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Book of Abstracts

correlation between TASL and maximal MB thickness (r=-0.674; p=0.004).

Conclusion: In subjects with hypertension, MBs demonstrated their protective role in evolution of coronary atherosclerosis and were of no significant importance for the onset of coronary events.

O70

IMPLEMENTATION OF INDUSTRIAL APPROACH OF X-RAY COMPUTED MICROTOMOGRAPHY IN DEVELOPMENTAL BIOLOGY

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X-ray computed microtomography is a non-destructive method for imaging inner structure of materials. Thanks to the possibility of fast measurement (in order of minutes to hours) and simple preparation of the sample, this method finds application not only in industry or medicine, but also in scientific fields including developmental biology. Modern developmental biology requires both qualitative and quantitative 3D information about studied objects, which is not usually provided by conventional 2D imaging methods. In addition, the complexity of biological structures often requires a comprehensive approach for quantitative comparison including determination of dimension, surface or volume. The goal of this work is to provide connection between technical and biological field. It brings new possibilities in imaging, data processing and evaluation of 3D models. Diverse structures were analyzed by different approaches on the selected examples from developmental biology. In addition, quantitative analysis usually used in industry were applied to segmented 3D models e.g. wall thickness analysis of facial cartilage, shape comparisons of nasal capsules, automatic quantification of the cells in the limb etc. A complete procedure consisting of staining, CT measurement and subsequent data processing is discussed.

S25

POST-TRANSCRIPTIONAL REGULATIONAL MECHANISMS IN MOUSE INTESTINAL STEM CELLS AND COLORECTAL CANCER

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Intestinal regeneration and tumorigenesis are believed to be driven by intestinal stem cells (ISCs). Elucidating mechanisms underlying ISC activation during regeneration and tumorigenesis can help uncover the underlying principles of intestinal homeostasis and disease including colorectal cancer. Here we show that *miR-31* drives ISC proliferation, and protects ISCs against apoptosis, both during homeostasis and regeneration in response to ionizing radiation injury. Furthermore, *miR-31* has oncogenic properties, promoting intestinal tumorigenesis. Mechanistically, *miR-31* acts to balance input from Wnt, BMP, TGFβ signals to coordinate control of intestinal homeostasis, regeneration and tumorigenesis. We further find that *miR-31* is regulated by the STAT3 signaling pathway in response to radiation injury. These findings identify *miR-31* as a critical modulator of ISC biology, and a potential therapeutic target for a broad range of intestinal regenerative disorders and cancers.

P11

STRUCTURE CHARACTERISTICS OF THE EARLY STAGES OF SKELETAL MUSCLES REGENERATION UNDER CHRONIC HYPERGLYCEMIA CONDITIONS

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Introduction: Early stages of skeletal muscles regeneration are characterized by the development of acute inflammation and progenitor cells activation. Taking into account the proved negative effect of chronic hyperglycemia on myosatellite cells activity and surviving, the aim of present work was to investigate the microscopic features of early phases of skeletal muscles regeneration under conditions of chronic hyperglycemia.

Methods: 18 male Wistar rats were divided into intact, control and experimental groups (6 in each group). Chronic hyperglycemia was modeled by streptozotocin and nicotinamide administering. Mechanical trauma was reproduced in triceps surae muscle.

Results: 7 day after triceps surae injury of control animals significant amount of degenerative fibers were observed. In the central zone isolated myotubes with centrally localized nuclei were visualized. Neutrophils in the lesion area were practically absent. At the edges of the wound, activation of fibroblast cells was revealed. The structural features of skeletal muscle damage zone of rats with chronic hyperglycemia were large hemorrhages and high number of necrotic modified muscle fibers. Along with this, connective tissue contained a large number of macrophages and neutrophils. Signs of myosatellite and fibroblast cells activation were not observed.

Conclusion: Obtained results revealed that chronic hyperglycemia suppresses the activity of skeletal muscles regeneration and resulted in prolongation of necrosis and degeneration phase and weak activity of progenitor cells.

P5

THE POSTTRAUMATIC REGENERATION OF LONG BONE DIAPHYSIS IN ANIMALS WITH CHRONIC HYPERGLYCEMIA

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Background: The musculoskeletal system diseases are the most frequent cause of temporary incapacity for work and disability that leads to significant economic burden. The patients with chronic hyperglycemia have the higher risk of fractures. The present work relates to the investigation of the structure features of posttraumatic regeneration of tibia in rats under conditions of the induced chronic hyperglycemia.

Methods: The chronic hyperglycemia in animals from the experimental group (10 rats) was induced by the streptozotocin. Three

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months after, the defect was applied in location from the medial surface of middle third of the tibia to marrow canal. The histomorphometric study of the defect was carried out on the third day.

Results: The study of tibia defect in the rats of experimental group revealed the decreasing of the macrophages number by 67.84% (p=0.0001) and the number of fibroblast by 35.42% (p=0.0001) compared to control group. At the same time the number of neutrophils and lymphocytes was higher by 94.21% (p=0.0001) and 88.95% (p=0.0001), respectively. The cells of osteoblastic differon were not revealed in animals with chronic hyperglycemia.

Conclusion: Obtained results suggested that chronic hyperglycemia causes the change in cell composition of regenerate at the early stages of osteogenesis that leads to delay in the osteoblastic differon cells proliferation and differentiation.

L2

HISTOLOGICAL EVALUATION OF IMPLANTED BIOMATERIALS

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Introduction: The lecture reviews histological evaluation of experimental studies performed in animal models when evaluating tissue integration of bioengineered composite, textile, and metallic materials. This is illustrated in healing of bone defects, in reinforcement of abdominal wall closure, and incorporation of artificial vascular grafts. Special attention is paid to using X-ray microtomography (micro-CT) as an alternative to optical microscopy.

Methods: In bone samples, the pros and cons of all three possible approaches to the processing and morphometric analysis are illustrated: (i) histological sectioning of demineralized bone samples, (ii) grinding sections processed from bone samples without prior demineralization, and (iii) microcomputed tomography (micro-CT) analysis of bone samples without sectioning. In soft tissues routine histology is combined with a variety of immunohistochemical methods. All the morphometric methods demonstrated in this review are based on stereology.

Results: Histomorphometry of undecalcified ground sections or demineralized paraffin sections of bone yielded data on bone volume and the thickness of cortical compact bone that was comparable with three-dimensional micro-CT examination. Open source software for calibrating quantitative micro-CT assessments was made available to minimize the amount of error produced by image segmentation of biological materials with a low contrast and overlapping radioopacity.

Conclusion: Morphometrics should be based on systematic uniform random sampling of tissue blocks, histological sections, and microscopic fields of view. When describing the tissue reaction to biomaterials, using continuous variables brings benefits as these can be processed using standard statistical procedures. Design-based stereological techniques are presently the methods of choice in quantitative histology.

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LENGTH OF THE STYLOID PROCESS OF THE TEMPORAL BONE AND ITS RELATION TO SEX, AGE AND LATERALITY

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Introduction: The styloid process (SP) is a slender bony projection, located on the inferior surface of the temporal bone just anterior to the stylomastoid foramen. The length of the SP varies considerably. An elongated SP may cause symptoms associated with Eagle's syndrome. The present study aimed to investigate the length of SP in relation to sex, age, and laterality, and to establish the incidence of the elongated SP among adult Bulgarians using computed tomography (CT) imaging.

Material and Methods: Sixty-three individuals (27 males and 36 females) were included in the study. All subjects were scanned using a CT scanner Toshiba Aquilion64. The bone tissue was segmented using Slicer 3D software and generated 3D models were exported in STL format. The length of the SP was measured medially from the base to the tip of the process. It was calculated as Euclidean distance based on the 3D coordinates of the picked points. The length was measured bilaterally. The sex, age, and bilateral differences were evaluated for statistical significance.

Results: There were no statistically significant differences in the length of SP in relation to sex, age, and laterality. The incidence of the elongated SP (>40 mm) was 6.3%. Such a SP was observed only in males and it was more frequently found on the left side.

Conclusion: The length of SP is not significantly influenced by sex, age, and laterality.

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