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C-kit positive cells of the heart consists of mast cells and cardiac progenitor cells populations  
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Background: Stem cell therapy is actively being explored as a novel method to regenerate damaged myocardium. It has been established that the heart contains a reservoir of stem cells (c-kit+, sca-1+, isl-1+) having the capability for ex vivo and in vivo differentiation toward the vascular and cardiac lineages and showing cardiac regeneration potential. The aim of the present study is to characterize cardiac stem cells in the human heart tissue (appendix of the right atrium) harvested during coronary artery bypass grafting.

Material and Methods: We analyzed samples of heart appendix by fluorescence-activated cell sorting and immunohistochemical method for markers of stemness (C-kit), hematopoietic cells (CD34, CD45), blood lineage markers (Lin) and tryptase. We isolated c-kit cells using explant culture and anti-c-kit antibody. Coculture with neonatal rat cardiomyocytes was used to analyze cardiomyogenic potential of c-kit cells.

Results: C-kit positive cells consist about 0.79±0.32% of total cell population of appendix of the right atrium and were largely negative for CD34 and cocktail of blood lineage markers Lin. We identified two populations of C-kit positive cells: about 60% of cells were C-kit(+)CD45(+), which might populate the heart via circulation and another one were CD45 negative (40%). Immunohistochemical research of autopsy samples of left ventricular tissue showed that majority of C-kit are distinctly positive for CD45 and tryptase, suggested that they are mast cells and only a small population of C-kit(+)CD45(-)triptase(-) cells represent human cardiac stem cells.

Using magnetic cell sorting c-kit positive cells could be successfully isolated from human heart tissue and expanded in vitro. C-kit cells undergo cardiomyogenic potential when cocultured with neonatal rat cardiomyocytes.

Conclusion: Thus appendix of the right atrium could be an alternative source of autologous cardiac stem cells.