

F.M. KIRBY FOUNDATION SOLICITATION EVALUATION FORM

DATE: April 5, 2022

REQUEST DATE: March 18, 2022

Last grant acknowledgement: Yes

Program Area: Health

APPLICANT:

Children's Hospital Corporation
300 Longwood Avenue
Boston, MA 02115

CONTACT: Mr. Kevin B. Churchwell, M.D., President and CEO

PHONE: 617-355-8555

PAYEE OTHER THAN ADDRESSEE:

AMOUNT REQUESTED: \$200,000 **NATURE OF REQUEST:** Toward the Kirby Center Innovation and Education Fund - \$150,000; toward the Kirby Center Equity, Diversity and Inclusion Initiative's internships - \$50,000

GRANT HISTORY

LAST GRANT DATE: 5/3/2021

LAST GRANT AMOUNT: \$200,000

FYE DATE: 9/30/2021

AFS DATE: 1/28/2022

2016	\$200,000	4/4/2016	Toward the F.M. Kirby Neurobiology Center-for the Innovation and Education Fund-\$100,000; for the Gene Manipulation Innovation Grants-\$100,000
2017	\$175,000	4/28/2017	Toward the F.M. Kirby Neurobiology Center, specifically the Innovation and Education Fund
2019	\$175,000	4/15/2019	Toward the F.M. Kirby Neurobiology Center, specifically the Innovation and Education Fund
2020	\$175,000	4/29/2020	Toward the F.M. Kirby Neurobiology Center, specifically the Innovation and Education Fund
2021	\$200,000	5/3/2021	Toward the F.M. Kirby Neurobiology Center, specifically the Innovation and Education Fund-\$150,000; toward Equity, Diversity and Inclusion internship initiative-\$50,000

DLK COMMENTS: 2021 was a productive year for the Kirby Center. Its faculty published 111 peer-reviewed papers, of which 11 appeared in high-significance journals including *Science*, *Cell*, and their related publications. Five patents were issued to Kirby Center faculty and 11 patent applications were filed since November 2020. In the past, the Center's work has been advanced through links with Boston's biotech community. However, increasingly, they are driving new therapeutics through the large-scale, industry-standard drug screening capacities of the BCH Translational Neuroscience Center. These in-house facilities have enabled the Center to take scientific risks in pursuing therapeutic strategies without the pressure for return-on-investment. Total federal research funding for Kirby Center faculty increased by 16% in FY21. The Center is providing researchers with powerful technologies, such as in-vivo two-photon microscopes, a laser

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scanning confocal microscope and an inverted microscope for live-imaging work, which help spur high risk/high reward work.

The Kirby Center Innovation Fund (funded by FMKF, as well as the Lavine Family) made grants to four projects in 2021. I will highlight one of the four projects. Todd Anthony, Ph.D., and his team have been conducting research on the mechanisms underlying autism spectrum disorder (ASD). Research on the neural circuits, using optogenetics, suggests that a single lateral septum neuronal subpopulation promotes anxiety and threat-driven arousal and suppresses social interactions. The Anthony lab intends on determining the precise effects of ASD-associated genetic mutations (of the specific neuronal receptor, Crfr2LS) on neuronal responses to sensory and social stimuli in mice. If the results support their hypothesis, they may have identified a novel target for ASD-focused therapeutics as well as revealing new insights into brain function (**JJK: Truly fascinating, and with potential impact on FMKF grantee, Autism Speaks.**) The other three projects involve 1) Ph.D. Xi He's development of a novel therapeutic strategy for atopic dermatitis, 2) Dr. Jonathan Lipton's lab is investigating the correlation between disrupted circadian clocks and neurodegenerative diseases such as Alzheimer's, frontotemporal dementia and Huntington's disease and 3) Dr. Hisashi Umemori's lab is conducting in vivo imaging of brain activity patterns to visualize the activity-driven and molecularly-executed pathway for growth and refinement of a critical mammalian sensory circuit.

One of the key strengths (and reasons to continue funding) of the Innovation Fund is its multiplier effect. Developing preliminary scientific results are key to gaining multi-year National Institutes of Health (NIH) grants. The request highlighted four recent NIH grants: Ph.D. Michael Do's work involving circadian regulation, Ph.D. Judith Steen's work on neurodegeneration in Alzheimer's Disease, Ph.D. Beth Stevens and Dr. Hisashi Umemori's work on synaptic pruning and its impact on neurodegenerative diseases, and Dr. Hisashi Umemori's work on specific dopamine molecule circuitry and links to disorders such as schizophrenia, autism, and OCD.

Equally important is the Kirby Center's close working relationship with clinicians. BCH recently opened the Brain, Mind & Behavior Center (BMBC) at their new Brookline facility. BMBC patients have neurodevelopmental and behavioral health conditions, autism spectrum disorders, Williams syndrome, anxiety, depression, and trauma/stress-related problems. Kirby researchers work closely with BMBC clinicians to help them better understand the underlying mechanisms of the brain to inform treatment strategies for their patients. This is the essence of bench-to-bedside.

On a final note, the Kirby Center Equity, Diversity and Inclusion (EDI) initiative appears to be thriving. The first cohort of college interns from Bunker Hill Community College (BHCC) took place in Fall 2021. BHCC has a diverse community comprised of 60% women, 20% Black, and 27% Hispanic/Latino students. The Fall interns worked an average of 15-20 hours per week in various labs conducting research on areas such as the dynamic behavior of brain immune cells, mapping the connectivity between the retina and the suprachiasmatic nucleus of the brain, and tuberous sclerosis complex (commonly found in epilepsy patients). Two of the five fall interns were hired to continue working in their labs and others reported that the internship helped determine their major when they transfer to a four-year degree program. The Winter 2022 cohort of five interns is underway and the Center is looking to expand to eight full-time (40 hrs/week for 10 weeks) internships for summer 2022. The Center also received NIH grant supplements to support two early-career researchers (under the EDI category), Elisa Rojas Palato and Nickesha Anderson. BCH launched the Sandra L. Fenwick (recently retired CEO) Institute for Pediatric Health Equity and Inclusion, which aims to identify and eliminate child health inequities.

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Financial analysis attached. I recommend the budgeted \$150K towards the Innovation Fund and \$50K towards the Kirby Center Equity, Diversity and Inclusion Initiative's internship program.

JJK COMMENTS: When DLK and I visited the Kirby Center in March of 2020, it was impressed upon us that the Innovation Fund allows for high risk / high reward research that has the potential to lead to transformative NIH funding or broad application across other areas of research beyond just neuroscience. This year's request drives home this point again. Karl Koehler, whom Diana and I met in 2020, is a great example of this. Dr. Clifford Woolf, director of the Kirby Center, recruited Koehler in 2019, and at our visit, Woolf said that "Karl is exactly the kind of young talent the Innovation Fund wants to attract." Koehler has been doing innovative work with stem cell cultures, growing human inner ear hair cells as well as a multi-layer human skin organoid. Koehler's inner ear hair cell project attracted the interest of the Department of Defense, which is funding Koehler to construct an "ear-on-a-chip" system that can be used to study the degeneration and regeneration of inner ear sensory cells and has promise for addressing hearing loss. Koehler's skin organoid work is attracting the attention of BCH's neurobiology, otolaryngology, and plastic surgery departments, who see potential here for tissue reconstruction and wound healing.

While the Innovation Fund and its assorted projects indeed act as a force multiplier, there appears, after one year, to already be an excellent return on investment in the Equity, Diversity, and Inclusion internship program, with two interns joining Kirby Center labs now full time. While places like the Kirby Center can be truly international and diverse in their talent, their talent pipelines are mainly connected directly to Ivies and other elite institutions. What I like most about this program is that it expands the Kirby Center's access to students from lower-income backgrounds, those more likely to attend a community college in Bunker Hill than one of Boston's many elite universities. I am sure that training these interns requires a not-insignificant amount of staff time, so good on BCH for being so committed to a broader range of talent. **DLK: update from Lisa Kaufman re: demographic breakdown of interns. The ten Fall/Winter interns self-reported as: Asian (3), Black/African American (2), Hispanic/Latino (2), and White (3). There were 6 females and 4 males.**

With much of the attention of the request placed upon the faculty of the Kirby Center, it is worth spending a little time recognizing its leader, Dr. Clifford Woolf. Woolf has built here a work culture that rewards collaboration and continuous learning: there are weekly, required meetings at which two labs present their work, keeping their peers informed and offering their work up to critical questions and new ideas. Furthermore, an annual retreat sets the science agenda for the year. Beyond this, Woolf looks to avoid telling scientists what to do, leaving space for innovation and creativity, while leading by example with his own work. This year's request reports that Woolf published a major review in *Science Translational Medicine* that proposes a new paradigm for drug development: using stem cell-derived pain-related neurons to discover effective, non-lethal, non-addictive analgesics for diverse forms of acute and chronic pain. Developing safer analgesics has been Woolf's life's work, and in the shadow of the ongoing opioid epidemic, this work has only become more urgent.

For the quality of the research here – led by MacArthur "Geniuses" like Beth Anderson – we continue to see an excellent return on investment. I recommend a grant of \$200,000, as designated below.

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Financial Statement Analysis

Grantee Name:	Children's Hospital	Date:	3/24/2022
Prepared By:	DLK		
Grant Request Amt.	\$ 200,000	Type of Financial Report Submitted	Audit
Budgeted Amt.	\$ 200,000	Period Covered in Financial Report	FY 9/30/21
Audit Firm	Ernst & Young LLP	Date of Report Issuance	1/28/2022
Opinion	Present fairly		
Basis of Acctg.	GAAP		

Current Ratio (Liquidity Ratio/Working Capital Ratio)

1.40

Amount of Unrestricted Net Assets (Operating Reserve)

\$ 7,007,435
(in thousands)

Note: A current ratio measures an organization's ability to pay short-term and long-term obligations. The higher the ratio, the more capable the organization is of paying its obligations. A ratio under 1 indicates that the organization's liabilities are greater than its assets.

Allocation of Functional Expenses	9/30/2021	%	Must Read Financial Statement Notes
A. Patient Care	\$ 2,223,268	90%	Ideally program expenses should be at least 70% of total budget.
B. Research	\$ 553,079	9%	
C. Medical Education	\$ 119,396	1%	
D. Total Expenses	\$ 2,895,743	100%	

(in thousands) Note 16 of Audit

Comments/ Notes:

FY22 Budget - BCH is projecting an operating surplus of \$22.4M for FY22 vs. a surplus of \$4.5M for FY21. Net patient service revenue is budgeted to grow by 5% (\$78.3M). Research revenues are budgeted with a 4% (\$14.6M) increase and operating revenues are budgeted to grow by 3% (\$4.6M) over FY21. BCH's request for \$200K represents 1.5% of their unrestricted philanthropy budget. Total operating expenses are budgeted to increase by 4% (\$68.7M), with salaries/benefits accounting for most of the increase. Direct research expenses are budgeted to increase by 4% (\$10.9M). The F. M. Kirby Neurobiology Center's FY22 budget is 5% less than its FY21 budget, with decreases in admin salaries, faculty salary support and core facility expenses. Federal research funds are up 19% (\$3.8M). The Center has budgeted \$92.5K towards 8 fulltime, 10 week equity, diversity and inclusion internships.

FY21 Audit - There was a \$4.0M operating loss for FY21 versus a \$68.2M operating loss for FY20. Net assets increased by \$1.4B for FY21, with non-operating gains (primarily investment-related) of \$1.1B and pension adjustments of \$167.5M. The Hospital received \$162.5M in contributions, as well as \$36.4M in nongovernmental grant awards for FY21. The Hospital provided \$61.3M in charity care for FY21. Total LT debt is \$1.5B. As of September 30, 2020, the Medical Center was in compliance with its debt covenants. Under the CARES Act, the Medical Center received funding in the amount of \$27M in FY21 and \$108M for FY20 and as the conditions were met the funding was recognized as other operating revenue. As of September 30, 2021, \$21.7M of deferred Social Security taxes were included in accrued salaries and wages and an addl \$21.7M was included in noncurrent liabilities. During FY21, \$1.5M of expedited Medicare payments were recovered through the provision of Medicare services. Unrecovered expedited payments of \$4.7M are included as a contract liability in estimated third-party settlement liabilities. The Hospital had \$7.5B in investments, of which \$2.7B were endowment-related. The audit noted the Medical Center received additional relief fund distributions of \$63.9M through December 31, 2021. Overall, there were no red flags as a result of my review.

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DISPOSITION:

- Declination
- Hold for review on/about:
- Approval for: **\$200,000**
- Hold for Board Review
- Insert Information: **Toward the F.M. Kirby Neurobiology Center, specifically the Innovation and Education Fund-\$150,000; toward Equity, Diversity and Inclusion internship initiative-\$50,000**
- Other:

Initials: JKR Date: 4/6/22
Check #: _____ Date: _____