Administrative Supplements for P30 Cancer Centers Support Grants (CCSG) to Establish Proof-of-Concept Federated Learning Frameworks That Will Run Multimodal Artificial Intelligence Models

Background:

A hallmark of NCI-designated cancer centers is that the science conducted at these institutions meets rigorous standards for transdisciplinary science and state-of-the-art research. The resources and computing environments at these institutions encourage multidisciplinary teams to creatively solve hard problems and ensure solutions are implemented at a relatively fast pace. The NCI would like to leverage these scientifically rich environments and invites teams of biomedical informaticians, data scientists, clinical researchers, and others to establish proof-of-concept federated learning frameworks to run multimodal AI models in coordination with other Cancer Centers and investigators at the NCI.

Purpose and Goals:

Federated Learning and Multimodal AI Tools

Federated Learning (FL) models enable researchers to test and train artificial intelligence (AI) models while preserving the privacy of the patient's data. FL is a collaborative AI approach in which training data is not centralized and stays within organizational boundaries. These boundaries preserve the privacy of the individual contributors. FL models enable the research algorithms to be shared among institutions, not the data, thereby ensuring patient privacy and trust.

Recently, researchers have begun focusing on multimodal AI approaches to incorporate imaging, genomic, and clinical data into their models to address the issue of modeling complex diseases. Instead of relying on data from a single modality, such as clinical factors, genomics, or radiology imaging, multimodal AI combines attributes from many approaches and uses them to describe the disease. Please see Acosta, *et. al.* for a current review of the field. This means the description used to predict patient outcomes is more data-rich, complete, and nuanced.

The tasks for this supplement are divided into three sections:

(1) Investigators will, either individually or as a Partnership with two or more Cancer Centers:

- Develop a multi-modal AI approach(es) for integrating multiple types of cancer data (minimum two modalities), including clinical, genomic, and imaging data, into a predictive machine-learning model.
- Establish a privacy-preserving FL network with another cancer center (i.e. Partnership). NCI Scientists will also participate in the FL network. NCI investigators will train/test selected multimodal approach(es) using their own data.
    - If an investigator prefers, the privacy-preserving FL could be set up only between NCI and the investigator's Cancer Center
- Test their Federated, multimodal AI tool(s) across the FL network. Data sharing with NCI or among consortium members is not expected. Models will be trained using the NCI's data.

(2) Investigators will choose from several pre-trained feature extraction modules to match their available data and build an appropriately sized classifier. This classifier will predict desired measures, such as patient survival or clinical subtype. This approach will allow for rapid iteration through multiple tool types. Tool types could apply to whole-slide image analysis, pathway analysis, protein expression measurement, and more.

(3) Investigators will be asked to share their tools and artifacts (e.g. documentation etc.) with the cancer research community via NIH designated/suggested public repositories as well as disseminate the findings in the form of publications and/or webinars in coordination with NCI.

(4) Awardees are not required to share the data they use for model development.

For Centers applying to both the NCI Clinical Informatics Scholar Administrative Supplement and the Federated Learning Administrative Supplement, the algorithms and methodologies proposed and implemented must be either different or complementary.

Eligibility and Budget

A. Awards will be made in September 2023.
B. Supplement budget requests may not exceed $300,000 in total costs.
C. Supplements are 1 year in duration.
D. This opportunity is open to all NCI-Designated Cancer Centers.
E. Cancer Centers whose P30 CCSG will be on a merit extension at the time the award is made in September of FY23 are eligible to apply.
F. Cancer Centers whose P30 CCSG will be on a cost extension at the time the award is made in September of FY23 are not eligible.
G. Any proposal that cannot be completed within the 1-year time frame will be viewed as non-responsive.
H. Allowable costs include funding for the cancer center team and the costs for supplies, including compute time. Large pieces of equipment cannot be purchased through this supplement.
I. Teams that have already submitted an NIH grant application similar to the project described above should not resubmit a similar application through this supplement mechanism.
J. Only one supplement request per center will be considered.

Application Submission Format

The NCI encourages Cancer Centers to apply in Partnership with another Cancer Center(s), although individual Centers may also apply. For Centers who chose to submit their applications as part of a Partnership, in each application, please indicate (A) the unique work being undertaken at your Center and (B) the name(s) of the other Centers that are part of your Partnership. Individual applications will

be reviewed using the same criteria as Partnership Centers. Due to the limited nature of this funding, all Partnership Members may not be funded.

Applications must be submitted electronically via eRA Commons to the parent award (P30) using PA-20-272 "Administrative Supplements to Existing Grants and Cooperative Agreements (Parent Admin Supplement)" on or before **July 14, 2023**. Your submission should follow the instructions in the funding opportunity announcement, including the following:

Research Plan (5 pages) please include the following elements:

A. The title of the supplement in parenthesis (NCI Cancer Informatics Scholar)
B. The research proposal should address questions that can be tested by using EHRs collected from patients at the Cancer Center and affiliated healthcare facilities.
C. Proposed research may include computational and clinical elements using RWD from clinical notes and records collected from patients at the Cancer Center and affiliated healthcare facilities.
D. Description of the background, preliminary data (if available), relevant cancer center infrastructure, data sources, research teams, etc.
E. Analyses and models that include a diverse population across the spectrum of age, sex, and race are encouraged.
F. Leadership of projects by junior or mid-level investigators is encouraged.
G. Please submit a separate SF424 biosketch form(s) for the Project Leader.

1. **Detailed budget and justification**
   - **A.** Please use the SF424 forms to document your funding request.
   - **B.** Appendices and attachments are not allowed.
   - **C.** For tracking purposes, please notify NCIClinicalInformatics@nih.gov when you submit your application (but please do not send the application itself).

Evaluation Criteria

Administrative supplements do not receive peer review. Instead, NCI staff will evaluate each supplement request to determine its overall merit. Supplements will be reviewed for quality and responsiveness to application criteria outlined above in the **RESEARCH PLAN SECTION** and **PURPOSE AND GOALS SECTION** of this Funding Announcement.

Awards

The number of awards is contingent upon NIH appropriations and the submission of a sufficient number of meritorious applications.

Reporting Requirements

As part of the annual progress report of the parent NCI Cancer Center Support Grants include information on what has been accomplished via the administrative supplement during the funding period.

Questions

For inquiries about the scientific objectives and goals of federated learning/ multimodal AI administrative supplement, please email NCIClinicalInformatics@nih.gov.

Pre-Submission Federated Learning Informational Webinar Material:

https://cbiit.webex.com/cbiit/j.php?MTID=mb050ddfc59280278e72f67c8b219ad63

Thursday, June 8, 2023, 2:00 PM | 1 hour | (UTC-04:00) Eastern Time (US & Canada)
Meeting number: 2318 276 1369
Password: PWunGmW@425

Join by a video system
Dial 23182761369@cbiit.webex.com
You can also dial 173.243.2.68 and enter your meeting number.

Join by phone
1-650-479-3207 Call-in toll number (US/Canada)

Access code: 231 827 61369