

Human

Cardiac Transplantation

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On Dec. 3, 1967, Dr. Christiaan Barnard at Groote Schuur Hospital in Cape Town, South Africa removed a heart that was failing because of coronary occlusive disease from a 55-year-old man and replaced it with the heart of a 25-year-old woman shortly after her fatal injury in an automobile accident. The patient made good clinical progress until the twelfth post-operative day, when some evidence of pneumonitis became apparent. Despite intensive treatment, the patient died on the seventeenth postoperative day of extensive bilateral pneumonia. At this writing, more than 60 human cardiac transplantations have been performed in a number of cardiovascular centers throughout the world. However, only a few of cardiac recipients are still living.

The electrifying news of Dr. Christiaan Barnard's immediate technical success in the heart transplantation has aroused various reactions in the minds of both the medical profession and the lay public. However, it seems to bring to reality the long-cherished hope that an incurably diseased and failing heart could be replaced. But the early death of this first patient and the failure of many subsequent attempts brought a resurgence of questions previously posed about homotransplantation of vital organs, particularly of the heart. Experimental studies in cardiac transplantation have been intensively pursued for some years in a number of laboratories throughout the world. Although the technical aspects of the procedure have been well developed for some time and fully described in scientific publications, long-term survival in animals has not been impressive.

In the light of current scientific knowledge, therefore, indications for transplantation of the heart in human beings are restricted.

The major critical problems that require solution to make the procedure generally applicable and practical as a method of treatment are concerned with the rejection phenomenon and the availability of donor hearts.

As in all organ homotransplantation the surgical procedure is complicated by the necessity of an acceptable donor. Since the most practical donors at this time are considered to be young, healthy victims of fatal injuries or diseases that do not affect the heart, awaiting a satisfactory donor may delay transplantation for months, and the critically ill cardiac patient may die in the interim. When a potential donor is found, consent must be obtained, extensive histocompatibility and other studies must be done, and the donor heart must be removed, all within the brief period required to permit restoration of cardiac viability after the donor's death. Current knowledge of methods of suppressing the rejection phenomenon in human organ transplantation is derived largely from experience with the kidney and the rather meager experience with the liver. To what extent these methods will serve a similar purpose and will be effective in human cardiac transplantation is not known.

The clinical and legal definitions of death impose grave responsibilities on the surgeon in removal of the donor's heart. Fully informed consent of both recipient and donor, or of next-of-kin, must, of course, be obtained. The surgeon must scrupulously guard against taking inadvertent advantage of the eagerness of a desperately ill patient or his family to consent to almost any procedure suggested by the physician for purely experimental purposes. He must be certain that the proposed heart transplantation is clinically and therapeutically indicated. This judgment should be made independently by physicians who are not members of the transplantation team. Because of the brief interval permissible between death of the donor and transplantation of his heart to the recipient, the definition of death becomes crucial. The legal, moral, and theologic aspects of this problem are intricate and formidable.

The South African achievement is a significant phase in human cardiac transplantation primarily because of its unequivocal confirmation that the pumping function of the human heart can be successfully replaced. Whether satisfactory function of the substitute can be maintained for prolonged periods remains to be determined. Since the physician can never afford to delay medical treatment until knowledge is complete and risk is entirely removed, he must apply current knowledge cautiously and judiciously, weighing the benefits against the hazards, in his efforts to relieve suffering and cure disease. Continued clinical trials are therefore necessary. Toward this end, investigation must be intensified to find better methods of controlling and minimizing the rejection phenomenon than currently available methods of tissue typing and of suppressing the antigenicity of donor tissue. Satisfactory methods of preserving potential donor organs must be vigorously sought. The moral, ethical, legal, and psychologic implications of human cardiac transplantation will undoubtedly be much more far-reaching than anticipated from present brief experience. The issues must be thoroughly analyzed, human values reconsidered, and satisfactory answers sought in the light of reason rather than in the heat of emotions.

Human cardiac transplantation will be continued and its clinical trials are necessary under the most deliberate judgment and energetic research until it becomes an established therapeutic procedure.



病人：「捐心臟給我的人是否也信上帝，否則我將會排斥得很厲害。」
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