population with re-endothelialization and matrix turnover.

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Reply to the Editor:

We thank Drs Stamm and Steinhoff for their comments. In the field of tissue-engineered heart valves, the choice between synthetic and biologic (either allogeneic or xenogenic) scaffolds is a major concern. As have many others, we hypothesized that the best valve replacement remains a heart valve. Porcine heart valves have been used for decades in cardiac surgery with good clinical results, especially in terms of durability in elderly patients. In particular, hemodynamic behavior of the latest gener-

ation of porcine bioprostheses, the stentless porcine valves, was found to be similar to that of native aortic valves.

These scaffolds, however, need preimplantation treatment to avoid acute xenogenic rejection. Decellularization seems a promising choice, because it both induces a decrease of cell-induced acute rejection and may allow autologous cell recolonization. Our study suggests that nonenzymatic decellularization may be used without inducing mechanical failure of the matrix in vivo. Previous decellularization procedures, such as deep osmotic shock (with distilled water)¹ or use of trypsin and ribonuclease,² have resulted in graft failure.³ Adverse immune reaction was advocated; however, we observed that a less aggressive decellularization procedure did not induce mechanical failure after 4-month exposure in the systemic arterial strain, suggesting that the decellularization procedure was critical for the in vivo outcome.

Stamm and coworkers⁴ used an enzymatic decellularization procedure, but they reinforced the scaffold with a biodegradable polymer coating. Short-term results were satisfactory, but little is known about the long-term behavior of these polymers. Previous long-term studies on biodegradable scaffolds as heart valve substitutes have reported fibrosis, retraction, and graft dysfunction.⁵

As noted by Stamm and Steinhoff, coagulation and complement activation, with the risk of collagen-induced platelet aggregation early after implantation, are a major concern with decellularized matrices. We found no evidence of thrombus formation on implanted decellularized scaffolds, and thrombosis occurred only in a nondecellularized xenograft. However, it should be underlined that in our study all animals received aspirin therapy (500 mg daily), as in usual clinical practice with biologic valves.

Finally, our study suggests that xenogenic scaffolds decellularized through a nonenzymatic procedure do not induce matrix failure in a sheep model, and interestingly allow partial recellularization in vivo. Longer implantation studies are mandatory to confirm these mechanical results. Moreover, because autologous cell recolonization of these decellularized scaffolds remains only partial, other strategies to induce complete recolonization by proper autologous cells are needed.

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Lung transplantation in a patient with Mounier-Kuhn syndrome

To the Editor:

We previously reported the first case of successful lung transplantation in a patient with Mounier-Kuhn syndrome.¹ The patient was a 59-year-old woman with a history of bronchiectasis of unknown etiology since childhood. The patient developed very severe obstructive lung disease and multiple episodes of pneumonia due to *Pseudomonas aeruginosa* that necessitated hospitalization. Computed chest tomography and bronchoscopy were diagnostic of Mounier-Kuhn syndrome. The patient underwent bilateral lung transplantation, and the degree of bronchomegaly was not as pronounced as the tracheomegaly and posed little difficulty during transplantation. The patient had a difficult postoperative course, with multiple failed extubations, *P aeruginosa* pneumonia, and prolonged respiratory failure necessitating tracheostomy. The pa-

tient was discharged home after making a successful recovery, followed by inpatient rehabilitation therapy. Subsequent hospitalization for surgical closure of the tracheostomy was followed by pneumonia, the need for mechanical ventilatory support, and redo tracheostomy. The prolonged hospitalization included recurrent pneumonias, malnutrition, and skin breakdown. Sepsis eventually developed, and supportive therapy was withdrawn after discussion with the patient's family.

Another recent article² also described double-lung transplantation for chronic obstructive pulmonary disease and bronchiectasis in a patient with Mounier-Kuhn syndrome. The patient developed dynamic airway collapse and required stent placement in both the main bronchi. These cases highlight the potential dangers of lung transplantation in patients with Mounier-Kuhn syndrome. Typically, patients with bronchiectasis undergo bilateral lung transplantation because of the risk of recurrent infections. Mounier-Kuhn syndrome is a very rare cause of bronchiectasis; however, in immunocompromised patients, it may pose challenges beyond those posed strictly as a result of recurrent suppurative infections of the pulmonary parenchyma. Because of a lack of longitudinal muscle fibers and thinning of the muscular layer, their central

airways are floppy and widely dilated, with out-pouchings, allowing for pooling of secretions and persistent colonization with resistant infections.^{1,3} This makes recurrent infections very likely despite the removal of both lungs. These mechanical abnormalities of the central airways can also compromise secretion clearance as a result of an ineffective cough.¹ In addition, the large difference in diameter between the central and peripheral airways and the collapsibility of central airways on exhalation make effective mechanical ventilation a challenging proposition because of poor laminar flow.⁴ Our patient also exhibited a lack of spontaneous closure of the tracheostomy stoma, thus necessitating surgical closure, which was soon followed by pneumonia. Although this was not exhibited by our patient to a significant degree, the other potential problem in these patients can conceivably be a large disproportion between the bronchial diameter of the donor and the recipient, thus making surgery complicated and compromising subsequent healing of the anastomosis. Because lung transplantation has become the standard of care for managing various advanced lung diseases, it is important to recognize this unusual cause of bronchiectasis so as to better inform our patients of the risk of potential complications.

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doi:10.1016/j.jtcvs.2006.04.036