# Utilization of Active Cooling in Hot Environments While Wearing Encapsulated Protective Ensembles – Jon Williams

**Objective**

- **Demonstrate that postural stability/balance is reduced with increased core body temperature during exercise in the heat wearing either Ebola PPE or firefighter PPE**
- **Demonstrate using fMRI that specific areas in the brain responsible for motor control and coordination are affected**
- **To relate changes in fMRI to postural stability in subjects exercise in the heat.**
- **Determine if cooling strategies can mitigate the reduced postural stability**

**Applicable standards**

- N/A

**Key Partners**

- University of Cincinnati School of Medicine
- Children's Hospital, Cincinnati
- NIOSH DSR

**Project Scope**

- **The NPPTL will conduct studies involving human subjects exercising in a hot environment while wearing either Ebola PPE or firefighter PPE (Williams, PI)**
- **Subjects will be tested for postural stability using special force plates (AccuSway Plus Platform)**
- **Core temperature and other physiological variables will be monitored throughout the exercise**
- **Changes in postural stability will be related to increased body core temperature**

**Milestones**

**FY15 – FY16: Protocol development, obtain OD and HSRB approval**

- **Purchase necessary instrumentation**

**FY16 - Completed human subject testing at NPPTL using FF PPE**

**FY17- 1) Present preliminary findings at scientific conference, 2) Conduct fMRI at UC, 3) conduct human subject testing using Ebola PPE**

**Stakeholders**

- Healthcare workers
- Firefighters
- IAFF
- Construction industry

**Outputs**

Aljaroudi A, Bhattacharya A, Kadis DS, Strauch A, Quinn T, **Williams WJ**. The Effect of Industrial Hyperthermia on Firefighters' Cognitive Function in Warm Humid Environment. Presented at the American College of Sports Medicine Conference, Denver, Colorado, May 30-June 3, 2017.

Aljaroudi AM, Bhattacharya A, Strauch A, Quinn T, **Williams WJ.** Utilization of Active Cooling on Postural Balance while Wearing Firefighter's Ensemble in Warm Humid Environment. Presented at the International Society for Postural and Gait Research (ISPGR) Conference, Fort Lauderdale, Florida, June 25-29, 2017.

**Outcomes:** none