rone, estrogen, growth hormone/IGF-1), humoral factors (subliminal chronic inflammation) and environmental factors (diet, sedentary lifestyle).

Regular physical activity and proper diet are the only effective methods for both the prevention and treatment of sarcopenia, as per the EBM criteria. The most effective exercises are resistance exercises, particularly progressive resistance training, affecting both the increase in strength and muscle mass. In turn, the lack of physical activity — whatever the reason — triggers muscle atrophy. The second key element in treating sarcopenia is a diet modification: a proper protein and vitamin D3 intake. The recommended consumption equals 0.8–1.2 g of protein per kg of body weight per day. Proteins provide the appropriate course of post-exercise regeneration processes and are an important anabolic stimulus for skeletal muscle. Vitamin D3 stimulates the synthesis of myocytes, their differentiation, inhibits apoptosis, affects the conductivity and muscle contraction.

According to the EBM muscle weakness is considered as particularly predisposing to falls — for this reason sarcopenia is a fall risk factor. Other important fall risk factors are: balance disorders, vision disorders, cognitive function conditions, insufficient physical activity, age above 80. Due to such aging factors as depleting biologic reserves, slow reflexes and osteopenia or osteoporosis a seemingly harmless fall from own height can have serious consequences and the most serious are fractures, which in the elderly can cause not only pain and temporary immobilisation, but also a permanent impairment of mobility, functional deterioration, increasing morbidity and mortality.

In falls prevention the main Focus must be placed on improving the efficiency of gait, balance and coordination and efficiency of the cardio-respiratory system. A special attention should be paid on various forms of physical activity. Regular exercise of moderate intensity is recommended at least 3 times a week: Nordic Walking, Tai-Chi, dancing, brisk walking. The most effective exercise plans are those under the guidance of instructors in fall prevention centers (e.g. The Falls Prevention Service of Shropshire Community Health NHS Trust, Falls Prevention Team of Berkshire Healthcare NHS Foundation Trust) and individually tailored home exercise programs. ■

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Application of lectinhistochemistry to study the morphology and reactivity of the articular cartilage

Introduction. Glycoconjugates are one of the components of cells and extracellular matrix, its structure irreversibly change throughout the organs development, reflecting the formation of the organism as a whole. Lectins are the most informative factors that allow to identify glycoconjugates. The lectin receptors fundamental functions consist in the regulation of cells migration, differentiation, formation of cell-cell and cell-matrix interactions A.D. Lutsyk et al. (1989), A. Danguy (2004), J. Dennis et al. (2009), A. Varki et al. (2009), Sh. Yang et al. (2015). The study of the lectin receptors distribution in the articular cartilage in norm and under reactive changes modeling is an integral element to understand the joint formation regularities.

The aim of the study. To determine the morphology and reactivity of the articular cartilage by means of lectinhistochemistry application.

Materials and methods of research. Hip joint of white laboratory rats from the 1st to 90th day of their postnatal life were chosen as materials of the present study. The method of M.A. Voloshyn (1981) was used as a model of antenatal antigen influence when studying joint reactivity. Use of experimental animals was guided by the «European Convention for the protection of Vertebrate Animals used for Experimental and Other Scientific Purposes» (Strasbourg, 18.03.1986). Joint fragments were fixed in the Buen liquid, decalcinated in a 20 % formic acid solution, dehydrated in an ascending battery of alcohols and chloroforms, immersed in paraffin. Peanut (PNA-HRP), vicia sativa (VSA-HRP), soybean (SBA-HRP), wheat germ (WGA-HRP), perca fluviatilis (PFA-HRP) agglutinins were used. Obtained results were processed using semiquantitative analysis by means of $\chi 10$, $\chi 40$, $\chi 100$ lens magnifications. Superficial (tangential) articular cartilage zone, middle (transitional) zone of articular cartilage and articular cartilage in the area of joint capsule marginal transitional zone were studied.

Results of the study. Articular surface is covered by synovial lining cells which continue directly from joint capsule to articular cartilage. Synovial lining cells are clearly delimited from articular cartilage by lamina which shows pronounced expression of all studied lectin receptors. Throughout the apical (luminal) surface of synovial lining cells during the whole observation period, there is an intensive deposition of lectin-binding sites. Glycoconjugates distribution in synovial layer that covers the articular cartilage did not significantly vary to 90th day and did not considerably change after antigenic influence. In the middle zone, there is an intense expression of β-D-galactose residues from the 14th to 90th day, α-D-manose residues — from the 30th to 45th day; α-L-fucose residues level decreases from the 1st to 7th day and trace concentrations of it are subsequently detected. Articular cartilage close by joint capsule marginal transitional zone revealed an intense expression of β-D-galactose and N-acetyl-D-galactosamine (NacGal) residues from the 14th to 90th day; α-D-manose and N-acetyl-D-glucosamine (GlcNAc) residues from the 30th to 90th day. In the middle zone, antigen influence leads to strong expression of N-acetyl-D-galactosamine (NacGal) residues on the 7th day, lack of α-D-manose residues from 30th to 45th day and an appearance of significant expression of N-acetyl-D-glucosamine (GlcNAc) residues on the 30th day. Articular cartilage in the area of joint capsule marginal transitional zone after antigen influence revealed an intense expression of β-D-galactose and N-acetyl-D-galactosamine (NacGal) residues on the 7th day, strong decrease of β-D-galactose residues from the 14th to 30th day and

α-D-manose residues from 30th to 45th day, considerable expression of α-L-fucose residues from 30th to 45th day.

Conclusions. The surface of the articular cartilage is covered by synovial layer. Pronounced glycoconjugates expression in the synovial layer, in the middle zone and in the articular cartilage close by joint capsule marginal transitional zone is believed to be innate, protective, non-specific, lectin mediated barrier between articular cartilage and synovia on the one hand and articular cartilage and joint capsule on the other hand. Changes in the glycoconjugates distribution after antigen influence may indicate the tension of immunobiological relationships between joint components and can be risk factor for joint pathologies. ■

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Results from monitoring studies of students bone tissue structure and function at Kharkiv region

Currently, the prevalence rate of the musculo-skeletal system pathology takes one of the leading places in the structure of morbidity among children in Ukraine.

The purpose of the study was to analyze the results of osteopenia prevalence rates monitoring among children of school age of the large industrial region.

The monitoring of the structural and functional state of bone tissues among students of Kharkiv region was conducted in 2005–2015. 4200 children aged 9 to 18 were comprehensively examined.The study of structural and functional state of the bone tissues was performed on the heel bone using ultrasound densitometer «Sonost-2000». The evaluation of densitometry results was performed in full compliance with WHO guidelines.

Selective methods of mathematical statistics, together with the substantiation of representative number of observations, as well as methods of variation statistics leaning upon mean values and the error absolute (M ± m) and relative (P ± m) values, standard deviation (σ) with the assessment of authenticity following Student's test (not less than $p < 0.05$), were employed during the analysis of the study findings.

In 2005 the prevalence rate of osteopenia among children in the region accounted for 29.5 ± 3.1 %, on the average,wherein I degree of osteopenia was found among (43.3 ± 5.1) %, II — (36.7 ± 2.8) %, III — (20.0 ± 2.5) % of children. It should be noted that the OP prevalence among prepubertal aged children turned out to be higher than among children of pubertal age ((24.8 ± 1.8) % and (18.2 ± ± 2.0) %, respectively; $p < 0.05$). No significant gender differences in diagnosed OP identified. Though, it should be mentioned that the incidence increased only slightly among girls ((26.1 ± 2.5) %, compared with boys (24.3 ± 2.7) %, $p > 0.005$.

Over a span of the decade the negative dynamics in the structural and functional state of bone tissue was observed. Thus, in 2015, (41,2 ± 3,6) % of children were diagnosed with OP. It should be mentioned that the OP structure severity has changed: I degree osteopenia incidence constituted (32.8 ± 3.8) %, II — (46.1 ± 4.1) %, III — (21.1 ± ± 2.5) % of cases.

Thus, what is being observed is thei ncrease in the incidence of moderate OP, while there is the decrease in mild OP, while the III degree of OP prevalence remains at the same level as in 2005. Attention is also attracted by the fact of the significant increase in cases of OP among children of pubertal age, as opposed to prepubertal aged children ((35.6 ± 4.7) % and (23.9 ± 2.3) %, respectively; $p < 0.05$). In addition, almost 68 % of all the OP cases among students who live in the Kharkiv region constitute II degree of OP.

In 2015, no significant differences in the incidence of OP depending on the gender of the child have been noted. However, still there is a slightly increased incidence of OP among girls against boys ((27.3 ± 2.9) % and (25.1 ± 2.5) %, respectively, $p > 0.005$).

As for the OP distribution, in 2005 there prevailed II degree of osteopenia, which is associated with chronic diseases of the gastrointestinal tract and kidneys. While in 2015 the share of I and II degree of OP was almost on the same level. As for the I degree of OP risk factors, in 2015 the key factor contributing to the development of OP turned out to be malnutrition with excessive consumption of sweet carbonated beverages, snacks and fast food; deterioration of the ecological environment and sedentary lifestyle.

Thus, the analysis of OP prevalence monitoring among school children showed a significant increase in the incidence of I degree of OP, which clearly shows the deterioration in the quality of nutrition and lifestyle among modern students, i.e those factors that are subject to correction requiring minimum costs incurred by families themselves, as well as the state on the whole. ■

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Osteoathritis of large joints in the patients with diabetes mellitus

Introduction. Osteoarthritis has a great medical, social and economic influence on the society, and the most pressing problem is considered to be knee and hip joint diseases, as gonarthrosis (GA) and coxarthrosis (CA) are the most disabling localizations of the pathological process. Diabetes mellitus (DM) is one of the independent risk factors for the development of osteoarthritis.

The objectives of this research were the comparative evaluation of clinical, radiological and sonographic signs of GA and CA in the patients with different types of DN and in