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1: [J Heart Lung Transplant.](#) 1994 Nov-Dec;13(6):940-9. [Links](#)

**Long-term results of combined heart-lung transplantation: the Stanford experience.**

[Sarris GE](#), [Smith JA](#), [Shumway NE](#), [Stinson EB](#), [Over PE](#), [Robbins RC](#), [Billingham ME](#), [Theodore J](#), [Moore KA](#), [Reitz BA](#).

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We assessed the long-term results of our experience with 109 patients with end-stage cardiopulmonary disease who underwent primary combined heart-lung transplantation at Stanford University Medical Center between March 1981 and January 1994. Average recipient age was 31 +/- 10 years (mean +/- standard deviation) median, 31 years; range, 1 month to 52 years. Recipient diagnoses included primary pulmonary hypertension (31%), Eisenmenger's syndrome (39%), complex congenital heart disease (8%), cystic fibrosis (14%), bronchiectasis (2%), and emphysema (3%). Immunosuppression was with cyclosporine and a tapering regimen of corticosteroids. In 1986 azathioprine was added, and since 1987 induction therapy with OKT3 has been employed. Actuarial survival rates at 1, 5, and 10 years were 68% +/- 4.6%, 43% +/- 5.4%, and 23% +/- 8.1%, respectively (mean +/- 1 standard error of the mean). Fourteen deaths occurred in the hospital for an operative mortality rate of 12.8% +/- 3.3%, and 61 deaths occurred overall. Causes of death included hemorrhage (five patients), infection (21), rejection (one), nonspecific pulmonary failure (four), graft coronary artery disease (six), and obliterative bronchiolitis (eight). Infection, rejection, and obliterative bronchiolitis were the major complications. Only 20% +/- 3.9% of patients were free from any infection 3 months after transplantation. Heart and lung rejection commonly occurred asynchronously; actuarial estimates of freedom from isolated lung rejection at 1 and 5 years were 47% +/- 5.2% and 40% +/- 5.6%, respectively. For simultaneous heart and lung rejection these estimates were 87% +/- 3.5% and 86% +/- 3.8%, and for isolated heart rejection 63% +/- 5.1% and 51% +/- 6.4%, respectively. Although graft coronary artery disease developed less frequently than in patients after isolated heart transplantation (90% +/- 4.6% of patients were free of graft coronary artery disease at 5 years), obliterative bronchiolitis remains a major long-term complication and cause of morbidity and mortality. Actuarial estimates of freedom from obliterative bronchiolitis at 1, 5, and 10 years were 71% +/- 5.1%, 51% +/- 6.1%, and 42% +/- 7.8%, respectively. These results show satisfactory early and medium-term outcome after combined heart-lung transplantation but also underscore that much progress is needed in controlling infection, rejection, and obliterative bronchiolitis, all of which remain as major impediments to long-term survival.

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