Since Reitz performed the first clinically successful heart-lung transplantation in 1981, more than 250 procedures have been performed worldwide in at least 20 centers. While much has been learned about the procedure, survival averages 50% which falls well below that expected for cardiac transplantation alone. It appears that the difference occurs because more problems have been noted in heart-lung transplantation related to selection of candidates and donors, ex-vivo preservation of the donor's organs, technical aspects of the operative procedure, and an apparent increased susceptibility for postoperative infection. Clinical success with the procedure has uncovered the unexpected potential for the development of a chronic obliterative disease of the small airways which represents bronchiolitis obliterans and which appears to be related to a chronic form of rejection. The passage of cardiopulmonary transplantation from an experimental to a therapeutic procedure will await further progress in these areas.

The most common indication for cardiopulmonary transplantation has been end-stage pulmonary vascular disease. Patients are generally homebound and oxygen-dependent and have measurable degrees of cor pulmonale. Other candidates have been successfully treated and have suffered from obstructive lung disease, cystic fibrosis, and parenchymal lung diseases, including sarcoidosis, fibrosing alveolitis, eosinophilic granuloma, etc. While recent clinical success has been obtained with single and double lung transplantation, the relative indication and merit of these procedures will depend on future clinical outcomes. Strict avoidance of candidates with previous thoracic surgery, especially median sternotomy and palliative procedures for congenital heart defects, is necessary to avoid operative exsanguination. The presence of chronic passive disease of the liver and resulting coagulopathy has also contributed to bleeding and poor results. The youngest surviving recipient is 3 years and the upper age thought acceptable is 50.

The hemostatic removal of the recipient's diseased heart and lungs poses the greatest technical challenge of the operative procedure. Additionally, of great concern the preservation of the function of the phrenic nerve is warranted. The unexpected occurrence of dense pleural adhesions is now an indication to avoid the procedure. The ideal cardiopulmonary donor must pass the criteria for cardiac donation and additionally must have a clear chest radiograph and arterial oxygen tension of more than 300mmHg with an inspired oxygen fraction of 1.0 and produce a clean sputum. More liberal acceptance of donors is ill-advised and led to high operative mortalities. Preservation of the heart-lung bloc currently is by a combination of cardioplegia and pulmoplegia, the latter consisting of a combined flush with Euro-Collins and prostaglandin PGE1. The key to preservation of the lung has been uniform cooling of the pulmonary parenchyma.

Immunosuppression following cardiopulmonary transplantation differs little from that following cardiac transplantation except that maintenance with steroids is avoided for two or three weeks following the procedure because of the concern of a delay in healing of the tracheal anastomosis. Rejection of the lung currently best diagnosed by changes in the radiograph is treated with pulses of methyl prednisolone. Bronchoalveolar lavage has been utilized in Pittsburgh to determine not only the presence or absence of infection but also in an attempt to identify phenotypic profiles and functional assessments of the effluent which can be attributed to infection, rejection, and the development of chronic airway disease.

Current research interests include improved methods of pulmonary preservation, the detection of alterations in antigen-processing responsible for a relatively high susceptibility of the recipient for pneumonia and the development of treatment strategies for bronchiolitis obliterans.