

## **Fatigue Failure of Musculoskeletal Tissues in Living Tissue: The Complexities of a Dynamic Biological System**

Keynote Sessions

Faculty:

Sean Gallagher

Much evidence suggests that the materials that comprise the musculoskeletal system are subject to cumulative damage development due to the repeated application of stress (a process known as fatigue failure). Fatigue failure is observed in all materials; however, musculoskeletal tissues reside in a biological entity comprised of multiple complex systems and processes that, while essential for attempting to maintain homeostasis, complicate our understanding of the process of damage accumulation in musculoskeletal tissues and the evaluation of musculoskeletal disorder (MSD) risk. Biological processes can be either beneficial and/or detrimental to musculoskeletal health. Clearly, a process of tremendous benefit in maintaining musculoskeletal function is the ability of these tissues to self-heal. It appears that the presence of a self-healing process can significantly extend fatigue life in materials. However, the healing process can be affected by many factors, including sleep duration and quality, psychological stress, and personal characteristics such as gender, ageing, and obesity. The current presentation will examine the influences of these and other dynamic processes on the accumulation of musculoskeletal tissue damage and the repair of these tissues. It will seek to develop recommendations for improved maintenance of the health of musculoskeletal tissues in both occupational and non-occupational settings.

### **About Our Speaker:**

Sean Gallagher

Dr Sean Gallagher, PhD, CPE, FAIHA, is currently the Hal N. and Peggy S. Pennington Associate Professor Emeritus in Auburn University's Department of Industrial Engineering. Dr Gallagher has worked in the Ergonomics field for over 38 years, starting with the U.S. Bureau of Mines (1984-1995), then the National Institute for Occupational Safety and Health (1995-2011), and now Auburn University (2012-present). He is a Fellow of the Human Factors and Ergonomics Society and the American Industrial Hygiene Association. Dr Gallagher is a Certified Professional Ergonomist and a two-time winner of the International Ergonomics Association/Liberty Mutual Medal in Occupational Safety and Ergonomics (2013 and 2018) and a recipient of the 2020 Paper of the Year Award by the journal Ergonomics. He has received various other team-based awards, including 2009 Alice Hamilton Award for Excellence in

Occupational Safety and Health (Educational Materials Category) and the 2011 HHS Innovates Award (Secretary's Pick).