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Telocytes & stem cells: An emerging cardiac cell therapy

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Telocytes (TCs) represent a novel cellular type identified by electron microscopy in 2010 in interstitial spaces of various cavitary and non-cavitary organs (see www.telocytes.com). TCs were found in vertebrates: fish, reptiles, birds and mammals, including humans. In heart, TCs are present in epi-, myo- and endocardium, having strategic positioning among cardiomyocytes, capillaries and nerve endings. TCs have a small cell body with specific prolongations, named telopodes (Tps). These are extremely long cellular processes (tens to hundreds of micrometers). Tps consist of an alternation of very thin segments - podomers (about 70 nm – clearly below the resolving power of light microscopy), and podoms - dilated portions accommodating mitochondria, endoplasmic reticulum and caveolae.

Cardiac TCs have a specific immunocytochemical 'portrait', as well as a specific microRNA signature. Moreover, TCs establish homo- and heterocellular junctions, making a 3D ultrastructural network. TCs release numerous extracellular vesicles, thus sending macromolecular signals to neighboring cells and thereby modifying their transcriptional activity, eventually. By electron microscopy,we identified, cardiac stem-cells niches in subepicardium, and by electron tomography complex nanoscopic contacts between TCs and resident progenitor cells. Apparently, Tps provide tracks for the 'evolution'of precursor cells towards mature cell types and their integration into organ microscopic architecture. TCs, via their paracrine (e.g. VEGF, cytokines, chemokines, NO) or microcrine (miRs) secretion might produce an adequate microenvironment for precursor cells. Last but not least, TCs are involved in neoangiogenesis after myocardial infarction. TCs (in tandem with stem cells) could be the 'rising stars' for regenerative medicine

Biography

L.M. Popescu, MD, PhD Dr. h.c.mult., is currently Professor of Cellular and Molecular Medicine, University of Medicine and Pharmacy, Bucharest, and Head of the National Institute of Pathology, Bucharest, Romania. With over 130 scientific articles in peer-reviewed journals, he is cited more than 2000 times (Hirsch index of about 30). He is Editor-in-Chief (and founder) of the Journal of Cellular and Molecular Medicine (Wiley/Blackwell), 5-year IF : 5.8. In 2012, Prof. Popescu was awarded the 'Medal of Merit' of the International Academy of Cardiovascular Sciences for his outstanding achievements in cardiovascular research. He is credited with the discovery of telocytes.

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