

Differential regenerative capacity of neonatal mouse hearts after cryoinjury.

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Public Summary:

Neonatal mouse hearts fully regenerate after ventricular resection similar to adult zebrafish. We established cryoinjury models to determine if different types and varying degrees of severity in cardiac injuries trigger different responses in neonatal mouse hearts. In contrast to ventricular resection, neonatal mouse hearts fail to regenerate and show severe impairment of cardiac function post transmural cryoinjury. However, neonatal hearts fully recover after non-transmural cryoinjury. Interestingly, cardiomyocyte proliferation does not significantly increase in neonatal mouse hearts after cryoinjuries. Epicardial activation and new coronary vessel formation occur after cryoinjury. The profibrotic marker PAI-1 is highly expressed after transmural but not non-transmural cryoinjuries, which may contribute to the differential scarring. Our results suggest that regenerative medicine strategies for heart injuries should vary depending on the nature of the injury.

Scientific Abstract:

Neonatal mouse hearts fully regenerate after ventricular resection similar to adult zebrafish. We established cryoinjury models to determine if different types and varying degrees of severity in cardiac injuries trigger different responses in neonatal mouse hearts. In contrast to ventricular resection, neonatal mouse hearts fail to regenerate and show severe impairment of cardiac function post transmural cryoinjury. However, neonatal hearts fully recover after non-transmural cryoinjury. Interestingly, cardiomyocyte proliferation does not significantly increase in neonatal mouse hearts after cryoinjuries. Epicardial activation and new coronary vessel formation occur after cryoinjury. The profibrotic marker PAI-1 is highly expressed after transmural but not non-transmural cryoinjuries, which may contribute to the differential scarring. Our results suggest that regenerative medicine strategies for heart injuries should vary depending on the nature of the injury.

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