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АКТУАЛЬНІ ПРОБЛЕМИ ТА СУЧАСНІ ДОСЯГНЕННЯ**

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### 3MICT

<i>Addepalli Santhosh, Hloba N.S., Hloba A.A.</i>	
<b>ROLE OF GAIT ANALYSIS IN DIAGNOSTICS OF NEUROLOGICAL DISEASES.....</b>	9
<i>Amara Taha Morad, Isaeva I.N.</i>	
<b>FUNCTION AND DYSFUNCTION OF BARORECEPTORS .....</b>	9
<i>Bibhu Charan Nayak, Nataliia Hloba, Inna Isaeva</i>	
<b>APPLICATION OF CARDIOPLEGIC SOLUTION IN CLINICAL PRACTICE .....</b>	10
<i>Danylko M.</i>	
<b>COMPARATIVE ANALYSIS OF THE EFFICIENCY OF DIAGNOSTIC AND TREATMENT MEASURES BY WOMEN WITH ECTOPIC PREGNANCY.....</b>	11
<i>Grishenko D.O., Girka D.E., Isaeva I.N.</i>	
<b>FEATURES OF REGULATION OF CIRCULATION DURING EXERCISES .....</b>	12
<i>Hady Al-Rihani, Irina S. Karmazina</i>	
<b>CYTOKINES AND C-REACTIVE PROTEIN TRIGGER THE HEMOSTASIS SYSTEM IMBALANCE IN INFLAMMATION .....</b>	13
<i>Kucherenko I.O., Novikova D.S., Kotsur V.E., Hloba N.S.</i>	
<b>PECULIARITIES OF METEOPATHY LEVELS IN YOUNG PEOPLE FROM DIFFERENT COUNTRIES .....</b>	14
<i>Lance-Onyeiwu Isaac Akunna, Beulah Nwokotubo, Isaeva I.N.</i>	
<b>EATING ATTITUDE DISORDERS IN YOUNG WOMEN .....</b>	14
<i>Nana Aisha Onisarotu, Viktoriia Chemes</i>	
<b>ATTITUDE OF PATIENT'S TOWARDS MEDICAL STUDENTS IN THE UKRAINIAN POPULATION.....</b>	15
<i>Omar Bajbouj, Mahmoud Alsharif, Nataliia Hloba, Irina Karmazina</i>	
<b>ACUTE MYELOID LEUKEMIA .....</b>	16
<i>Peleshenko O.I., Kovalyov M.M., Isaeva I.N.</i>	
<b>DYNAMICS OF CARDIOVASCULAR SYSTEM INDEXES IN YOUNG PEOPLE WITH ARTERIAL HYPOTENSION DURING PHYSICAL ACTIVITY .....</b>	17
<i>Ponomareva A.M., Nagovskaya D.M., Shakina L.A.</i>	
<b>SKIN AGING AND METHODS FOR ITS PREVENTION .....</b>	18
<i>Sabareesh Sridharan, Baskar Kalaivani, Rajasaimani Kandeewari, Nataliia Hloba</i>	
<b>BLOOD PRESSURE LEVELS IN TRAINED AND UNTRAINED FOREIGN STUDENTS .....</b>	18
<i>Sader Abbas, Vasylieva O.V.</i>	
<b>THE EFFECT OF CHRONIC ELECTRICAL STIMULATION ON THE PHYSIOLOGICAL PROPERTIES OF MUSCLES IN PATIENTS WITH MYOTONIC DYSTROPHY.....</b>	19
<i>Shivan Amin, Vasylieva O.V.</i>	
<b>SALIVARY GLANDS AND THEIR PHYSIOLOGICAL ROLE .....</b>	19
<i>Siwar Dahamsha, Vasylieva O.V.</i>	
<b>VIOLATIONS OF COLOR VISION IN ARAB POPULATION.....</b>	20
<i>Zlenko V.V., Sokol E.N., Kovalyov M.M., Hloba A.A.</i>	
<b>PSYCHOPHYSIOLOGICAL PECULIARITIES OF ADAPTATION TO ELECTROMAGNETIC RADIATION OF RADIOFREQUENCY WAVE BAND IN PEOPLE WITH DIFFERENT TYPES OF AUTONOMIC REGULATION .....</b>	21
<i>Student V.</i>	
<b>STUDY OF BIODISTRIBUTION OF MAGNETIC NANOPARTICLES IN RAT MODEL EX VIVO USING ATOMIC-FORCE MICROSCOPY.....</b>	21
<i>Sukhov V.A.</i>	
<b>CYTOGENETIC FEATURES OF ADOLESCENTS WITH PHOBIC-ANXIETY DISORDERS .....</b>	22
<i>Topchii S.</i>	
<b>MORPHO-FUNCTIONAL FEATURES OF THE CEREBELLAR TONSIL .....</b>	23
<i>Tymbota M., Chernobay L.V.</i>	
<b>RESEARCH OF INTERSYSTEM INTEGRATION IN PROCESS OF ADAPTATION TO PSYCHO-EMOTIONAL STRESS IN CONDITIONS OF PHYSICAL LOAD .....</b>	24
<i>Vasylyev D.V., Vasylieva O.V.</i>	
<b>PHLEBOANGIODYSPLASIAS AND POSSIBILITIES OF THEIR CORRECTION AT KLIPPEL-TRENAUNAY-WEBER SYNDROME.....</b>	24
<i>Vedavyas Medikonduri, Hloba N.S., Hloba A.A.</i>	
<b>PHYSIOLOGY OF BONE HEALING .....</b>	25
<i>Velyka A.Ya.</i>	
<b>FUNCTIONAL CONDITIONS OF THE RAT KIDNEYS UNDER THE SALT LOAD.....</b>	26
<i>Wise Asiome, Irina S. Karmazina, Inna N. Isaeva</i>	
<b>SICKLE CELL DISEASE – UNDERLYING PHYSIOLOGICAL FACTORS FOR PROGNOSIS OF OUTCOME AND DEVELOPMENT OF TREATMENT .....</b>	27
<i>Yadav Balbir Singh, Roman V. Alekseyenko</i>	
<b>THE DIRECTIONS OF STUDENT'S HEALTH IN TERMS OF TRAINING LOAD EFFECTS ON THE BODY.....</b>	29
<i>Александрова Е.В., Глоба Н.С., Чернобай Л.В.</i>	
<b>ЭФФЕКТИВНОСТЬ СОЦИАЛЬНО-ПСИХОЛОГИЧЕСКОЙ АДАПТАЦИИ ЛИЦ ЮНОШЕСКОГО ВОЗРАСТА В ЗАВИСИМОСТИ ОТ УРОВНЯ НЕЙРОТИЗМА .....</b>	30

Addepalli Santhosh, Hloba N.S., Hloba A.A.\*

**ROLE OF GAIT ANALYSIS IN DIAGNOSTICS OF NEUROLOGICAL DISEASES**

Kharkiv National Medical University, Kharkiv, Ukraine

\*Ukrainian Scientific Research Institution of Prosthetics and Rehabilitation, Kharkiv, Ukraine

*santhosh29.addepalli@gmail.com*

**Background.** Gait is the systematic, rhythmic, coordinated, semi-rotatory movements of the lower limb, trunk, arm and head resulting in an interplay between loss and recovery of balance with constant change in the center of gravity causing forward propulsion of an organism in space. Normal gait is rhythmic and characterized by alternating propulsive and retropulsive motions of lower extremities; however, locomotor or neurological disorders can lead to appearance of specific gait patterns. Data on walking can be used to evaluate the effects of treatment, such as surgery, drugs, and/or assistive devices, on patients having gait pathologies or be a tool for long-term clinical monitoring of surgical patients (e.g., for patients who have received total artificial knees). Moreover, gait analysis can be used as a diagnostic tool for patients having musculoskeletal and/or neurological control problems and serve as an indicator of disease severity in such patients.

Normal gait is rhythmic and characterized by alternating propulsive and retropulsive motions of lower extremities. Gait includes 2 main phases – stance phase and swing phase. Stance phase begins at the instant that one extremity contacts the ground and continues only as long as some portion of the foot is in contact with the ground. It is approximately 60 % of gait duration. Swing phase begins as soon as the toe of one extremity leaves the ground & ceases just before heel strike or contact of the same extremity. It makes up 40 % of normal gait cycle.

Main methods of gait analysis comprise stride analysis, angular kinematic analysis, force plate and foot pressure analysis, and electromyographic (EMG) analysis. In stride analysis, the temporal sequence of stance and swing are qualified using either simple tools, such as a stopwatch and ink and paper, or electromechanical instruments, such as pressure-sensitive switches imbedded in shoe inserts or applied to the bottom of the foot. Angular kinematic analysis uses electrogoniometry, accelerometry, and optoelectronic techniques. Electrogoniometers are available in uniaxial and multiaxial configurations and are attached directly to the body segments of interest for the direct measurement of an angular displacement. Force plate and foot pressure analysis techniques involve the recording of information at the foot-floor interface during the stance phase of gait. Force plates measure the resultant ground reaction force beneath the foot and the location of its point of application in the plane of the supporting surface. Pressure plates or insoles measure the load distribution beneath the foot during stance. EMG is used to record muscle activation during walking. Both surface and intramuscular sensing techniques are used in gait analysis. It helps to explain motor performance underlying the kinematic and kinetic characteristics of gait.

Deviations of gait can occur due to pain, weak muscle, abnormal muscle activity, joint abnormalities, contractures around joints, limb length discrepancies etc., in some cases causing appearance of specific gait patterns that can be used in diagnostics of particular diseases and their severity.

In the early stages of idiopathic Parkinson's disease, gait is characterized mainly by reduced speed and decreased amplitude of leg movements, accompanied by reduced arm swing. Falls and complex gait disturbances such as freezing and start hesitation are usually confined to the later stages of Parkinson's disease. Flex posture of neck, trunk hip and knee occurs due to rigidity; specific are short steps lacking heel strike and toe off, loss of arm swing and pelvic rotation.

In cerebellar disease, gait is slow and wide-based, with irregular timing and amplitude of steps. Sway can be omnidirectional in lesions of the vestibulocerebellum, lateralized in hemispherical lesions and predominantly anteroposterior in atrophy of the anterior lobe. Apart from disequilibrium, a disturbance of trunk and limb kinematics and interlimb co-ordination is presumed to be responsible for gait disturbance.

**Conclusion.** Gait is a natural movement for human body, however, in reality it is the thoroughly coordinated complex of various movements of different body parts. Therefore, damage on any of its components will cause changes of gait patterns that helps in diagnostics and treatment assessment of a number of diseases. Stages of Parkinson's disease are characterized by different changes of gait, thus the diagnosis can be more precise while using gait analysis. For cerebellar lesions, gait research helps to estimate the site of lesion more precisely. Analysis of gait is not a new method, however, its value as a diagnostic instrument is really high, thus, it's necessary to continue its research and to improve methods used for that purpose.

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Amara Taha Morad, Isaeva I.N.

**FUNCTION AND DYSFUNCTION OF BARORECEPTORS**

Kharkiv National Medical University, Kharkiv

Scientific Supervisor: PhD Inna N. Isaeva

*inisaeva@ukr.net*

**Background.** The sympathetic nervous system and the kidneys exert considerable influence on the long-term control of blood pressure. The ability of the baroreflex to influence both these systems of arterial pressure regulation via the central nervous system suggests that the baroreflex may contribute to the chronic regulation of mean arterial pressure. The ability of the baroreflex to powerfully buffer acute changes in arterial