

in the chest on the side of the operation, the anteroposterior size decreased by 19.8 ± 2.6 mm and transverse by 10.8 ± 2.6 mm. The degree of decrease in anteroposterior direction is more pronounced, that leads retraction of the thoracic wall by 19.8 ± 3.7 mm.

The deformation of the chest occurs due to a decrease in the angles of the inclination of the ribs: the III rib by 5.6 ± 1.7 , the VII rib by 3.9 ± 1.1 . Deformity of the spine consists in significant scoliotic changes, after pneumonectomy on the right on 3.1 ± 2.5 , after pneumonectomy on the left on 5.8 ± 4.2 . Kifotic changes of the spine are minimal (1.7 ± 1.8).

Conclusions. Performing of pneumonectomy leads to significant changes in the thorax: deformity of the chest on the operated side and scoliosis of the spine.

BREAST CANCER BRAIN METASTASIZATION: COMPARISON OF HIPPOCAMPAL AND CEREBELLAR PATTERNS

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Key words: brain regions, epithelial-mesenchymal transition, myosin light chain kinase, platelet-derived growth factor-B, signaling, transendothelial migration

Aim. To decipher key aspects of breast cancer (BC) brain metastasization related with blood-brain barrier (BBB) transposition by malignant cells, their phenotype, and migratory and proliferative features, as well as to establish the regional pattern of the brain metastatic process.

Material and Methods. Hippocampal and cerebellar sections of mice inoculated with BC cells (BCCs) were studied along metastasization (5 hours, 3, 7, and 10 days) by histologic/immunohistochemical/immunofluorescence analysis.

Results and Discussion. Brain metastases were detected from 7 days onwards, with greater tumour area observed in the hippocampus. Accordingly, a higher number of cells expressing the proliferation marker Ki-67 and platelet-derived growth factor-B was observed in the hippocampus. Malignant cells entering in the parenchyma expressed the mesenchy-

mal marker vimentin, whereas in metastasis the epithelial marker pan Cytokeratin was observed as well, particularly in the hippocampus. Moreover, an earlier expression of Rac 1 was observed in the hippocampus, compatible with mesenchymal-like migration. The brain metastatic process was accompanied by BBB alterations, depicted by impairment of tight and adherens junctions' proteins claudin-5 and β -catenin, and enhanced caveolae protein's expression, together with an earlier activation of myosin light chain kinase in pericytes, in the hippocampus.

Conclusions. These results reveal the alterations occurring in BBB endothelial and mural cells along brain metastasization, and the ability of BCC to express growth factors and migration-associated proteins, essential for their survival and invasiveness. Moreover, they reveal that brain metastasization of BC occurs earlier and more severely in hippocampus than in cerebellum. Supported by FCT (Portugal) and NKFIH/OTKA (Hungary).

MORPHOMETRIC ANALYSIS OF THE PATTERNS OF CALCANEAL FACETS FOR THE TALUS

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Key words: calcaneus; facets for the talus; variations; morphometry

Background. The literature describes different patterns of calcaneal facets for the talus in terms of whether some calcaneal facets are connected or separated from each other or completely absent.

Aim. The aim of this study was to establish the patterns of calcaneal facets for the talus, calculate their total size and analyse data considering the gender.

Material and Methods. Study involved 33 calcanei. The gender was established according to average parameter values standardly used for that purpose. The calcanei were photographed using a digital camera. The patterns of calcaneal facets were determined by comparing these photographs with photographs from the literature. ImageJ program was used to measure gender determination parameters and size of calcaneal facets.

Results and Discussion. Pattern 1 was the most commonly found in the study sample (51.52%), then pattern 2 (42.42%) and pattern 3 (6.06%). Among female bones the most frequent was pattern 1, while among male bones patterns 1 and 2 were present

with the same frequency. Patterns 1 and 2 have larger contact surface for the talus compared to pattern 3. Male bones have larger contact surface for the talus than female bones.

Conclusions. The sum of pattern 1 and pattern 3 frequencies in our study was high, so we concluded that our population is more prone to subtalar arthritis. Knowing how frequent are the different patterns of calcaneal facets for the talus in a certain population is important for orthopaedic surgeons when performing foot osteotomy.

THE PECULIARITIES OF HUMAN AND ANIMAL HUMERUS SYSTEMIC ORGANIZATION AT THE DISTAL EPIPHYSIS LEVEL

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Key words: *system organization, humerus, human, osteometry, factor analysis*

Aim. The main purpose of research is to detect the general patterns and characteristics of the Humerus (H) systemic organization (SO) of the man's and animals with different volumes of movements in the elbow joint at the level of it's distal epiphysis (DE).

Material and Methods. The H Bos taurus Taurus (B) R40/L40, Orycolagus cuniculus (O) — R40/L40, Canis lupus familiaris (C) — 39R/39L, Homo sapiens (H) — R77/L77 were studied using osteometry. There are 23 homologous structures were measured on each bone. A group of angular structures of the DE: corner of torsion, tilt of the diaphysis, the angle of groove of the block up to the plane of condyles. All values were analyzed involved calculating confidence intervals at $\alpha \geq 0.05$ and multilevel Maximum likelihood factors Analysis (FA) with the rotation Equamax normalized and taking into account the lateralization of bones with the calculation of factor loads (FL).

Results and Discussion. There were no differences in the magnitude of the R/L angles. The value of the twist angle varies in the O-B-H-C series from 46 to 81°. The angle of inclination of the diaphysis increases in the series H-B-O-C is from 6 to 37°. Angle of the groove of the block, representing the rotation of the lower limb-O-C-B-H is in the range 46–59°.

Conclusions. The results of the study revealed the presence of a latent asymmetry of the SO of the H at the level of it's DE, which is caused by a change in the number and volume of movements in evolution.

STUDY OF MYOCARDIAL REMODELING MARKERS IN EXPERIMENTAL HISTOTOXIC HYPOXIA

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Key words: *myocardium, rats, fibrogenesis, hypoxia*

Background. In modern works, there are isolated data concerning the problem of cardiac remodeling and fibrogenesis.

Aim. The available data are ambiguous, so the goal of the study is to study the processes of fibrogenesis and inflammation in the myocardium of sexually mature rats.

Material and Methods. The study was conducted on 25 mature male Wistar rats weighing 220–310 g. The control group was represented by 5 intact animals. A solution of cobalt chloride for the modeling of histoxic hypoxia was introduced through an atraumatic probe into the stomach at a dose of 4 mg/kg, daily once a day for 30 days.

Results and Discussion. The conducted study showed that changes in the myocardium developed, which, according to morpho-functional manifestations, could be attributed to varieties of toxic cardiomyopathy. Hydrophobic dystrophy was observed in the cytoplasm of cardiomyocytes, myocytolysis foci appeared. Masson's staining revealed an excessive amount of collagen fibers in the interstitium, and also in the perivascular space, which apparently made it more difficult to transport substrates and oxygen from the bloodstream to the working cells under hypoxic conditions. Perivascularly and in interstitium, intensely colored macrophages and fibroblasts appeared. Remodeling of the myocardium, which occurs during hypoxic damage, is accompanied by a reorganization of the connective tissue stroma. At the same time, the enzymatic cleavage of the previously existing connective tissue fibers develops and de novo synthesis of interstitial substance according to the new conditions of mechanical loads. The leading role in this process is assigned to the enzymes of the metalloproteinase group. Expression of MMP-9 metalloproteinase was characterized as weakly positive (+) and positive (++) in some parts of the myocardium. Increased expression