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EXPLORING MICROGRAVITY INDUCED CHANGES TO THE COAGULATION SYSTEM USING THROMBOELASTOMETRY

Abstract

Background: An internal jugular venous thrombus in an astronaut was identified in 2020 following a two-month microgravity exposure. This raised concerns about thromboembolic events (TEs) during spaceflight. Studies have suggested that microgravity can induce changes in venous flow, venous distension, as well as causing endothelial dysfunction, which might all contribute to a hypercoagulable state. However, whether these proposed mechanisms translate into a clinically significant increase in TE risk remains unclear. Additionally, the specific risks and implications of microgravity-induced coagulation changes in diverse populations, including future spacefarers with varying health conditions and ages, remain unclear.

Methods: Thromboelastometry (TEG) offers a comprehensive assessment of whole blood coagulation dynamics, providing a more holistic view compared to traditional coagulation assays. A previous study of coagulation disorders in a 60-day bedrest setting have provided valuable insights into blood coagulation dynamics, although TEG did not differ in this specific study. However, the transferability of these findings to true microgravity environments remains to be elucidated.

Significance: Understanding the effects of microgravity on the coagulation process is crucial for ensuring the health and safety of astronauts during space missions. By leveraging thromboelastometry to study the end-result of the coagulation cascade, we can obtain valuable insights into the impact of microgravity on the coagulation system and comprehensively evaluate the risk of TE. Furthermore, this knowledge could inform preventive strategies and enhance the safety of future long-duration missions as well as diverse populations participating in future low-cost spaceflight ventures.