Medicine in Extreme Environments (MEE) Elective ENRH-151

- **Course Director:** Dr. Benjamin Levine, M.D.
- **Student Liaisons:** Nidhish Lokesh MS2, Jenny Kim MS3, Bradley Upchurch MS4, Will Young MS4
- **Resident Liaison:** Dr. Ty Stannard, M.D.
- **Number of Students**
  - Minimum number of participants – 10
  - Maximum number of participants - 35
- **Rationale:**
  - As medical professionals, much of our training focuses on managing sick patients in normal, everyday environments. Understandably, much less emphasis is placed on the issues faced by otherwise healthy individuals in extreme situations. This class aims to enlighten students on what occurs in these situations. Learning about the extremes will help students better understand human physiology and provide practical expertise in certain situations (wilderness emergencies, sports injuries, etc.).
- **Objectives**
  - After participation in this course students will be able to:
    - Develop an understanding of how microgravity, high altitude, sports, wilderness, and diving are different from standard human environments
    - Explain the different mechanisms by which the human body adapts to extreme environmental stressors
    - Discuss the systemic pathologic changes that occur when the body can no longer adjust to environmental changes
    - Become familiar with how typical treatments are modified to deal with the various conditions that arise in extreme scenarios
    - Avoid situations that lead to wilderness emergencies and treat simple injuries in remote areas
    - Plan out how to become involved in careers that are related to extreme environments (hyperbaric medicine, sports medicine, aerospace medicine, combat medicine, etc.)

- **Format**
  - 13 one-hour, interactive, virtual lectures over Microsoft Teams
  - Courses are *typically on Tuesdays from 12pm – 1pm
    - *This year there are 2 Friday classes and 1 Thursday class, and there will be one class that is from 11am – 12pm instead of 12pm – 1pm.
  - Some lectures may have an assigned publication as background pre-reading; these research articles might be discussed in further detail during class
- **Requirements and Student Evaluations**
  - Grading will be Pass/Fail; to receive transcript acknowledgement, students must:
    - Attend 10 of 13 lecture hours
    - Complete the online REDCap course evaluation form
- **Description of Classes**
  - Class 1 – Introduction and Welcome to MEE
    - Lecturer: Dr. Benjamin Levine, M.D. – Founder and Director of the Institute for Exercise and Environmental Medicine (IEEM), Professor of Internal Medicine/Cardiology and Distinguished Professor of Exercise Sciences
    - Dr. Levine will give a brief overview of the elective and provide some interesting case studies to give students exposure to the types of topics that will be covered.
  - Class 2 – Athlete/VIP Medicine and Medical Management of Large Events
    - Lecturer: Dr. Gilberto Salazar, M.D. – Associate Professor, Section Chief of EMS Education
    - Dr. Salazar, drawing from his own past experience working with these patient populations, will deliver a talk focusing on the medical care and management of athletes and celebrities. He will also talk about some of the unique considerations of caring for people during large events.
  - Class 3 – High Altitude Medicine: Climbing the Seven Summits
    - Lecturer: Dr. Biff Palmer, M.D. – Professor of Internal Medicine

- Dr. Palmer will talk about his ascent of Mt. Everest and the rest of the famed "7 Summits" (the highest peak on each continent) with a specific focus on the physiological and pathological changes that occur with increasing altitude.

- Class 4 – Space Medicine II: Psychology of Isolation and Spaceflight
  - Lecturer: Dr. Jay C. Buckey, M.D. – Astronaut of the Columbia STS-90 crew, Director of the Space Medicine Innovations Lab at Dartmouth and Professor of Medicine at Dartmouth's Geisel SOM
  - The psychological challenges and changes that occur in extended isolation (months-long stays on the ISS or Antarctic bases) will be explored. Use of the Oculus Rift to create a comforting and natural virtual environment to combat depression and other psychological disorders stemming from isolation will also be discussed.
- Class 5 – Space Medicine I: General Spaceflight
  - Lecturer: Dr. Benjamin Levine, M.D. – Founder and Director of the Institute for Exercise and Environmental Medicine (IEEM), Professor of Internal Medicine/Cardiology and Distinguished Professor of Exercise Sciences
  - The physiology of spaceflight will be discussed, with a focus on the cardiovascular, musculoskeletal, and neurological changes that occur in astronauts and how they are managed.
- Class 6 – Combat Medicine
  - Lecturer: Dr. Alexander Eastman, M.D. – Assistant Professor of Trauma Surgery, Dallas SWAT Lieutenant and Lead Medical Officer, Chief Medical Officer of the US Dept. of Homeland Security Countering Weapons of Mass Destruction Office
  - This lecture will focus on the most common injuries and treatment strategies seen in the field of combat medicine, specifically for police force and SWAT teams. This lecture will also mostly focus on the physiologic effects of trauma.
- Class 7 – Hyperbaric and Dive Medicine: Decompression Sickness
  - Lecturer: Dr. Renie Guilliod, M.D. – Assistant Professor, US Navy Diving Medical Officer, Medical Director of the Hyperbaric Medicine Program at the IEEM

- Dr. Guilliod's hyperbaric medicine lecture includes his experience as a US Navy Diving Medical Officer and the many uses of hyperbaric medicine that have come from insights in dive medicine. We may also get a virtual tour of the hyperbaric chamber at the IEEM.

- Class 8 – Wilderness Medicine I: Toxicology and Snakebites
  - Lecturer: Dr. Nancy Onisko, D.O. – Assistant Professor, Department of Emergency Medicine
  - Dr. Onisko will give an intro into the field of toxicology and some of the cool things that toxicologists get to do. She will then dive into venomous snakebites, covering the identification of venomous snakes in DFW, components of their venom and their effects on the body, and the DOs and DONTs of snakebite management both in the field and in the ED.
- Class 9 – Sports Medicine I: The Care of Ironman Athletes
  - Lecturer: Dr. Robert Sallis, M.D.– Chairman of the Ironman Sports Medicine Conference, Co-Director of the Sports Medicine Fellowship at Kaiser Permanente Medical Center, Clinical Professor of Family Medicine at UC Riverside SOM, former President of the American College of Sports Medicine (ACSM)
  - Dr. Sallis, a past president of the ACSM and the Chairman of the annual Ironman Sports Medicine Conference, will give a talk on the management and care of athletes who compete in the Ironman – a grueling, long-distance triathlon event consisting of a 2.4 mile swim, a 112 mile bike ride, and a 26.22 mile run, completed in that order and widely considered to be one of the most difficult athletic achievements in the world. Come learn about the various challenges that the athletes and those charged with their care face during these competitions.
- Class 10 – Wilderness Medicine II: Typical Clinical Scenarios + Basic Wilderness Training
  - Lecturer: Dr. Tyler Stannard, M.D. – Chief Resident, UTSW Department Emergency Medicine
  - The course will cover basic cases involving wilderness medicine such as dehydration, spider/snake bites, frostbite, etc. and will explain the response to situations that arise in remote areas. Students will be taught several basic wilderness medicine techniques

and may run case scenarios in groups simulating different wilderness emergency situations.

- Class 11 – Thermoregulation and the Management of Heat Injuries
  - Lecturer: Dr. Douglas Casa, Ph.D. – CEO of the Korey Stringer Institute, Professor in the Dept. of Kinesiology at the University of Connecticut, Director of Athletic Training Education
  - Dr. Casa's life work to maximize athletic performance in the heat and prevent sudden cardiac death in sports stems from a passion he developed after his own exertional heat stroke during a 10K race in 1985. He will speak on the human body's thermoregulation mechanisms and the management of heat-related injuries, drawing from his own vast experience in extensively researching exertional heat stress, treating athletes at large events like the Boston Marathon, and being asked to serve on Heat Planning Committees for events like the Tokyo 2020 Olympics and the Qatar 2019 FIFA World Cup.
- Class 12 – Sports Medicine II: Concussions and CTE
  - Lecturer: Dr. Kimberly Harmon, M.D. – Head Football Physician for the University of Washington, previous Chair of the Student Athlete Health and Well-Being Board of Directors for the Pac-12 Conference, previous Medical Consultant for the National Basketball Players Association
  - Concern about concussion has skyrocketed both in the public and in the media. This class will explore the epidemiology of concussion in sport (is football really that dangerous?), examine how the diagnosis of concussion is made on the sideline, and briefly discuss what we do and don't know about the long-term effects of concussion and repetitive head injury.
- Class 13 – Student Presentations – What went wrong?
  - Facilitators: Nidhish Lokesh, MS2, MEE Student Liaison and Dr. Tyler Stannard, M.D. (Chief Resident, UTSW Dept. of Emergency Medicine)
  - Students will have chosen a journal article a few weeks prior that is related to one of the topics covered in the class. They will then give a brief 2-3-minute overview of

their article, explain why the author's findings are important/notable to their peers, and answer any questions on the article as time permits.