

Tissue engineering of cardiovascular tissues using mesenchymal stem cells

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Tissue engineering and stem cells show potentials to restore lost or malfunctioning human tissues or organs. Another cell source for tissue engineering of cardiovascular tissues is stem cell. This study reports the development of cardiovascular tissues using tissue engineering and mesenchymal stem cells. The blood vessels, heart valves, and cardiac muscle were fabricated by culturing mesenchymal stem cells on biodegradable synthetic or natural matrices. Bone marrow was isolated from dogs or rats and mesenchymal stem cells were cultured. The cells were seeded onto biodegradable synthetic or natural matrices and implanted in dogs or rats. Histological and immunohistochemical analyses were performed to examine the regenerated cardiovascular tissues. Histological and immunohistochemical analyses showed the complete regeneration of blood vessels, heart valves, and cardiac muscle. Fluorescent labeling of cells prior to implantation and fluorescence examination of the regenerated tissues revealed that the implanted cells reconstituted the cardiovascular tissues. This study demonstrates the potential of tissue engineering and mesenchymal stem cells for the regeneration of functional cardiovascular tissues or organs.