

F. M. KIRBY FOUNDATION SOLICITATION EVALUATION FORM

DATE: April 7, 2024

REQUEST DATE: February 29, 2024

Program Area: Health

Grant Type: Board Grant

APPLICANT:

Scheie Eye Institute, Trustees of the University of Pennsylvania
51N 39th Street
Philadelphia, PA 19104-2689

CONTACT: Dr. Bennie H. Jeng, Harold G. Sheie Chair and Professor, Chairman, Department of Ophthalmology

AMOUNT REQUESTED: \$250,000

BUDGETED AMOUNT: \$125,000

NATURE OF REQUEST: Support of the purchase of a MERSCOPE spacial transcriptomics machine

GRANT HISTORY

SUPPORT: 1981-2022

OF APPROVED GRANTS: 35

TOTAL DOLLARS: \$14,777,944

LAST GRANT DATE: 12/12/2022

LAST GRANT AMOUNT: \$227,000

FYE DATE: 06/30

AFS DATE: 09/28/2023

Year Approved	Approved Amount	Approval Date	Grant Purpose
2022	\$227,000	12/12/2022	Support of capital equipment for the F.M. Kirby Center for Molecular Ophthalmology; this grant comprised total support through 2023
2021	\$125,000	05/03/2021	Capital equipment for the F.M. Kirby Center for Molecular Ophthalmology
2019	\$119,500	09/16/2019	Capital equipment for the F.M. Kirby Center for Molecular Ophthalmology
2018	\$150,000	04/23/2018	Capital equipment for the F.M. Kirby Center for Molecular Ophthalmology
2016	\$200,000	04/04/2016	Capital equipment for the F.M. Kirby Center for Molecular Ophthalmology-\$100,000 in 2016 and 2017

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LAST SITE VISIT DATE: October 2022

ENDORSEE: N/A

FINANCIAL ANALYSIS COMMENTS: The FY24 expense budget for the Scheie Eye Institute (Scheie) at the University of Pennsylvania projects an 8% increase over the prior year actuals. Operating expenses are projected to increase across all line items, with the largest single increases applicable to supplies and non-academic salaries. The FY24 revenue budget projects a 9% increase over the prior year actuals. The FY24 revenue budget projects a \$2M gross operating margin versus \$1.4M in FY23, and a net of \$546K (after accounting for corporate overhead of \$1.4M) versus a net of \$464K (with corporate overhead of \$1M) in FY23. Net patient revenues are projected to increase by \$4.4M. The FY23 University of Pennsylvania audit shows unrestricted net assets totaling \$18.8B, and a cash position of \$3.2B. Asset increases were primarily driven by investment performance. Investments are valued at \$23B. Total endowment value is \$21B, a 1% increase from FY22. The endowment produced an investment return of 1.3% for FY23. Net patient service revenue accounted for 58.1% of total operating revenue. As of June 30, 2023, the University held long-term debt totaling \$4.4B, a decrease of 2.2% from FY22 - \$2.5B is attributable to the University of Pennsylvania Health System (UPHS). UPHS operating revenues were \$10B, an increase of 8.4% over FY22. FMKF last approved a grant to Scheie in FY22, which comprised total support through 2023. The amount accounted for 1.77% of grants and contributions in FY22.

ORGANIZATION DESCRIPTION: Penn Medicine's Department of Ophthalmology, Scheie Eye Institute (Scheie), offers individualized care across 17 ophthalmic sub-specialties and has one of the largest teams of eye care specialists in the United States. Faculty are committed to translating the latest research into the most up-to-date treatment approaches, collaborating across the university and hospital system, mentoring and teaching the next generation of clinical scientists, and partnering with the community to address unmet eye care needs. Scheie is home to the F. M. Kirby Center for Molecular Ophthalmology, which is dedicated to investigating the genetic causes of blinding diseases. The Kirby Center recently welcomed Dr. Yuyan Cheng as a principal investigator. Her laboratory combines state-of-the art single cell and spacial genomics techniques to better understand neurodegenerative retinal diseases. The equipment requested below, will reside in Dr. Cheng's lab.

Bennie Jeng was appointed Chair of the Department of Ophthalmology and Director of Scheie effective July 1, 2022, after long time leader Joan O-Brien was named the Inaugural Director of the Penn Medicine Center for Ophthalmic Genetics in Complex Diseases. A nationally recognized clinician-scientist specializing in cornea and external eye diseases, Dr. Jeng was previously Professor and Chair of the Department of Ophthalmology and Visual Sciences at the University of Maryland School of Medicine.

EMILY PRINCE COMMENTS: In FY24, Scheie is seeking a two-year, \$250K grant to support the purchase of a MERSCOPE spacial transcriptomics machine.

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FMKF support of Scheie dates back to 1981, with an initial grant of \$2,500. Since that time, 35 grants totaling \$14,777,944 have been approved, including a \$5M grant in 1992 to establish the F. M. Kirby Center for Molecular Ophthalmology, a \$1.5M grant in 1995 to establish the F. M. Kirby Professorship in Molecular Ophthalmology, and a \$2M grant in 2005 to establish the F. M. Kirby Chair in Molecular Ophthalmology. Since 2007, FMKF funding has supported the purchase of capital equipment that has allowed F. M. Kirby researchers and others across Scheie to remain at the forefront of science and innovation over the last 50 years. Recently JJK had the opportunity to attend the Scheie Vision Science Symposium, where he was asked to make some remarks, which I am sure he will address below.

The request provided progress reports on eight Kirby investigators whose research covers topics such as glaucoma, the genetics of ocular disease, gene and stem cell therapy for retinal diseases, and new treatments for macular degeneration. One investigator, Dr. Cui, was recently awarded her first major NIH grant (\$2.5M over five years) after completing a Mentored Clinical Scientist Development Award from the National Eye Institute. Another exciting update, which speaks to Scheie's commitment to partnering with the community to address unmet eye care needs, is that Dr. O'Brien's team used a grant from the UPenn Hospital Board of Women Visitors to purchase a mobile van and equip it with a complete suite of glaucoma diagnostic equipment. They are now using the van to provide free glaucoma screenings at community centers, retirement communities, and churches in Philadelphia.

The MERSCOPE platform is the industry's first high plex, *in situ* single-cell spacial genomics solution. What this means is that the machine enables precise visualizations of many genes at once, providing a comprehensive view of gene activity in their natural spatial context. The machine enables researchers to design specific DNA probes for target genes, each labeled with a unique fluorescent tag. After the probes have bound to their targets, the sample undergoes a sequential imaging process. This involves systematically imaging each probe's fluorescent label one at a time, capturing a series of images for each gene set. The sequential imaging, coupled with computational algorithms, allows for the precise identification of each gene's presence and location within cells of the retina. The platform is comprised of an imaging box and a processing computer.

Scheie scientists aim to leverage the MERSCOPE technology to address three major questions in the context of the retina: 1) determine the cell-type composition of healthy and degenerative mouse and human retina; 2) define inter-cellular interactions that alter the neuronal functions in the retina; and, 3) elucidate the molecular interactions among retinal cell types leading to changes in genes and their encoded products which ultimately influence cell behavior and functions. This work will significantly strengthen their understanding of molecular and cellular mechanisms underpinning neurodegeneration in conditions such as optic neuritis/neuropathy, glaucoma, and age-related macular degeneration. Ultimately, the long-term goal is to utilize this comprehensive platform to identify key genes or cell types that can be targeted to improve treatments for blinding diseases in humans.

The total cost of the MERSCOPE machine is \$375K. Scheie can secure a lease-to-buy arrangement to obtain the equipment, which would allow them to get the machine now, using the \$250K two-year grant from FMKF, if approved. To pay off the remaining balance, Scheie will request an additional \$125K from FMKF three years from now. If FMKF is unable to provide any of the

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requested awards, Scheie will seek funding from alternative sources - I would like to point out that despite Scheie investigators being the recipients of many research awards, these don't always cover equipment. The request notes specifically that Dr. Dunaief receives over \$1.4M from the NIH annually, but it doesn't cover new equipment! If Scheie is still unable to cover the cost after exhausting these options, they will use funds from their endowment to purchase the machine. Bottom line, this machine would be game changing for the work of the Cheng lab – and others at the Kirby Center – and Scheie is committed to procuring it. As noted above, Dr. Cheng will manage the equipment, oversee projects performed on the equipment, and collaborate with Kirby PIs on the optimization of its use.

The MERSCOPE technology sounds fascinating, and if it can speed up the science around blinding diseases by providing a comprehensive view of gene activity, then it seems a worthy investment. Given that Scheie's investigators have historically been well funded for their work, capital equipment remains a niche in which FMKF support can be impactful. Therefore, in FY24, I recommend we fund the full request.

RECOMMENDATION: In FY24, I recommend a two-year, \$250K grant to support the purchase of a MERSCOPE spacial transcriptomics machine, payable as follows:

FY24: \$125K

FY25: \$125K

JUSTIN J. KICZEK COMMENTS: As ECP notes above, I did have the opportunity to speak a few weeks ago at the 30th anniversary of the establishment of the F. M. Kirby Center for Molecular Ophthalmology, which was the perfect occasion to reflect on FMKF's history of support. I enjoyed hearing Dr. Stuart Fine's "shaggy dog" story of how he had connected with previous foundation leadership, including FMK II, and how this special relationship bloomed. As SDK noted at the time, Scheie is the single largest recipient of FMKF funding in our health / medical docket, and for good reason. In part through our support, Scheie has risen to be one of the nation's premier institutions for vision science and has been responsible for revolutionary treatment, including Dr. Jean Bennett's gene therapy which, in a first of its kind result, reversed a blinding condition known as Lerner's.

While Scheie continues to recruit top scientists and receive NIH funding, the capital needs to keep up with technological advances and new frontiers in research are always there. Given our connection in name to the F. M. Kirby Center for Molecular Ophthalmology, it seems fitting that the request here for funding for a MERSCOPE platform allows Scheie investigators to attend to the "molecular and cellular mechanisms underpinning neurodegeneration in conditions such as optic neuritis/neuropathy, glaucoma, and age-related macular degeneration."

I remain impressed that all of the stewardship responsibilities here appear to be fulfilled by the scientists themselves. ECP and I work exclusively with Dr. Josh Dunaief and Dr. Bennie Jeng, director of Scheie. Perhaps this was a precedent set by Stuart Fine himself and perhaps this is why the FMKF team here feels especially connected to the work of the Institute itself.

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RECOMMENDATION: I recommend a two-year, \$250,000 grant to support the purchase of a MERSCOPE spacial transcriptomics machine, payable in increments of \$125,000 in years 2024 and 2025.

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DISPOSITION:

- Declination
- Hold for review on/about:
- Approval for: **\$250,000**
- Recommended Grant Payment(s):
2024: \$125,000
2025: \$125,000
2026:
- Hold for Board Review: **April 26, 2024**
- Payee Other Than Addressee: **Trustees of the University of Pennsylvania**
- Insert Information:
- Other:
Include multi-year grant letter.
Include for the Scheie Eye Inst. on check memo.

Initials: JK

Date: 04/11/2024

Check # _____

Date: _____