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Satellite Cells for Myocardial Regeneration.

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Satellite cells are mononucleated myogenic stem cells located under or embedded in the basal lamina of skeletal muscle fibers. The formation of new muscle nuclei and regeneration of injured skeletal muscle from satellite cells have been well documented. Mammalian cardiac myocytes divide and multiply during embryonic and early postnatal life. After this period, growth involves cellular enlargement and proliferation of subcellular organelles. Ventricular muscle cells of adult mammals are terminally differentiated cells which lose their ability to multiply. Injuries to the heart result in scar formation, and the lack of regenerative capacity of cardiac muscle has been attributed to the fact that myocardium does not contain satellite cells. Dogs with humane care and under proper anesthesia were used for satellite cell isolation from tibialis anterior muscle. The heart was subjected to cryoinjury by a cryoprobe maintained at -160°C by internally circulating liquid nitrogen. The isolated satellite cells were cultured and labeled with ^{14}C -thymidine before being implanted back into the injured myocardium of the same dog. After 4 weeks, the injured myocardium had formed a transmural scar with labeled satellite cells surviving between the collagen fibers. After 10 weeks, the implanted satellite cells had proliferated and differentiated into cardiomyocyte like cells. Collagen fibers and satellite cells could still be observed between the newly formed heart muscle cells. This may provide a long-lasting and inexpensive treatment for patients with infarcted myocardium, cardiomyopathy, or ventricular failure.