Hana Kolesová, Ph.D. – Scientific Focus

EMBRYONIC DEVELOPMENT OF THE HEART AND THE DEVELOPMENT OF CONGENITAL HEART DISEASES

We are focused on embryonic development of the heart at different stages and study arising of congenital heart defects when normal development is disrupted. We analyze not only the heart muscle (myocardium), but also the development of the heart's vascular supply, cardiac innervation and development of cardiac conduction system. We also study the possibilities of heart regeneration during embryonic development.

We mostly work with mouse, chicken and quail embryos to model various cardiac pathologies.

We use both classical methods of morphological analysis (histology, immunohistology) and modern imaging methods of whole hearts (μCT, confocal microscopy and advanced image analysis). We use optical mapping and VEVO ultrasound imaging to analyse the physiological properties of embryonic hearts. We study the molecular mechanisms responsible for congenital heart defects using RNAscope and RNA sequencing.

The main signaling cascades we are currently investigating are HIF1α signaling, Notch signaling pathway with Shh signaling.

We collaborate with several laboratories at the 1st Faculty of Medicine, Faculty of Sciences of Charles University, Academy of Sciences and Biocev. We also have foreign collaborations, mainly in Germany and USA.