Developing Personalized Sensorimotor Adaptability Countermeasures for Spaceflight

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Astronauts experience sensorimotor disturbances during their initial exposure to microgravity and during the re-adaptation phase following a return to an Earth-gravitational environment. Interestingly, astronauts who return from spaceflight show substantial differences in their abilities to readapt to a gravitational environment. The ability to predict the manner and degree to which individual astronauts would be affected would improve the effectiveness of countermeasure training programs designed to enhance sensorimotor adaptability. In this paper we will be presenting results from our ground-based study that show how behavioral, brain imaging and genomic data may be used to predict individual differences in sensorimotor adaptability to novel sensorimotor environments. This approach will allow us to better design and implement sensorimotor adaptability training countermeasures against decrements in post-mission adaptive capability that are customized for each crewmember's sensory biases, adaptive capacity, brain structure, functional capacities, and genetic predispositions. The ability to customize adaptability training will allow more efficient use of crew time during training and will optimize training prescriptions for astronauts to ensure expected outcomes.

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