

## SURGERY

# Artificial Heart Readied

The outlook for implantation of an artificial human heart is promising, the major problems at this point being primarily technical ones—By Faye Marley

► AN ARTIFICIAL HEART could be pumping inside a human chest within five years.

Dr. Frank Hastings of the National Heart Institute, Bethesda, Md., told SCIENCE SERVICE that this was a conceivable goal, although the Institute shies away from setting any time limit.

The first person to have his ailing heart replaced by a mechanical one will probably be someone who is being kept alive with a heart-lung machine.

"This type of person is a likely candidate," Dr. Hastings stated. He said that a totally implanted artificial heart should not present any immunity problem, in which the body rejects foreign tissue, so the principal problems are technical details.

"I don't think any of the pump-type hearts are promising at this time," he said. "Keeping an animal alive for a day and a half is not very promising. But we do have more knowledge than is generally known, and a total heart may be ready in the conceivable future. We must get material compatible with human blood."

One of the more forward-looking pieces of research, which Dr. Hastings says is ingenious, is one that has worked in a calf in Cleveland, Ohio. Dr. Willem Kolff and his collaborators at the Cleveland Clinic have used a device recently developed for the Army by engineers at the U.S. Army's Harry Diamond Laboratories. It pioneers in the use of so-called fluid amplifiers, control and switching devices that require few if any moving parts. They run on compressed air or gas.

Under the sponsorship of the National Heart Institute, the engineers have done preliminary work and hope that a small implantable heart for humans can be modeled in a few years.

The part implanted in the heart cavity of a calf, keeping the animal alive nearly 24 hours, consisted of a lucite shell housing both right and left ventricles, while simultaneously serving as a container for the four bicuspid heart valves. In this design the fluid amplifiers are kept outside and separate.

Already the Army researchers are working, however, to combine the control devices with the heart chambers into one compact apparatus that would be completely implanted and have a provision for automatic power control. The complete heart apparatus should closely resemble a real heart in weight, size and shape. Material coming into contact with the recipient's tissue should be chemically inert and not alter the tissue's function.

The artificial heart should duplicate the pulsed flows generated by a real heart, the Army engineers say, at the same time pro-

ducing the necessary output pressure and flows to "satisfy perfusion needs."

A preliminary report prepared by the Harry Diamond Laboratories, Washington, D. C., can be ordered from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, price \$2.00. Ask for AD 619 673N Proposed Specification for an Artificial Heart to Be Implanted in the Chest.

• Science News Letter, 88:213 October 2, 1965

## SURGERY

## Near-Freezing of Brain Permits Lengthy Surgery

► A TOKYO NEUROSURGEON has lowered the temperature of the brain to an unprecedented 43 degrees F., using a new method. This has permitted up to triple the normal time for brain operations.

Mixed reactions greeted Dr. Tatsuyuki Kudo's statement that he had cooled the brain without affecting the rest of the circulation. No heart-lung machine was used, nor anticoagulants.

Dr. A. Earl Walker denies that a brain so cooled could be completely isolated. Dr. Walker, who is professor of neurological

surgery, Johns Hopkins University, Baltimore, is also the new president of the World Federation of Neurological Societies.

"There will always be at least one percent leakage through the vertebral vessels," Dr. Walker maintains.

The report published in Medical World News, 6:42, 1965, was given at the International Congress of Neurosurgery in Copenhagen. Dr. Kudo said that he and an operative team of 25 surgeons, nurses and technicians have treated six persons, three of whom are still living. The others survived for a while after surgery.

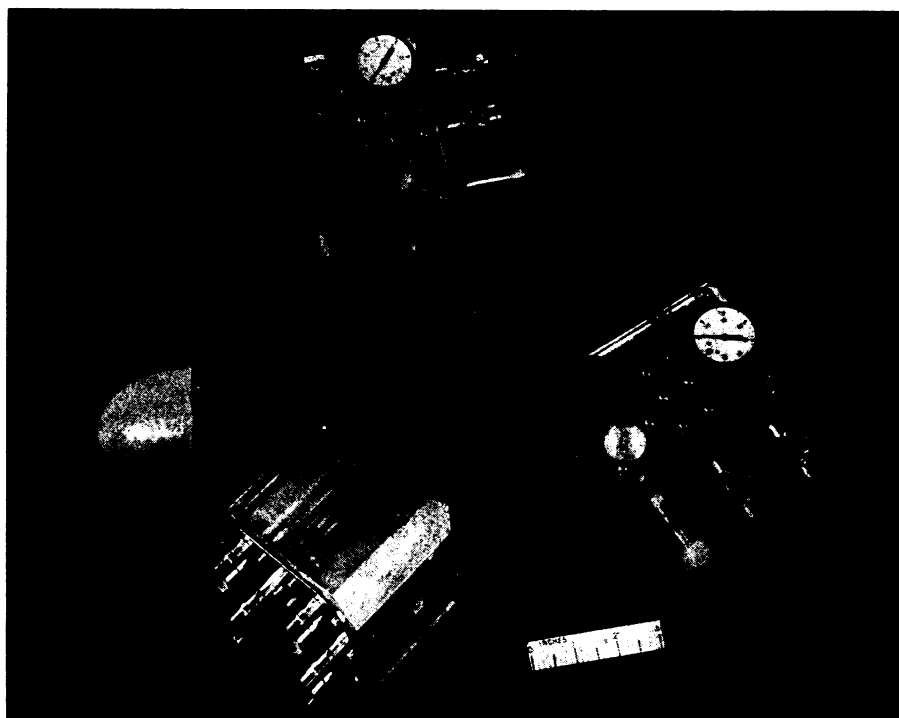
The practicality of deep cooling was established in 1961 by the Japanese team in experiments with 130 dogs. At normal temperatures, three minutes' lack of blood supply (ischemia) would cause death, but the experiments with hypercooled brains showed that they could be kept partly alive up to seven or eight hours.

The human patients' own blood surges up to rewarm the sleeping brain when surgery is over and clamps removed. Surface warming of the body cuts the "revitalization" time to about an hour.

Another cryosurgery report in Medical World News, 6:41, 1965, told of a new operation on the prostate gland that entirely avoids the scalpel. By quick freezing, the diseased organ is reduced to material that easily passes out during urination.

Drs. Maurice J. Gonder and Ward A. Soanes, urologists at the Veterans Administration Hospital and Millard Fillmore Hospital Research Institute, Buffalo, N.Y., reported this work.

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U.S. Army's Harry Diamond Laboratories

**ARTIFICIAL HEART**—This artificial heart is controlled by two fluid amplifiers (top and right). In lower foreground is the two-chambered "heart" with both ventricles, one of which is shown at left. The heart, minus the amplifiers, was implanted in a calf.