Scientists are trying to reconstruct the skull bones in record time

SibFU biotechnologists constructed and researched biological hybrid tissue-engineering systems made of biodegradable polymers «Bioplastotan» in combination with osteoblasts. In 2017, an article concerning the results of conducted research was published in the Journal of Biomedical Materials Research: Part A.

According to **Ekaterina Shishatskaya**, an Academic Advisor of the research and Professor of the Russian Academy of Sciences, the achieved results turn a new page in solving an urgent and socially relevant problem of reparative bone shaping: *"The development of effective means of bone tissue's bioengineering is an actual problem of restorative medicine. On the one hand, the morphological properties of bone tissue (a high content and density packaging of highly mineralized fibrous matrix) provide a high mechanical resistance to bones, but on the other hand, they lead to fractures as a result of excessive pressure. The bone tissue often incapable of the full restoration of defect."*

The acutest problem, in the opinion of scientists, is reconstructing of the skull bones. Due to the specific nature of embryonic development and histophysiologic characteristic, the skull bones have low recovery properties. The analyses of long-term clinical observations show that the recovery of post-traumatic defects of flat skull bones proceeds slowly — it takes several months and even years. In some cases, a damaged fragment can be filled with connective tissue, which grows faster and scars, instead of bone tissue. Insufficient resistance of connective tissue, in contrast with bone tissue, is the reason of its functional insolvency which leads to the significant risks.

Anna Shumilova, Candidate of Biological Sciences, did her thesis on this subject: *"The first stage implied the development of polymeric constructions obtained by different methods and the examination of their ability to provide differentiation and proliferation of stem cells to osteoblast cells. At the second stage, constructed hybrid implants were researched by the help of the model defect of laboratory animals' flat skull bones in contrast with commercial materials. According to molecular, biochemical, histological analyses and X-ray computed tomography, the solvency of the developed implants has been proved, particularly in combination with osteoblasts which provided the full cover of the entire defect within 120 days."*

The achieved results of application of biodegradable polymers, which belong to polyhydroxyalkanoates, has no parallel in the world and far exceeds the data received by implementation of polylactides and other polymeric materials.

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