Get Bear Smart Society

Black Bear Research May Revolutionize Medicine

By Bill Hudson, WCCO — Mar 9, 2010

In a University of Minnesota research laboratory, the thumping sounds of a beating heart can be heard throughout the room. But it’s what you see that is so amazing. Resting on a thick pad of yellow foam, attached to wires and plastic tubing is an actual swine heart pulsating in a constant cadence.

“We’re studying the functions of a heart that’s been excised and re-animated,” explains Dr. Paul Iaizzo.

Iaizzo is a professor of surgery and the lead investigator at the University of Minnesota Visible Heart Laboratory.

The Visible Heart Laboratory is the only lab in the world where animal hearts are being pre-treated with blood plasma from a black bear and shocked back into rhythm. What they’re finding has the potential to revolutionize medicine.

Dr. Iaizzo said the preliminary results of his research appear promising.

"By giving it (heart tissue) bear plasma prior to the experiment they see better recovery," Dr. Iaizzo said

In theory, human hears and muscle tissue could be pre-treated with some form of the bear plasma to render similar results in the operating room. It’s a theory they have been refining after multiple trips into the northern Minnesota woods.

Paul Iaizzo and his team of researchers plodded through deep snow near Camp Ripley, north of Little Falls. They headed to a spot about a half-mile from the nearest road to a den of sleeping black bears. On their backs they carried heavy packs loaded with sophisticated medical equipment, including an EKG machine and a portable ultrasound monitor.

Dave Garshelis is the primary black bear researcher with Minnesota’s Department of Natural Resources.

“The more we find the more remarkable it gets,” said Garshelis. “Looking at this heart stuff it’s quite fascinating to see the changes they go through across the year.”
Garshelis has been radio tracking and monitoring black bear hibernation for several decades. The mother bear that the research team will visit on this trip is one Garshelis has been following for years.

After the effects of anesthesia take hold, the bear and her yearling are gently pulled from the den. It's not exactly what you might picture for a five month winter retreat. With a bed of thin grass lining the dirt the bear den appears little more than a five by four-foot hole carved into a gentle hillside.

The adult female and her yearling are measured and weighed. She tipped the scales at 217 pounds and her cub born last winter has grown to 98 pounds.

Garshelis and fellow researcher Karen Noyce draw vials of blood that will be later tested. A caliper measurement of the bear's large incisors is made after pulling back its gums. To the outside observer both appear to be in perfect health.

"The food supply is better down here so the yearlings and all bears grow faster. So, this guy is pretty big. Some of the (bears) up north are like half this size," Garshelis points out.

It's amazing considering that the animals will spend five to seven months without eating, drinking, urinating or defecating. Yet, despite that total lack of nutrition and movement they'll lose just a fraction of their muscle mass.

Exactly "how" that is medically possible is what these University, Medtronic and DNR scientists are hoping to discover.

Dr. Paul Iaizzo compares a bear's physiology to that of a human, explaining, "If you or I would sit on the couch for three to four months our hearts would shrink with disuse."

In fact, researchers are finding through their sophisticated monitoring that the heart of a hibernating black bear will stop and rest 12 to 15 seconds between beats. Like a triage unit set up on ground tarps, electrocardiograms, ultrasounds and implantable devices are revealing first of a kind data.

Tim Laske is an engineering director at Medtronic. The research is a perfect collaboration between the DNR, University and the medical device giant because of the huge potential for human applications.

"We think it's the first time ever that anyone has recorded the heart rate of any wild animal for a 12-month period," Laske says as he downloads the latest data. Holding a radio device to the bear's chest, he's reading stored information from a Medtronic device that is implanted underneath the bear's skin.

What it tells the research team is nothing short of amazing. Over the past year, the bear's heart stopped beating 65,000 times for an appreciable amount of time.

"If this bear were a human, it would have fainted 65-thousand times," said Laske.

Researchers are discovering that unique properties in the bear's blood plasma or serum likely protects the animal's organs and muscle tissue from a lack of oxygen. It's that lack of nourishment and oxygen in the blood that leads to heart and muscle damage.

If similar "plasma fractions" or synthetic compounds can be applied for medical use in humans, it would mean quicker recoveries from surgery and a greatly expanded number of heart transplants.
The reason, Dr. Iaizzo explains, "for a heart transplant you can go up to 4 to 6 hours (after removal). After that it is deemed not viable for transplantation."

Iaizzo believes that if the research leads to Food and Drug Administration approved treatments, bear plasma protein has the potential to double the time window for heart transplantation. It's conceivable that a donor heart located on the east coast could be pre-treated with a protective protein, giving transplant teams the time to fly the donated organ to the west coast to an awaiting patient.

Currently, two-thirds of all patients needing a heart transplant die while waiting for a match within that geographic time window.

"We've been able to take plasma and pre-treat before we isolate and re-animate (a heart) outside the body and look at its function and we see improvement," said Iaizzo.

Remarkably, the potential of future medicine might have been discovered in a bear's winter den.