MEDICINE

Heart-Lung Substitute

A device not much larger than a water glass oxygenates and pumps blood at same time. It is expected to find use in chest surgery and in combat hospitals.

➤ A COMBINED mechanical heart and lung, not much bigger than a large-sized water glass, has been developed and used successfully in experiments with dogs.

Using millions of microscopic holes as the key to its operation, the artificial heart and lung should make it possible for virtually every hospital and research center, regardless of size, to have this mechanical substitute at its disposal for use during major chest surgery. It should also be valuable to the military for use in the combat zones.

Measuring three and one-half inches in diameter and ten inches in height, the mechanical apparatus diffuses oxygen into the blood and removes the free oxygen from the blood system before putting it back into the body.

The device is the result of several years experimentation and development by Dr. Frank Gollan of the Thayer Veterans Administration Hospital, Nashville, Tenn., with the cooperation of the Selas Corporation of America, Philadelphia, Pa. The artificial heart and lung is expected to make obsolete the bulky and complicated mechanical hearts and lungs now being used.

The apparatus works, George V. Jordan Jr. of Selas explained, when oxygen, which is pumped into the cylinder at a pressure of approximately 20 pounds per square inch, diffuses through a microporous filter disk made of porcelain and having 800,000,000 holes to the square inch.

At the same time, blood from the veins is pumped above the filter and mixes with the diffused oxygen. It then passes through plastic fibers coated with a substance to prevent foaming, which removes the free oxygen by filtration. The blood is pumped back into the arteries.

In experiments conducted at the Thayer Veterans Administration Hospital, the use of the mechanical heart and lung has made it possible to maintain a cardiac arrest of one-hour duration in dogs during a period of cold temperature reaching as low as 50 degrees Fahrenheit.

The animals were revived without any clinically detectable damage.

In other experiments using the artificial heart and lung with dogs at the hospital, scientists were able to perform surgery on the left heart without the danger of air embolism. The entire venous return to the right heart was shunted into the combined heart-lung, refrigerated and returned under pressure to the aorta. At 55.4 degrees Fahrenheit, the researchers reported, the heart stopped beating and the left ventricle was opened.

The heart chambers were empty and, due to cardiac arrest, coronary air embolism did not occur. After about 30 minutes of cardiac arrest, the heart was closed, the blood rewarmed and normal functions returned to the animal without evidence of cerebral or cardiac damage. The lowest body temperature reached was about 34 degrees Fahrenheit.

This experiment was conducted by Drs. Gollan, Merrill W. Schell, James T. Grace and Donald S. Tysinger.

In still another experiment using the pump-oxygenator as a substitution for the heart and lungs, dogs were kept alive at temperatures below 50 degrees Fahrenheit without hemoglobin, which pointed up the life-saving usefulness of the artificial heart and lung to prevent circulatory failure during operations performed when the subject has undergone "freezing."

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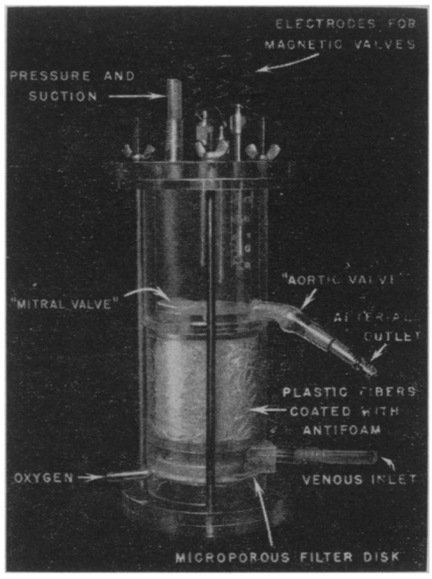

PUMPS AND BREATHES — This device, three and one-half inches in diameter and ten inches tall, performs the functions of the heart and the lungs at once. With it doctors could operate while a dog's natural heart was stopped for an hour.

GENERAL SCIENCE

Military Reserve Plan

➤ PRESIDENT EISENHOWER'S new military reserve plan, sent to Congress, could go a long way toward solving the nation's problem of how best to utilize its specialists during emergencies.

In the new plan, a government manpower expert stated, the Administration has provided the necessary machinery for using the country's scientists, technicians and engineers to their best capacity. But, he cautioned, it will work only if properly administered.

Previous manpower plans and selective service acts did not provide for best use of the specialists to meet the nation's needs, and both the military and civilian economies suffered heavily as a result.

If the plan is accepted by Congress, the establishment of a board made up of members who are familiar with the specialist needs of the nation to guide the flow of trained personnel into both military and civilian jobs will be needed, the expert reported.

The problem of utilizing scientists, technicians and engineers during emergencies has grown more acute with the increase in the technological and personnel training race between this country and Russia.

Under the new plan, the expert explained, it is projected that specialists in school can be deferred until they finish their education, and then be allowed to enlist for six months of active duty, to be followed by nine and one-half years of obligatory duty in the reserve corps.

The administration's plan, as it is now set up, permits only those men under 19 years of age to enlist for six months and then these youths must join the National Guard or a first line Army or Marine Reserve unit. The age limitation could be waived for specialists.

Normally, a six-month enlistee would be in the "Service Callable Reserve," which is subject to immediate recall. It is hoped that specialists who serve for six months will be permitted to make up their reserve obligation in the "Selectively Callable Reserve," a standby pool that can be called to active duty only in a national mobilization.

This would insure proper utilization in time of need, for otherwise, the expert pointed out, the nation's scientific and technical manpower pool would face the risk of being recalled en masse immediately, in any sudden emergency, leaving our technology helpless.

Another Korea, for example, would mean that the nation's industry and educational system might face a dangerous denuding of their young specialists. This would not only set back production and research necessary during emergency, but impair the nation's future technological, educational and scientific health, he said.

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