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Time is start-up's precious product

• A U of M spinoff aims to use its drug therapy to extend the “golden hour” for people who have life-threatening injuries.

By THOMAS LEE, Star Tribune

Do hibernating squirrels and deep-diving whales hold the key to keeping trauma victims alive, even if they lose a catastrophic amount of blood?

VitalMedix Inc. thinks so. The Minneapolis-based start-up, which recently spun off from the University of Minnesota, is developing a hemorrhagic shock drug designed to buy precious time for a victim suffering near-fatal injuries.

Based on the research of two U doctors, the drug, dubbed Tamiasyn, incorporates chemicals found in some animals that allow them to survive in certain conditions such as hibernation or at great undersea depths. The idea is to extend what trauma surgeons call the “golden hour,” the period of time after an injury that offers the patient the best chance for survival if quickly transported to a hospital.

Potential customers could be emergency medical teams, trauma centers and the military, VitalMedix CEO Jeff Williams said.

“Everyone is trying to compress the time between injury and the beginning of repair,” including the use of helicopters and finding better ways to treat people in the ambulance, Williams said. “The system we are developing will work to do the opposite -- expand time. Our goal is to take the golden hour and make it four times longer.”

The company has yet to prove that Tamiasyn works on humans. VitalMedix -- which so far has raised \$1 million from the university and CentreStone Ventures, a Canadian firm that provides seed capital to life-science start-ups -- estimates that it needs at least \$27 million to fund its clinical trials on humans.

But the payoff could be enormous, experts say.

“It would be a tremendous breakthrough,” said Dr. Jim Thompson, director for emergency services at the University of Minnesota Medical Center at Fairview Hospital. He is not affiliated with VitalMedix.

The current treatment for trauma victims at an injury scene is mostly “load and go,” meaning first responders concentrate on transporting the patient to a hospital as quickly as possible. Aside from stopping bleeding and pumping electrolytes into the patient through an intravenous line, paramedics or emer-



Jeffrey M. Williams, President & CEO, VitalMedix, Inc.

gency medical technicians can only do so much, Thompson said. “The options are not that big,” he said. “There is very little time to resuscitate people. But what if we had another hour or even 20 minutes? More people might make it.”

In some ways, VitalMedix will be a crucial test for the university's retooled technology transfer program. Despite world-class research, the U's efforts over the years to monetize its inventions have largely fizzled.

VitalMedix, along with Orasi Medical and Medication Management, are the first three companies to emerge from the U's new Venture Center, led by veteran investment banker and venture capitalist Doug Johnson. Unlike previous start-ups that failed, VitalMedix was ready to attract investors the moment it spun off, John-

son said. The Venture Center funded a study that proved that Tamiasyn worked on pigs. It also recruited an experienced management team to run the company, led by Williams, a veteran medical device entrepreneur.

Johnson believes the company will most likely be acquired. The U owns a 25 percent stake in VitalMedix, with the rest belonging to management and investors.

VitalMedix “represents ... what our model says we are supposed to do: Bring technology to the public and bring a capital gain back to the university,” Johnson said. “I have extremely high hopes for VitalMedix. There isn't a treatment for accident victims today that is effective.”

Researchers in recent years have been exploring very different strategies to extend the

golden hour for badly injured patients. A trauma surgeon at Massachusetts General Hospital in Boston, for example, has been experimenting with freezing the body's circulatory system to a state of "suspended animation." A University of Alabama scientist is examining whether estrogen, a hormone that restores blood pressure in women during menstruation, might prolong a victim's golden hour.

The story of Tamiasyn originates with the U.S. military. Matt Andrews and Les Drewes, doctors based at the U's Duluth campus, received a grant from the Defense Advanced Research Projects Agency (DARPA) to develop a way to keep wounded troops alive long enough to reach a hospital.

"One of the great stories in the military right now ... [is that] wounds that did kill so many people in Vietnam aren't killing them [in Iraq and Afghanistan]," Williams said. Roadside bombs "are terrible things, but these guys are surviving a lot more than they would have in the 1960s and '70s because they have better body armor. But the bad news is yeah, they are surviving for a while but they are bleeding out by the time they get back into the combat support hospital."

'Demand-side' solution

DARPA was particularly interested in a "demand-side approach," a technology that could reduce the body's need for oxygen after an injury "so that oxygen supply meets demand even in the face of severe blood loss," according to agency materials. DARPA noted that hibernating animals and deep-diving mammals could slow their metabolic demands for oxygen in low-supply conditions.

As it turned out, Drewes was looking at how whales avoided brain damage during deep-sea diving; Andrews was studying how squirrels survived the physiological stress of hibernation.

They identified the presence of two compounds: beta hydroxybutyrate (BHB) and melatonin. Because cells require oxygen to process energy, BHB could reduce the body's need for oxygen by providing fuel directly to the cells. Melatonin, a powerful antioxidant, could protect cells from damage during periods of low blood flow.

"Cells can't live without oxygen, that's what we were always taught," Williams said. "That's not exactly true. They can live without oxygen. They

can't live without fuel. Cells have to continuously produce energy. Otherwise they die."

The scientists tested the compounds on rats, which are nonhibernating animals. They found that the rats were still alive even after losing 60 percent of their blood. With funding from the Venture Center, the scientists tested the compounds on pigs, getting similar results.

Tamiasyn has yet to be tested on humans. The company will eventually equip emergency medical teams with the drug. Under rules developed by the Food and Drug Administration, participating hospitals will notify the community that they plan to test Tamiasyn on trauma victims. Any citizen can opt out of the trial.

To administer the drug, VitalMedix developed a system consisting of a kit the size of a cigar box filled with cartridges preloaded with the drug. By pressing a button, first responders can administer Tamiasyn through an intravenous line.

"Does it mean something to humans?" Williams said. "We don't know yet. ... But you have to remember that these people who are receiving this drug are essentially going to die unless something just short of a mir-

acle happens. We are working with people that are in such bad condition in the first place that I feel optimistic that we will do some good."

Experts in emergency care are cautious but intrigued.

"We have much yet to learn about trauma and how the human body responds to it," said Dr. Scott Atchison, medical director for Spectrum Aeromed, a Fargo, N.D.-based company that equips helicopters and planes with specialized medical equipment.

"We do know that providing critical care to an acutely injured person at a motor-vehicle or some other accident scene, often at night and in poor weather conditions, is a very challenging undertaking."

Atchison said that a drug like Tamiasyn -- one that's easy to deliver and keeps patients from sliding into hemorrhagic shock -- could ultimately "allow more patients to be safely transported to a trauma center for lifesaving care."

Thomas Lee • 612-673-7744