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## [How Can Some Mammals Hibernate?](#)

*Japanese researchers discover hibernation hormone that may have numerous medical uses*

Scientists have wondered for decades how is it possible for an animal such as a bear to hibernate. Unlike cold-blooded animals that are more dependent on external temperature changes and are sometimes simply forced by the external conditions to go numb, mammals are capable of retaining a constant internal temperature. Nevertheless, some mammals, from chipmunks to bears, have adapted to the harsh winter conditions by hibernating. Japanese scientists have now discovered a hormone which seems to be responsible for the dormant state. "One of the most curious biological phenomena in mammals is their ability to hibernate (each year), which allows them to survive unusually low body temperatures at or near freezing," said study author Takashi Ohtsu of Kanagawa Academy of Science and Technology in Japan. Researchers studied chipmunks and found that concentrations of a certain "hibernation-specific protein" (HP) in the blood started to decrease prior to hibernation and remained low throughout the inactive state. Hibernation ended after blood HP levels rose. Further study revealed an inverse relationship between HP levels in the blood and brain. While HP levels dipped in blood, the hormone rose dramatically in cerebral spinal fluid. The connection between HP and hibernation was also proved by the fact that when the animals received treatments blocking the HP's activity in the brain, their hibernation period shortened dramatically. "Although the functions of HP remain to be clarified, the current observations lead us to propose the involvement of the protein complex in the regulation of energy metabolism and/or biological defenses during hibernation - crucial events for adapting to the severe physiological state," Ohtsu said. Moreover, the scientists discovered that the annual variation of HP concentration was not triggered by the external conditions, but by the animal's internal clock - hibernation occurred in the same way even when the animals were kept in constant external conditions. **Potential medical applications** This hormone might have similar, hibernation triggering, effects in humans. Hibernation is a state in which the bodily functions are drastically reduced and the organism can cope with very harsh conditions. It could be useful to induce such a state during difficult operations. The hormone might also be used to devise "pharmacological applications in humans to the prevention of lethal diseases, such as hypothermia (low body temperature), ischemia (shortage of oxygen), muscle atrophy, bacterial infection, and tumor genesis (the development of tumors), which has been observed during hibernation in hibernators," the researchers said. Alternatively, it could be used to preserve donor organs for weeks or even months without quickly extracting them from the brain dead individual. Finally, "these studies may further stimulate the exploration of new techniques for cryosurgery of the heart and brain, as well as the development of hypothermia treatment that is effective for preventing brain ischemic damage." In cryosurgery, physicians use extreme cold to destroy abnormal tissue, such as cancerous tumors, but in order for that to work the individual as a whole has to be able to cope with such extreme conditions.