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Telocytesand stem cells in myocardial regeneration

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Abstract

Telocytes (TCs) are a newly described (2010) distinct type of interstitial cells. TCs are defined by their very long prolongations (hundreds of micrometers) called telopodes (Tps); see www.telocytes.com and Wikipedia. Patch voltage-clamp data shows that TCs are unexcitable cells. TCs were found in many organs where they form a 3D network among the organ-specific cells and blood capillaries, nerve endings and immunoreactive cells. Beyond the ultrastructural portrait of TCs, the immuno-phenotype, gene profile and the microRNA imprint were also described.Unlike other interstitial cells, TCs are key-players in intercellular signaling.Tps establish direct contacts (junctions) with neighboring cells (long distancesignaling). Short distance (local) signaling of TCs is achieved by extracellular vesicles, mainly by shed vesicles (*in situ* electron microscopy indicated an average diameter of 180 nm; n= 6,094).

Cardiac TCs have been identified in epi-, myo- and endo-cardium. Of particular interest are the junctions (nanocontacts) between stem and/or progenitor cells and TCs in myocardium stem niche in situ, as found by electron tomography. Cultured cardiac TCs release growth factors (VEGF), cytokines (IL6) and chemokines (CXCL-1), presumably through shed vesicles (SELDI-TOF-MS and xMAP Technology). Using the membrane impermeable calcein and RNA oligoswe found *in vitro* that cardiac TCs can shuttle microRNAs to other cells through vesicles. Cardiac TCs co-cultured with cardiac stem cells in a transwell system (400 nm pores) enhances stem cell differentiation to cardiac myocytes. This makes the tandem TCs-Stem cellsa valuable candidate for myocardial regeneration.

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 140 scientific articles in peer-reviewed journals, he is cited about 3000 times (Hirsch index above 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.