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Dolphin "Diabetes" Could Be Important Model for Humans

by Erik Stokstad on February 18, 2010 8:21 PM | Permanent Link

Credit: Brian Balmer, Sarasota Dolphin Research Program

SAN DIEGO—The best nonhuman model for type 2 diabetes is not a rat or even a primate. It's a dolphin, researchers suggested at a press conference here this morning at the annual meeting of the American Association for the Advancement of Science (which publishes *Science* NOW). Apparently, these marine mammals regularly shift their blood chemistry in a way that can cause problems strikingly similar to those associated with diabetes in humans, such as insulin resistance, excess iron, and kidney stones.

In 2007, veterinary epidemiologist Stephanie Venn-Watson of the National Marine Mammal Foundation in San Diego and veterinary pathologist Sam Ridgway of the University of California, San Diego, School of Medicine, made a surprising discovery in bottlenose dolphins (*Tursiops truncatus*) owned by the U.S. Navy. After reviewing 7 years of routine blood samples from 52 dolphins, they found that the blood chemistry after fasting resembled that of people with diabetes—higher levels of glucose and other molecules, such as an enzyme called gamma-glutamyl transpeptidase—while the blood after a meal was like that of healthy people. This allows the dolphins to maintain adequate glucose levels while eating a high-protein diet, Venn-Watson said.

Last year, the group described signs of disease complications associated with diabetes. Some dolphins have hemochromatosis, an excess of iron in the blood, and high levels of triglycerides, problems associated with type 2 diabetes in humans. Some of these dolphins also have insulin resistance.

Now the team has added hypocitraturia (low urine levels of citrate) to the list. As in humans, these dolphins have a higher risk of kidney stones, probably because of the hypocitraturia. The findings are in press at the *Journal of Comparative Medicine*.

Venn-Watson proposes that dolphins could be the most realistic model for studying diabetes, because their condition is more similar to that of humans than in rats, cats, pigs, or primates. Figuring out how dolphins turn their diabetes-like state on and off—and how this leads to problems—could reveal clues to preventing diabetes in humans, she said.