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In-vivo angiogenesis in myocardial tissue engineering and regeneration

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Myocardial infarction leads to myocardial ischemia, loss of vascularization and fibrosis. To regain function, new myocardium must replace the damaged tissue. Tissue engineering and stem cell co-transplantation proved to be promising novel therapies to achieve this goal, yet further understanding of these therapies is to be acquired. A major barrier to cell survival after delivery into the scar tissues involves proper vascularization. Our group uses the mouse dorsal skin fold chamber model to support the ectopic engraftment of neonatal mouse heart tissue as well as that of neonatal myocardial cell implants. The chambers are observed daily under bright field microscope and at predetermined intervals using fluorescent markers. We perfected a technique to obtain 100% engraftment rate. Angiogenesis occurs in both atrial and ventricular tissues as well as neonatal myocardial cells implants. Functional ectopic myocardial tissue was obtained after implantation of both atrial and ventricular neonatal myocardium. The spontaneous contractions in myocardial implants were observed using the intravital microscope and were confirmed by direct ultrasound examination. The beating rate was comparable to the mouse resting heart rate. This model can facilitate understanding and modulation of myocardial tissue engineering and regeneration.

Biography

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