

Forecasting Glaucoma Disease Progression with Artificial Intelligence

MAJOR GAPS IN GLAUCOMA CARE: We currently have no way to *forecast* glaucoma disease progression or make predictions about whether patients will require incisional surgery or be blinded by glaucoma. Also, decisions about target IOP are arbitrary and based on clinical consideration of patient age, amount of baseline damage, and baseline IOP.

The Glaucoma Foundation (TGF) is requesting applications that address these gaps using artificial intelligence strategies. Successful applications will be supported at the level of up to \$250,000 USD over a two-year period. No indirect funds are allowed. TGF wants to focus on applications that forecast outcomes rather than provide alternative monitoring strategies. Also, while a great deal of interest has been placed on using AI to use images to predict a surrogate outcome, a successful application is one that will forecast an outcome and ultimately impact patient care. The research team must be willing to share the algorithm freely. This would not involve sharing individual-level patient data. The most competitive application will be one that could lead to a randomized clinical trial of AI-guided versus usual care in the management of glaucoma, although that will not be the objective of this RFA.

DELIVERABLE: The application should define an algorithm that will forecast a clinically relevant glaucoma outcome over a specified time period. Algorithms directed at longer forecasts will be given higher priority. Algorithms that do not require interim data inputs are desirable as such algorithms are truly providing a long-range forecast.

OVERALL APPROACH CONSIDERATIONS: Appropriate applications will consider the type of patients under consideration, appropriate input images and co-labels, the computer learning strategy or strategies used, the desired outcome, sample sizes for training, validation, and testing datasets. Applications will describe their research team and describe the potential generalizability of their algorithm(s).

ALGORITHM IMPACT ON GLAUCOMA CARE: The application will describe how the algorithm will impact glaucoma care and articulate how the algorithm could set the stage for a future randomized clinical trial of usual care versus AI-guided forecasting enhanced care, if possible. The application should estimate how many patients will be impacted by the algorithm and describe measures that will be taken to maintain the algorithm and check for ongoing robust results after its development.

The application should describe specific aims, provide a background of the problem it wants to solve, offer detailed methodology, review preliminary data, and describe anticipated results. A timeline for achieving the project objectives along with a detailed budget should be provided. It is expected that the study team will demonstrate the capability to assemble the appropriate datasets quickly and initial funds will be released when there is evidence that the algorithm has achieved a precision rate of at least 80%. The preliminary version of the algorithm may be reviewed to determine its functionality. The final installment of funds is released when the team has demonstrated 80% precision on a held-out external dataset, although 90+% precision is the ultimate goal.

FUNDING: A grant of up to \$100,000 will be payable in the first year. Contingent on a satisfactory report, an additional grant of up to \$100,000 will be made in the second year. \$50,000 will be given on publication to a peer-reviewed journal.

Instructions

- A. Please read through the application carefully and include all the required information. There are five parts to this application: 1) a Summary Information sheet; 2) a Supplemental Information section; 3) a Budget Form and an Other Funding portion 4) a Project Description, and 5) a Biographical Sketch. Please make sure each section is complete.
- B. Submit a PDF of your application to asteele@glaucomafoundation.org by **Friday, September 10, 2021**. **The email should be titled "Artificial Intelligence Grant Application" with the PDF application attached to the email.**
- C. Submit one original and three copies of the completed application and the related appendices. **The hard copy applications must be in our office by Monday, September 13, 2021, 5:00 p.m. EST.**
- D. Mail/Email applications to: **Andrea Steele**
Director of Operations
The Glaucoma Foundation
80 Maiden Lane, Suite 700
New York, NY 10038
asteele@glaucomafoundation.org

For technical questions, please contact: **Robert Ritch, MD**
Medical Director, Vice President, Secretary and Founder, TGF
Professor and Chief, Glaucoma Service
The New York Eye & Ear Infirmary
ritchmd@glaucoma.net

Applications submitted for the September deadline will be awarded in the winter of 2021.

Terms and Restrictions

- A. Grants are awarded for a two-year period subject to review after year one.
- B. Applicants must clearly demonstrate the Principal Investigator's understanding of glaucoma or his or her collaboration with an investigator who has experience in glaucoma research. If collaboration is warranted, a letter of support from the glaucoma researcher must be included in the application.
- C. Applicants must have a full-time faculty position or the equivalent.
- D. Initial grant funding for a one-year period is limited to a maximum of \$100,000. The Principal Investigator may apply for a renewal for up to \$100,000. Renewal grants are for an additional year's research and must be based upon findings from the first year's work. A grant of \$50,000 will be made upon publication to a peer-reviewed journal.
- E. The Glaucoma Foundation does not provide funds for Investigator salaries, travel, overhead or other indirect costs. However, technician salaries are eligible.
- F. No page limit is prescribed. It is left to the applicant to determine the number of pages necessary to make the proposal convincing without being excessive. Minimum font size is 11-point font.

Part One

Summary Information

A. Title of Project

B. Principal Investigator

1. Name:
2. Degree(s):
3. Title:
4. Department:
5. Mailing Address:
6. Phone:
7. Fax:
8. Email Address:

C. Names of Co-Investigators

D. Name and address of institution at which project will be performed

E. Dates of Proposed Period of Support *(month, day, year--MM/DD/YY)*

F. Total amount of funds requested

G. Signatures:

I certify that the statements made herein are true, complete and accurate to the best of my knowledge. I am aware that any false, fictitious, or fraudulent statements or claims may disqualify me as a future applicant. I agree to accept responsibility for the scientific conduct of the project and to provide the required progress reports if a grant is awarded as a result of this application. I understand that failure to submit the required reports will disqualify me as a future applicant.

_____ Date _____
Principal Investigator

I certify that the statements herein are true, complete and accurate to the best of my knowledge, and accept the obligation to comply with the terms of agreement if a grant is awarded as a result of this application.

_____ Date _____
Department Chair/ Official of Institution

Principal Investigator _____

Part Two

Supplemental Information

Summary

Please attach a description of the project's specific aims. Include the research design and the methods to be employed. If the application is funded, this description will become public information. Therefore, exclude proprietary/confidential information (200-500 words).

Lay summary

Please write a summary which clearly describes the goals and importance of this project, in language which a person without professional and specialized knowledge of this subject should be able to understand (100-200 words).

Principal Investigator _____

Part Three

Proposed Budget/Other Funding

A. Budget Form

Note: At the present time, The Glaucoma Foundation does not provide funds for Investigator salaries, travel, overhead or other indirect costs.

Budget Justification: Please attach an explanation for proposed equipment expenditures and for proposed technician salaries.

Equipment

Cost

Total Equipment:

Consumable Supplies

Cost

Other:

Cost

Total Other: \$

Total Budget

Total Budget: \$

Principal Investigator _____

Part Three (cont'd.)

Proposed Budget/ Other Funding

B. Other Support

Other support includes all financial resources, from public or private institutions, available in direct support of an individual's research projects. This definition includes research grants, cooperative agreements, contracts and/or institutional awards.

There are no forms supplied for this section. Please use additional pages as needed.

1. Using the format below, please describe all other support for this project and related research. In addition, please list all other institutions to which you have applied for funding for this project.

Name of Individual	Dates of Approved/Proposed Project	Percent Effort
Principal Investigator:		
Amount Awarded/Requested:		
Source:		
Title of Project:		
The major goals of this project are:		
OVERLAP (<i>summarized for each individual</i>).		

2. Using the same format, please describe all other support for all current projects. Use additional sheets as necessary.

3. List all other institutions and foundations to which you have applied for funding for all current projects. Use additional sheets as necessary.

4. List all projects for which funding has been applied, but which is not a current project.

Principal Investigator _____

Part Four

Project Description

- A. Objective**
- B. Background**
- C. Experimental Design/Methodology**
- D. Preliminary Results**
- E. Significance**
- F. References**

Part Five

Biographical Sketch

Please provide a CV for the primary investigator and each of the key personnel conducting the research.