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What hibernating bears can tell us about space travel

Scientists studying hibernation discovered that bears' super-slow metabolism may provide clues for treating trauma patients and preparing for spaceflight.



This American Black Bear looks just about ready to bunk down for winter – or maybe he's groggy from just waking up. Hibernating black bears drop their metabolisms down to 25 percent of what their summer levels, scientists discovered, but their internal temperatures only fall 5 or 6 degrees.

Institute of Arctic Biology / University of Alaska Fairbanks / Science / AP

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By *Pete Spotts*, Staff writer / February 17, 2011

Scientists have taken an unprecedented look at the biological changes bears undergo when they bed down for winter, and the results have been little short of stunning, researchers say.

From an unexpectedly dramatic slowdown in the chemical processes that keep the bears alive to their rafter-rattling snores, ursine metabolic tricks may suggest more-effective ways of stabilizing trauma patients as they await hospital treatment, the researchers involved say.

In addition, the project's results could contribute to new approaches for helping astronauts counter the physical changes they experience during long missions in space, the scientists add.

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The study, which appears in this week's issue of the

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journal Science, shows that during the five to seven months black bears hibernate, their heartbeats slowed to as few as nine beats per minute, often with pauses that last up to 20 seconds. The chemical processes that keep them alive slow to only 25 percent of their summertime, most-active levels.

Studies of other, smaller hibernating creatures, such as arctic ground squirrels, suggested that a hibernating animal's metabolism rate falls by 50 percent for every 10-degree drop in body temperature. But the bears'

body temperatures dropped only 5 or 6 degrees, while their metabolism plunged 75 percent. And as other studies on hibernating bears had shown, the animals did not lose significant amounts of bone or muscle mass for their seven months of inactivity.

It's the bears' ability to radically slow their life-support system while maintaining muscle and bone mass that make the results so intriguing for human purposes, suggests Brian Barnes, a scientist at the Institute of Arctic Biology at the University of Alaska and the senior scientist on the project.

"Somehow they've tricked their tissues – their bones and muscle – into thinking that they are still doing work," he says. By discovering the biochemical signals that perform that trick, he continues, it might be possible to chemically reproduce the same feat in humans.

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The research involved observations of five bears over three years. The Alaska Department of Fish and Game provided the bears after capturing them as "nuisance animals" – predators wandering too close to human populations for human comfort.

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