

SPACE LIFE SCIENCES SYMPOSIUM (A1)

Poster Session (P)

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WHEN HIBERNATION IS EXPLOITED IN HUMAN DURING SPACE TRAVEL, IMMUNE SYSTEM
FUNCTION WOULD BE REDUCED SERIOUSLY

Abstract

Many endothermic animal species counter the energetic challenge of food shortage and low ambient temperature by entering daily torpor or hibernation. This is a state characterized by inactivity and slower metabolism. Hibernation is triggered by changes in environmental factors, generally by light, temperature, and food availability. During deep torpor, physiological functions such as heart rate, respiration, immune and renal functions, and neural activity run at greatly reduced rates. Hibernating mammals may provide a natural model system to study physiological mechanisms. For instance, mammal's muscle strength was reduced only 23%. Lots of scientists have thought this idea before and they have made good progress. But the immune system that I want to focus on has not been clear yet. The matter is, if hibernation is exploited in human, immune system could be serious problem. Because both space flight and hibernation have weakened the immune system. Human studies have indicated that space flight alters leukocyte distribution, interferon and other cytokine production, and natural killer cell activity in humans. Interferon- γ production was found to be dramatically enhanced in space. Apollo crew members developed bacterial or viral infections during their missions. Several factors could contribute to those effects, including microgravity, stress and radiation. Likewise hibernate animals, torpor period seriously reduces numbers of all types of leukocytes and therefore increase infection risk, there is a substantial decline in immune function during torpor. The mechanisms leading to this is poorly understood. So how do they combat pathogens during hibernation? Many hibernation animals awake periodically-as squirrels do ones a week- Scientist thought that periodic arousals may activate dormant immune system, which can then combat pathogens that may have been introduced during hibernation. The main idea that I would like to focus on is immune system. if we understand clearly how hibernate animals can survive during torpor with decline immune system, then hibernation would be exploited in humans, whose immune system decrease during space flight, would travel easier to another planet. I want to research differences between hibernation animal's immune system mechanism and human's immune system mechanism in space.