TOLERANCE OF CENTRIFUGE-INDUCED G-FORCE BY DISEASE STATE

Summary
The coming of the commercial age of spaceflight portends a paradigm shift concerning the medical qualifications of future space "tourists." The majority of the medical knowledge of the human body in microgravity is based upon studies of remarkably healthy individuals well-trained for such an environment. However, unlike career astronauts, prospective commercial space passengers will self-select based upon financial means, which is often inversely related to youth and physical fitness. With very little data regarding the effects of spaceflight on individuals with known diseases, the development of medical standards and screening of commercial passengers is currently an area of much discussion and debate. UTMB has received funding from the FAA under the Center of Excellence for Commercial Space Transportation grant to investigate this area. The concern is whether spaceflight, an already hazardous endeavor, would be a greater hazard for the less healthy individual. It remains difficult to predict how particular disease processes will respond to the hyper-gravity environment during launch and landing of space craft, and exactly what these hazards may entail. In this study we will train and test individuals with known disease processes in the NASTAR Center centrifuge in Southampton, PA. Various G-profile runs will be used in order to determine the subjects' overall stamina for exposure to acceleration forces that might be experienced in a suborbital commercial spaceflight.

Objectives
We aim to screen individuals known to have each of the following: (1) controlled hypertension (2) controlled diabetes (3) well controlled cardiovascular disease or disease history such as coronary artery disease, (4) respiratory compromise from chronic obstructive pulmonary disease or asthma, and (5) history of neck or spine injury or disease. We will further screen individuals with no known history of these diseases to act as a control group.
We will compare each of the study groups to a similarly-sized group of individuals undergoing the same acceleration exposures without any known disease processes.
This understanding will provide the foundation on which medical screening criteria can be developed that may be applicable to commercial spaceflight participants.

Customer/Partner
UTMB Health, FAA Center of Excellence for Commercial Space Transportation

Status
IRB Review January 2013. Experiment to start Q1 CY2013.

Future Publications
American Institute of Aeronautics and Astronautics (AIAA)
Aviation Space and Environmental Medicine