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Resident Cardiac Stem Cell from the Left Atrial Appendage

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The concept of the heart as a terminally differentiated or post-mitotic organ unable to regenerate working myocytes has been at the center of cardiovascular research and therapeutic developments for the last fifty years. However, in the past few years, compelling evidence has accumulated suggesting that the heart has at least some regenerative potential, and its reaction to pathologic loads can accompanied by myocyte proliferation. This has been demonstrated to be dependent on age and co-morbid conditions. Given the fact that tissue stem cells exist in many organs throughout an organism's lifetime, it seems likely that these cells are involved in the pathogenesis of many diseases. As it is likely, inferring from other organs, that niches of stem cells are to be found mainly in crypt-like area, the left atrial appendage (LAA) is a very likely place to find stem cells.

Methods: Isolated murine LAA tissue was cut into small pieces, digested three times with trypsin and collagenase IV. Te explants was then cultured in CEM. After a period of 3 weeks, a layer of cells is generated from adherent explants.

Results: We isolated undifferentiated cells that grow as self-adherent clusters-cardiospheres from explants of adult LAA from murine hearts. We verified that these cells express stem cells markers/antigens (cKit and SCA1) and can spontaneously differentiate, express cardiomyocyte markers (GATA4 and MEF2c) and even spontaneously contract in culture. These cells form colonies, and self-renew. Implants from LAA tissue on ventricular myocardium showed migration of donor cardiomyocytes into receptor tissue.

Discussion: The LAA can potentially be used as a “biological Band Aid” to assist in infarction limitation and repair. These cells could also be relevant in understanding the mechanisms driving endogenous cardiomyocytes to reenter the cell cycle and the search for strategies to transplant cardiac progenitor cells.