

DAGSI Research Topic Template

1. **Research Title:** Mitochondrial Based Biometric Sensor to Monitor Stress-Induced Metabolic Flux in-situ
2. **Individual Sponsor:** List the AFRL research topic sponsor's contact information

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3. **Academic Area/Field and Education Level**

Bioengineering/molecular biology/ (BS, MS or PhD level)

4. **Objectives:** 1. To develop a biometric sensor based on measuring and characterizing mitochondrial structure and function as an indicator of Airman health and performance 2. Design sensing device that detects mitochondria dysfunction to inform physiological conditions and predict future performance

5. **Description:** Provide a brief background and/or description of the proposed research topic

This research program intends to develop a biometric sensor based on measuring and characterizing mitochondrial structure and function as an indicator of Airman health and performance. Mitochondrial function plays a critical role in the optimum human performance, the biometric sensor is a device that detects mitochondrial dysfunction to inform physiological conditions and predict future performance. We anticipate that the data collected, analyzed, and interpreted will result in establishing mitochondrial health as a critical component of a biosensor capable of quantitatively measuring an individual's current (and future) physiological condition. Biosensors are analytic devices capable of providing qualitative and quantitative data that can be used to assess human health. Components of a biosensor include a biological element, transducer, signal produced by an analyte, and a detector. Traditional bioassays also contain these components but require a multi-step analyses process. The overarching goal of this research is to develop a 1-step sensing device that can take a biological sample, react with an analyte, and produce a signal meaningful for human performance metrics. The device would offer fast and cost-effective technology able to be networked with a comprehensive monitoring program. The 'MitoHealth BioSensor' requires 4 basic components: a catalyst that promotes a mitochondrial reaction, a transducer that detects the product, an amplifier that boosts the biological signal, and an output display to communicate data.

6. **Research Classification/Restrictions:** NA
7. **Eligible Research Institutions:** Indicate to what organizations this topic should be provided

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