

Can people put themselves in a state of death to live longer?

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Scientists can hopefully put patients in a state of death or pause life - the boundary between life and death - to treat common wounds or even save lives from the " *death hand* " .

In February 2011, **Kelly Dwyer** was discovered and rescued from an ice hole after hours. At that time, her body temperature had dropped to just over 15 degrees C and the pulse was so weak that it was almost impossible to measure.

And before taking her to the ambulance, her heart stopped beating. Doctors at a hospital near Manchester tried to warm her up for several hours but couldn't. Her body temperature was still over 20 degrees Celsius, her heart still couldn't beat even though she used a defibrillator.



Kelly Dwyer while still in the hospital.

A doctor quickly took her to the Church Health Center. Here, she was connected to an artificial heart machine to warm more positively. They filtered and added oxygen to the blood, then quickly pumped them into her body to circulate again. Kelly's body temperature eventually increased again, and after five years of clinical death, her heart beat again. Two weeks later, Kelly was discharged with only a minor injury in her hand.

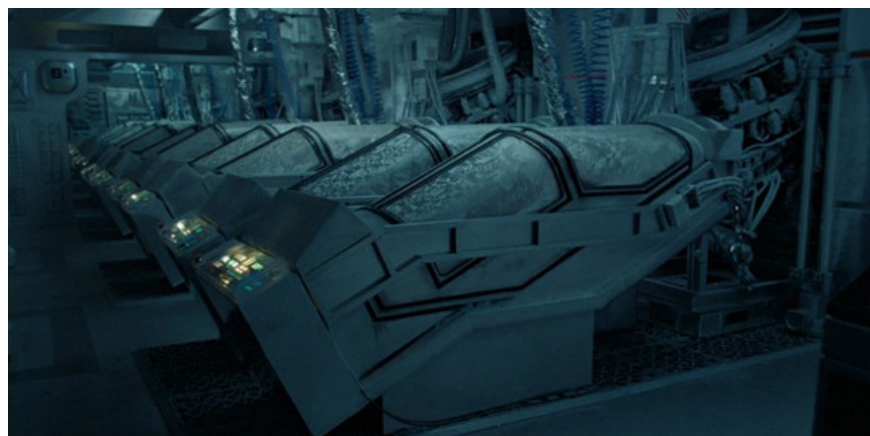
Put your body in a dead state to find a way to live

Thanks to the advancement of technology, saving lives from death is no longer a science fiction story, cases like Dwyer are no longer a rarity.

Freezing technology before the heart stops beating makes metabolic processes slow. The body absorbs very little oxygen, and it will temporarily stop moving for up to 7 hours without cells being destroyed.

But doctors and scientists want to go even further. They hope to create a " *near death state* " to save lives? By creating a " *pause button* " , doctors can have more valuable time to make the difference between life and death.

If this becomes true, it will be a step forward to change the game to save nearly 200,000 Americans each year from injury.



Will the idea of hibernation as in science fiction films come true?

A small group of scientists and medical professionals across the United States are looking for different ways to **suspend life** , to perform surgeries without causing traumatic patients to bleed to death, or prevent cell destruction during treatment of heart disease.

Some groups aim to pump **cold saline solution** into the patient's blood vessels, while others work towards stopping medication.

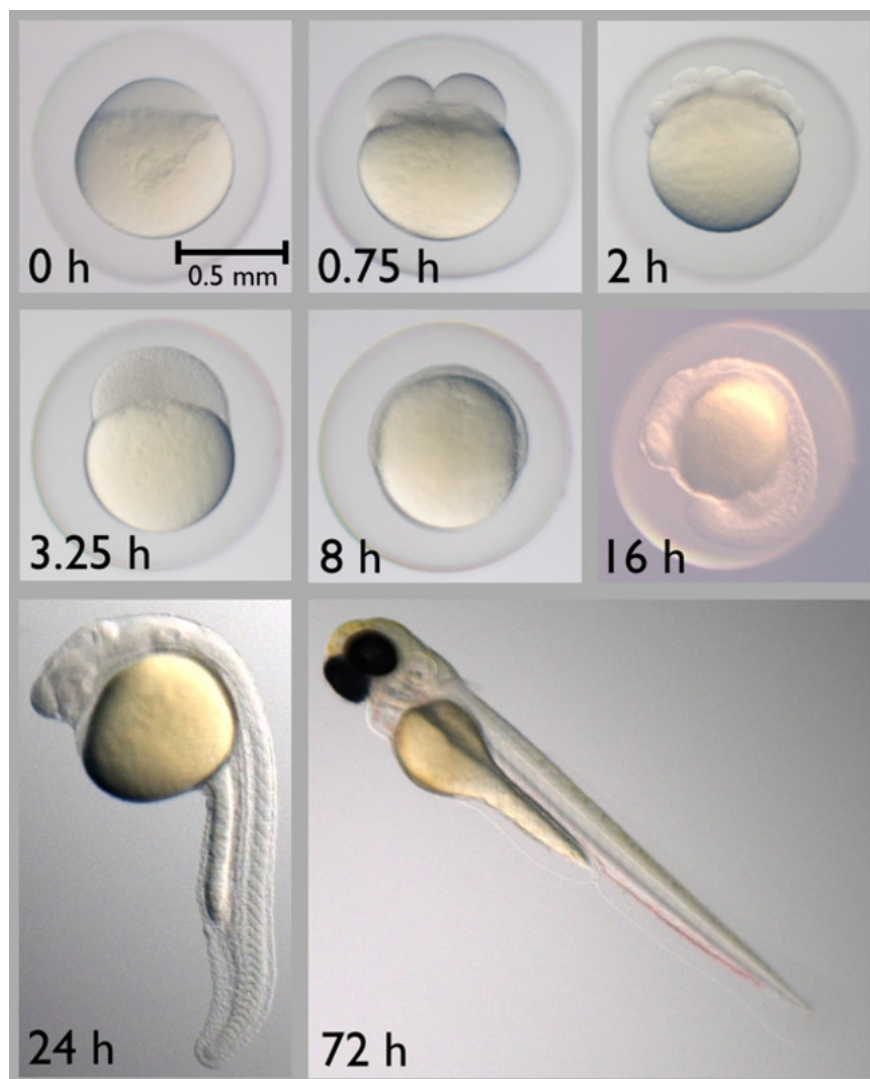
In 2010, the US Department of Defense launched a research project to find a way **to control the biological clock** of a \$ 34 million human named Biochronicity.

Slowing down or stopping this biological time will help injured soldiers survive longer or even completely healthy - " *so we can take them somewhere to treat the wound.* "Colonel Matthew Martin, 48, a surgeon with research is being supported by Biochronicity.

Deadly compounds can also save people

Dr. **Mark Roth** from Fred Hutchinson Cancer Research Center in Seattle is seen as a pioneer in the study of **halting therapy to treat trauma** . With 20 years of research on this issue, he won the MacArthur Genius Grant award when adjusting the biological clock of small fish and round worms.

His experiment was carried out on a petri dish with small zebrafish fish, which had been growing for only a few hours but they had blood vessels and hearts, though almost transparent. Using small tubes, he withdrew oxygen and led nitrogen gas into a container of these petri dishes, in other words, he was changing the air environment these fish breathe.



Zebrafish fish shape after a few hours of development.

" At the moment the atmosphere we're breathing in is similar to the inside of the box, but over time, the entire space in the box will be completely Nitrogen. When these organisms breathe in that air, they will Tomorrow, when we put them back into the air in the room, they will work again. "He said.

By the early 2000s, Mr. Roth's experiments on motor suspension were only performed on small organisms such as zebrafish fish and nematode nematodes. However, during a test of hydrogen sulfide H₂S on mice by exposing them to air containing 80 parts of that gas at room temperature. Roth realized he could put them into a state of inactivity, but then when placed in a regular atmosphere, they could " *revive* " without harm.

This breakthrough opens up the potential to treat patients with heart disease and cancer. This work also helped bring **the \$ 500,000 MacArthur prize** to Mr. Roth.

Since then, Roth has focused on finding compounds in **deadly gases** in tightly-locked, enclosed chambers with security cameras and alarms. Roth says, " *These gases will kill you. Selenide, Carbon Monoxide CO, Cyanide, you can die in just two minutes. But someday, these deadly gases can save your life.*"



So far, Roth has identified four compounds that naturally exist in the human body and can slow down the amount of oxygen used in the body: **sulfur, Bromine, Iodine and Selenium** . He calls them " *fundamental degrading agents*" (elemental reducing agents or ERA).

Roth wanted to develop these **ERAs** into a drug that could be injected into the body to prevent blood recurrence (reperfusion) - the destruction of tissue that could occur during the doctor's pause of a pain. heart. When blood flows back through the heart, even at normal speeds, a sudden increase in oxygen can permanently damage heart cells, leading to chronic heart failure (the leading cause of death). death in the world).

Roth's research results show that if he stores an ERA compound before the blockage in the blood vessels is removed, it can help the heart muscle avoid being destroyed in a re-injury. blood circulation.

"*We have shown that you can inject Sodium Iodide intravenously into a patient, which will reduce the 75% of normal damage in standard cardiac care .*" He said. "*You can keep your heart from dying by temporarily slowing down its operation.*"

After joining up with Faraday Pharmaceuticals, a private company, Roth hopes to start testing on heart disease patients with ERA substances he found in 2017.



The suspension of movement will make the surgery easier and safer.

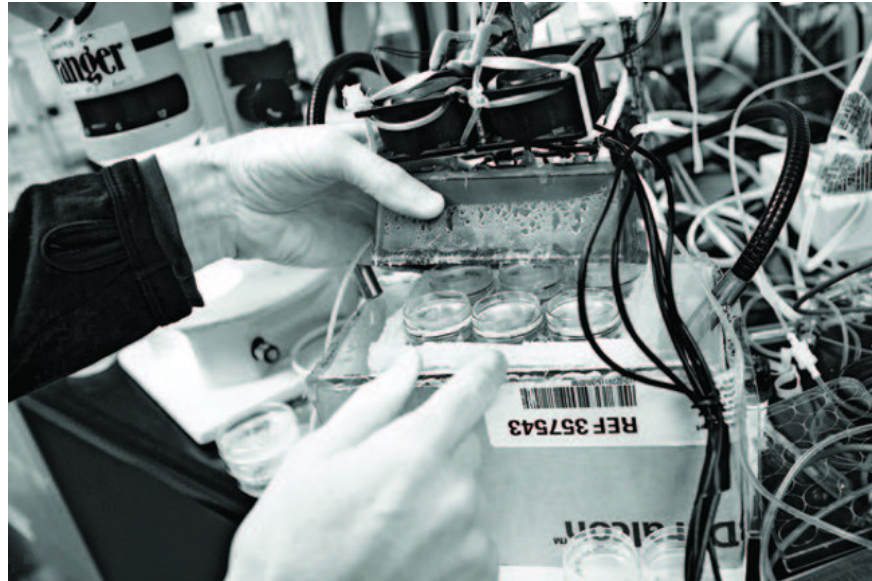
Both Mr. Roth and Stephen Hill, CEO of Faraday Pharmaceuticals, believe that one day, these ERAs can be used for a variety of medical surgeries, such as organ transplants and prosthetics. Even so, their current goal, which will target patients with heart attacks, is undergoing a process of restoring blood circulation to the coronary arteries.

Other emergency injuries, such as gun injuries, are also promising candidates for this suspension. In fact, a group of health professionals in the West Bank have given the green light for testing this method on humans for such trauma, which is also using another slowing technique.

Transmission of cold salt water to replace blood to maintain life

Dr. **Sam Tisherman** , Director of the Center for Active Care and Injury Treatment at the University of Maryland School of Medicine, Baltimore, has another way to reach the boundary between life and death. He called it "*emergency maintenance and resuscitation* " (EPR: Emergency Preservation and Resuscitation).

Unlike Mr. Roth's method, Mr. Tisherman's approach is to **cool patients to low body temperature** by replacing blood in the body with a **saline solution at freezing temperature** . This causes the patient's body temperature to drop rapidly to 10 - 13 degrees C. This is similar to taking the patient to the same condition that Kelly Dwyer went through when falling into the ice hole.



Type of blood replacement machine with cold saline solution.

A typical treatment for a patient with a gun wound involves inserting a breathing tube, then using a large intravenous catheter to replace the lost blood and fluid, while a doctor another surgeon treated the wound before the patient's heart stopped beating. *"It's a race of time."* Mr. Tisherman said. *"And these efforts are often ineffective. Only 5-10% of people with cardiac arrest stop trauma that can survive."*

Therefore, this emergency hypothermia can give surgeons more time to surgery. They can then continue to circulate blood and gradually warm up the patient's body. Mr. Tisherman and his colleagues spent two decades perfecting this method in animals.

By 2014, the US Food and Drug Administration allowed them to test humans on the UPMC Church Hospital in Pittsburgh, Pennsylvania. Tests are still ongoing, but no information has been disclosed.



If this method works, it could become a lifesaver for many lives - especially in a city with the second highest number of murders across the United States in 2015 (344 cases in 2015).

A step towards emergency can save thousands of wounded soldiers on the battlefield

What happens when in the battlefield, where the nearest treatment facility is also hundreds of kilometers away? It was a challenge and also a motivation for **Matthew Martin** , a surgeon, to find out. Once a head of an ambulance team at a field hospital in Baghdad, he had to witness many soldiers who had been killed after losing their lives, although they could be treated completely, but could not keep up to the facilities. Fully equipped treatment in the back.

After four visits to Iraq and Afghanistan, Martin is trying to achieve the same results as Mr. Tisherman, without the equipment that could not be brought out of the front. That means he will use **chemicals** , not refrigerants, to slow the body's rhythm.



Ambulance on the battlefield has always been a fierce race against time.

Martin said. *"The question is , can we lower the need for human blood for a period of time, so much so that the person really does not need blood to flow in? That will be the ultimate goal of this."*

He conducted studies on the physiological effects of a drug tested on pigs when they simulated a serious bleeding injury at the Madigan Army Medical Center in Tacoma, Washington.

"The goal is to create a pocket therapy." He said. " For an ambulance soldier with his medicine bag to inject a lot of wounded soldiers quickly. He can inject this drug and start the suspension process, for soldiers to have more time to give. to the surgery facility. "



Martin and colleagues identified a variety of enzymes called **PI 3-kinase** that help regulate metabolism and drugs that can control their activity. Studies show that injecting this drug at the time of ischemia - occurs when blood flow to the heart is depleted - can slow down metabolism without hurting animals object.

Dr Roth's compounds, Dr. Tisherman's cold saline solution or Dr. Martin's enzymes, all still have a long way to go. But just with their appearance, it is enough to give us hope in the future, where people can survive longer than the serious injuries we accidentally encounter.

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