

Sternotomy is the method most often used during cardiac- and thoracic surgery. However after this kind of surgery, complications related to healing of the sternum, emerge in 5% of the patients. The most common problem is a so called unstable sternum, which can lead to breath disturbance chest pain, mediastinum infection and extended hospitalisation. Not so long ago the unstable sternum in 50% lead to death, however the progress in medicine as well as the development of new technologies reduced this ratio to 10%, which is still a very serious problem.

To ensure the well-being of patients and their faster convalescence, the research on breeding chondrocytes in artificial environment has been started in the Experimental Laboratory of the American Heart of Poland's R&D Centre. The technique using chondrocyte cultures is commonly used in orthopaedics for treatment of knee defects and enables impressive results. However, the use of articular cartilage cells for treating cartilage injury was not reported up to now. Thus we propose the use of allogeneic chondrocytes from the sternum cartilage present in fibrin glue, which can be directly applied on the sternum wound after sternotomy to speed up its regeneration.

The research will be conducted on domestic pigs. They will undergo surgery the same way as it is done in cardiac surgery with chest opening. In usual proceeding the sternum remains extended for at least 60 minutes. Afterwards in the study group, on the edges of the created wound, previously obtained allogeneic chondrocytes cultures suspended in a fibrin glue will be applied. The fibrin glue with no chondrocytes will be used in the control group.

The proposed study is the first of this kind implemented in vivo, in big animal i.e. the domestic pig. The results of the study will allow assessment of the possibility of in vitro breeding of chondrocyte cells in artificial environment. The study will answer the question whether the implantation of these cells after sternotomy is safe and affects tissue regeneration after its damage.

Positive results of the study, will enable further steps of the research. The use of human cells and first phase clinical tests will follow. The obtained results can contribute to limiting post-cardiac surgery complications, including deaths. In consequence the patients' prognoses and their quality of life enhance.