

SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Human Physiology in Space (2)

Author: Prof.Dr. Hanns-Christian Gunga  
Germany, hanns-christian.gunga@charite.de

CORE BODY TEMPERATURES IN ASTRONAUTS ON THE INTERNATIONAL SPACE STATION

**Abstract**

Endothermic organisms such as humans have a core body temperature (CBT) of about 37 C, which is controlled by the hypothalamus with slightly undulating circadian rhythm changes. Even mild CBT deviations impair physiological functions, leading to changes in physical and mental performance, while more severe deviations ( $\pm 33$  C or  $\pm 40$  C) may have life-threatening consequences. Several factors, including exercise intensity, environmental conditions, and hydration, determine the extent, duration, and health risks associated with exercise-induced hyperthermia. Heat exchange between an organism and its environment occurs by way of conduction, convection, radiation, and evaporation. Under terrestrial thermoneutral and resting conditions this happens mainly by radiation and convection. It has been assumed that in space these mechanisms of heat exchange are challenged due to a lack of convective heat transfer, diminished production, and/or efficiency of evaporation. Several authors have touched on the issue of thermoregulation in weightlessness, either in sleep or in circadian rhythm-related studies, but it should be of particular interest during vigorous exercise where  $\pm 80$

This research was supported by DLR/BMWi Projects 50WB0223, 50WB0724, and 50WB1030.