Baboon-to-Human Transplant Draws Mixed Reviews

A team of California researchers this week drew skepticism as well as praise for transplanting the heart of a healthy baboon into a two-week-old girl. The transplant occurred a generation after the first efforts at such cross-species procedures met with limited success at best.

The chief differences between the procedure performed on Oct. 26 by Leonard L. Bailey and colleagues at Loma Linda (Calif.) University Medical Center and the cross-species transplants of the 1960s and 1970s are the extreme youth of the patient (and hence her relatively underdeveloped immune system) and the availability of a more selectively powerful drug, cyclosporine, to fight rejection of the graft. Bailey believes, in part from his own work in 150 transplants between animal species, that those two factors should significantly improve the infant's chances of survival, and could warrant continuing the procedure in additional patients. As of Oct. 31, the child, identified to the public only as "Baby Fae," was off the critical list.

Some transplant researchers questioned whether Bailey's hunch would prove correct; all agreed that the understanding of which immunological factors are important in determining the ultimate success of an organ transplant is still imperfect.

"In most of our minds, it [the Loma Linda transplant] is not so terribly outlandish," Mark A. Hardy, director of transplantation at Columbia University Presbyterian Hospital in New York, told SCIENCE NEWS. "It might work. We think it may be more difficult [than in transplanted human hearts] to avoid rejection in the long term, but even that has never really been put to the test with the modern immunotherapeutic techniques. No one has dared until this case to test a concept which was first tried in the early 1960s."

Of those several early patients transplanted with chimpanzee or baboon hearts in the United States, South Africa and Britain, most died within hours. The longest reported survivor lived only three and a half days. But attempts at about the same time to replace failing human kidneys with organs from nonhuman primates were more successful, Hardy says. Nine patients were given chimpanzee kidneys at Columbia University in 1963. "At that time little was known about tissue typing, and immunosuppression was at the very earliest stages," he says. "Despite that, several of the chimpanzee kidneys in the recipients worked well for several months. One patient died nine months later of unrelated pneumonia, but had a fully functioning kidney."

As success rates with transplanted organs from human cadavers increased, few centers pursued cross-species transplantation. But the early data indicated that, under the right circumstances and with the right type of organ, animal grafts might one day be useful, Hardy says. He adds that he does not think the Loma Linda effort was premature. "Just because it was the first doesn't mean that it was unwarranted, or necessarily the best or the last," he says.

Baby Fae was born with hypoplastic left heart syndrome, a gross underdevelopment of the heart's main pumping chamber, the left ventricle. Until recently the condition, which afflicts about one in 12,000 newborns in the United States, was considered uniformly fatal, and Bailey indicated that a transplant was the child's only realistic option. However, William I. Norwood, formerly at Children's Hospital Medical Center in Boston, and colleagues have developed a two-step surgical technique to repair the misshapen hearts (SN: 1/15/83, p. 39). Norwood, now at Philadelphia Children's Hospital, and the Boston group have continued to treat more than 100 such infants, with about a 50 percent survival rate to date, according to Boston cardiologist Peter Lang.

"There are a number of these children who are doing very well," Lang says, adding that the oldest survivor is now a relatively healthy four-year-old. Only a few children worldwide, including one infant, have received human heart transplants to date. It's too soon to tell, Lang says, whether surgical repairs or transplants will provide children who suffer from hypoplastic left heart syndrome with the longest, highest-quality life. "One of the important things is to let parents of children with this condition know that there are several options open to them," he says, adding that it remains to be seen what sort of role, if any, transplantation of hearts from animals will eventually play.

Randall Morris of Stanford University's heart transplant team says that in addition to the issue of organ rejection, questions remain concerning the effects of cyclosporine on developing blood systems, whether an animal heart can grow to sustain an adult human and whether accurate tissue typing can be worked out for nonhuman primates. —*D. Franklin*

Ovary transplant restores fertility

In a delicate eight-hour procedure, physicians at St. Luke's West Hospital in St. Louis have reversed a deliberate sterilization in a 28-year-old woman and then — for the first time ever in humans — successfully transplanted an ovary and fallopian tube to her infertile twin sister.

The first sister's tubes had been scarred in a sterilization procedure, says Sherman Silber, who headed the surgical team. Her identical twin's tubes and ovaries had been surgically removed as a result of pelvic inflammatory disease. "In one operation," says Silber, "we restored fertility to both of them."

Silber described the success of the February operation, which employed microsurgical techniques, at last week's meeting of the American College of Surgeons in San Francisco. The recipient sister began to produce estrogen several months after the operation, an indication that the organs are "viable and intact." Silber, who nine years ago performed the first vasectomy reversal using microsurgery, told SCIENCE NEWS that the woman could become pregnant in six months to a year, depending on how soon her body resumes its normal hormonal cycling. The donor twin is already pregnant.

The transplant operation is limited for now to identical twins, since their cells are genetically alike and won't reject the organs, Silber says. However, he adds, "This shows we can transplant these organs, and it represents the nth degree of using microsurgery for restoring fertility in so-called irreparable cases."

Gilbert Greenwald, a professor of physiology at the University of Kansas Medical Center in Kansas City, Kan., says the operation's success is not surprising, because of the high success rates in similar procedures done on rats and mice. "There's no reason why it can't work eventually in nonrelated persons as well," says Jane Schultz, chief of the genetics and transplantation biology branch at the National Institute of Allergy and Infectious Diseases in Bethesda, Md. According to Schultz, endocrine organs such as the testis and ovary seem to be "privileged" in that they aren't usually attacked as readily as other organs by the host immune system. "It's more of a technical problem rather than immunological," she adds.

Silber is cautiously optimistic that such transplants may become more commonplace in the next decade. He predicts that it will take that long for better immune-dampening drugs to be developed that will safely protect against organ rejection, and sees this first operation as a "major stride in conquering infertility." —*S. I. Benowitz*