonists and agonists increased activation during agonist contraction. Two studies demonstrated decreasing muscle stiffness and increasing ROM. One research article also concluded that LMTrPs treatment increased endurance, and strength of knee extensors and the ROM in a hip-joint.

Conclusion
Evidence was shown that there is a relationship between LMTrPS and functional outcomes of the musculoskeletal system. LMTrPs have been shown to alter the ability of muscles to contract. Furthermore, evidence also shows that eliminating LMTrPs resulted in an improvement of strength, endurance and ROM. There are few researches conducted on the topic and further exploration of the subject is recommended.

Keywords: latent rigger points, prevention, muscle, sport

SIGMA-1 RECEPTOR

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Sigma-1 receptors are intracellular proteins located in smooth endoplasmatic reticulum, involved in regulating release of calcium from said structure. Although they were classified as opioid receptors, later studies have excluded them from this group. These receptors are important for many physiological and pathological processes in CNS such as regulating release of dopamine and glutamate and modulating the effects of NMDAR activation. In this presentation, we want to present current scientific research about role of this receptor in CNS pathology, and the ways in which sigma-1 ligands can be used in treatment. On the cellular level, the activation

of sigma-1 receptors have neuroprotective effects on target cells, which might be helpful in treatment of Alzheimer and Huntington diseases. Some sigma-1 receptor agonists can be also used in depression treatment with fluvoxamine having the highest affinity. On the other hand, psychological effects of sigma-1 receptors are less clear, as there are lots of evidences of their role in development of psychosis, schizophrenia and even cocaine addiction. Currently there are various drugs, both pharmaceutical (i.e. aforementioned fluvoxamine) and illicit (mostly stimulants, psychedelics and dissociatives) with affinity to sigma-1 receptor. Interestingly enough, this receptor is claimed by drug users on Internet fora to be responsible for feelings of enlightment, signifficance, and delusions of being a saviour, which appears to be a kind of religious psychosis. Furthermore, there are some theories about role this receptor in Near Death Experiences. Unfortunetally, there was no scientific publications which definitely explain this phenomena.

ARE BULLSEYE SHOOTERS EXPOSED TO A HIGHER RISK OF CARPAL TUNNEL SYNDROME AND OTHER COEXISTING DISTAL AND PROXIMAL NEUROPATHIES OF THE UPPER EXTREMITY?

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Introduction

Bullseye shooting is a sport trained with firearms; it involves prolonged maintaining shooting position while sustaining force exposition from recoil and vibration on shot. It is likely to result in distal neuropathies (DN) in the wrist, from which carpal tunnel syndrome (CTS) is particularly prevalent among manual workers. Additionally, other neurogenic pathologies in nerves of the brachial plexus may co occur at different levels: 1) proximal including Erb's point and spinal levels; 2) distal – Guyon canal syndrome (GCS) in the wrist.

Aim

Verifying whether systematic practising bullseye shooting with a handgun leads to a higher risk of developing CTS or other neurogenic pathologies in the upper extremity in comparison with the general population utilizing neurophysiological testing.

Material and methods

Prior to conducting screening, we obtained anthropometric measurements of 42 shooters who trained for minimum 6 months. The screening consisted of 3 tests: 1) Tinel-Hoffman sign for median nerve, 2) history of CTS-related symptoms, 3) sensory perception evaluated by von Frey's filament test. Froment sign was examined as well, although it was not part of the screening. Patients with at least one positive outcome were enrolled into the neurophysiological studies: motor evoked potentials (MEP), nerve conduction study (NCS) and global electromyography (EMG) , which were used to assess the transmission of nerve fibers from the spinal level (C5-C8 neuromeres) to distal part of the hand (median and ulnar nerves innervations).

Results

Screening revealed 13 shooters with highly likely CTS, from whom 10 displayed symptoms in shooting hand. Additionally, we found 2 positive Froment signs; 1 in a patient positively

screened for CTS. Nine of the thirteen shooters were examined neurophysiologically, while four resigned from further participation in the research; 4 patients displayed CTS and 2 GCS. Most of shooters showed proximal neuropathies of median and lower brachial plexus motor fibers.

Conclusions
Completed neurophysiological evaluation detected CTS in 9.5% of shooters (4/42) which is over 3 times more frequent than in the general population (2.7%); in addition, 4.8% (2/42) shooters suffered from GCS.

Keywords: Carpal Tunnel Syndrome, bullseye shooting, short firearm, proximal and distal brachial plexus neuropathies

FOOD FOR THOUGHT – HOW TO INDUCE ADIPOCYTE BROWNING, LOSE WEIGHT AND REDUCE RISK OF STROKE? A REVIEW OF BROWNING-INDUCING DIETARY INTERVENTIONS

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Obesity pandemic is a serious threat to public health, since it is a risk factor of various diseases, including neurological ones with stroke being the most severe and common. Therefore, finding new means to reduce weight is of the utmost importance. Recently, attention of the scientific community has been directed towards adipocyte browning – a process which consists in transdifferentiation of white adipocytes into the beige ones. Since beige fat cells are abundant with mitochondria expressing uncoupling protein 1 (UCP1), they are capable of thermogenesis, which leads to increased basal metabolic rate, energy expenditure and weight loss. A review of PubMed-indexed literature was performed and over 100 papers describing dietary interventions (e.g. supplementation of various compounds, fruit/plant extracts or intermittent fasting) resulting in adipocyte browning were included. We analysed 42 interventions in vitro on animal and 9 on human cells; in in vivo setting 55 interventions concerned rodents and 3 humans. Importantly, many research conducted on animals involved employing high fat diet (HFD) which induced obesity; browning upon dietary intervention was almost always followed by weight reduction. The data we found strongly suggest effectiveness of dietary interventions in induction of browning, labelling them as potential tools against obesity and consequently stroke. However, most of the analysed papers concerned rodents and, thus, their results are not fully applicable to human due to differences in physiology; future research should assess safety and efficacy of these interventions in clinical trials.

CENTRAL SENSITIZATION OF PAIN IN PHYSIOTHERAPY

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Nowadays, there are three main pain descriptors: nociceptive pain, neuropathic pain and nociplastic pain. The last one is the newest expression defining pain as "Pain that arises from altered

nociception, despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence for disease or lesion of the somatosensory system causing the pain." The implementation of modern pain neuroscience in practice is indicated as the most important for musculoskeletal physical therapists around the world. One of the examples are myofascial trigger points which are connected with central sensitization (one of the subtypes of the nociplastic pain). Central sensitization (CS) is defined as an amplification of neural signaling within the central nervous system that elicits pain hypersensitivity and ongoing neuronal excitation which outlasts the initial nociceptor input. Typical feature for that state are abnormally low the peripheral thresholds for pain from pressure, temperature, electrical, and other stimuli and it has been proposed that that trigger points may function as a peripheral mediator of CS.

Keywords: nociplastic pain, central sensitization, trigger points

MOOD DISORDERS

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Mood disorders continue to be a significant burden to those affected, resulting in significant illness-associated disability and premature mortality. In addition to mood disturbance, individuals also suffer from other transdiagnostic impairments (eg, anhedonia and cognitive impairment). Although there have been significant advancements in psychiatric treatment over the last few decades, treatment efficacy (eg, symptom remission, lack of functional recovery, and disease modification) continues to be an important limitation. Consequently, there is an urgent need to identify novel approaches capable of addressing the foregoing needs, providing the basis for the exploration of conceptual models and treatment opportunities that consider inflammation to be a key factor in mood disorder development. In part driven by metabolic comorbidities, a large proportion of individuals with mood disorders also have an imbalance in the inflammatory milieu. The aim of this review is to highlight evidence implicating inflammation in various effector systems in mood disorders, with a particular focus on the intercommunication with glutamatergic signaling, immune system signaling, as well as metabolic parameters (eg, L-methyl folate bioavailability). This article also briefly reviews novel and repurposed agents that are capable of targeting the innate immune inflammatory system and possibly correcting an abnormal immune/inflammatory milieu (eg, infliximab).

SPORT-RELATED TRAUMATIC BRAIN INJURIES – SHORT-TERM AND LONG-TERM EFFECTS ON HEALTH OF ATHLETES

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Background

Nowadays, sport is a symbol of the proper development of the physical and mental condition. But physical activity, especially professional, could be dangerous for athletes, because of the risk of injuries. Some of the most popular sports disciplines like martial arts, football or skiing are burdened with increased risk of traumatic brain injury.

Objective
This paper aims to give an overview of the frequency of sport-related traumatic brain injuries and the short-term and long-term consequences of these incidents.

Methods
Reviewer authors searched the Cochrane Library, Google Scholar and Medline database for scientific papers relevant to sport-related traumatic brain injuries published from 2010 to March 2020. The key search terms included 'athletic injuries', 'sports concussion', 'sports-related concussion', 'brain concussion', 'brain injury', 'traumatic brain injury' and 'head injury'.

Results
The relatively highest risk of head injuries was in American football, football and hockey. Some studies report that a significant number of head injuries are not reported by athletes. The most common traumatic brain injury is a concussion. In short-term, players who have concussion has a higher risk of sustaining another concussion. In the long-term, some studies have suggested an association between concussion and cognitive dysfunction. Assessment of long-term effects is problematic due to differences in research methodology and shortage of prospective studies.

Conclusion
It is necessary to awareness athletes, especially young players, about the consequences of head injuries. Also, it is required to conduct prospective studies on the long-term consequences of concussion.

COMPARISON OF NERVE ELECTROSTIMULATION PARAMETERS AFTER ITS INJURY FOR THERAPEUTIC PURPOSES

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Introduction
Spinal cord injuries occur most often among young people, resulting in permanent neurological deficits. On average, six months after the injury degeneration of cells' bodies and axons of motoneurons occurs. This is manifested by examinations results of peripheral impulse transmission below the level of injury. This phenomenocan be inhibited using electrostimulation of nerves by maintaining their function of nerve impulses transmission to the effector based on the orthodontic principle and by antidromic activation of the motoneurone cell body itself.

Aim
The purpose of this review is to present algorithms currently used during electrostimulation procedures and to select of the most optimal.

Methods
The review of the papers depicted using the the PubMed browser referring to current data on the effectiveness of peripheral nerve electrical stimulation particularly in patients after incomplete spinal cord injuries (iSCI). Articles containing data on specific parameters of the applied electrostimulation were selected and subjected to analysis.

Results
The literature on this subject lacks descriptions of electrostimulation algorithms that would be optimal considering a patient's individual physiology of nerve impulse transmission. Parameters applied during electrostimulation include: the pulse duration from 0.1 to 500ms, frequency from 1 to 100Hz and the current intensity up to 250mA.

Conclusions
Thanks to electrostimulation therapy, patients after spinal cord injury can maintain the function of peripheral nervous system while the injured spinal cord undergoes healing processes. In the following paper we will emphasize the necessity to standardise the stimulation algorithm as well as the size and placement of the electrodes in order to achieve the best clinical results.

Keywords: electrostimulation, incomplete spinal cord injury, nerve stimulation parameters

THE PROFESSION OF JET FIGHTER DOES NOT EVOKE CHANGES IN MUSCLES MOTOR UNITS ACTIVITY AND TRANSMISSION OF NEURAL IMPULSES IN UPPER EXTREMITIES NERVES

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Introduction and aim
Overloads associated with the work of a jet fighter pilot can lead to changes in the activity of muscle motor units due to the secondary neurogenic pathologies and/or the phenomenon of muscle's overload itself. Additional clinical manifestations of the pathology may include pain in the cervical and lumbosacral spine, superficial sensation pathologies or muscle paresis. The aim of the study was to determine whether the above abnormalities can be diagnosed by clinical methods and using clinical neurophysiology studies in jet fighter pilots.

Subjects and methods
Fourteen jet fighters with an average flight duration of 1711.7 hours, average age 38.2 years, with similar anthropometric characteristics, were interviewed regarding profession's duration, physical activity and the occurrence of pain symptoms measured in the VAS scale. The scope of dermatomal sensation innervation at C2-S1 was examined on both sides using the test method of perception with von Frey's filaments. The activity of the motor units of selected proximal and distal muscles of the upper and lower extremities during relaxation and maximal contraction lasting 5 seconds were examined by electromyography (EMG). The transmission of nerve impulses in the proximal and distal motor nerve branches of the upper extremities was diagnosed bilaterally in electroneurographic studies (ENG, F and M evoked potentials).

Results
Pilots of the examined group are characterized by moderate physical activity with periods of intensity increasing 2 times a week, the occurrence of cervical and lumbosacral pain was estimated at 1 in the VAS scale, surface perception studies did not reveal symptoms of hyperalgesia or hypoaesthesia in the scope of C2-S1 dermatomal innervation bilaterally. Comparison of the

results with the reference parameters of clinical neurophysiology studies in healthy volunteers of the control group (N = > 15) indicated the lack of pathology in terms of resting muscle tone and activity of motor units during the maximal contraction of proximal and distal muscles examined in both upper and lower extremities during EMG tests. In cases of recordings from the biceps brachii, abductor pollicis brevis, quadriceps femoris and extensor digitorum longus muscles, the increase in the amplitude parameter at a significance level of p = > 0.02–0.04 suggests higher efficiency of motor units than in the healthy population of the control group. The results of ENG examination of the neural impulses transmission in motor fibers of the median nerves peripherally and fibers of the ventral roots of the cervical spinal neuromers were characterized by evoked potential parameters similar to those recorded in the control group of healthy people.

Conclusions
The nature of the work of a jet fighter pilot exposed to significant overloads generally does not affect the activity of proximal and distal upper and lower extremities muscle motor units diagnosed on both sides with the electromyographic method. This factor also does not cause abnormalities in the surface perception of the C2-S1 dermatomes studied, or in the transmission of nerve impulses in the motor fibers of the upper extremities nerves and the C5-C7 spinal roots.

Keywords: jet fighter pilots, overloadings, cervical pain, back pain, electromyography, electroneurography

COMMUNICATION DISORDERS AS AN EARLY SYMPTOM OF MOTOR NEURON DISEASE (MND)

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Objectives
Motor Neuron Disease (MND) is a term that concerns the whole group of disorders with degenerative nature within both superior and inferior motor neuron. More often MND is considered to be a multisystemic illness with a special predilection to motor neurons. The most common symptom is asymmetric weakened strength in one limb, usually arm, manifesting in stiffness, slowing down and clumsiness of motion.

Material and methods
Two female and one male patient, at the age of 62, 62, 78 were referred to the Department of Phoniatrics and Audiology due to voice and speech disorders. The patients underwent complete phoniatric and neurological assessment. Phoniatric examination included perceptual voice evaluation, examination of the voice emission, evaluation of larynx phonological activity with videolaryngoscopy and acoustic voice analysis.

Results
Variety of the symptoms was connected with a damage of the nerve transmission to the internal muscles of the larynx. Abnormalities in the evaluation of the phonation activity confirmed objective examination of acoustic voice analysis (MDVP), which revealed significant disturbances in all parameters defining frequency perturbation measures, most of all jitter.

Conclusion

Communication disorders are rarely the first symptoms of MND, but they can appear as the main complaint in the first period of the disease when no more symptoms occur. Motor neuron disease of the larynx may occur in various forms depends on damaged muscles: dyspnea, hypofunctional dysphonia or atrophy of the voice muscles.