

Black bears study offers hope for deep space human hibernation

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- Animals slow down their heart beat by 75% when they sleep for six months each year without food or drink

As Winnie the Pooh would testify, bears are known for their love of food, rather than their love of exercise.

Now a new study has shown just how inactive real-life black bears can be.

Scientists have discovered that the creatures slow down their metabolic rate by a staggering 75 per cent to sleep through half the year without food, water or even an urgent visit to the woods.

At the same time they cut their heart beat dramatically - sometimes leaving gaps of 20 seconds before beats.



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Taking it easy: Black bears slow down their metabolic rate by 75 per cent to sleep through half the year without food, water or even an urgent visit to the woods

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It is the first time researchers have been able to monitor North American black bears throughout their seven-month long winter hibernation and the results have astonished experts.

They say the findings could have implications for medicine - and could allow doctors to one day slow down patients' metabolism while waiting for life-saving treatment.

It could even help pave the way for long distance space travel, using the sort of hibernation pods seen in science-fiction movies such as Alien and 2001: A Space Odyssey.

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The scientists found that during their long snooze, the bears' heart rates slowed from around 55 beats per minute to an average of just 14.

Dr Olvind Tolen, from the University of Alaska at Fairbanks, said: 'They have an almost normal heartbeat when they take a breath. But between breaths the bears' hearts beat very slowly.

'Sometimes there is as much as 20 seconds between beats.

'Each time the bear takes a breath, its heart accelerates for a short time to almost that of a resting bear in summer. When the bear breathes, the heart slows down again.'

The researchers, who report their findings in the journal Science, studied five black bears captured by state officials when they wandered too close to towns in Alaska.

In the wild, the bears spend five to seven months hibernating each winter. During that time they do not drink eat, urinate or defecate and yet emerge from their dens in spring in pristine condition.



During their long snooze, the bears' heart rates slowed from around 55 beats per minute to an average of just 14

The bears were placed in homes designed to mimic dens in the woods away from people and watched with infra-red cameras and movement sensors.

The scientists implanted radio transmitters in the animals' bodies to monitor heart rate,

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body temperature and muscle activity.

Measuring the oxygen levels in their blood showed that the bears slowed down their metabolic rates - the rate they convert food to energy - to just 25 per cent of the normal summer level.

The reduced metabolism allows them to survive on the fat they store up in the summer and autumn.

Their body temperature fluctuated between 30C and 36C in two to seven day cycles - a pattern never seen in any other hibernating animal before.

Once the bears' temperatures dropped to 30C they started to shiver, until the temperature rose to 36C again. Then the bears stopped shivering, until their temperature reached 30C.

In spring, when they woke up, the metabolic rates were still sluggish - just half the normal summer levels. It took another three weeks before their bodies returned to normal.

The researchers say the findings don't just explain how animals hibernate - they could also be useful for people.

Hibernation is common in mammals - and people may still carry genes that help our bodies slow down for long periods.

'If our research could help by showing how to reduce metabolic rates and oxygen demands in human tissues, one could possibly save people,' Dr Tolen said.

'We simply need to learn how to turn things on and off to induce states that take advantage of the different levels of hibernation.'

Dr Brian Barners, a co-author of the study, said: 'When black bears emerge from hibernation in spring, it has been shown that they have not suffered the losses in muscle and bone mass and function that would be expected to occur in humans over such a long time of immobility and disuse.

'If we could discover the genetic and molecular basis for this protection, and for the mechanisms that underlie the reduction in metabolic demand, there is the possibility that we could derive new therapies and medicines to use on humans to prevent osteoporosis, disuse atrophy of muscle or even to place injured people in a type of suspended or reduced animations until they can be delivered to advanced medical care.'

Hibernation could even be used in deep space travel, the experts said.

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