Cardiovascular Disease and Human Adult Stem Cells

1. Bone marrow and adipose tissue-derived human adult stem cells, when healthy and injected into a coronary artery or directly into heart muscle, improve coronary blood flow and myocardial function in patients with acute myocardial infarcts and ischemic cardiomyopathies.

Cardiovascular Disease and Human Adult Stem Cells

2. Human adult mesenchymal and pre-mesenchymal stem cells, aldehyde dehydrogenase expressing, and CD 34+ cells, when healthy, improve coronary blood flow in patients with ischemic cardiomyopathies and peripheral blood flow to ischemic limbs.

Cardiovascular Disease and Human Adult Stem Cells

3. Mesenchymal and pre-mesenchymal stem cells appear to not be rejected when given to different individuals.

Cardiovascular Disease and Human Adult Stem Cells

4. Human adult CD 34+ stem cells given to SCID mice with experimentally-created myocardial infarcts fuse with reversibly injured murine cells, turn on the cell cycle, and generate new cardiac myocytes. They also differentiate into smooth muscle cells, endothelial cells, and cardiac myocytes at a low level. These cells improve LVEF for at least 25 weeks after injection (probably longer) and persist for at least one year within the heart. The improvement of LVEF is related to improved coronary blood flow.

Cardiovascular Disease and Human Adult Stem Cells

5. Human adult stem cells taken from elderly patients with severe CHF and ischemic cardiomyopathies are sometimes dysfunctional, i.e. they cannot reproduce themselves in culture. When these cells are placed into the human heart, they do not enhance cardiac function.

Cardiovascular Disease and Human Adult Stem Cells

6. The opportunities for the future are:
   A. Determine how to resuscitate aging, dysfunctional human adult cardiac stem cells.
   B. Amplify the fusion phenomenon in vivo, generating a larger number of cardiac myocytes.
   C. Evaluate embryonic cells and their utility, safety, and tolerability in cardiovascular repair and regeneration.

Cardiovascular Disease and Human Adult Stem Cells

7. Most pressing need is to further develop and evaluate transformed iPS cells and fibroblasts and mesenchymal stem cells as they are transformed into cardiac myocytes in their ability to contribute to cardiovascular repair and regeneration.