Transplantation of neonatal cardiomyocytes plus fibrin sealant restores myocardial function in a rat model of myocardial infarction.

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Abstract:

Background: Most cardiac regenerative approaches can restore injured heart muscles. In this study, we investigated if fibrin sealant could help neonatal cardiomyocytes restore myocardial function in a rat model of myocardial infarction. Methods: The left anterior descending artery in adult female Sprague-Dawley (SD) rats was ligated to make a myocardial infarction model. Neonatal ventricular cardiomyocytes from one-day male SD rats were isolated, labeled and cultured. The cells were injected into the infarcted area three weeks later. The animals were randomized into four recipient groups: (1) cardiomyocytes plus fibrin sealant (group CF, n=10); (2) cardiomyocytes alone (group C, n=10); (3) fibrin sealant recipients alone (group F, n=10); (4) control group (n=10). Four weeks after transplantation, echocardiography and Langerdoff model were used to assess heart function. Immunohistochemical staining and polymerase chain reaction (PCR) were performed to track the implanted cardiomyocytes and detect the sex-determining region Y gene on Y chromosome. Results: Echocardiography showed the fraction shortening (FS) in groups CF, C, F and control group was (27.80+/-6.32)%, (22.29+/-4.54)%, (19.24+/-6.29)% and (20.36+/-3.29)% respectively with statistically significant differences in group CF compared with the other groups (P<0.05). The Langendoff model revealed that the left ventricular development of peak pressure (LVDPmax, mmHg) in groups CF, C, F and control group was 104.81+/-17.05, 80.97+/-21.60, 72.07+/-26.17 and 71.42+/-17.55 respectively with statistically significant differences in group CF compared with the other groups (P<0.05). Pathological examination and PCR indicated that transplanted cardiomyocytes in group CF survived better than those in the other groups. Conclusion:

Transplanted neonatal cardiomyocytes plus fibrin sealant can survive in myocardial infarctioned area and improve heart function greatly in rat models.