Opportunity Title: AFRL - Mitochondrial Health & Organ-Level Effects
Doctoral/Postdoctoral Internship
Opportunity Reference Code: AFRL-711HPW-2021-0019RR

Organization U.S. Department of Defense (DOD)

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How to Apply Click on *Apply* at the bottom of the opportunity to start your application.

Description

What will I be doing?

As an ORISE participant, you will join a community of scientists and researchers in an effort to gain knowledge in areas related to the Air Force Research Laboratory's (AFRL) mission.

Airmen constantly endure an evolving spectrum of operational stress scenarios that are vital to the continued success and achievement of the Air Force mission directives. The overarching aim of this research is to improve rapid assessment of operationally relevant exposure to stress by delineating structural and functional dynamics of mitochondria. Mitochondria, a sub-cellular organelle with its own genome, produces the energy required for life and generates signals that enable organisms to adapt to high levels of stress. Mitochondrial dysregulation primarily affects neurological, endocrine, and immune systems that play an important role in optimizing performance, decision-making, and premature fatigue. Therefore, it is important to evaluate structural and functional dynamics of mitochondria through microscopic imaging & biochemical analysis.

Why should I apply?

You will develop and advance your professional and academic career through doctoral and/or post-doctoral training. This exciting opportunity not only provides advanced research training during and beyond the doctoral degree but prepares you to follow scientific careers at the AFRL. Along the way, you will engage in activities and research in several areas. These include, but are not limited to, conducting research on the following objectives:

- Simulating airmen stress scenarios using cultured human cells and validate the link between stress scenarios and mechanistic analyses.
- Developing a biometric analysis based on measuring mitochondrial structure/function in response to combat and operational stress.
  - This will consist of (1) electron microscopy to analyze size, shape, and ultrastructure of the mitochondria and (2) biochemical & molecular analysis inclusive of gene, protein, and cellular metabolism in order to systematically build a mechanistic roadmap from healthy to stress induced injury.
- Bridging the gap between cellular metabolic health and Airmen organ-level effects after stress-induced injury by investigating mitochondria signaling.
- Developing in silico simulations or algorithms using artificial intelligence to provide predictive health effects.

Where will I be located?

Wright State University in Dayton, Ohio

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What is the anticipated start date?

Exact start dates will be determined at the time of selection and in coordination with the selected candidate. Applications are reviewed on an ongoing basis and internships will be filled as qualified candidates are identified.

What is the appointment length?

An ORISE appointment period can be a short-term (less than 2 weeks), summer (10-12 weeks), or yearlong appointment. Appointments may be extended depending on funding availability, project assignment, program rules, and availability of the participant.

What are the benefits?

You will receive a stipend to be determined by AFRL. Stipends are typically based on a participant's academic standing, discipline, experience, and research facility location. Other benefits may include the following:

- Health Insurance Supplement (*Participants are eligible to purchase health insurance through ORISE)*
- Relocation Allowance
- Training and Travel Allowance

About AFRL

AFRL leads the discovery, development and integration of affordable warfighting technologies for America's air, space and cyberspace forces. AFRL is a full-spectrum laboratory, responsible for planning and executing the Air Force's science and technology program. AFRL leads a worldwide government, industry and academic partnership in the discovery, development and delivery of a wide range of revolutionary technologies. The laboratory provides leading edge warfighting capabilities keeping our air, space and cyberspace forces the world's best. The 711 Human Performance Wing advances human performance in air, space and cyberspace through research, education and consultation, accomplished through the synergies created by the wing's two distinct but complementary entities: Airman Systems Directorate and U.S. Air Force School of Aerospace Medicine.

About ORISE

This program, administered by Oak Ridge Associated Universities (ORAU) through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and DoD. Participants do not enter into an employee/employer relationship with ORISE, ORAU, DoD or any other office or agency. Instead, you will be affiliated with ORISE for the administration of the appointment through the ORISE appointment letter and Terms of Appointment. Proof of health insurance is required for participation in this program. Health insurance can

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be obtained through ORISE. For more information, visit the ORISE Research Participation Program at the U.S. Department of Defense.

Key Words

Biochemistry, Bioinformatics, Biophysics, Toxicology, Bio-organic Chemistry

Qualifications

The qualified candidate should currently be pursuing or recently have received a doctoral degree in aerosol engineering, chemistry, bioengineering, chemical engineering. Degree must have been received within five years of the appointment start date.

Highly competitive postdoctoral applicants will have education and/or experience in one or more of the following:

- Demonstrable record of high-impact, peer-reviewed publications about mitochondria or related disciplines.
- Well-developed planning and organizational skills, with the ability to prioritize multiple tasks and set and meet deadlines.
- Excellent written communication and verbal communication skills with proven ability to produce clear, succinct reports.
- 3D Cell culture- Lung, skin, neuronal and liver, Air liquid interface co-culture models.
- Electron microscopy to analyze structural changes of mitochondria.
- Analysis of mitochondrial dynamics and functions using imaging approaches: confocal laser scanning microscopy.
- Characterize baseline mitochondria via biochemical analysis: Extracellular flux/oxygen consumption rate (Seahorse), enzyme linked bioassays, flow cytometry, and gene profiling.
- Ability to complete research activities independently and excellent skillset in imaging and biochemical analysis.
- Excellent skillset in 3D cell culture, mitochondrial biology, electron microcopy, and confocal microscopy.
- An excellent team player with great initiative and demonstrated capacity to work in a collegiate manner.

Application Requirements

A complete application consists of:

- Zintellect Profile
- Educational and Employment History
- Essay Questions (goals, experiences, and skills relevant to the opportunity)
- Resume (PDF)
- Transcripts/Academic Records - For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. Click here for detailed information about acceptable transcripts.
- One Recommendation

If you have questions, send an email to AIRFORCE@orise.orau.gov. Please list the reference code of this opportunity [AFRL-711HPW-2021-0019RR] in the subject line of the email.

Connect with ORISE...on the GO! Download the new ORISE GO mobile app in the Apple App Store or Google Play Store to help you stay engaged, connected, and informed during your ORISE experience and beyond!

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Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree received within the last 60 months or currently pursuing.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12)
  - **Communications and Graphics Design** (2)
  - **Computer, Information, and Data Sciences** (17)
  - **Earth and Geosciences** (21)
  - **Engineering** (27)
  - **Environmental and Marine Sciences** (14)
  - **Life Health and Medical Sciences** (46)
  - **Mathematics and Statistics** (10)
  - **Physics** (16)
  - **Science & Engineering-related** (1)
  - **Social and Behavioral Sciences** (28)