WG 4 (Physiological Health)

TED Talks - Medical Officers Pannel – Physiological Challenges at the Battlefield

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As climate change reshapes the battlefield, military operations are increasingly conducted in extreme environments, placing significant physiological demands on soldiers. This session features a TED-style panel with three medical officers from the battalion and brigade levels, sharing firsthand experiences from the IRON SWORD war. They will discuss how heat and cold exposure, sleep deprivation, nutrition, and physical exertion impact operational performance.

Heat stress is a critical factor in both dismounted ground forces and armored vehicle crews. Soldiers operating in high temperatures face dehydration, heat exhaustion, and reduced cognitive function, while armored crews in enclosed vehicles struggle with excessive heat buildup, leading to hyperthermia and impaired decision-making. Conversely, cold environments increase the risk of hypothermia, frostbite, and reduced dexterity, affecting combat effectiveness. Extreme weather events also disrupt logistics, delay medical evacuations, and impact sleep quality-leading to decreased situational awareness and performance.

Beyond the physiological burden on soldiers, the panel will address the medical officers' challenges in balancing operational needs with health risks. They will discuss their role in guiding commanders on mitigating environmental stress while maintaining combat readiness.

By bridging battlefield experience with scientific inquiry, this panel will provide insights into improving soldier resilience and performance in the era of climatic change and highlight the need for future military collaboration.

WG 4 (Physiological Health)

Advancing Heat Stress Mitigation: A New Universal Heat Load Index

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Background:
Rising global temperatures pose significant challenges for outdoor physical activities, including military training, athletics, and manual labor. Heat stress increases the risk of exertional heat illnesses, necessitating accurate assessment tools to mitigate these risks. Traditional heat stress indices, such as the Wet Bulb Globe Temperature (WBGT), rely on outdated parameters and have limitations, particularly in high-altitude environments where black globe and wet bulb temperatures become unreliable. Additionally, current indices do not incorporate advancements in fast-response digital sensor technology and the role of ultraviolet (UV) radiation in thermal load assessment.

Purpose:
This study aims to develop a universally applicable and validated heat load index that incorporates real-time meteorological variables, including ambient temperature (T_a), relative humidity (RH), solar radiation (SR), and ultraviolet (UV) exposure. The new index seeks to provide precise, real-time guidelines for various exercise intensities, helping to prevent heat injuries and enhance operational safety for military personnel.

Methods:
The research follows a four-phase methodology. Phase I involves collecting meteorological data from three locations in Israel (-400m, sea level, and 2,000m) over six months, with measurements taken every 10 minutes. Phase II analyzes these data to construct a predictive heat load model. Phase III validates the model with additional data from locations in Israel and five in the United States, spanning various altitudes. Finally, Phase IV is a request for information (RFI) to develop a handheld device integrating the new index for field use.

Conclusions/Possible Implementations:
The proposed heat load index will utilize fast-response digital microsensor technology to improve real-time heat stress assessment. Implementing this index can extend safely extend training hours. Military operations and other high-exertion activities will benefit from improved safety guidelines, reducing heat-related injuries and optimizing performance.