COE CST Seventh Annual Technical Meeting

Task 310: Assessment of Methods, Procedures, and Technologies Available for the Protection of SFPs in Commercial Spaceflight Vehicles

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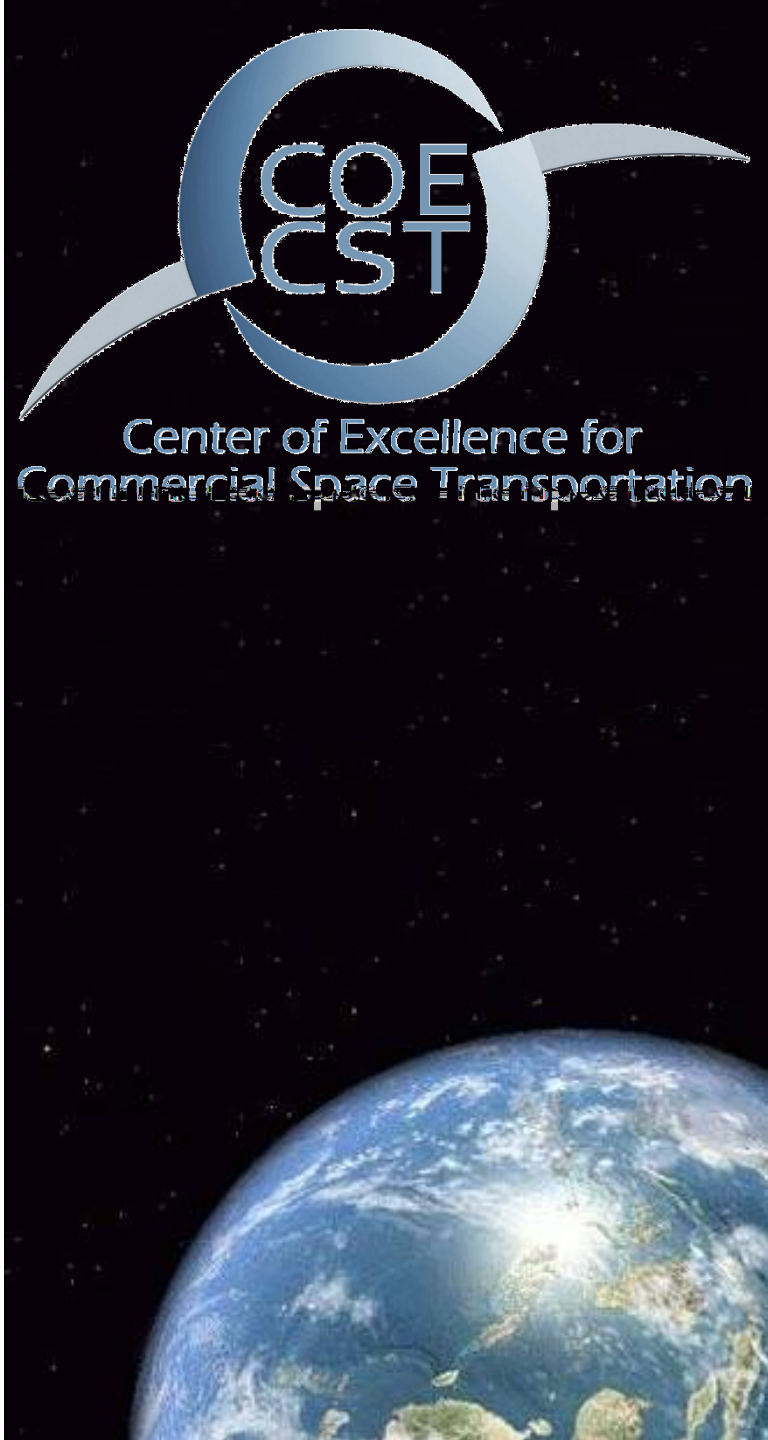

Agenda

- Team Members
- Task Description
- Schedule
- Goals
- Results
- Conclusions and Future Work

Team Members

- Principal Investigator: Charles Mathers, MD, MPH
- Co-Investigators: James M. Vanderploeg, MD, MPH; Rebecca Blue, MD, MPH; Tarah Castleberry, DO, MPH; Leigh Speicher, MD, MPH
- Students: Alejandro Garbino, MD, PhD

Organizations

- University of Texas Medical Branch
- The Mayo Clinic, Jacksonville

Task Description

- To evaluate methods to enhance the safety of the cabin environment, space vehicle crashworthiness, individual restraint systems, emergency evacuation systems, and survival equipment

Schedule

- 2016-2017: Literature review regarding restraint system design and impact vulnerability of varied populations
- Identify best-practices regarding restraint design and safety for cabin designs

Goals

- Optimization of crew and passenger compartments to promote the survival of occupants during human spaceflight operations
- Dedicated efforts towards enhancing safety methods and advanced crashworthiness of spaceflight vehicles to improve the safety of spaceflight endeavors

Results

- Data are lacking regarding potential commercial spaceflight impact forces
  - Analog studies: motor vehicle impacts, aviation mishaps, previous spaceflight mishaps

- Restraint Design:
  - Superior performance of harness designs that include bilateral shoulder restraint and negative-G belts to limit torso movement

- Injury Patterns:
  - Anthropometric variations – varied risk by sex, age, body morphology
  - Obese and elderly at increased vulnerability for high morbidity/mortality – improved outcomes with more rigorous restraint design

Future Work

- Presentation and publication of significant findings
  - Submitted, in review, Aerospace Medicine and Human Performance
  - Presentation anticipated at Aerospace Medical Association Annual Scientific Meeting 2018

TASK 310. ASSESSMENT OF METHODS, PROCEDURES, AND TECHNOLOGIES AVAILABLE FOR THE PROTECTION OF SFPs IN COMMERCIAL SPACEFLIGHT VEHICLES

utmb Health
Aerospace Medicine

PROJECT AT-A-GLANCE

- University: The University of Texas Medical Branch
- Principal Investigator: Charles H. Mathers, MD, MPH
- Co-Investigators: James M. Vanderploeg, MD, MPH; Rebecca Blue, MD, MPH; Tarah Castleberry, DO, MPH; Leigh Speicher, MD, MPH
- Residents: Alejandro Garbino, MD, PhD

RELEVANCE TO COMMERCIAL SPACE INDUSTRY

- Dedicated efforts towards the enhanced safety in spaceflight vehicles will improve the success of commercial space endeavors
- Direct applicability to design phase of commercial spaceflight vehicles, integration of medical efforts with cabin engineering

STATEMENT OF WORK

- Identify injury patterns associated with various restraint designs
- Identify injury patterns and relative risks of anthropometrically and demographically varied populations, including factors such as sex, obesity, advanced age
- Identify any best practices for restraint design in commercial spaceflight vehicles

STATUS

- Literature review and analysis completed 2017
- Abstract submitted for Aerospace Medical Association Annual Scientific Meeting presentation, 2018
- Manuscript submitted to Aerospace Medicine and Human Performance Journal; in review

FUTURE WORK

- Presentation and publication of significant findings – publication anticipated 2018, presentation expected at Aerospace Medical Association Annual Scientific Meeting 2018