

Lecture Abstract:

Humans and tall animals have evolved to cope successfully with the forces of Earth's gravity. Tree-climbing snakes, giraffes, and people - species with greater height and therefore greater gradients of blood pressure from their hearts to their heads - have developed sophisticated mechanisms to provide adequate blood flow to their brains, while restricting blood flow and tissue swelling in their legs and tails. When humans or animals go into space, the absence of gravity starts to reverse the normal adaptations that have evolved over millions of years. Dr. Hargens, who is a NASA-funded scientist for over 25 years, has studied various models including snakes, giraffes and identical twins in bed to help understand deconditioning due to spaceflight and aging. This research has led to possible benefits of exercise for maintaining cardiovascular and musculoskeletal systems during future trips to the moon and Mars and for rehabilitation of elderly orthopaedic patients after surgery. The lecture will provide insights into the benefits of physical activity and the risks of inactivity for healthy aging of the heart, muscles and bones.

Brief Bio Sketch:

Alan R. Hargens, Ph.D., is a Professor of Orthopaedic Surgery at the University of California, San Diego (UCSD). Dr. Hargens received his B.A. in Chemistry from the University of Minnesota and subsequently completed his Ph.D. in Marine Biology/Physiology from UCSD. In addition to his affiliations and work for UCSD, he has previously acted as a Visiting Assistant Professor for the University of Aarhus in Denmark and has held several positions within the Physiology and Gravitational Research Branches of the NASA-Ames Research Center.

His aging research interests have included orthopaedic and clinical physiology with recent research emphasizing gravity effects on the cardiovascular and musculoskeletal systems. Utilizing noninvasive methods for measuring intracranial and intramuscular pressures and blood flow, he has evaluated pressure effects on tissue nutrition and viability. Dr.

Hargens has explored the use of lower body negative pressure exercise and other exercise devices to maintain astronaut health and performance in space. This research is also applied to aid rehabilitation of orthopaedic patients by allowing "moon walking" exercise early after surgery (see <http://bones.ucsd.edu>). Dr. Hargen's lab also uses a body segment loading device for use in MRI to visualize and quantify the effects of gravity and weight bearing on various musculoskeletal tissues. Thus, most of his space research has "spin offs" for Earth benefit.

Recent honors include holding the position of President for the International Society of Adaptive Medicine between 2003 and 2006, acting as Chair of the NASA Peer Review Panel in 2002 for the Program "Human Health from Earth to Space: A NASA-MU Partnership for Understanding Sex Differences in Physiology", and receiving the Jacqueline Perry Award as a co-author for lower body positive pressure (LBPP) exercise research in knee surgery patients, from the Orthopaedic Rehabilitation Association in 2003.