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The Ups and Downs of Organ Transplantation

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Some might argue that the “need” for xenotransplantation will decrease with time. New insights into the molecular basis of disease, novel approaches to diagnosis and imaging, increasing emphasis on prevention and regeneration and the application of new technologies for therapeutics will help alleviate some of the most important causes of organ failure, disability and death and these advances will eliminate some of the most pressing indications for organ transplantation. As only one example, we would offer the possibility that further understanding of the immunological basis of insulin-dependant diabetes will someday allow detection of the disease and the commencing of specific treatment before the beta cell mass is destroyed (certainly, the vast sums spent on research into type 1 diabetes must be largely justified by this hope). And, one might argue, if these causes of disability are overcome, the need for transplantation and hence for xenotransplantation will decrease. We would disagree with that argument.

We anticipate that the extension of life by advances in medicine and therapeutics and the avoidance of disability will increase the demand for transplantation. The incidence of such diseases as type 2 diabetes, nephrosclerosis and congestive heart failure increases with age. The diseases of aging could be treated by transplantation, but they often are not because human organs are offered to those who are younger and better able to tolerate major surgery. Advances in medicine will allow the aged to better tolerate surgery. The argument that scarce human organs should be offered to those with greater life expectancy will not meet current ethical standards, and hence the demand for transplantation will increase. If, however, xenografts were equivalent to allografts except for the duration of function one might reconsider the ethics of organ distribution.

We anticipate that molecular diagnosis will add to the demand for organ transplants. Imagine if a blood or urine test could reveal the existence of a tumor before a mass could be detected. Such tests, which may soon be available for certain tumors, will spark new interest in preemptive transplantation. Bilateral nephrectomy and kidney transplantation are performed in infants thought to be at high risk of developing Wilms tumor; would one not consider a similar approach for other tumors? If those at high risk for developing tumors of the lung, kidney and urinary track and liver could be identified and if preemptive transplantation were found to be effective, the demand for transplantation would increase by an order of magnitude.

Finally, we anticipate that new insights into metabolic or hormonal functions of the kidney and lungs (or perhaps other organs) will reveal heretofore unrecognized risks associated with mild insufficiency. As only one example, we would offer the possibility that studies showing that

small increases in the serum creatinine or microalbuminuria predict cardiovascular disease may be followed by evidence that mild renal insufficiency causes vascular disease. Such a finding in turn leads to the conclusion that renal transplantation should be performed earlier in the course of disease or as a treatment for insufficiency (rather than uremia).

For these reasons, we think advances in medicine and surgery will increase the demand for organ transplantation and that increase will heighten interest in xenotransplantation. Of course, xenotransplantation may never be preferred over allotransplantation for some purposes. However, we can well imagine xenotransplantation may someday provide the added organ function needed by some or the limited duration of organ function needed by others.