

Abstract

The cardiovascular system is the first functional system that develops in vertebrates during embryonic development. Its irreplaceable function is the transport of nutrients and the removal of waste products. During the development the heart not only grows, but also acts as a pump that drives the blood circulation of the embryo. With advancing development, it is necessary to ensure an adequate supply of oxygen to the heart, for that reason coronary arteries are formed. Each cardiomyocyte is surrounded by at least one capillary, therefore the interaction between cardiomyocytes and endothelial cells plays an indispensable role in the proper functioning of the heart. Understanding, how cardiomyocytes and endothelial cells communicate, is essential for medical research in cardiac tissue regeneration.

A number of factors involved in coronary development are described in the literature. However, these factors are described as separate signaling pathways, not as a system of mutually interacting mechanisms.

The main goal of my bachelor thesis is to connect individual signaling cascades important in cardiomyocyte-endothelial cell communication and describe their interactions. The main factors overviewed are VEGF, Notch, PDGF, Angiopoietin and others. Factors function and signalization is reviewed in details. Pathologies that are associated with mutations in signaling cascades and the possibility of using factors in medicine are also mentioned.

This work is going to be published in the review „Development and pathologies of coronary microvasculature and its crosstalk with cardiomyocytes“ (Neffeová et al., 2021, accepted), in which I wrote a chapter on the communication of cardiomyocytes with endothelial cells of the coronary microcirculation.

Key words: angiogenesis, signaling molecules, coronary vessels, heart, embryonic development