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The release of transitory amplifying cells from cardiac stem cell-containing "cell-in-cell structures" and their cardiac differentiation is a main way of cardiomyogenesis after transient myocardial ischemia in rat

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Despite intensive research of Cardiac Stem Cell (CSC) biology, there has been an open question whether CSCs or adult cardiomyocytes (CMs) are responsible for renewal of adult mammalian myocardium. In addition, it is not clear why CSCs are not able to regenerate cardiac tissue after myocardial infarction (MI). Using *in vitro* and *ex vivo* experiments on myocardial cells obtained from newborn and young adult rats, we described the phenomenon of intracellular development of CSCs inside CMs with formation of "Cell-In-Cell Structures" (CICSs). Later, CSC-containing CICSs were also found in the myocardium of adult mammals, including human. Here, we present the data on cardiomyogenic differentiation of CICS-embedded CSCs obtained in the *in vivo* rat model of permanent left coronary artery ligation as well as myocardial ischemia-reperfusion. Two weeks, after 40-min ischemia followed by reperfusion, CSCs were found to be actively involved in myogenesis in the peri-infarct area and remote to the infarct area locations. Selection of areas was confirmed by the ultrastructural analysis of myocardial fragments. Importantly, new CMs were produced not only by means of formation of CSC-derived colonies, but also by differentiation of Transitory Amplifying Cells (TACs) released from pre-existing CICSs. Permanent coronary ligation also caused formation of new and opening of pre-existing CICSs; however, this was not accompanied with increased myogenic differentiation of TACs. Therefore, despite the presence of small colonies in intact areas of the heart, MI is associated with severe inhibition of cardiomyogenesis in infarct and peri-infarct areas.

Biography

Galina B. Belostotskaya has graduated from Leningrad State University in 1970 and defended her thesis in 1984 on "Radiobiology". Currently, she is working at the Sechenov Institute of Evolutionary Physiology and Biochemistry of Russian Academy of Sciences as the Head of Cyto-analysis Centre. She has been studying the Resident Muscle Stem Cells and has published more than 15 papers in Russian journals and several articles in *Cell Cycle* (2014, 2015), *Bioelectromagnetics* (2014) and *Carbohydrate Polymers* (2015). Being the Head of Investigations, she has released 7 specialists and 2 graduate students.

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