

## WHAT'S NEW FOR RU RESOURCE CENTERS – FY22

The Rockefeller University Resource Centers (RCs) continued to support our scientific community with expert staff, cutting edge equipment and services in fiscal year 2022. The Resource Center staff continued to conduct applied research to improve techniques and methodologies and fine tune services to meet researchers' changing needs.

The University remained in a Phase III+ mode of operations, with further relaxation of visitor, social distancing, and events policies. The change in operational status allowed Centers to adjust user capacity and expand use by external researchers. Revised user guidelines were referenced and updated in the Resource Centers' websites. Some of the Centers found that some policies implemented during the pandemic streamlined efforts and improved processes so these are being maintained, e.g., virtual and remote training/consultation continue to augment in-person training and procedures for "touchless" sample drop off remain in place.

*While not possible to report here on all the many contributions the Resource Centers make to further and support science and the University's mission, we highlight some of these contributions as examples.*

### A FEW HIGHLIGHTED CONTRIBUTIONS

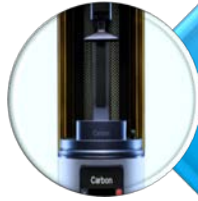
**The Comparative Bioscience Center (CBC)**, directed by [Ravi Tolwani](#), acquired a Vevo F2 Ultrasound, the world's first ultra-high to low (71 – 1 MHz) frequency imaging system. **The Vevo F2 is ideal for cross-functional biological and physiological research.** The system allows for imaging a range of animal models. The Vevo F2 features HD image processing technology and introduces a completely new signal pathway – from transducer to display screen – which enables better image clarity. In addition, the CBC now oversees the **Rodent Behavior Core** in the CBC Annex. The Behavior Core is a unique resource allowing investigators to conduct behavior assessments and characterizations of new mouse models. Some capabilities of the equipment include the ability to conduct open field, locomotor, anxiety, learning memory, sensorimotor and social interaction assessments.

**The High Throughput and Spectroscopy Resource Center** directed by [Fraser Glickman](#), was renamed the **Fisher Drug Discovery Resource Center (FDDRC)** in February in recognition of a generous gift from the Fisher Foundation. The new name better reflects the equipment and breadth of expertise of the Center. Over the past 14 years of operations, the FDDRC has increased capacity for high throughput screening by 8-fold, dramatically increased the variety of compounds available, expanded the portfolio of assay technologies to include methods such as high-content screening, cheminformatics and biophysical methods for drug characterization to high pharmaceutical industry standards. In collaboration with medicinal chemistry groups and academic labs on and off campus, the FDDRC has supported the development of drug lead optimization, resulting in several significant patents and publications. The FDDRC staff, in collaboration with the academic laboratories it works with, convert ideas for drug discovery into tangible compounds for drug development.

**The Proteomics Resource Center (PRC)**, directed by [Henrik Molina](#), is providing QC visualization support using Panorama from SkyLine for both metabolomics and proteomics analyses.

**Cryo-Electron Microscopy Resource Center (CEMRC)**, led by [Mark Ebrahim](#), was selected by Nanoscience Instruments as the demo site for their METEOR integrated cryo-in situ fluorescence light microscopy system over other U.S. candidates. The METEOR demo provides University researchers the opportunity to evaluate and further enhance cryo-electron tomography (cryo-ET) workflow. The University will use the extended demo period to determine whether to purchase for on-going use. Most importantly, if the METEOR proves to be a critical piece of equipment, it will give RU scientist a competitive edge in being able to produce high quality lamella to answer pressing scientific questions.

# NEW EQUIPMENT



**PIT: Carbon M2 Printer** - is a rapid fabrication tool. Its material versatility, voxel resolution and speed enable fast iteration of prototypes and production that scales to research needs.



**CEMRC: Vitrobot** - performs the cryo-fixation process at constant physical and mechanical conditions like temperature, relative humidity, blotting conditions and freezing velocity. This ensures high quality cryo-fixation results and high sample preparation before cryo-TEM observation.



**CBC: Visual Sonics Ultrasound** - Ultra-high to low frequency ultrasound (71–1 MHz) for imaging a range of animal models. It features HD image processing technology.



**FDDRC: Licor Odyssey M** - Used to image Western blot membranes, nucleic acid and protein gels, multiwell-plates, and microscope slides in 18 channels including laser scanning fluorescence with 4 lasers and 9 emission channels, bio and chemi luminescence, and transmitted/epi light detection with multiplex detection and overlay capabilities.



**GRC: 2100 Agilent Bioanalyzer** - A well established tool for DNA/RNA quality assessment.



**FCRC: Curiox Lamina Wash HT2000** provides better cell recovery, greater reproducibility, cleaner resolution of populations and decreases the cell clumping and the subsequent clogging of flow cytometers. It is faster than conventional centrifugation-based sample washing methods .

# MAKING AN IMPACT

Acknowledgement of the RCs ensures the University meets contractual obligations to funding agencies, strengthens the reputation of the RCs and increases the competitiveness of grant applications that reference use of the RCs. From January 2021- August 2022, the RCs were acknowledged in **119 publications by University researchers** and RC staff were co-authors on **63 publications by University and other institutions' scientists**.

## EDUCATION AND OUTREACH (Examples)

The heads of all the Centers participated in the *orientation for first year Graduate Students* on **September 27, 2021**, introducing the new students to the support, services, training and consultative services available from the Centers.

The annual *Resource Center Presentation Series*, running from **January 2022 to July 2022**, included talks by all the University Centers. Most were recorded and posted to Center websites.

## ON & OFF CAMPUS LECTURES (Examples)

- "BINA News" by Alison North at the RMS Virtual UK Light Microscopy Facility Meeting, January 6, 2022
- "Making Biome Data FAIR on a Global Scale" by Jason Swedlow from the University of Dundee, preceded by two-hour workshop on OMERO, May 4, 2022

## CLASSES AND TRAINING (limited listing)

**HPCRC** • Jason Banfelder taught the "Quantitative Understanding in Biology" course for University graduate fellows (March – May 2022) **BRC** • BRC staff taught the "Analysis of RNASeq data in R and Bioconductor" (Spring 2022) **EMRC** • Amalia Pasolli taught "Neuroscience at Scale," as part of the Bard-Rockefeller Semester in Science, on February 16 and March 9, 2022. **FCRC** • Staff regularly lead the "Beyond the Basics" Flow Cytometry Class and recently implemented an expanded "Pre-Sort and Sample Preparation Overview" Session. **BIRC** • Ved Sharma leads the Image Analysis User Group Meetings, including "How do I do 'X' in ImageJ/Fiji," on June 23, 2022.

## GRANTS, GIFTS and AWARDS

• Fisher Foundation Gift and renaming of the HTSRC as the Fisher Foundation Drug Discovery Resource Center (FDDRC). • **BIRC** - Zeiss 980 confocal funded by HHMI via Vosshall Lab. • **HPCRC** - Computers in HPC funded by HHMI via Casanova and Jarvis Labs.

## METHODOLOGY PUBS/PRESENTATIONS (limited listing)

• Banerjee A, et al (**Pasolli HA**), *Scanning electron microscopy of murine skin ultrathin sections and*

*cultured keratinocytes*. STAR Protoc. 2021 Aug 17;2(3):100729.

• Boehm, U, et al (**AJ North**), *QUAREP-LiMi: a community endeavor to advance quality assessment and reproducibility in light microscopy*. Nat Methods, 2021. **18**(12): p. 1423-1426.

• Hammer, M, et al (**AJ North**), *Towards community-driven metadata standards for light microscopy: tiered specifications extending the OME model*. Nat Methods, 2021. **18**(12): p. 1427-1440.

• Xu CS, et al (**Pasolli HA**), *An open-access volume electron microscopy atlas of whole cells and tissues*. Nature. 2021 Nov;599(7883):147-151.

• Nelson, G, et al (**AJ North**), *QUAREP-LiMi: A community-driven initiative to establish guidelines for quality assessment and reproducibility for instruments and images in light microscopy*. J Microsc, 2021. **284**(1): p. 56-73.

• Shola, DTN, **C Yang**, **C Han**, **R Norinsky**, and RD Peraza, *Generation of Mouse Model (KI and CKO) via Easi-CRISPR*. Methods Mol Biol, 2021. **2224**: p. 1-27.

• Larsen, SB, CJ Cowley, SM Sajjath, **D Barrows**, Y Yang, **TS Carroll**, and E Fuchs, *Establishment, maintenance, and recall of inflammatory memory*. Cell Stem Cell, 2021. **28**(10): p. 1758-1774 e8

• **Adura, C**, et al, *A simple method to estimate the mean number of lipophilic molecules on nanoparticle surfaces by fluorescence measurements*. Nanotech, 2021. **32**(31): p. 10.

## SOME RU TECHNOLOGY AND VENDOR PRESENTATIONS

**FDDRC** • User workshop for the Nanotemper Dianthus new nanoDSF, which is a label-free form of differential scanning fluorimetry, August 3, 2021.

**FCRC** • Sponsored BD Biosciences presentation, "Technology and Innovation: Advancing Flow Cytometry" by Robert Balderas (Distinguished BD Fellow, VP Biological Sciences, VP Market Development) March 16, 2022

## NEW HIRES:

Kathryn Rozen-Gagnon- Bioinformatics Analyst, Bioinformatics

Victor Bustos- Senior Research Support Specialist, DDRC

Tim McGinn- Research Support Specialist, DDRC

Estrella Cazares- Research Support Aide, Glasswashing

Jackie Woodruff- Research Support Assistant, GRC

Anurag Sharma- Senior Research Support Specialist, EMRC

Michelle Zhang - Instrumentation Associate, PIT

Nicholas Belenko - Instrumentation Engineer, PIT

Christopher Peralta - Research Support Assistant, PRC

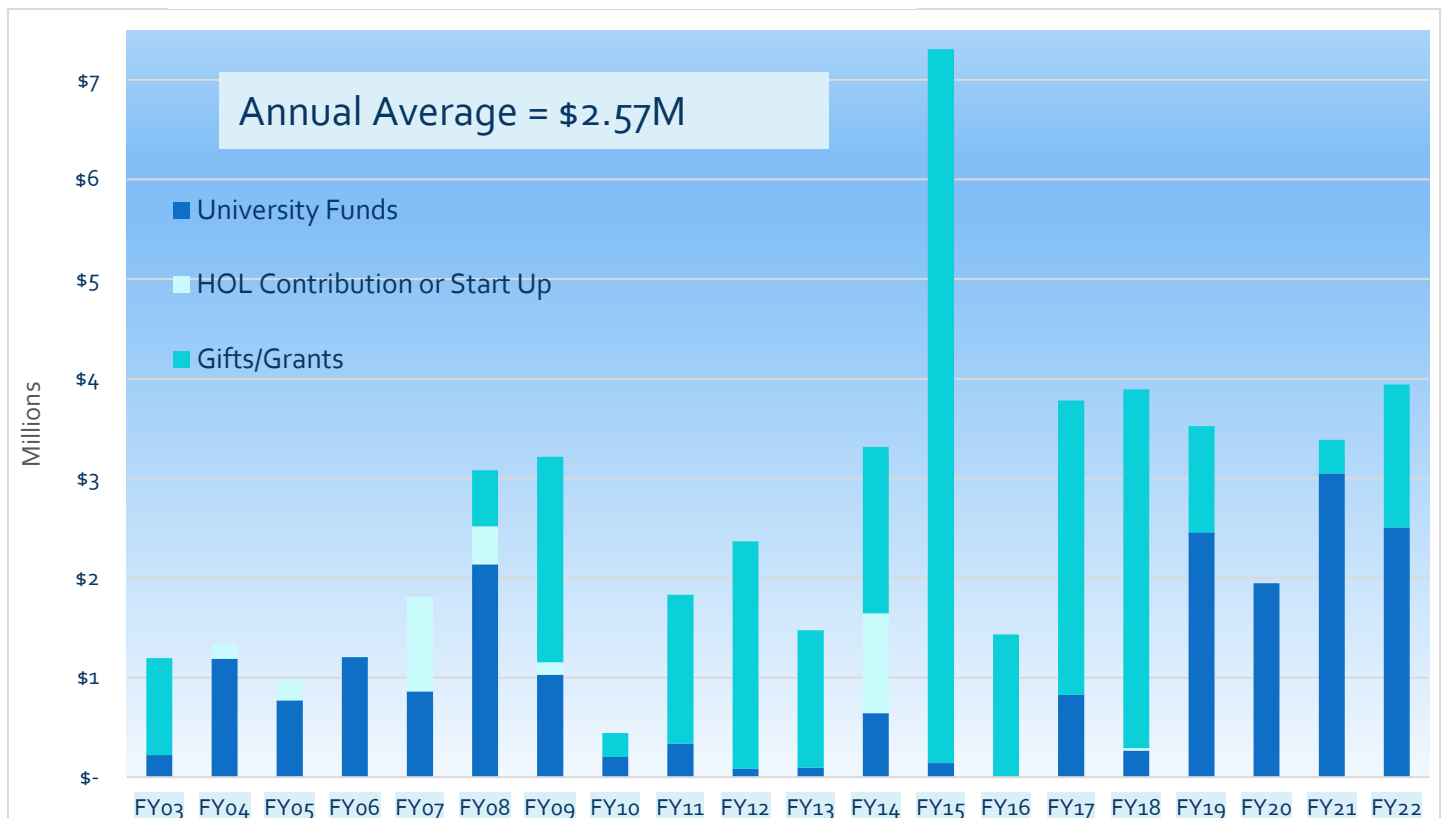
# BY THE NUMBERS

Number of Labs Using Resource Centers	RU	External
Antibody & Bioresource	8	100+
Bio-Imaging	53	15
Bioinformatics	37	1
Comparative Bioscience Center	46	3
Cryo-EM	15	0
Drug Discovery	45	8
Electron Microscopy	23	6
Flow Cytometry	41	0
Genomics	45	1
CRISPR & Genome Editing	12	1
Glasswashing	59	2
High Performance Computing	64	2
Laboratory of Comparative Pathology	18	50+
Precision Instrumentation Technologies	41	1
Proteomics	40	14
Reference Genome	2	31
Structural Biology	14	2
Transgenic & Reproductive Technologies	20	3

Operating funds for the Resource Centers are drawn from the University's annual operating budget and are offset, to varying levels, by user fees. User fees for Center services and products are set to offset only direct operating costs, e.g., consumables, service contracts and labor. User fees are not used to offset capital equipment costs.

User fees for services and products are established by the University administration, in compliance with NIH requirements, with input from the Centers' Scientific Advisory Committees, and with review by University Finance.

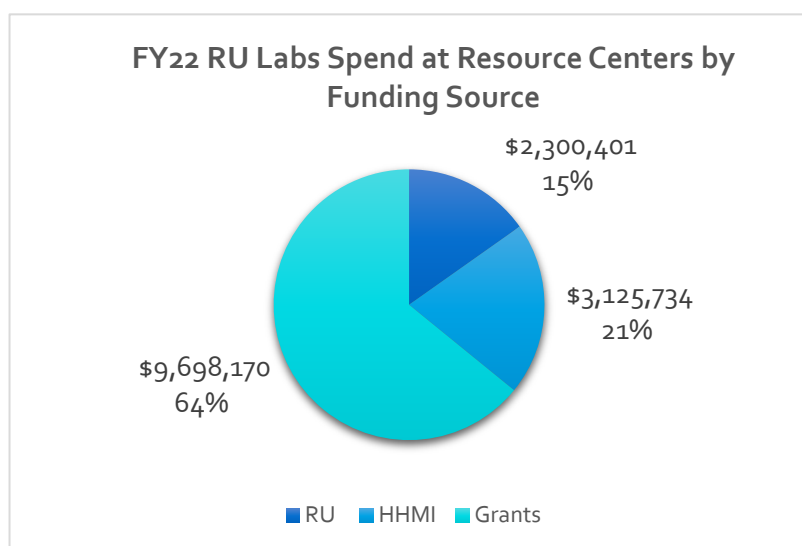
## FY22 Capital Equipment FY03- FY22



Center Operating Budgets and Cost Recovery FY19 to FY22

Resource Center	FY19		FY20		FY21		FY22	
	Operating	Cost Recovery	Operating	Cost Recovery	Operating	Cost Recovery	Operating	Cost Recovery
Antibody & Bioresource	32,753	32,753	41,000	61,600	86,133	25,380	0*	52,698
Bio-Imaging	1,227,634	756,368	1,251,267	617,960	950,096	463,439	954,090	557,937
Bioinformatics	342,475	80,900	537,491	189,121	692,003	201,331	791,862	244,208
CBC	11,578,969	9,540,218	12,261,781	9,303,496	11,791,150	9,257,085	12,094,265	9,490,635
CRISPR & Genome Editing	968,614	172,460	969,349	155,030	907,818	174,679	790,840	142,309
Cryo EM	604,847	308,274	685,846	412,500	937,812	279,990	844,208	410,001
Drug Discovery	1,278,697	723,556	1,322,811	862,005	1,329,119	740,580	1,120,774	1,045,729
Electron Microscopy	471,714	98,077	530,302	92,608	419,992	100,148	430,391	125,978
Flow Cytometry	1,044,822	487,401	1,073,987	363,831	976,219	424,263	1,029,675	522,043
Genomics	2,509,800	2,487,546	2,211,047	1,970,000	2,502,574	2,143,202	2,581,490	2,640,886
Glasswashing	510,104	269,399	480,249	213,032	482,471	249,989	463,449	257,067
High Performance Computing	475,653	176,080	555,186	263,937	564,128	297,895	541,333	348,442
Precision Instr. Technologies	514,750	111,240	561,175	88,343	634,547	120,603	492,215	89,788
Proteomics	1,307,846	740,472	1,214,535	787,791	1,315,609	862,865	1,215,801	920,011
Reference Genome	1,553,506	982,325	1,063,168	811,266	1,017,990	589,174	1,276,757	939,931
Structural Biology	179,467	7,505	187,233	10,153	127,758	22,912	174,496	35,648
Transgenic & Reproductive Tech	1,061,884	480,000	1,010,046	437,432	1,010,331	719,646	996,616	612,472
<b>TOTAL</b>	<b>25,663,288</b>	<b>17,454,574</b>	<b>25,956,473</b>	<b>16,640,105</b>	<b>25,745,750</b>	<b>16,673,181</b>	<b>25,798,262</b>	<b>18,435,783</b>
Subsidy	32%		36%		31%		29%	

\*Operating fees reflect charges to RU by MSK for percentage of their unrecovered costs; MSK did not invoice RU in FY22.



The PIT was featured in the May 22 [SEEK feature, "The tools that drive discovery."](#)