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Life on hold

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Life on hold

There's a strange state between being dead and alive that could save your life, says **Bijal Trivedi**

 **HASAN ALAM** gazes over the cold, motionless body of a pig lying on a stainless steel table before him. The animal has no pulse, no blood, no electrical activity in its brain, and its tissues consume no oxygen. It has been in this state for two-and-a-half hours. It looks dead. "You would think so," he says, "but you can bring it back."

He flicks a switch and warm blood starts pumping into the animal, gradually ramping up its body temperature. At about 25 °C the pig's heart starts beating of its own accord and the animal jolts back to life.

Alam, a trauma surgeon at Massachusetts General Hospital in Boston, is testing a new technique to grab patients at the brink of death and divert them into a state of suspended animation. Doctors could keep a body hovering in this twilight zone between life and death for hours while repairing wounds, and then revive it. The work could

save the lives of gunshot and car accident victims, and patients suffering other life-threatening wounds that have caused severe blood loss.

Alam is one of several researchers experimenting with suspended animation. Strategies range from extracting all the oxygen from an organism to awakening what some scientists believe is our latent ability to hibernate. Though clinical techniques to induce comas already exist, these only suspend activity in the brain. Alam and others are studying ways to put the entire body on hold. They are still deciphering the precise mechanisms behind how and why life can so routinely be paused in vitro and in animals. But after countless experiments, they are increasingly sure of one thing: it can be done.

The pig experiment is brutal, but vital if Alam is to get the go-ahead to use the technique on humans. First he anaesthetises

the pig to minimise the possibility of pain. Then he cuts into its abdomen and slices a major vein and artery. The cuts are designed to simulate multiple gunshots to a person's chest and abdomen. Blood loss is rapid and massive – about 50 per cent – and the animal's body quickly enters an advanced state of shock. He then drains the pig's blood and stores it. Finally, he pumps organ preservation fluid – a cocktail of nutrients and free-radical scavengers routinely used to store transplant organs – chilled to 2 °C, into its circulatory system to replace the blood and cool the animal from inside out. Over 20 minutes the pig's body temperature falls from 37 to a frigid 10 °C – what ER doctors call profound hypothermia.

Alam keeps the pig in suspended animation for 90 minutes, long enough to repair its damaged blood vessels. He then warms the pig's blood stored earlier and ►

