MEDICINE

Can the Dead Be Given Life?

Scientists Answer Both Yes and No, For It All Depends Upon How Dead the Victim Is; Brain Is First to Die

By JANE STAFFORD

THRUSTING an electric needle into the heart to start it beating again, adrenalin injections directly into the heart, the pulmotor, artificial respiration —all these methods science has devised for resuscitating or reviving a person who has apparently died. But do they really restore the dead to life?

It all depends on what you mean by death, or, to put it another way, on how dead the victim is. If you say a person is dead the moment his heart has stopped its beating or he has stopped breathing, one or another of these methods may very well restore life to his body by starting the heart and lungs going again.

These methods do not always succeed, however, and their success or failure depends on what has happened to the rest of his body, particularly to his brain. If certain organs, such as the kidneys or liver, have become so broken down by disease that they cannot function, or if there is so much poison—either chemical or bacterial—in the body that it cannot be entirely eliminated, starting the heart and lung action will not be of any use.

Restoring life, however, is not merely a matter of starting the heart beating and the lungs breathing, as you may have supposed. It is a matter, also of starting the brain functioning, getting the mental processes going once more. Science has not yet found a restorative for a dead brain, though it has many devices for priming the body's pump, the heart.

"If I had been shocked by an electric current, I would not want anyone to bring me back to life," declared an eminent physiologist. "For if I were resuscitated, the chances are my brain would not be functioning and I would be dead from the neck up."

The brain "dies" from starvation. It gets its nourishment from the blood constantly pumped to it by the heart. When the heart stops pumping for any length of time, the brain is deprived of nourishment and starves to death.

The whole matter of restoring life after death depends on how long the brain has been deprived of nourishment. That is why, when you try to revive the victim of a drowning accident or an electric shock, you must start resuscitation at once without even waiting for a doctor.

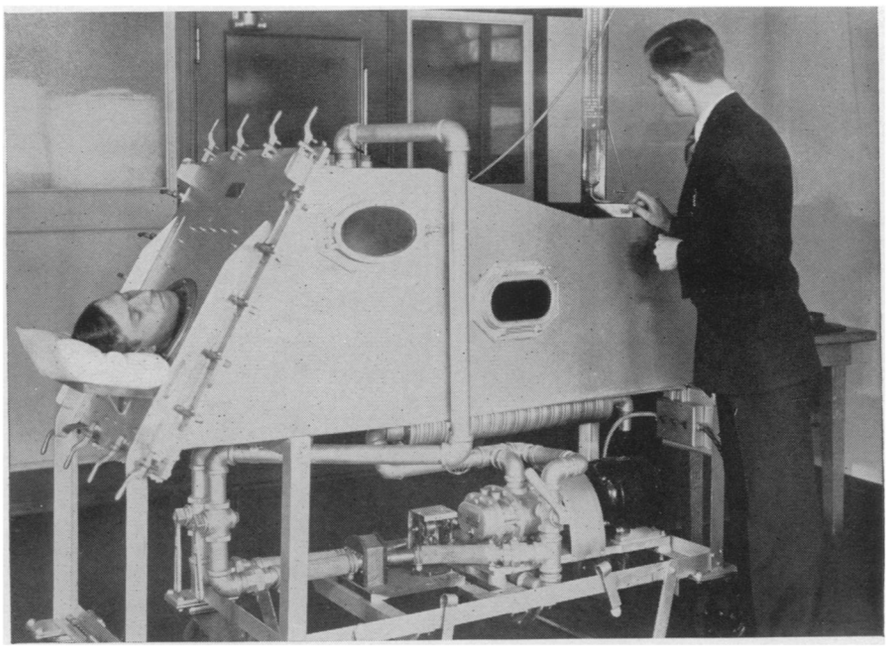
No one knows yet how long the brain can be completely deprived of blood supply and still be revived. Possibly not more than ten or fifteen minutes. But the exact limit has not been determined, although physiologists have given this problem some attention.

This was the crux of the experiments carried on at the University of California by Dr. Robert E. Cornish, whose revivals of dogs that had been put to death has attracted nation-wide interest. Dr. Cornish and associates succeeded in starting the heart and circulation in these animals by methods commonly and often successfully used to revive victims of accidents or dying patients. As a result, the animals' bodies came to life. But their brains, according to early reports, failed to function properly. These had apparently been too long deprived of nourishment.

Physiologists, hearing of Dr. Cornish's investigations, hoped that they would shed light on the question of how long the brain could be starved without being irrevocably damaged. But they do not yet feel that the question has been fully answered. One of the dogs is said to have barked and eaten food, even to have recognized certain voices and signals. Its brain, however, was not restored to completely normal functioning; the dog may never be more than a half-wit.

Failure to restore life to accident victims is usually due to the fact that too much time has elapsed after apparent death occurred. Even if improved methods of resuscitation could start heart action and breathing in victims dead for any length of time, physiologists suggest that such success might be anything but a kindness to the victim or his family.

Scientists working at the Johns Hopkins University, however, have found a way around this difficulty under certain conditions of death. Animal victims of electric shock from a low voltage current, such as is car- (*Turn to Page* 346)



MAN'S BATTLE AGAINST DEATH

—finds a capable ally in the Drinker respirator, a machine which carries on artificial respiration tirelessly.

From Page 341

ried on the ordinary household wires, may be restored to life if a stronger counter-shock is applied to the heart within a few minutes of death. The discovery was made by Drs. William B. Kouwenhoven, Donald R. Hooker and Orthello B. Langworthy.

The success of the countershock depends on the effects of the first shock and on what it has done to the victim's heart.

Low Voltage Dangerous

A shock from a low voltage current is much more dangerous than a shock from a high voltage wire because it is more likely to cause a peculiar condition of the heart known as fibrillation.

Ordinarily the many muscle fibers of the heart all contract together in regular rhythm to pump the blood out into the arteries which carry it around the body. In fibrillation the muscle fibers act as individual units and the result is a useless twittering and quivering instead of a strong contraction. When the heart gets the jitters this way it fails entirely to pump blood out to the rest of the body.

It is for this condition that a strong counter shock is a successful treatment. The counter shock, if applied within a few minutes, will stop the fibrillation and give the heart a chance to resume its normal beat, the Johns Hopkins investigators found. If it can be given quickly, before the brain has been too long deprived of nourishment, the victim may be restored to life.

The discovery of this treatment is particularly promising because when the heart is fibrillating artificial respiration, the usual method of reviving victims of electric shock, is probably ineffective.

Victims of high voltage shock whose hearts stopped beating without fibrillation might lose their last chance of recovery if treated by electrical countershock. But in some cases they may be restored by artificial respiration, which is one of the most important of all methods of restoring life. Artificial respiration by the prone pressure method is so simple that a child can do it, and so vitally important in cases of drowning or gas poisoning as well as some kinds of electric shock that everyone should know how to do it.

Alternate Pressure

The method consists, essentially, of alternately compressing the chest and releasing the pressure, thus causing the air to flow in and out of the lungs. A number of methods of doing this have been tried. One of them is to place the victim on a see-saw or teeter-totter. Tilting the body back and forth in this way forces the diaphragm—the large muscle dividing the chest from the abdomen—to compress the lungs and then to allow them to expand and suck in air. This method is reported to be one of the devices used by Dr. Cornish in reviving his dogs.

Considered the safest and most efficient method of artificial respiration, however, is the prone pressure method devised by the eminent British scientist, Sir Edward Sharpey-Schäfer, in 1903. You have probably heard or read dramatic stories of persons being restored to life after this type of artificial respiration had been carried on for many hours.

In some cases of illness, notably infantile paralysis, the muscles used in breathing are paralyzed and the patient can only be kept alive by having someone else keep his lungs expanding and contracting. Sometimes this is done by the prone pressure method of artificial respiration, relays of relatives and friends taking turns. For use in such cases, a young engineer at Harvard School of Public Health, Philip Drinker, designed an apparatus called a respirator which replaces the manual operation of artificial respiration. The patient is placed inside the respirator with only his head outside. The pressure of air inside the tank is alternately increased and decreased and this change in pressure forces the lungs to expand and contract, just as the manual or prone pressure method does, and with every expansion air is sucked into the lungs, to be forced out with every contraction as in normal breathing.

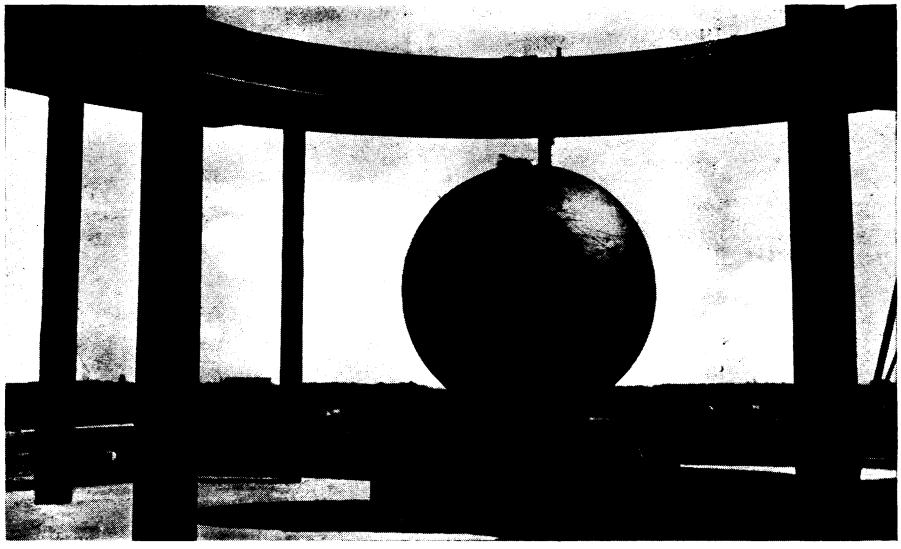
Pulmotor Also Aids

After some accidents, particularly gas poisoning, a pulmotor is used with artificial respiration by the prone pressure method. The patient then gets oxygen or a mixture of oxygen and carbon dioxide sucked into his lungs with every artificial breath.

Artificial respiration restores life by first starting the breathing again. Other methods have been devised to restore life by first starting the heart beating again. One of these is an electric needle which is thrust between the ribs and directly into the heart. This device was invented by Dr. Albert S. Hyman of New York City. It takes advantage of the fact that the heart has a natural pace-maker, a spot where its contraction is started and which is connected with

DIRECTIONS FOR ARTIFICIAL RESPIRATION

1. **Start immediately; don't stop to move patient, loosen clothing or anything else.**
2. **Send some one else for a physician.**
3. **Lay patient on his belly, one arm extended directly overhead, the other arm bent at elbow.**
4. **See that the nose and mouth are free for breathing. The patient's face should be turned outward and should rest on one hand and forearm.**
5. **If you can quickly open his mouth, feel in it and in his throat with your fingers to locate and remove any foreign object, such as chewing gum, tobacco or false teeth, that might get back into the wind pipe and obstruct the passage of air.**
6. **Kneel straddling the patient's thighs. Place the palms of your hands on the small of his back with your fingers resting on his ribs. Your little fingers should just touch the lowest rib, the thumbs and other fingers in a natural position.**
7. **Hold your arms straight without bending the elbows and swing forward slowly so that the weight of your body is gradually brought to bear on the patient. Your shoulder should be directly over the heel of your hand at the elbow at the end of the forward swing. This operation should take about two seconds.**
8. **Now immediately swing backward so as to remove the pressure.**
9. **Wait two seconds and then swing forward again.**
10. **Repeat these two movements unhurriedly and rhythmically twelve to fifteen times a minute. A complete respiration—breathing in and out—should take four or five seconds.**
11. **Keep this up without interruption until natural breathing is restored—if necessary for four hours or longer or until a physician declares the patient dead.**
12. **As soon as you have started artificial respiration and while you are keeping it up, let someone else loosen any tight clothing about the patient's neck, chest or waist.**
13. **Keep the patient warm but do not give any liquids by mouth until he has fully recovered.**
14. **If it is necessary to have someone relieve you at artificial respiration, make the change without losing the rhythm.**
15. **Watch the patient after natural breathing has started and if it stops after a short time, as often happens, be ready to resume artificial respiration at once.**



TO A PIONEER

The historic hill in suburban Berlin where Otto Lilienthal made his pioneer glider flights is now marked by this unique monument commemorating his 1896 flights on the site. The low hill at Lichterfelds—really little more than a mound—is the mecca of aviation enthusiasts who visit Germany's capital. There, they see the great metal globe of the world resting on a marble base. The names of celebrated aviators and their historic flights are engraved on the sphere. Round-the-world flights, flights across ocean, deserts, and the poles are recorded for posterity.

those parts of the brain and nervous system which have to do with regulating the heart beat. Dr. Hyman's device is called the artificial pace-maker.

The needle is stuck into the heart close to the natural pace-maker and a weak electric shock is sent through it into the heart at regular intervals, say forty or more to the minute. Each shock starts a contraction of the heart just as the natural pace-maker would. If there is nothing permanently wrong with the heart, its own pace-maker may recover and take up its job again and the heart will go on beating naturally and the patient be restored to life.

An older method of reviving a stopped heart is by massage. The surgeon opens the chest of the apparently lifeless patient and massages the heart at the same time that oxygen is being given by artificial respiration. In reporting the heart massage method of reviving lifeless patients, Prof. O. Bruns of the University of Königsburg, Germany, credits his success with the method more to the artificial respiration with oxygen than to the heart massage.

Other methods of starting the heart make use of chemical stimulants. Chief among these is adrenalin, the potent hormone produced by the medulla or inner part of the adrenal glands. In extreme cases, this is injected directly into the heart. Generally it is injected into a vein of a dying patient, and is carried back to the heart by the blood stream. Camphor and strychnine are other, less potent heart stimulants.

A heart may stop beating and life ebb away when there has been severe hemorrhage. In such cases, the physician will resort to blood transfusion to give the heart something to pump. In Russia a method has recently been found for using the blood of accident victims who could not be resuscitated to restore life to other patients about to die from lack of blood.

The scientists who discovered the value of counter-shock for reviving victims of electric shock hope to find a way of making it practical for use on linemen and others working with electricity who are most exposed to its dangers. Artificial respiration can be used by any layman who learns it.

Science News Letter, December 1, 1934