

## 2025 START Program

### CFP Brief

THEME: **02. Digital Health**

SUB-THEME: **2.3. Identification and Correlation of Novel Biomarkers in Human Eye Fundus Images and/or Human Breath for Disease Detection**

#### Context/ Overview

Imaging of the eye fundus and the analysis of volatile organic compounds (VOCs) in human breath and other human emissions have emerged as promising non-invasive methods for the early identification of various diseases. While several biomarkers have been hypothesized, many remain undiscovered. There is significant potential to explore these biomarkers further to improve early diagnosis and treatment outcomes.

#### Objective

The objective of this call for proposals is to encourage research that aims to identify novel biomarkers by analyzing images of the eye fundus and/or the full range of VOCs emitted by the human body. Additionally, the research should investigate the strength of the correlation between these biomarkers and underlying health conditions.

#### Scope

We invite proposals that focus on the following areas:

1. Biomarker Discovery: Identification of new biomarkers in eye fundus images and/or human gaseous emissions that indicate health conditions. This can include both hardware/sensors and AI models to analyze and correlate these biomarkers to disease and other human conditions. The proposal can also include novel methods to generate and measure identifiable disease markers via ingestible or other types of non-invasive probes.
2. Correlation Analysis: Investigation of the correlation strength between identified biomarkers and specific diseases and human conditions. Validation in humans is highly preferred.
3. Method Development: Development of advanced algorithms and techniques for analyzing hyperspectral images and/or VOC data.
4. Validation: Validation of the identified biomarkers using comprehensive datasets and simulations. Emphasis should be on non-invasive validation methods.

#### Specific Topics & focus areas \*

1. Development of machine learning and AI models to process and analyze hyperspectral images and/or VOC data.
2. Integration of multi-sensor multimodal data from various sources to improve the accuracy and reliability of biomarker identification. This can include longitudinal analysis of health data from other sources (e.g., electronic health records, prior blood and other testing, etc.).

3. Cross-validation of biomarkers across different health conditions to assess their diagnostic value.
4. Utilization of appropriate methods to validate the findings and establish proof of concept.

※ The topics are not limited to the above examples and the participants are encouraged to propose other original ideas.

This call is open to researchers and institutions with expertise in one or more fields of **hyperspectral imaging, VOC analysis, machine learning, biomedical engineering**, and related fields. Collaborative proposals that bring together multidisciplinary teams are highly encouraged.

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