

molecules can be changed by drugs in ways consistent with drug action, and when injected back into the living animals, they markedly influence their behavior and brain wave patterns. But whether or not free radicals actually participate in basic nerve function is a matter of inference at the moment.

The free radicals are there; they must be explained, comments Dr. Samuel Bogoch, director of the Foundation for Research on the Nervous System in Boston. "You couldn't make as good a theory now with free radicals as with the ion shifts," he says, but he feels that the Polis work is a very important finding. If free radical changes are not the basis of energy in nerves, they might well be the energizing trigger.

HEART TRANSPLANTS

Seven of 25 survive

Dr. Philip Blaiberg continued to be the longest-lived of the seven survivors of heart transplants last week in spite of a bad setback with liver and lung complications that raised the question of a possible second heart donor. Dr. Christiaan Barnard raised the possibility of another transplant. But this, even for surgeons comfortable with the notion of transplanting human hearts, is a radical notion.

Although second kidneys and even third ones have been transplanted with good success, a second heart transplant has never been done and it is hard to predict the outcome, says Dr. Richard R. Lower of the Medical College of Virginia.

The idea of transplanting a lung or both lungs with the heart—a possibility also raised by Dr. Barnard—is technically feasible, he believes. But the rejection problem remains.

Dr. Theodore Cooper, director of the National Heart Institute at Bethesda, Md., points out that second or third heart operations have been performed on valve patients but that the entire heart transplant is a much larger and more difficult operative procedure.

"As for transplanting lungs along with a heart, there would be fewer suture lines on the heart itself," he explains, "but the connection of aorta and vena cava must be made as well as that of the trachea. Experimental evidence does not indicate that such surgery would be any less formidable than the heart transplant alone."

Dr. Denton Cooley of Houston, Texas, who has done six transplants into humans, of whom three still live, agrees that transplanting lungs with the heart is simpler from a suture standpoint.

One of the most promising treatments to prevent rejection of kidneys has been that of the antilymphocyte globulin (ALG), which Dr. Barnard has now used to improve the condition of Dr. Blaiberg. Dr. Barnard obtained his ALG from France, where there are several good research centers making it. ALG also is produced at a few centers in the United States.

The drug prevents the lymphocytes (white cells that play a key role in the body's rejection of foreign tissue) from effectively rejecting a transplant, but more needs to be known about its mechanism.

It is made by injecting human lymphocytes into a horse, which becomes a blood donor. The horse's natural defenses work to resist the foreign lymphocytes before the blood is extracted. The purified serum is then used on humans. Although ALG weakens the body's natural defenses against infection, the body seems to recover its defenses faster than with other drugs when the treatment is stopped.

Both Imuran and prednisone have been used with Dr. Blaiberg, but the large doses of Imuran, a drug which is toxic to the liver, are believed to have caused his liver complications, including hepatitis. When Imuran is lessened, prednisone must be increased, and it has its own side effects. Lung complications indicating pulmonary edema and possibly pneumonia followed the liver problems.

Dr. Blaiberg underwent his heart transplant on Jan. 2. Of the 25 patients with heart transplants, in addition to the Capetown dentist, who is now 59

years old, these were still alive the middle of last week:

In Houston, at St. Luke's Hospital, Everett Claire Thomas, age 47, of Phoenix, Ariz., who received his heart May 3; Louis John Fierro, 54, of Elmont, N.Y., who got his transplant May 21; George Henry DeBord, a San Antonio contractor, living in Helotes, Texas, who was given his transplant July 2. In Paris Dominican Father Jean-Marie Boulogne still survives with his May 12 transplant; in Valparaiso, Chile, Maria Elena Penacola, and in Montreal, Canada, Gaetan Paris, both of whom had been given heart transplants on June 28, were believed doing well.

Among the others who have died are 45-year-old Frederick West, Britain's only heart transplant patient, who lived 46 days; 66-year-old Clovis Roblain, France's and Europe's first person to receive a donor's heart, and Joseph G. Klett of Orange, Va., Dr. Lower's patient. Louis Washkansky was the first to receive a human heart transplant on Dec. 3, 1967. He was the patient of Dr. Barnard, but died in Capetown 18 days after the surgery. Mike Kasperak, patient of Dr. Norman E. Shumway at Stanford University Medical Center, died Jan. 21, 1968, two weeks after receiving his transplant. Dr. Adrian Kantrowitz of Maimonides Hospital, Brooklyn, performed the second transplant of a human heart, Dec. 6, 1967, but the two-and-a-half-week old infant boy died six and a half hours later.

Dr. P. K. Sen, director of King Edward Memorial Hospital in Bombay, India, transplanted a heart on Feb. 17, 1968, but the recipient died hours later.

SCIENCE FUNDING

Looking beyond the war

The United States does not have a tradition of government support for basic science. What it has is momentum born of World War II. And Presidential Science Adviser Dr. Donald F. Hornig notwithstanding, the momentum seems to have run down.

"The country need not be convinced any longer," Dr. Hornig told the American Physical Society last year "that we need strength in basic research. This is accepted by the executive, by the Congress and by the people of the country."

By this view, the current tightening of the budget strings for the support of science is temporary, caused by the tightness of the Government's Vietnam budgets.

There is another view.

"There are many Congressmen who regard scientific research as a leak in

the budget barrel," says Prof. Thomas Gold of Cornell University, "and having plugged it, are not likely to drill new holes."

The proof of the pudding may have to await peace in Vietnam.

If and when that war ends money will become available for civilian uses. A large part of the cost of the war as carried on the books—\$30 billion a year—will remain in defense and diplomatic budgets so long as there is no change in foreign policy. But a portion, estimated by various economists at between \$15 billion and \$22.5 billion, will come loose.

Economists differ on what will happen to this money. Charles L. Schultze, former budget director now senior fellow of the Brookings Institution, believes it will probably disappear in a tax cut. But Schultze's Brookings col-