Age-dependent chronic rejection after experimental heart transplantation

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Background
The progressive decline of allograft function is predominantly a consequence of chronic rejection, but the etiology of this process is not fully understood. To evaluate the influence of age we performed heart transplantation in an experimental model of chronic rejection using inbred rats of different age.

Methods
Lewis rats served as donors and F344 rats were used as recipients. Young rats were 4 weeks of age, whereas adult rats were 4 months of age. Transplanted animals were grouped as follows: Group I, old to old; Group II, old to young; Group III, young to old; and Group IV, young to young. Intra-abdominal heterotopic heart transplantation was performed. Thereafter, functional evaluation was performed by daily palpation and surface electrocardiogram (ECG) to calculate the functional heart rejection index (fHRI). One month after transplantation the hearts were explanted and examined pathohistologically.

Results
Functional deterioration was noted in all groups, but all hearts were still beating when explanted. Young recipients and young donors showed significantly better results. Transplantation of young recipients led to a better fHRI ($p < 0.001$) and to a less critical chronic graft vasculopathy, especially when there was a young heart transplanted ($p = 0.03$). Furthermore, whenever a young donor heart was used, there was a better graft performance and less severe chronic rejection ($p = 0.02$).

Conclusions
Experimental cardiac transplantation of young hearts leads to a better graft performance as well as to a lower incidence of a severe chronic graft disease. Thus, older donor age may adversely influence long-term performance of cardiac allografts.

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