



2015 ABSTRACTS OF THE AsMA SCIENTIFIC SESSIONS

86th Annual Scientific Meeting
May 10–14, 2015

Walt Disney World Dolphin Hotel
Lake Buena Vista, FL

The following are the sessions and abstracts with rooms and presentation times for all presentations accepted after blind peer-review—in slide, poster, or panel sessions—for the 2015 Annual Scientific Meeting of the Aerospace Medical Association. The numbered abstracts are keyed to both the daily schedule and the author index. The Sessions are listed with Roman numerals. A separate Index for Session chairs with these numerals is included. The order of some sessions may have changed (check the Addendum provided at the meeting for the latest information). Abstracts withdrawn are listed as W/D.

SLIDES & PANELS: Each slide presentation is scheduled for 15 minutes. We strive to keep slide presentation on time. Panel presentations have more flexibility and may not keep to a strict 15 minute per presenter format.

POSTERS: Posters will be on display in America's Seminar from 10:00–12:00 and 2:30–4:30 on Monday and Tuesday. Poster authors should be present for at least 90 minutes and are encouraged to be present, or have a representative attend the poster, during the entire session.

EXHIBITS: Exhibits will be open Sunday evening during the Welcome Reception, and 9:30 a.m. to 4:30 p.m. Monday and Tuesday. Please wear your badge and visit every exhibit.

CONFLICT OF INTEREST: All meeting planners and presenters completed financial disclosure forms for this live educational activity. All potential conflicts of interest were resolved before planners and presenters were approved to participate in the educational activity. Any conflicts of interest that could not be resolved resulted in disqualification from any role involved in planning, management, presentation, or evaluation of the educational activity.

Sunday, May 10
Asia 3

8:00 A.M.

[I.] WORKSHOP: INTRODUCTION TO AEROSPACE EPIDEMIOLOGY

*Sponsored by the International Association of
Military Flight Surgeon Pilots*

8:00 a.m.–5 p.m.

Fee: \$200

8 AMA PRA Category 1 Credits™

Chair: Peter Mapes
Rockville, MD

[001] INTRODUCTION TO AEROSPACE EPIDEMIOLOGY

P.B. Mapes

*Clinical Support Division, Defense Health Agency,
Rockville, MD*

INTRODUCTION: This course familiarizes people with the statistical and epidemiological study of rare events in the context of aerospace mishap investigation through meta-analyses of aerospace mishaps. While the course subject is specialized, the material taught will provide a relatively comprehensive review of the statistics and epidemiology required as core knowledge for the specialty examinations administered by the American Board of Preventive Medicine in Aerospace, Occupational & General Preventive Medicine. The

workshop will provide six hours of lecture and discussion followed by two hours of guided practice with problems taken from a variety of real investigations. **METHODS:** Members of the International Association of Military Flight Surgeon Pilots will serve as instructors for this workshop. The workshop will cover denominator selection, sampling, study size, distributions, validity, parametric analyses, α and β errors, Power, confidence interval design and calculation, nonparametric analyses and causality. It will be taught in a mixed lecture and discussion format with a session of guided practice for the last quarter of the workshop. **RESULTS:** Attendees should be able to evaluate data based on its strengths, identify and select adequate sample sizes, design studies, know the criteria for association and causality, be able to apply functions from the EpiInfo™ programming for calculations and perform well on testing covering biostatistics and epidemiology lead-in to Board Certification upon completion of this workshop.

DISCUSSION: This is the first time a workshop on aerospace epidemiology has been offered anywhere to our knowledge. Attendees should come away with unique understanding of the applications of statistics and epidemiology to aerospace safety and mishap investigations. This workshop is uniquely qualified for the awarding of both CME and MOC hours. To participate in the guided practice portion of the workshop, learners will need to bring a portable computer loaded with the version of the EpiInfo(TM) government freeware applicable to the operating system of the computer used. The Centers for Disease Control and Prevention makes the EpiInfo(TM) programs available for free at their web site.

Learning Objectives:

1. Attendees should come away with unique understanding of the applications of statistics and epidemiology to aerospace safety and mishap investigations.

Sunday, May 10
Asia 4

9:00 A.M.

10:00 A.M.

[II.] WORKSHOP: AIRCREW FATIGUE: CAUSES, CONSEQUENCES, AND COUNTERMEASURES

9:00 a.m.-3 p.m.

Fee: \$125, Advance registration only

5 AMA PRA Category 1 Credits™

Co-Chair: John Caldwell
Yellow Springs, OH

Co-Chair: Lynn Caldwell
Yellow Springs, OH

[002] AIRCREW FATIGUE: CAUSES, CONSEQUENCES, AND COUNTERMEASURES

J. Caldwell¹ and L. Caldwell²

¹Coastal Performance Consulting, Yellow Springs, OH; ²Aeromedical Directorate, Naval Medical Research Unit Dayton, Yellow Springs, OH

INTRODUCTION: In modern aviation operations, aircrew fatigue is a serious but often unrecognized problem. The unpredictable work hours, long duty periods, circadian disruptions, and disturbed or restricted sleep that are commonly experienced by aviation personnel strain the body's adaptive capabilities. The result is that crewmembers often report for duty in a fatigued state. Because of this they make mistakes, respond more slowly, experience cognitive difficulties, and suffer mood disturbances that, taken together, often lead to performance problems and compromised safety. Aircrew fatigue can be effectively mitigated, but only if scientifically validated strategies are systematically applied. These include 1) the implementation of crew scheduling procedures that are based on up-to-date scientific information about the underpinnings of fatigue; 2) the implementation of scientifically-based in-flight counter-fatigue practices; 3) educating crew and crew schedulers on the importance of sleep and circadian rhythms in effective fatigue management; and 4) the utilization of effective strategies for optimizing off-duty sleep periods. Once comprehensive, scientifically-validated fatigue-risk mitigation processes are fully integrated into the aviation safety system, fatigue can be effectively managed, and safety and performance can be optimized. The proposed fatigue workshop will outline the importance of addressing fatigue from inadequate sleep as a danger in aviation, the basic physiological mechanisms underlying fatigue, and the most common causes of fatigue in air transport and other settings. In addition, the workshop will present ways to recognize fatigue in operational environments, provide information about the relative efficacy of various fatigue countermeasures, and present some basics of a good Fatigue Risk Management System (FRMS). This workshop is aimed at those with a basic understanding of the problem of fatigue in operational environments, and/or those who are anticipating new duty assignments in which they will bear some responsibility for the alertness management of aviators or other personnel. No prior education in fatigue management, sleep, or circadian rhythms is required.

Learning Objectives:

1. Identify the sources of fatigue in the operational community.

Monday, May 11
Northern Hemisphere Ballroom

8:00 A.M.

OPENING CEREMONIES AND 61ST ANNUAL LOUIS H. BAUER LECTURE

Advanced Medical Technologies and their Implications for Aerospace Medicine and Human Performance

Melchor Antuñano, M.D., M.S.

Director, FAA Civil Aerospace Medical Institute, Oklahoma City, OK

Monday, May 11
Americas Seminar

[III.] POSTER: SPACE: THE FINAL FRONTIER

Co-Chair: Michael Gallagher
Edmonton, Alberta, Canada

Co-Chair: Anita Mantri
Bryan, TX

[003] BASIC SPEECH PERCEPTION DEFICITS DURING MICROGRAVITY SIMULATION AND CONTROLLED SLEEP LOSS

C. Frank¹ and D. Molfese²

¹Psychology, Butler University, Indianapolis, IN; ²Center for Brain, Biology, and Behavior, University of Nebraska--Lincoln, Lincoln, NE

INTRODUCTION: The goals of this study were to assess the impact of microgravity on basic speech perception and to examine the consequences of controlled sleep loss on basic speech perception and the interaction, or cumulative effect, that sleep loss and microgravity produce when experienced together. Brain event-related potentials (ERPs) of 22 female and 23 male adults were recorded during an auditory phoneme distinction task both: (a) in an upright, sitting position and (b) in a head-down tilt (HDT) position used to simulate the effects of microgravity. After maintaining regular sleep patterns for Week 1, each participant was assigned to one of three sleep loss conditions for Week 2: (a) no sleep reduction, (b) 1-hour nightly sleep reduction or (c) 3-hour nightly sleep reduction. As expected, position had an overall effect, while sleep reduction differentially affected speech perception. No interactions between position and sleep were found, suggesting that sleep loss and head-down tilt act independently on the brain in a simulated microgravity environment.

Learning Objectives:

1. Assess the impact of microgravity on basic speech perception.

[004] DIABETES MELLITUS - A NOVEL ANALOGUE ENVIRONMENT TO ASSESS IMMUNE DYSFUNCTION IN MICROGRAVITY

A.S. Ahmed

Center for Space Medicine, Baylor College of Medicine, Houston, TX

INTRODUCTION: Microgravity alters the normal physiology of cells and tissues seen on Earth; however, researching the mechanisms of these changes in outer space presents a challenge. Routine experimentation in space is limited by factors such as high cost, relatively short mission duration, and inadequate facilities. These limitations can be circumvented via analogue environments - artificial settings that simulate the desired effects of microgravity without the need to leave Earth. Analogue environments are not a novel concept and simulations mimicking specific effects of microgravity are in use, such as clinostats, rotary cell culture system bioreactors, hind limb unloading, and head-down tilt. However these modalities do not adequately address microgravity-induced immune dysfunction. Microgravity causes immunosuppression via effects on a variety of cells and signaling molecules - alteration of inflammatory cell function and tissue infiltration, changes in neutrophil phagocytic and oxidative responses, morphologic and functional changes in fibroblasts, blunting of monocyte and T-lymphocyte stimulation, decreased production of antibodies and cytokines by lymphoid cells, and decreased cellular response to growth factors such as PDGF, FGF, and EGF. These changes can lead to higher infection rates, worse prognosis after infection, and impaired wound healing following injury. A common condition that exerts similar deleterious effects on these cell populations and signaling molecules is diabetes mellitus. Hyperglycemic states result in diminished function and migration of immune cells such as neutrophils, monocytes, lymphocytes, and fibroblasts. It also alters signaling molecule and growth factor concentrations and cellular responses. Due to similarities in effects on immune cells and molecules, diabetes mellitus can serve as a novel analogue environment to test interventions and