

The Hot Brain: Survival, Temperature, and the Human Body (MIT Press)

Review Article

Human Thermoregulation and Measurement of Body Temperature in Exercise and Clinical Settings

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Abstract

This review discusses human thermoregulation during exercise and the measurement of body temperature in clinical and exercise settings. The thermoregulatory mechanisms play important roles in maintaining physiological homeostasis during rest and physical exercise. Physical exertion poses a challenge to thermoregulation by causing a substantial increase in metabolic heat production. However, within a non-thermolytic range, the thermoregulatory mechanisms are capable of adapting to sustain physiological functions under these conditions. The central nervous system may also rely on hyperthermia to protect the body from "overheating." Hyperthermia may serve as a self-limiting signal that triggers central inhibition of exercise performance when a temperature threshold is achieved. Exposure to sub-lethal heat stress may also confer tolerance against higher doses of heat stress by inducing the production of heat shock proteins, which protect cells against the thermolytic effects of heat. Advances in body temperature measurement also contribute to research in thermoregulation. Current evidence supports the use of oral temperature measurement in the clinical setting, although it may not be as convenient as tympanic temperature measurement using the infrared temperature scanner. Rectal and esophageal temperatures are widely accepted surrogate measurements of core temperature (Tc), but they cause discomfort and are less likely to be accepted by users. Gastrointestinal temperature measurement using the ingestible temperature sensor provides an acceptable level of accuracy as a surrogate measure of Tc without causing discomfort to the user. This form of Tc measurement also allows Tc to be measured continuously in the field and has gained wider acceptance in the last decade.

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Key words: Core temperature, Gastrointestinal temperature, Ingestible temperature sensor, Thermoregulation

Introduction

The ability to sense and regulate body temperature is a key feature of human survival. A deviation of $\pm 3.5^{\circ}\text{C}$ from the resting temperature of 37°C can result in physiological impairments and fatality.¹ Some researchers suggested that heat could have played a central role in the synthesis and survival of the first unicellular organism on earth,² and the ability to sense and regulate body temperature contributed to the evolution of these unicellular organisms to multicellular cold-blooded creatures (e.g., fishes, reptiles and amphibians) and warm-blooded mammals.³ Organisms not endowed with thermoregulatory and protective functions and behaviours would have been eliminated through natural selection. Different strategies to regulate body temperature

are used to maintain physiological homeostasis. For example, cold-blooded animals regulate temperature by relying on external heat sources (ectotherms).⁴ These animals are dormant at low body temperature and become active to seek food and shelter when their body temperature is raised by absorbing heat from the environment. Humans are endotherms because humans generate heat internally to regulate body temperature through a balance of heat production, absorption, and loss.

Like the first living cell on earth, thermo-sensitivity, thermoregulation, and thermo-protection remain a central part of physiological homeostasis and survival, and are necessary properties for living organisms to operate proficiently in their environment.⁵ Physical exercise is one

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The book traces the story of the brain throughout evolution and shows how the control of body temperature as a survival mechanism was achieved. From the first .The Hot Brain: Survival, Temperature, and the Human Body. Front Cover. Carl V. Gisolfi Mora, Francisco Mora Teruel. MIT Press, - Medical - pages.The Hot Brain: Survival, Temperature, and the Human Body (MIT Press) by Carl V Gisolfi () [Carl V Gisolfi;Francisco Mora Teruel] on mydietdigest.comThe Hot Brain - Survival, Temperature, And the Human Body - Free ebook The MIT Press. is provided in screen-viewable form for personal use only by.APA (6th ed.) Gisolfi, C. V., & Mora, F. (). The hot brain: Survival, temperature, and the human body. Cambridge, Mass: MIT Press.The hot brain. survival, temperature, and the human body. Gisolfi, Carl V. Cambridge, Mass.: MIT Press, []. Place a Hold.Edited by C.V. Gisolfi and F. Mora, The MIT Press, Cambridge, MA, When I received this book for review, I skimmed it quickly and thought it had little of.Buy The Hot Brain (): Survival, Temperature, and the Human Body: NHBS - Carl V Gisolfi and Francisco Mora, MIT Press.4. Gisolfi CV, Mora F. The Hot Brain: Survival, Temperature and the. Human Body . Massachusetts: MIT Press, , , Download Free eBook:[PDF] The Hot Brain: Survival, Temperature, and the Human Body (MIT Press) - Free epub, mobi, pdf ebooks download.The book traces the story of the brain throughout evolution and shows how the control of body temperature as a survival mechanism was.Find great deals for The Hot Brain: Survival, Temperature, and the Human Body by Carl V. Gisolfi and Francisco Mora (, Hardcover). Shop with confidence.As the temperature spikes, your body works to counter it, sometimes with Here's how to help the cooling alongso you can survive the. Shop News Video Beat the heat: To cool the brain, cool the body, says Lars Nybo, a professor of human On a hot day, sweat glands (tube-like skin structures) can emit about The brain is an organ that serves as the center of the nervous system in all vertebrate and most invertebrate animals. The brain is located in the head, usually close to the sensory organs for senses such as vision. The brain is the most complex organ in a vertebrate's body. For any animal, survival requires maintaining a variety of parameters of.human beings, to maintain core body temperature (Tb) to survive. Outline of the serotonergic system in the brain. 5-HT is an .. 5-HT but dopamine or noradrenalin during exercise in hot . London: The MIT Press. Gisolfi C V and Mora F The Hot Brain: Survival, Temperature, and the Human Body (Cambridge, MA: MIT Press). Gunga H-C, Sandsund.Military & Defense News Strategy Here's how long humans could survive in space without a spacesuit The vacuum of space will pull the air from your body. Without air in your lungs, blood will stop sending oxygen to your brain. Four MIT graduates created a restaurant with a robotic kitchen that.Qatar's summer temperatures could be too hot for footballers at the World Cup. What is the effect of heat on the human body?.Ambient temperature has a significant influence on human physiological .. Gisolfi (Ed.), The Hot Brain: Survival, Temperature and the Human Body, MIT Press.Body temperature is controlled in a part of the brain called the hypothalamus. In cold environments, this may be

done by placing a hot water bottle in a winter survival kit, with nonperishable food, blankets, a first aid kit. Note that in the warm-cut coronal slice, DCN cell bodies of both small as well as in those at room temperatures, in most of the warm-cut slices .. (Boca Raton, FL: CRC Press;) ; Kirov S. A., Petrak L. J., Effect of composition of experimental solutions on neuronal survival during rat brain slicing. You think of firelight and saunas and warm food and wine. There is no precise core temperature at which the human body perishes from cold. the frigid air pressing against your tired body and sweat-soaked clothes. You've slid into the temperature range at which cold renders the enzymes in your brain less efficient. A technology to keep organs alive outside the body is saving lives. Left at body temperature, the damage, called ischemia, progresses rapidly. That's why heart surgeons have required hearts from brain-dead donors. In recent tests of such techniques, called warm perfusion, scientists have shown they. Koalas Eat Toxic Leaves to Survive Now Scientists Know How . Different regions of the brain have varying levels of susceptibility, beginning . infusing warm fluids to gradually increase his body temperature. . She has assembled an exit kit that will help her die quickly when she decides it's time: two. But one of the more unexpected effects was just recently published: could keep them warm and help give their immune systems a boost. Westerners were also able to increase their core body temperatures slightly when taught the process. . Latest News Even if they survive, they might not thrive.

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