Fatigue is a complex, multifaceted phenomenon and the contributors to fatigue may be either physical or psychological and the occurrence site may be the brain or the body. Early work of the NeuroErgonomics Lab in this area successfully quantified the interactive effects of physical and non-physical (cognitive demands, distractors, stress) factors on worker capacity using traditional ergonomic assessments. However, examining the role of brain functioning during fatigue development is critical to extend our knowledge on the etiology and potential mechanisms of worker fatigue. What is the role of the brain in fatigue development? How does it affect downstream peripheral responses? What are the potential mechanisms through which stress, burnout, and other psychological symptoms, such as depression, increase fatigability? How does human and machines interact in hazardous environments when fatigue and/or stress is inevitable. Findings from these studies will be presented.

The increasing prevalence of obesity in the world has risen to an epidemic level, which is accompanied with a growing burden of physical disability, particularly in the elderly. While obesity is associated with structural changes, such as decreased white matter integrity, in the aging brain, it is unclear whether such changes impact cortical connectivity during neuromuscular control. Current basic research efforts on mapping functional connectivity between different motor-function related cortical regions in response to hand and leg motor actions to investigate the impact of obesity, stress, and aging on activities of daily living will be discussed. Establishing obesity-specific neural activation patterns responsible for motor performance under stress in older adults will facilitate development of novel and practical community-based interventions focused on improving brain function, and subsequent motor and cognitive functions, that are otherwise compromised with aging and obesity. Findings from a recently completed NIOSH-funded multi-site study will also be presented.

Discussions of several Research2Practice investigations will be provided. Recent efforts of the Lab in determining fatigue-related variability in oil and gas operator performance and health outcomes will be presented. The efforts toward development of assessment and mitigation tools will be discussed that have the potential to facilitate recommendations of strategies for accident prevention and containment in high-risk energy operations.