A more critical analysis of tissue engineering approaches to reconstitute myocardial tissue by means of tissue engineering is desirable. It would help identify flaws and define standardized quality criteria to guide future attempts to manufacture implantable myocardium. Along with crucial issues that need to be routinely addressed in future restorative concepts, such as geometry (cardiac helix, anisotropy, asymmetry), hemodynamics, microstructure (angiotropy, conductivity), storage, conservation, scale, cell type (viability-robustness, target-specific plasticity, communication, immunogeneity, inflammation, function), cell labeling deserves particular attention. Appropriate cell labeling before cell transfer or seeding within preformed scaffolds and transplantation will facilitate evaluation of cell/tissue fate and engraftment. Reliability and interpretability of the results would be significantly enhanced if cell labeling and tracking methods would be used routinely. Depicted is a cluster of carboxyfluorescein diacetate succinimidyl ester–labeled cells as they align along fibers of the collagen network and display colocalization for DAPI (nuclear blue stain) and MF-20 ("halo" identifies myocytes).1

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Reference