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Surviving on the bear essentials



MAY 6, 2011

PHILLIPA GARDINER/THINK TANK

The American black bear (*Ursus americanus*) can hibernate for five to seven months without eating, drinking, urinating or defecating — surviving on nothing but the air it breathes and the energy reserved in its body.

Thanks to scientists at the Institute of Arctic Biology (IAB) at the University of Alaska in Fairbanks, we now have a better understanding of the physiology of hibernation. Their study monitored bears continuously throughout winter and into spring in a near natural setting away from human disturbance — a world first.

Five bears captured by the Alaska Department of Fish and Game were relocated to a remote area and provided with artificial dens. Each animal was fitted with a radio transmitter which recorded its body temperature, heart beats and muscle activity. Researchers measured the metabolic rate of each bear via the concentration of oxygen and carbon dioxide levels in the dens.

The researchers found that the bears' heart rate decreased from an average of 55 beats per minute (bpm), to as low as nine bpm. The bears were breathing at an average of just one to two breaths per minute. As in previous studies, the bears showed little loss in muscle and bone mass.

According to Øivind Tøien, a research scientist at the IAB, they found the "bears' metabolism slowed by 75 per cent, but their core body temperature decreased by only five to six degrees." Their temperatures cycled from 30 to 36 degrees Celsius over several days, the first time fluctuations like this had been recorded for any hibernating mammal.

Interestingly, when the researchers monitored the bears after they emerged in the spring, they found it took two to three weeks for them to return to a normal metabolic state, suggesting that metabolic suppression is independent of reduced body temperature.

This important observation indicates there may be a biochemical switch that controls the metabolic rate in black bears. The IAB group is now looking at changes in gene expression that occur when bears transition from an active to hibernating state.

A greater understanding of the molecular and genetic changes that occur in hibernating bears could lead to applications in emergency medicine for humans. The director of the IAB, Brian Barnes, pointed out in a statement, "Quickly reducing metabolic demand in victims of stroke, heart attack or trauma would put them in a stabilized, protected state to provide more time to arrange advanced medical care. It could extend the golden hour to a golden day or longer."

For those interested in space travel, putting humans into a type of hibernation could help avoid the problems of long-distance flights to Mars and beyond.

It is the time of year when bears around Squamish are becoming active and looking for food after a long winter. We can all play a part in reducing human-bear interactions — please take a moment to visit the Get Bear Smart Society website (<http://www.bearsmart.com>) to learn how to become bear smart at work, home and play.