2025 Annual Report

HSC Cores Research Facilities

HEALTH
UNIVERSITY OF UTAH

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UNIVERSITY OF UTAH

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Annual Report FY25

HSC Cores Facilities

Overall Financial Summary

Revenue & Expenses

- HSC Core Facilities budgeted $13.6 million for FY25, with expenses totaling $14 million. Approximately $7.85 million in expenses went to salaries and benefits while $6.25 million was spent on equipment and operating supplies.
- In FY25, $10.8 million in services were billed, and collected from all units combined. An overhead fee of 5% ($606,121) was used for administrative support.

Core Research Facilities

FY25 Cores	Total Expenses	Equipment Expenses	Total Revenue	SVPHS	VPR	RIF/Match
Administration	1,664,160		1,790,344	705,000		
ADD	200,710		133,285	0		
BHIDC	23,569		73,863	0		
BIDAC	19,458		10,750	0		
Cell Imaging	635,390		716,258	225,000		
Data Science Services	1,757,149		1,784,162	785,000		
DNA Peptide	282,897		260,139	50,000		
DNA Sequencing	708,940		695,945	25,000		
Drug Discovery	214,974		232,320	75,000		
EM	1,124,654	79,524	1,115,895	200,000		79,524
Flow Cytometry	795,961	185,075	839,212	40,000		148,434
Genomics	289,830		257,050	0		
Iron & Heme	123,950		13,027	0		
Machine Shop	310,854	7,205	300,278	60,000		
Mass Spectrometry	1,015,393	402,621	691,359	225,000		198,961
Metabolic Phenotyping	305,403		246,774	85,000		
Metabolomics	2,120,980	1,324,672	2,092,195	240,000		1,193,545
Mutation Generation	147,526		153,427	70,000		
NMR	107,723		131,092	70,000		
Powder	74,671		43,027	0		
PreClinical Imaging	206,138		204,754	120,000	20,000	
Scalable Analytics	39,639		91,661	0		
Small Animal Ultrasound	48,061		60,948	20,000		
Software Development	758,090		613,347	0		
Transgenic Mouse	580,369		463,795	250,000		
USTAR Genetics	501,413		579,332	175,000		

Service Recharge Centers

FY25 Service Recharge Centers	Total Expenses	Equipment Expenses	Total Revenue	SVPHS	VPR	RIF/Match
BioMedical Microfluids	34,408		44,951			
BioPhysical Interactions	10,811		300			
Center Human Toxicology	198,883		292,033			
Crus	6,666		15,213			
Genetic Science Learning CTR	2,144,781		1,357,953			
MCL Meldrum	134,064		94,275			
Metabolic Kitchen	34,049		38,157			
Metal 3D Printing	3,950		8,371			
Midas	90,120		94,397			
Nanofab Administration	1,545,879	963,869	1,887,354	1,216,241	50,000	365,680
Nanofab Cleanroom	1,268,489		888,808			
Nanofab Surface Analysis	875,580		735,207			
Xray Crystallography	7,841		45,284			

Cores Administration

Overview

The Health Sciences Center (HSC) Core Facilities administratively reports to the Assistant Vice President for Cores Infrastructure Dr. James Cox, who reports to Dr. Rachel Hess, Associate Vice President for Research. The administrative office is managed by Ms. Brenda Smith, with assistance from Ms. Iryna Wiley, Ms. Terra Curley, and Mr. Derek Schlotfeldt. Responsibilities of the Core Administration office include - personnel management, budget preparation, financial affairs, ordering of supplies, and tracking expenses for all 41 Core Facilities/Service Recharge Centers. In addition, the Administrative Core supports general research infrastructure for the community, e.g. maintaining the X-ray film developer in the SOM and the research irradiator logging and access requests. All cores and recharge centers operate on a charge-back basis, with the Administration Core recovering 5% of the revenue collected for billing and collection services.

Personnel

- James E. Cox, Ph.D., Assistant Vice President for Cores Infrastructure
- Brenda Smith, Administrative Director
- Derek Schlotfeldt, Manager Administrative
- Terra Curley, Senior Accountant
- Iryna Wiley, Financial Mgt Analyst
- Elliot Francis, Principal Software Engineer
- Megan Bowler, Principal Software Engineer

Advisory Board Committee

Last meeting date: January 8th, 2025

- James Cox PhD, Assistant Vice President for Cores Infrastructure
- Rachel Hess MD MS, Associate Vice President for Research, SVPHS
- Chris Hill PhD, Vice Dean of Research, SOM
- Kevin Whitty PhD, Associate Dean for Research, College of Engineering
- Scott Summers PhD, Professor and Chair, Nutrition & Integrative Physiology
- Erin Rothwell PhD, VP for Research
- Mark Yandell PhD, Professor, Human Genetics
- Matthew Rondina MD, Associate Professor, Internal Medicine
- Sarah Franklin PhD, Associate Professor, Internal Medicine
- Martin McMahon PhD, Professor, Dermatology
- Dean Tantin PhD, Professor, Pathology
- Eric Schmidt PhD, Professor, Medicinal Chemistry
- Wes Sundquist PhD, Professor, Biochemistry
- Alana Welm PhD, Professor, Oncological Sciences

FY25 Annual Update

- In FY25 the core billed $10.8M; however, what is most impressive the collection rate for billed services remains at **100%**. We have developed an account management system to allow each Director to view revenue and expenses in real time. The tracking system stores fiscal data so that historical comparisons between revenue and expenses can be performed as well as validation of expenses, and operational analysis.
- One new Service/Recharge Centers; Xray Crystallography is now managed through the administrative office to increase accountability and reduce expenses associated with billing and collections.
- The annual retreat was held in person in October 2024.
- Admin Core created an updated ordering system to replace an existing FileMaker Pro deployment. This update included a move to a UIT managed server, a new web-based User Interface and a transfer of all historical data. The new ordering system brings the ordering system fully under Cores control as a mission critical operation support application. This system is anticipated to expand access and ease of ordering for all participating facilities.
- HSC had a full main website rebuild.
- HSC assumed control of all cores related websites.
- Cores interactive Map
- The electronic inventory system remains in active use by many organizations across campus. Minor updates include expanded support for the new university provided RFID inventory tags in addition to the HS Cores printed tags.
- Critical IT infrastructure has been expanded in response to new needs and decentralized to allow quicker disaster recovery and more robust fail-over for all active services.
- Upgraded infrastructure to reduce downtimes and increase recovery/robustness.

FY26 Goals

- Unify Management of U24/U54 CIHD/CCEH Websites
- Deploy rebuilt inventory system with custom reporting support and GPS coordinate tracking
- Begin development of multi-facility project coordination/user defined research project management tools in Resource System
- Develop project proposal for Cores-wide freezer contents tracking program/initiative
- Develop service contract tracking system

Cores Administration Revenue & Expenses

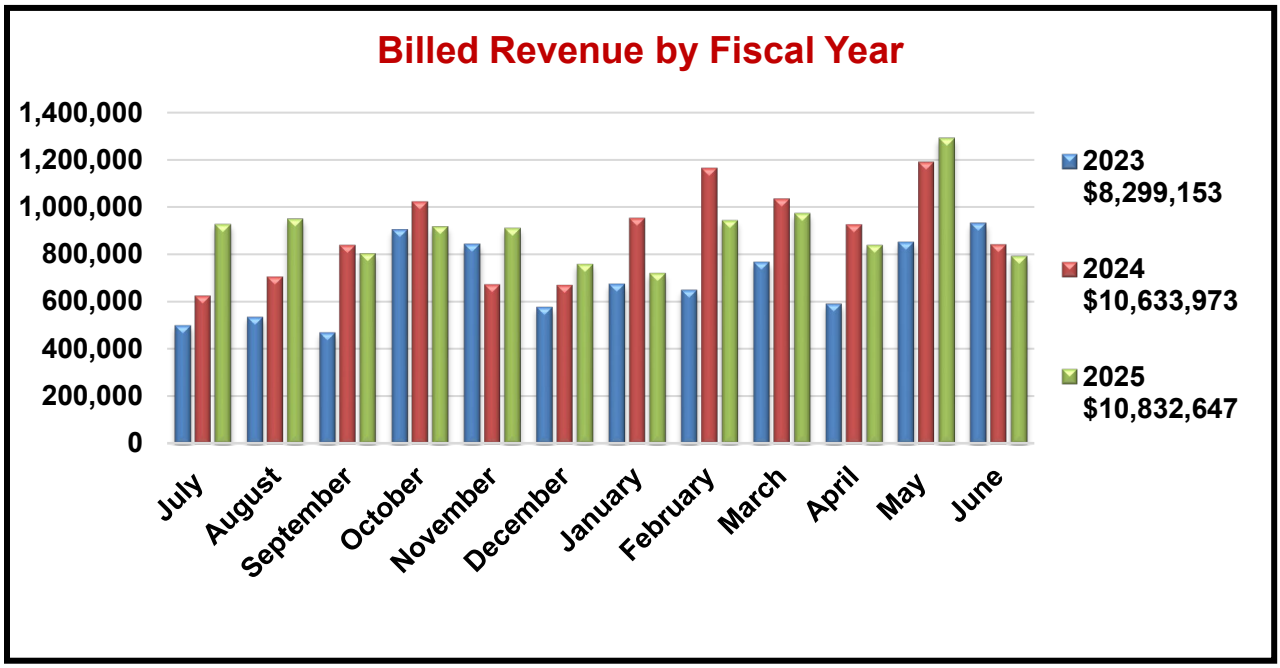
FY25 Expenses: Total $1,664,160

The Cores Administration Budget covers the following expenses:

- Salaries/Benefits: $989,136
- Fixed Expenses (IT Support for 62 staff, developer, x-ray, software Expenses): $126,424.
- Equipment expenses: $516,370
- Unanticipated equipment repairs and replacement: $32,230

FY25 Revenues: Total $1,790,344

- SVP of Health Sciences Support: $705,000
- FY25 Revenue Generated from Services: $606,121
- Equipment Support: $479,213



Addendum

The administrative core ensures that all cores maintain a regular faculty advisory committee meeting that conforms to the following guidelines:
https://cores.utah.edu/health-science-center-core-facilities-governance/#governance

Anticonvulsant Drug Development (ADD) Program

Overview

The Anticonvulsant Drug Development (ADD) Program is an established laboratory experienced in the preclinical identification and evaluation of investigational compounds for the treatment of epilepsy.

Uniqueness

Current investigators at the program have held multiple contracts with biopharmaceutical and government partners for testing of novel compounds in seizure models. The program has considerable experience in performing efficacy and tolerability assessments of novel and established antiseizure drugs (ASDs) using multiple routes of administration [intraperitoneal (i.p.), intravenous (i.v.), oral (per os, p.o.), subcutaneous (s.c.), intramuscular (i.m.), and intracerebroventricular (i.c.v.)] in models for epilepsy.

Services

The models we offer include maximal electroshock (MES)-induced seizure, 6 Hz seizure (varying stimulus intensities), corneal kindled seizure test, lamotrigine-resistant amygdala kindled model, genetic model of Dravet Syndrome (monotherapy and polytherapy testing), viral-induced epilepsy model (Theiler's murine encephalomyelitis virus [TMEV] model), spontaneous bursting model (*in vitro* slice electrophysiology assay), intra-amygdala kainate microinjection model of temporal lobe epilepsy, and post kainate, status epilepticus (SE)-induced chronically seizing rat and mouse models. In parallel, our staff routinely evaluates the effect of investigational compounds on motor impairment in the rotarod test, the open field locomotor assay, the minimal motor impairment (MMI) assay, and the modified Functional Observation Battery (FOB, or Irwin test). Our facilities include state-of-the-art multi-channel monitoring units to allow for continuous video-electroencephalographic (v-EEG) monitoring of spontaneous seizures. We also offer chronic administration of any compound to rats or mice using a drug-in-food model. Using our automated feeder system, drugs can be delivered on a fixed schedule, 24/7 for any requested length of time. Food pellets containing compounds are formulated either by outsourcing or can be custom made in-house. Prices will be determined based on the requirements of the planned study.

FY26 Goals

- Continue Established Operations
- Reaching out to new users

Personnel

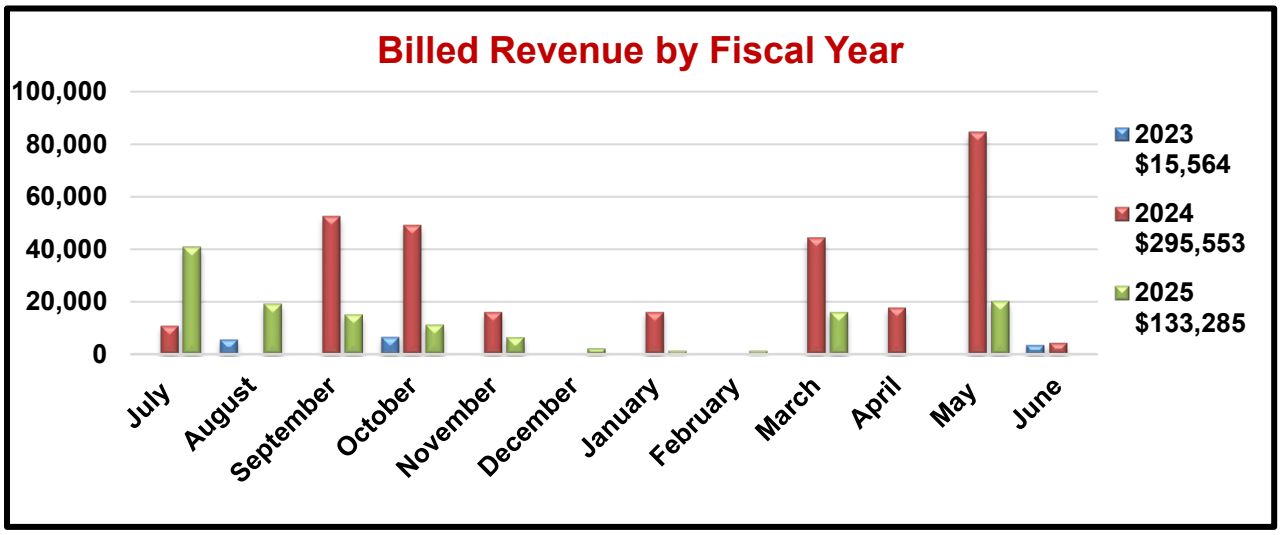
- Karen S. Wilcox Ph.D., Director
- Cameron Metcalf Ph.D., Associate Director
- Vanja Panic Ph.D., Assistant Director (Operations)
- Peter West Ph.D., Research Associate Professor
- Misty Smith Ph.D., Research Assistant Professor
- Kristina Johnson, Laboratory Manager
- Carolina Moncion Ph.D., Sr. Research Analyst
- Christine Wnukowski Ph.D., Sr. Research Analyst
- Elisa Koehler, Project Administrator

Revenue/Expenses

FY25 expenses: $200,710

FY25 revenue: $133,285

- Revenue generated from services: $133,285

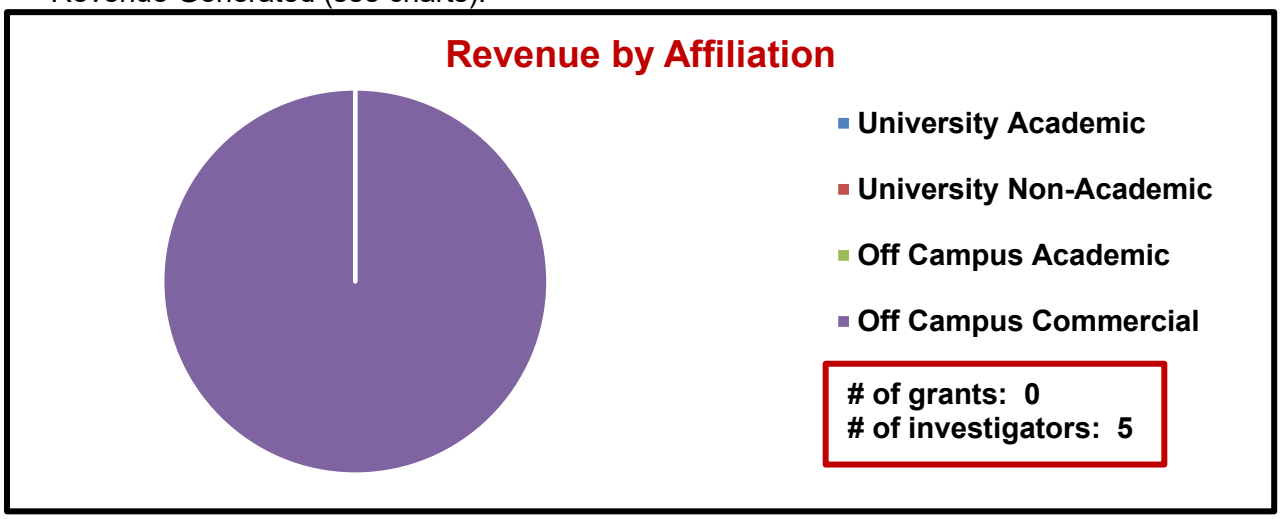


* Legend displays total annual revenue by fiscal year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts):



Top Users

1	Sensorium Therapeutics	Off Campus Commercial
2	Lundbeck DK	Off Campus Commercial
3	AMO Pharma Limited	Off Campus Commercial
4	London Pharmaceuticals and Research Corp.	Off Campus Commercial
5	BioSymetrics	Off Campus Commercial

Publications

No known publications acknowledged this facility in FY25.

Behavioral Health Innovation and Dissemination Center

Overview

The mission of the Behavioral Health Innovation and Dissemination Center (BHIDC) at The University of Utah (U of U) is to develop, test, and implement behavioral health interventions as well as to train U of U students to deliver them and make these and other state of the art interventions available to the public. The BHIDC conducts research primarily focused on cognitive-behavioral interventions for adults and couples, and provides low cost, evidence-based treatments to Utah residents. BHIDC staff also began conducting training workshops and educational presentations for healthcare providers and the public in FY2025.

Services

BHIDC offered a range of services including consulting, training, and psychological treatments beginning in FY25.

Personnel

- Brian Baucom, PhD, Co-Director
- Feea Leifker, MPH, PhD, Co-Director
- Liz Greene, DNP, APRN, PMHNP-BC, Assistant Professor, Clinical
- Mona Yaptangco, PhD, Research Assistant Professor
- Robert Warner, PhD, Research Assistant Professor
- Sara Valerious, LCSW, Research Associate
- Natalie Brown, CSW, Research Associate
- Abigail Boggins, B.A., Research Associate

Advisory Board Committee

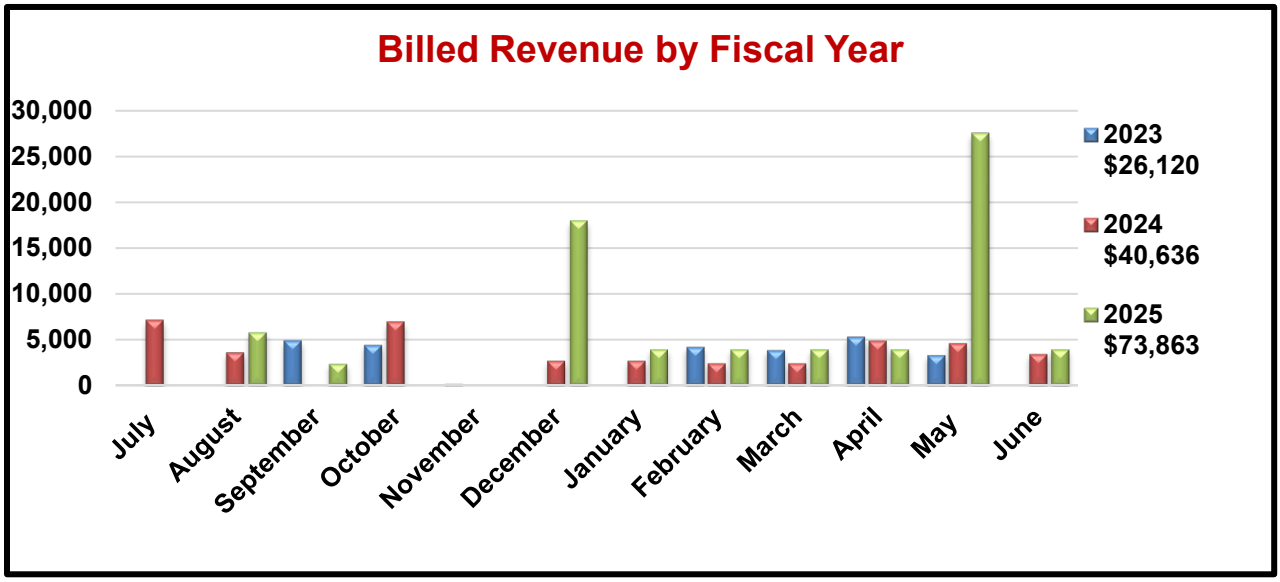
- Cynthia Berg Ph.D., Distinguished Professor of Psychology
- Lee Ellington Ph.D., Professor, College of Nursing
- Rebecca Utz Ph.D., Professor, Department of Sociology
- Lori Kowaleski-Jones Ph.D., Associate Professor, Department of Family & Consumer Studies

Revenue/Expenses

FY25 Expenses: Total $23,569

FY25 Revenue: Total $73,863

- FY25 Revenue generated from services: $73,863

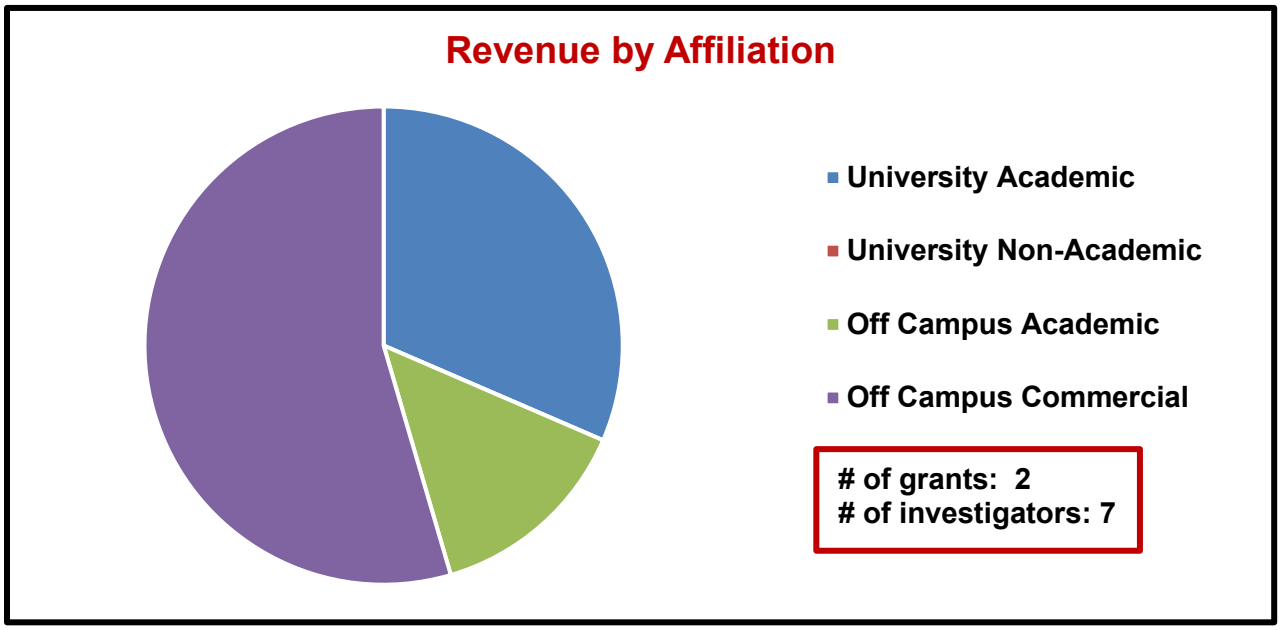


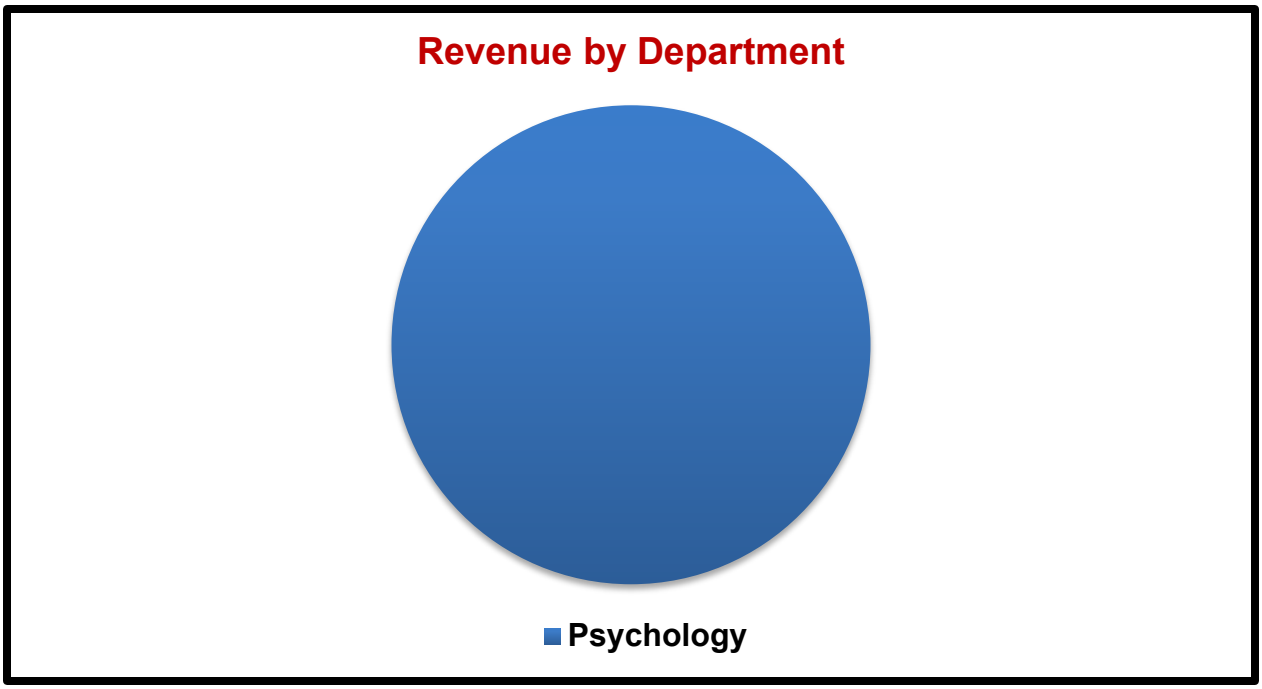
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Tim Hortons Foundation Camps	Off Campus Commercial
2	Katherine Baucom	Department, NIH
3	Witten.Herdecke University	Off Campus Academic
4	University of Marburg	Off Campus Academic
5	Aarhus University	Off Campus Academic
6	Aether Mindtech Solutions Pvt Ltd	Off Campus Academic
7	LiveMore ScreenLess	Off Campus Academic

Publications

1. Arkin, M., R. P. Lubeznik-Warner, A. Eisenhower and J. E. Rhodes Development and validation of a self-report measure of summer camp counselor burnout. Applied Developmental Science: 1-18.10.1080/10888691.2025.2512869
2. Butner, J. E., L. M. Thornton, R. E. Kilshaw, R. E. Flatt, Q. Shi, P. R. Deboeck, J. Tregarthen, S. Argue, B. R. W. Baucom and C. M. Bulik (2025). Distinct Patterns of Dynamical Regulation in Passive Sensor Data Following Binge and Purge Behaviors. Int J Eat Disord 58(7): 1296-1306.10.1002/eat.24437
3. Froehly, M., Sibthorp, J., Lubeznik-Warner, R. P., Meerts-Brandsma, L., & Rochelle, S. (Accepted). Utilizing the narrative identity framework to understand the differences between high and low point experiences in outdoor adventure education. Journal of Adventure Education and Outdoor Learning.
4. Johnson, K. and F. Leifker (2024). Cognitive Processing Therapy for Childbirth-Related PTSD: A Case Study and Considerations for Treatment. Cognitive and Behavioral Practice.10.1016/j.cbpra.2024.04.007
5. Leo, K., S. L. Langer, H. McDaniel, B. R. W. Baucom, F. Keefe, K. Ramos, D. J. Lee and L. S. Porter (2025). Parenting Concerns, Psychological Distress, and Relationship Adjustment Among Patients With Cancer and Their Partners: A Longitudinal Study. Psychooncology 34(1): e70057.10.1002/pon.70057
6. Povilaitis, V., R. Lubeznik-Warner and K. McGregor-Wheatley (2024). Understanding Why Youth Depart Early from Summer Camp. Journal of Youth Development 19: 2024
7. Shi, Q., L. M. Thornton, R. Kilshaw, R. E. Flatt, J. E. Butner, C. Adamo, P. R. Deboeck, B. R. W. Baucom, J. Tregarthen, S. Argue and C. M. Bulik (2025). Relationship Between Intensive Passive Data Signals and Patterns of Binge-Eating Behaviors: From a Dynamical-System Approach. Clin Psychol Sci 13(3): 558-581.10.1177/21677026241280728

8. Terrill, A. L., S. Gordon, C. Sparks, B. B. Baucom, B. Cardell, J. J. MacKenzie, J. J. Majersik, M. Reblin and L. G. Richards (2025). Resilience in Stroke survivor-care-partner Dyads (ReStoreD): a study protocol for a randomized-control trial. Trials 26(1): 195.10.1186/s13063-025-08891-x
9. Troxel, W.M., Baucom, B.R.W., Euler, M.J., Bermudez, B., & Baron, K.G. (in press). The CHARMS Study: Rationale and Study Protocol for an Observational Study of Sleep and Biobehavioral Rhythms in Older Adult Couples. Sleep Advances.

Biomedical Imaging
Data Science & AI Core

Overview

The Biomedical Imaging, Data Science and AI Core (BIDAC) facility provides innovative consulting services in artificial intelligence, computer vision and image analysis to academic research groups and startups across healthcare and health sciences. By leveraging novel technologies, the development and deployment of end-to-end AI-driven data science solutions help partners turn data into insights. Areas of expertise include deep learning applied to healthcare imaging, machine learning for clinical research, HIPAA-compliant data management for clinical studies and computer vision for various domains. These application-oriented services utilize the expertise, computational resources and software development infrastructure of the Scientific Computing and Imaging (SCI) Institute. BIDAC aims to further the scientific mission of the University of Utah by enhancing the capabilities and competitiveness of HSC research partners.

Services

BIDAC offers a range of services including consulting, development of AI, computer vision or image analysis solutions, training, data visualization, software prototyping and algorithm development.

Examples of services that have been developed and/or used include:

- **AI solutions for healthcare imaging.** We developed expertise in building and delivering end-to-end data science solutions using deep learning techniques. Customized workflows leveraged convolutional neural networks (CNNs) and state-of-the-art transformer-based models. Applications included the detection and 3D segmentation of cerebral aneurysms, and 3D multi-organ segmentation for cancer imaging.
- **Machine learning analysis for clinical studies and clinical trials.** BIDAC provided consulting services, comprehensively evaluating machine learning models used in clinical trials for cardiovascular medicine, helping predict ischemia.
- **Vision AI services.** BIDAC developed domain specific computer vision services, by designing and building custom neural network-based solutions. Applications included multi-system thermal stereovision for autonomous navigation, and classification tasks on multi-magnification electron microscopy data.
- **GPU accelerated data science.** BIDAC offered advanced software engineering services to modernize multiple open-source software products, by implementing GPU acceleration, and by focusing on continuous integration and continuous delivery (CI/CD). One application example enhanced retinal connectomics within ophthalmology research.
- **Design and management of a HIPAA-compliant big data engineering pipeline to support clinical research.** In partnership with researchers from Radiology, the Enterprise Data Warehouse (EDW) and the Center for High Performance Computing (CHPC), BIDAC enabled secured data transfer, data management, data analytics and data analysis of 140,000+ radiological images. Clinical studies included AI analysis for COPD and COVID-19 research, image analysis for Deep Brain Stimulation.

Personnel

- Clement Vachet, Director

Advisory Board Committee

- Tolga Tasdizen, PhD, Associate Professor Electrical and Computer Engineering
- Edward DiBella, PhD, Prof. Radiology and Imaging Sciences, Director UCAIR
- Florian Solzbacher, PhD, Professor Electrical & Computer Engineering, Director CEI

FY25 Annual Update

Grant Support - BIDAC performed preliminary work and/or provided letters of support for the following grant/contract submissions:

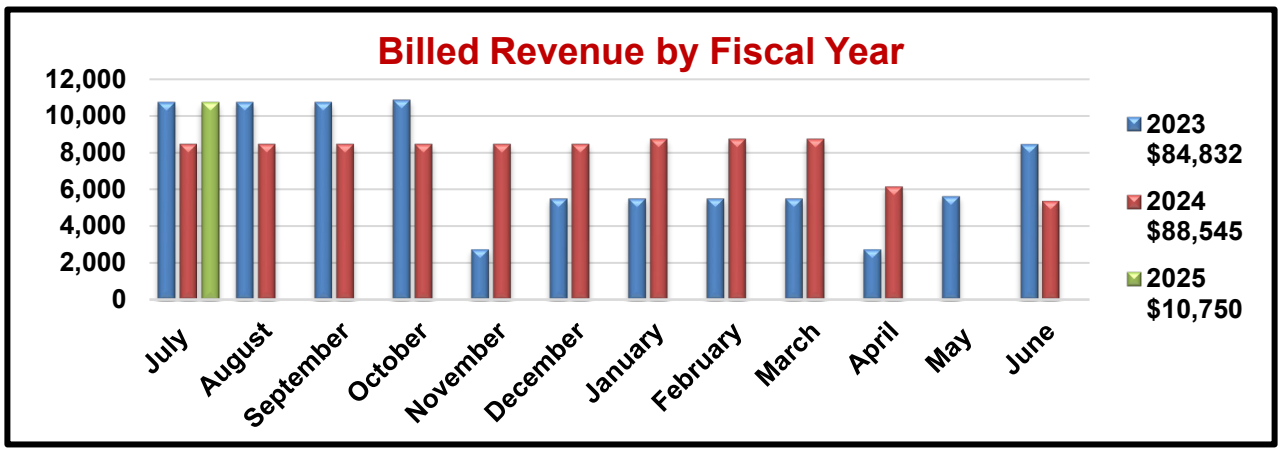
- NSF SBIR Phase II – Rudy Wilcox, RefloDx LLC.

Revenue/Expenses

FY25 Expenses: **Total $19,458**

FY25 Revenue: **Total $10,750**

- VP of Health Sciences Support: $ 0
- FY25 Revenue generated from services: $10,750

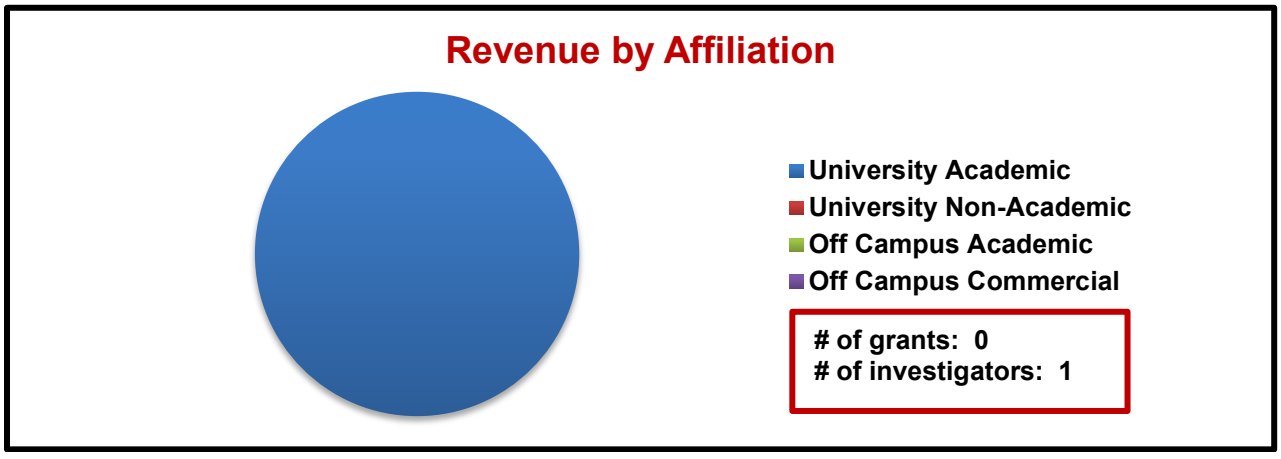


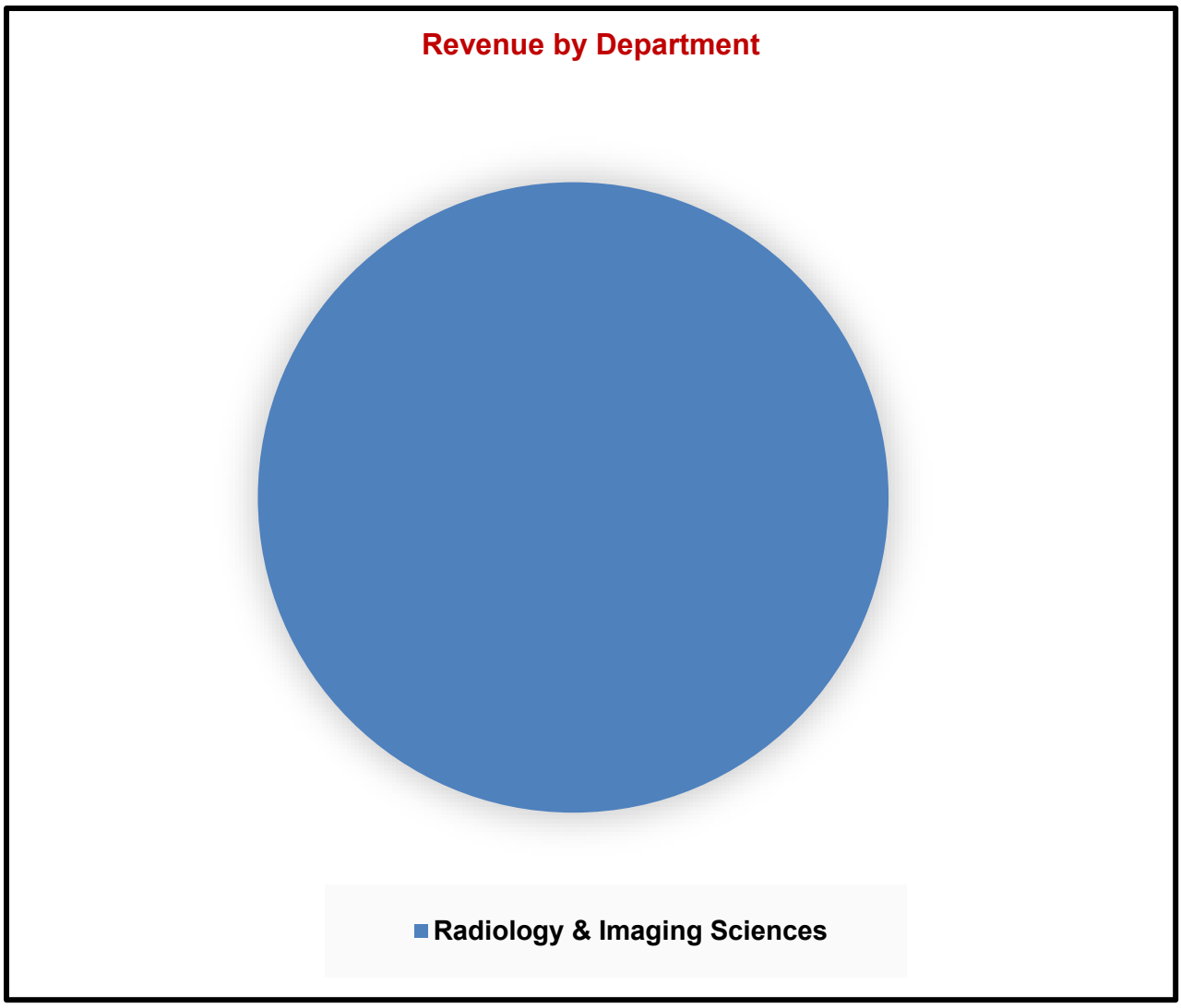
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Satoshi Minoshima	Department

Publications

No known publications acknowledged this facility in FY25.

Cell Imaging Facility

Overview

The Cell Imaging Facility provides training and consultation on the use of confocal, automated widefield, TIRF, and two-photon microscopy, as well as the software tools for quantitative analysis of image data. The facility has a Zeiss 880 Airyscan confocal, a Leica SP8 White light laser confocal, a Leica SP8 405/488/561/633 confocal, one Olympus FV1000 Spectral confocal, one Zeiss 700 confocal, and one multi-photon microscopes from Prairie/Bruker. In addition, one Nikon Ti automated widefield microscope, one DeltaVision Ultra widefield microscope and a spinning disk confocal (CSUW1) are available for live cell imaging. A STEDYCON for super-resolution microscope from Abberior-instruments that is integrated for resolving 40nm resolution is available. A Nikon NSTORM super-resolution microscope with TIRF function can measure the resolution~20nm. Two slide scanners, Zeiss Axio Scan.Z1 and AxioScan 7 are available for automated archiving of histology and fluorescence data. A Nikon Spinning Disk Confocal with dual cameras combined with additional TIRF and photoactivation functions is available. A CosMx™ Spatial Molecular Imager (SMI) from NanoString/Bruker provides high-plex in-situ analysis at cellular and subcellular resolution in FFPE and fresh frozen tissue. Automated microscopes with one of four different stage incubators are available (CO_2, temperature, humidity, hypoxia) for live cell imaging. Imaris, Nikon Elements AI, FluoRender, and ImageJ software are available for 2D and 3D analysis of image data.

Services

The training and equipment provided by the facility is aimed at reducing the startup time and degree of expertise necessary for an individual user to design and execute experiments requiring microscopy and image processing. Services are offered at multiple locations to be within proximity to the user base.

FY26 Goals

Optimizing acknowledgement of the core in published manuscripts with data generated from the core is very important in developing a strategy to acquire additional equipment.

Equipment Location

HSC Location

- Zeiss 700 Confocal Microscope
- Nikon NSTORM Super-resolution Microscope with TIRF function
- Prairie Multi-Photon Microscope
- Zeiss Axioscan.Z1 automated slide scanner with a 100-slide loader
- EVOS M5000 FL Widefield Microscope
- Nanostring CosMx Spatial Molecular Imager (SMI)
- Imaris/Nikon Elements AI Workstation

HCI Location

- Leica SP8 confocal with a white light laser
- Leica SP8 confocal with 405, 488, 561, 633nm lasers
- Nikon Ti Automated Microscope
- Zeiss AxioScan 7 slide scanner
- Ibidi stage incubator with CO_2, temperature and hypoxia control
- Imaris Workstation

Biology ASB/Crocker Location

- Olympus FV1000 Confocal Microscope
- Zeiss 880 Airyscan Confocal
- Vutara super resolution
- STEDYCON super resolution
- Leica Cryostat

EEJMRB Location

- Leica Spinning Disk Confocal Microscope
- DeltaVision Ultra Widefield Microscope
- Nikon Spinning Disk Confocal, TIRF and Photoactivation Microscope

Personnel

- Xiang Wang, Ph.D., Director
- Anton Classen, Ph.D., Research Associate
- Satoshi Kumatsu Ph.D., Research Associate
- Katherine Siebeneck, Lab Specialist

Advisory Board Committee

Last meeting date: December 5th, 2024

- Marcus Babst, Professor, Biology
- Sophie Caron, Associate Professor, Biological Sciences
- James Cox, HSC Cores Director
- Bruce Edgar, Professor, Oncological Sciences
- Gabrielle Kardon, Professor, Human Genetics
- Michelle Mendoza, Associate Professor, Oncological Sciences
- Minna Roh-**Johnson**, Associate Professor, Biochemistry
- Alex Shcheglovitov, Associate Professor, Neurobiology and Anatomy

FY25 Annual Update

New Services

- Consultation is available at four locations: Building 5 CSC, 555 HCI, 565 EEJMRB and 585 HSC

New Equipment

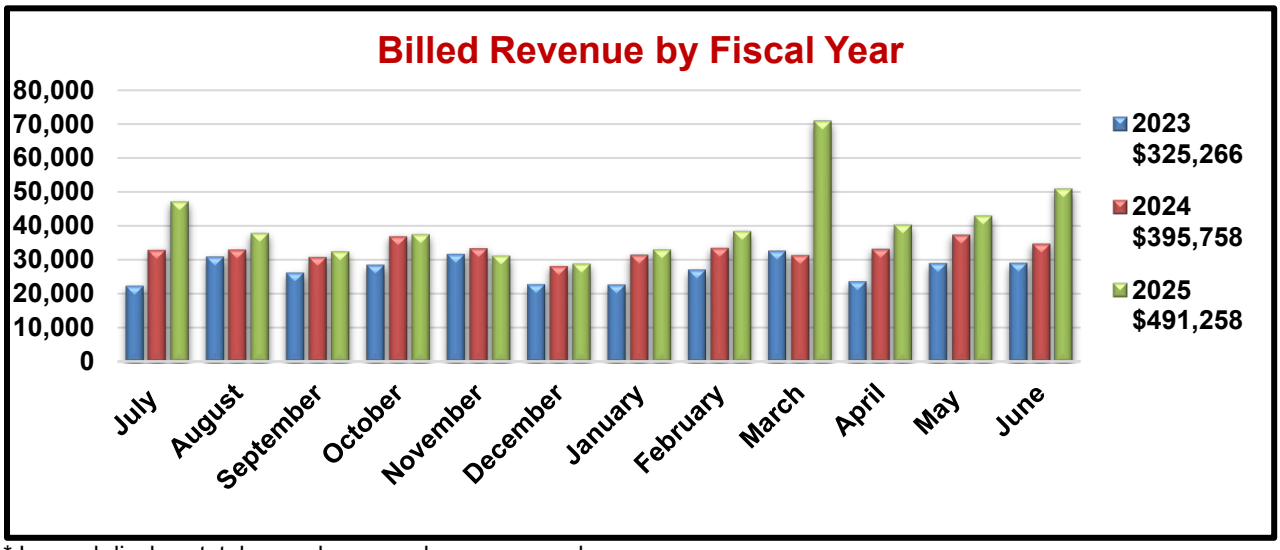
- Nikon NSTORM Super-resolution Microscope with TIRF function

Revenue/Expenses

FY25 Expenses: Total $635,390

FY25 Revenue: Total $716,258

- VP of Health Sciences Support: $225,000
- FY25 Revenue generated from services: $491,258

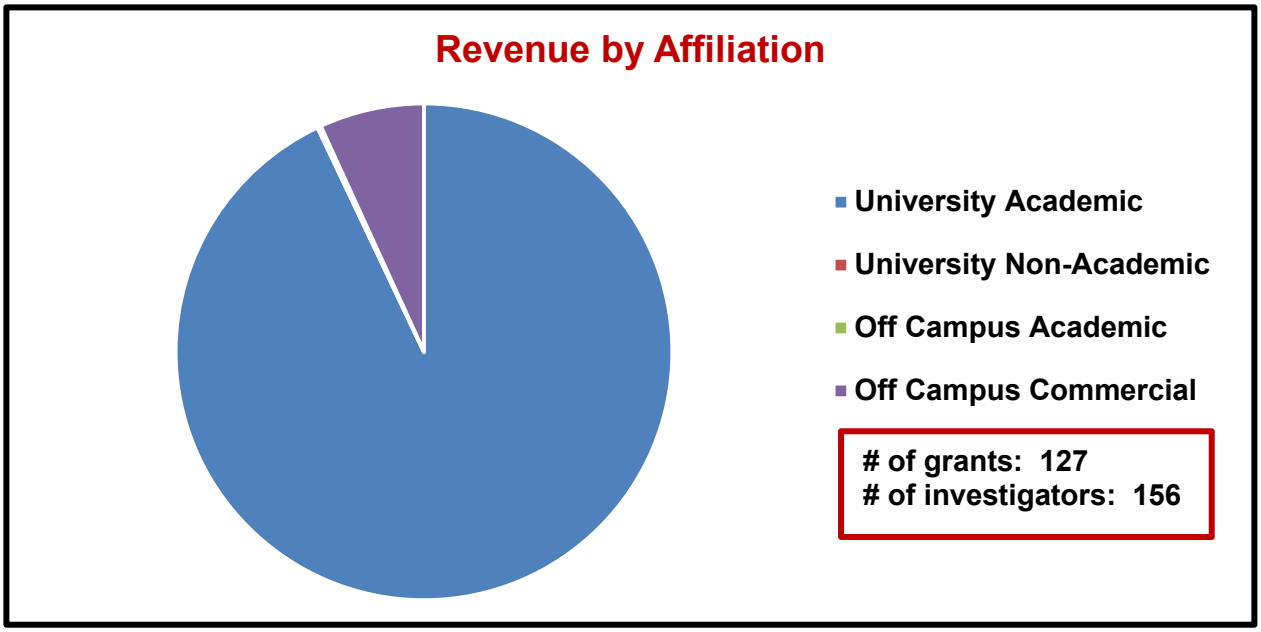


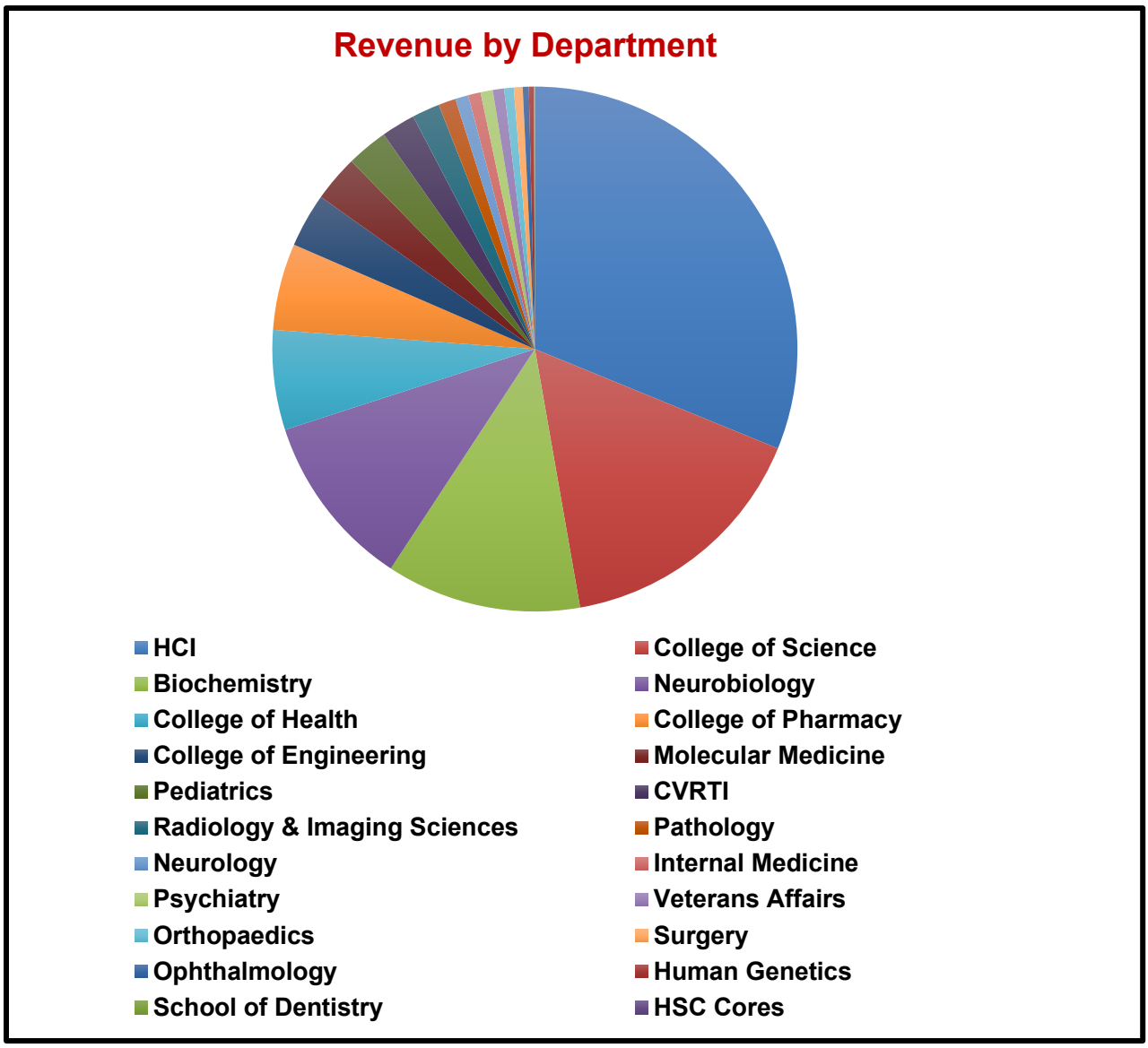
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following)





Top Users

1	Erik Jorgensen	Department
2	Michelle Mendoza	NIH
3	Ensigna Biosystems	Off Campus Commercial
4	Minna Roh-Johnson	Department, NIH, University of Utah Research Foundation
5	Chris Fillmore	Department
6	Bruce Edgar	Department, NIH
7	Sophie Caron	NIH, NSF
8	Jessica Osterhout	Department
9	Micah Drummond	Department, NIH
10	Karen Wilcox	NIH

Publications

1. Abouelghar, A., J. S. Carrier, J. R. Torvi, E. Jenson, C. Jones, B. Gangadharan, E. A. Geyer, L. M. Rice, B. Lagesse, G. Barnes and M. P. Miller (2024). Stu2 has an essential kinetochore role independent of regulating microtubule dynamics. bioRxiv: 2022.2009.2009.507218.10.1101/2022.09.09.507218
2. Bender, A. A., E. K. Kirkeby, D. J. Cross, S. Minoshima, A. G. Roberts and T. E. Mastren (2024). Development of a (213)Bi-Labeled Pyridyl Benzofuran for Targeted alpha-Therapy of Amyloid-beta Aggregates. J Nucl Med 65(9): 1467-1472.10.2967/jnumed.124.267482
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33. Stewart, M. G., J. S. Carrier, J. A. Zahm, S. C. Harrison and M. P. Miller (2025). A coordinated kinase and phosphatase network regulates Stu2 recruitment to yeast kinetochores. J Cell Biol 224(8).10.1083/jcb.202410196
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36. von Diezmann, L., C. Bristow and O. Rog (2024). Diffusion within the synaptonemal complex can account for signal transduction along meiotic chromosomes. Mol Biol Cell 35(12): ar148.10.1091/mbc.E24-05-0225
37. Walker, M. F., J. Zhang, W. Steiner, P. I. Ku, J. F. Zhu, Z. Michaelson, Y. C. Yen, A. Lee, A. B. Long, M. J. Casey, A. Poddar, I. B. Nelson, C. D. Arveseth, F. Nagel, R. Clough, S. LaPotin, K. M. Kwan, S. Schulz, R. A. Stewart, J. J. G. Tesmer, T. Caspary, R. Subramanian, X. Ge and B. R. Myers (2024). GRK2 kinases in the primary cilium initiate SMOOTHENED-PKA signaling in the Hedgehog cascade. PLoS Biol 22(8): e3002685.10.1371/journal.pbio.3002685
38. Yi, C., Y. Kitamura, S. Maezawa, S. H. Namekawa and B. R. Cairns (2025). ZBTB16/PLZF regulates juvenile spermatogonial stem cell development through an extensive transcription factor poising network. Nat Struct Mol Biol 32(7): 1213-1226.10.1038/s41594-025-01509-5

Data Science Services

Data science is the discipline of extracting knowledge from data and medical informatics is the science of how to use data, information, and knowledge to improve human health and the delivery of health care services. Data Science Services (DSS) is the University of Utah Health's (UHealth) centralized analytics team that provides healthcare data science and medical informatics expertise to the University's clinical and translational research community. DSS serves as the research data concierge for the UHealth Enterprise Data Warehouse (EDW), Epic electronic health record (over 3 million UHealth patients), Epic Cosmos (over 300 million patients from across various Epic health systems), and other healthcare databases. DSS provides analytic, technical, and consultative support, education, and training to clinicians and researchers on healthcare data, data science, self-service tools, and the effective use of all available analytics resources to answer complex, data-intensive research questions in healthcare.

Datasets: we provide raw data, analytic datasets, controlled medical vocabularies, metadata, and other types of supporting documentation during the post-award through publication stages.

Analytics: we provide broad healthcare analytics development and support for research including techniques like machine learning, data visualization, and various business intelligence approaches, including analyses using Epic Cosmos.

Feasibility: we support research from the early design stage onwards through consultations, feasibility estimates, preliminary analyses, pre-award support, pre-IRB submission cohort size estimations, etc.

Tools and applications: we provide access and ongoing support for various EDW research tools like Epic SlicerDicer, Business Objects Enterprise (BOE) Clinical Universe, Human Subjects Recruitment Tool, Warthog, DWCell, etc.

Clinical trials: we enhance clinical trials recruitment through Epic MyChart, Human Subject Recruitment Tool (HSRT), automated BOE and Tableau reports to meet accrual goals and reduce cost.

Natural Language Processing (NLP): we provide clinical NLP support for retrospective and prospective studies, and augmented text-searches using EDW tools like Oracle Text and Warthog, using the EDW's over 80 million clinical notes.

Data management: we host research datasets within the EDW and other UHealth repositories and provide comprehensive support for datasets, recurring reports, automatically refreshed datasets, etc.

Collaborations and training: we support multi-center studies through Cosmos Teleport, other research networks, research registries, etc., and conduct seminars, workshops, and hands-on training for departments and divisions on healthcare data.

Personnel

- Vikrant G. Deshmukh, PhD, JD, MS, MSc – Director of Data Science Services and Adj. Asst. Professor, Population Health Sciences, Biomedical Informatics, and Nursing.
- Mingyuan Zhang, MS – Senior Data Scientist, DSS.
- Reid Holbrook, MD, MPH, MBA – Senior Medical Informaticist, DSS.
- Vasee Sivaloganathan, MS – Medical Informaticist, DSS.
- Mihai Virtosu, MS – Medical Informaticist, DSS.
- Lama Albarqawi, MS – Medical Informaticist, DSS.
- Ryan Butcher, MBA – Medical Informaticist, DSS.

Academic Oversight Committee

- **Chair**: Yves Lussier, MD, FACMI (Professor and Chair, Biomedical Informatics).
- **Vice-Chair**: Carl V. Asche, PhD, MSc, MBA (Research Professor, Pharmacotherapy).
- Vivek K. Reddy, MD, MMM (Assoc. Professor (clinical), Vascular Neurology; Chief Medical Information Officer, University of Utah Hospital).
- Andrea S. Wallace, PhD, RN, FAAN (Assoc. Professor and Assoc. Dean of Research, College of Nursing).
- Julie Fritz, PhD, PT, ATC (Distinguished Professor and Assoc. Dean for Research, College of Health).
- Srinivasan Beddhu, MD (Professor, Internal Medicine).
- Carole Stipelman, MD, MPH, FAAP (Clinical Professor, Pediatrics; Medical Director, UHealth Pediatric Clinic and Sugarhouse Pediatrics).
- Jacob Kean, PhD, MA, MEd (Assoc. Professor, Internal Medicine).
- Julio Facelli, PhD, FACMI (Professor and Vice-Chair, Biomedical Informatics).

Contact

- Pulse site: https://pulse.utah.edu/site/DSS
- Team email: datascience@hsc.utah.edu

FY25 Annual Updates

The DSS team continues its mission of excellence as the centralized analytics team serving the University's clinical and translational research community. In FY25, we welcomed back Mr. Ryan Butcher to the DSS team, after a two-year stint at another institution.

Clinical research – DSS collaborated with CRSO and the ITS Epic team to launch Epic MyChart patient recruitment to provide a streamlined and cost-effective mechanism for recruiting patients in clinical studies at UHealth. There were 35 active clinical studies supported by DSS (1,547 patients recruited), of which, 14 studies used MyChart (726 patients recruited, 2,702 patients indicated willingness to participate) and 22 used EDW analytics tools (822 patients recruited), one of which used a combined approach.

Epic Cosmos – The Epic Cosmos initiative, co-led by DSS and Epic Cogito teams continues to place the University of Utah among the top 10 institutions in the country in Cosmos usage among hundreds of participating healthcare organizations. We organized a successful Cosmos Hackathon in November 2024, one of the first of its kind, with over 50 hands-on participants, and plan to make that a regular event. We also went live with Cosmos Teleport to bring multicenter, sponsor-initiated clinical studies to Utah through the Cosmos platform, and Cosmos LookAlikes, which bring the power of Cosmos research from the bench to the bedside, being fully integrated within the Epic EHR at the point of care. DSS Director, Dr. Deshmukh, was elected as the Chair of the Governing Council for Epic Cosmos.

Pre-award support – DSS provided letters of support for the following grant/contract submissions in FY'25:

- NIH – Amol Karmarkar, PhD (Virginia Commonwealth University), Amit Kumar, PhD, MPH (College of Health), and Alexandra L. Terrill, PhD (UHealth Physical Medicine and Rehabilitation).
- NIH – Jia-Wen Guo, PhD, RN (College of Nursing).
- NIH – Tanya M. Halliday, PhD, RD and Christopher M Depner (College of Health).
- NIH – Senthil Nachimuthu, MD, PhD (School of Medicine).
- NIH – Shinduk Lee DrPH, MSPH (College of Nursing).
- NIH – Nina de Lacy, MD, MBA (School of Medicine).
- NIH – Rebecca Kim, MD, MAS (School of Medicine).
- NIH – Nancy Allen, PhD, MS, RN (College of Nursing).
- NIH – Casey Tak, PhD, MPH (College of Pharmacy).
- PCORI – Torri Metz, MD, MS and Ron Reeder, PhD (School of Medicine).
- NIH – Eric Monson, MD, PhD (School of Medicine).
- NIH – Brent Kious, MD, PhD and Hilary Coon, PhD, MA (School of Medicine).
- NIH – Nancy Allen, PhD, MS, RN and Alycia Bristol, PhD, MS, RN (College of Nursing).
- NIH – Xuan Wang, PhD (School of Medicine).
- ARPA-H – Makoto Jones, MD, MS (School of Medicine).

Awards supported in Federal FY'24 (Utah FY'25) by DSS projects

Proposal ID	Principal Investigator	Award received	Total Amount
10069655	Adluru Venkata Raja, Ganesh	07/30/2024	$349,866
10057603	Beddhu, Srinivasan	08/24/2024	$408,262
10063551	Doherty, Jennifer	09/17/2024	$485,043
10070434	Finkelstein, Joseph	07/05/2024	$899,990
10063237	Hess, Rachel	07/14/2024	$915,253
10066025	Kirchhoff, Anne	07/19/2024	$432,376
10065482	Murtaugh, Maureen	08/16/2024	$899,372
10066553	Ozanne, Elissa	08/14/2024	$393,647
10065363	Rapaport, Mark Hyman	07/16/2024	$456,700
10065363	Rapaport, Mark Hyman	09/16/2024	$40,594
10065380	Schliep, Karen	07/01/2024	$489,236
10065380	Schliep, Karen	07/19/2024	$35,473
10052886	Schliep, Karen	08/12/2024	$111,869
10074064	Schliep, Karen Cecilia	07/25/2024	$27,150
10064777	Smid, Marcela	07/18/2024	$211,702

Awards supported in Federal FY'25 (Utah FY'25) by DSS projects

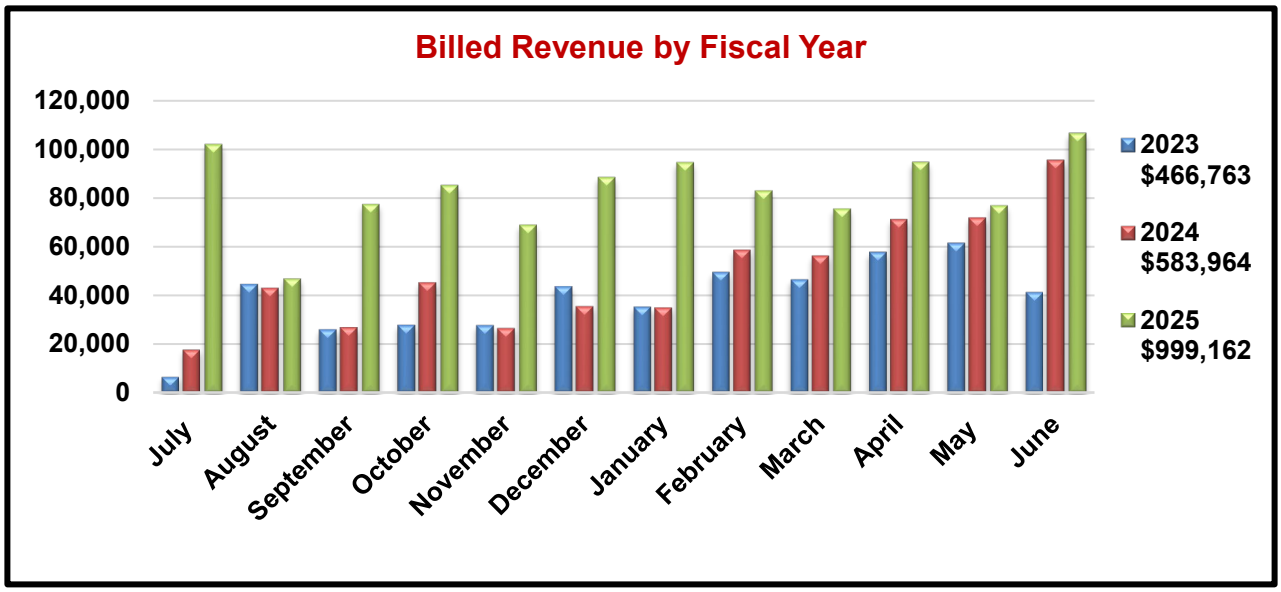
Proposal ID	Principal Investigator	Award received	Total Amount
10069655	Adluru Venkata Raja, Ganesh	05/27/2025	$479,687
10065642	Allen, Nancy	03/17/2025	$277,200
10055606	Camp, Nicola J	10/15/2024	$418,355
10073790	Coon, Hilary H	06/23/2025	$777,195
10067253	Depner, Chris	02/03/2025	$26,622
10067253	Depner, Chris	06/18/2025	$441
10071910	Fritz, Julie Mae	03/31/2025	$566,822
10069062	Gordon, Adam Joseph	11/07/2024	$691,050
10074901	Godara, Amandeep	02/19/2025	$163,629
10063237	Hess, Rachel	12/27/2024	$1,169,758
10063237	Hess, Rachel	06/03/2025	$1,169,757
10070057	Kelly, Kerry E.	10/02/2024	$728,176
10077234	Lu, Yue	05/07/2025	$931,616
10072048	Mickey, Brian	05/09/2025	$663,950
10058034	Morimoto, Sarah Shizuko	02/28/2025	$1,240,609
10058034	Morimoto, Sarah Shizuko	03/07/2025	$146,914
10065363	Rapaport, Mark Hyman	05/16/2025	$519,364
10074388	Ryan, Jeanna Tachiki	12/11/2024	$24,733
10065380	Schliep, Karen	02/18/2025	$76,710
10050768	Silver, Robert	10/15/2024	$1,961,467
10065332	Supiano, Mark Andrew	11/20/2024	$108,925
10055452	Supiano, Mark Andrew	11/22/2024	$771,486
10069966	Tak, Casey	04/18/2025	$57,712
10068565	Tasdizen, Tolga	12/30/2024	$115,500
10075546	Wallace, Andrea Schneider	01/06/2025	$10,000
10074387	Wilcox, Tanya	12/02/2024	$365,438
10069699	Youngquist, Scott Travis	10/10/2024	$190,655

Revenue/Expenses

FY25 Expenses: **Total $1,757,149**

FY24 Revenue: Total $1,784,162

- VP of Health Sciences Support: $785,000
- FY25 Revenue generated from services: $999,162

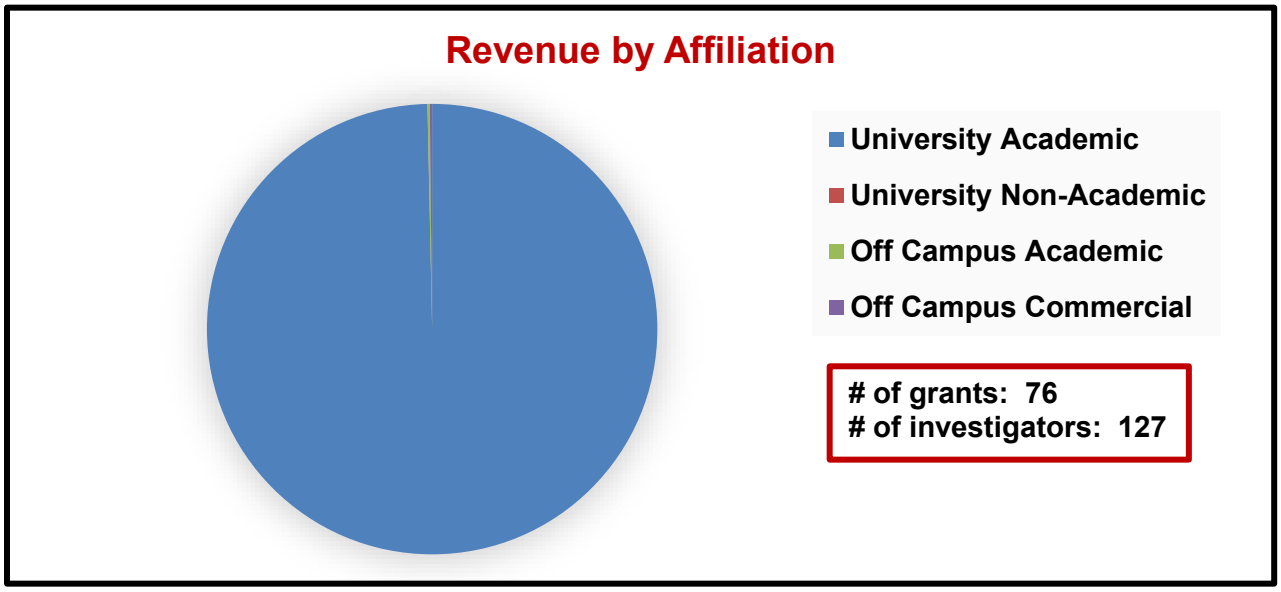


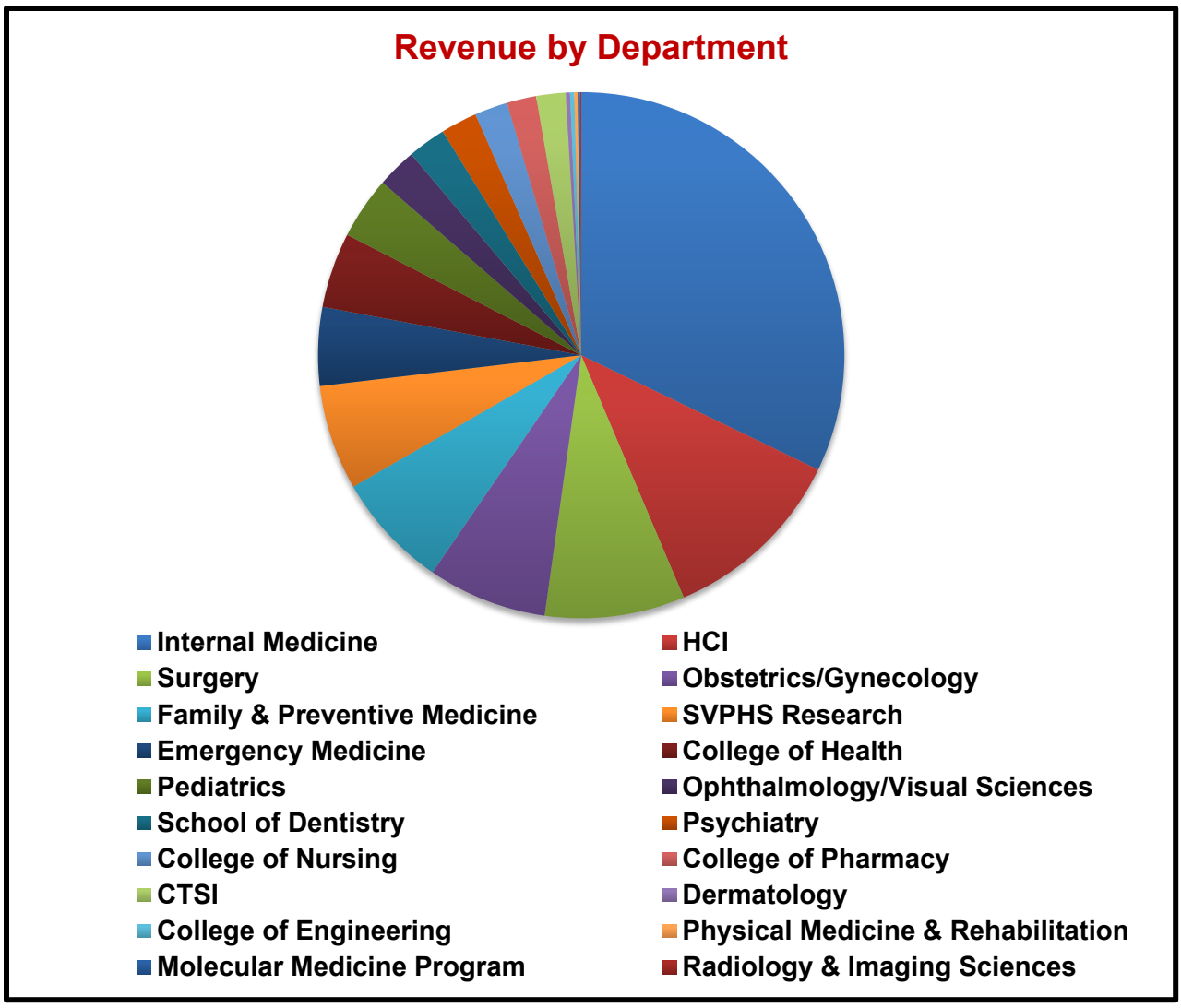
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





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6	Srinivasan Beddhu	NIH, Department, Vertex Pharmaceuticals
7	Brandon Craswell	Department
8	Jeri Bullock	VPR Seed
9	Miklos Molnar	Nephrology
10	Margaret French	Department

Publications

1. Adediran, E., R. Owens, E. Gardner, A. Curtin, J. Stuligross, D. Forbes, J. Wang and D. Ose (2024). Risk factors of undiagnosed and uncontrolled hypertension in primary care patients with hypertension: a cross-sectional study. BMC Prim Care 25(1): 311.10.1186/s12875-024-02511-4
2. Allen, N. A., C. A. Berg, E. Iacob, B. R. Gonzales, J. E. Butner and M. L. Litchman (2024). Examining Share plus-A Continuous Glucose Monitoring Plus Data-Sharing Intervention in Older Adults and Their Care Partners: Protocol for a Randomized Control Study. JMIR Res Protoc 13: e60004.10.2196/60004
3. Allen-Brady, K., F. Clayton, M. W. Hazel, J. Stevens, A. L. Pyne, M. A. Pletneva, M. Cessna, C. Stubben, J. Robson, J. Fang and K. A. Peterson (2025). Overlap of Genomic and Transcriptomic Genes Identified in Familial Eosinophilic Esophagitis. Gastroenterology 168(6): 1101-1113 e1118.10.1053/j.gastro.2025.01.235
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81. Willis, C., C. J. Tan, A. Chhibber, A. H. Watanabe, C. Lam, S. Mehta, J. Kwong, L. Park, M. Pavilack-Kirker, X. Xu, K. Kelley and D. Stenehjem (2024). Patient characteristics and treatment patterns of patients with locally advanced or metastatic HER2-low breast cancer, a single site descriptive study. Breast Cancer Res Treat 208(3): 619-630.10.1007/s10549-024-07458-9
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DNA Peptide Facility

Overview

The DNA Peptide Facility provides researchers with chemical synthesis of custom oligonucleotides and oligopeptides. The facility synthesizes standard DNA/RNA oligos and peptides with multiple purity options, ranging from crude to HPLC purified. This core can incorporate a wide array of specialty modifications, including fluorophore-labeling and functional group derivatization via amino-, thiol-, and click compatible modifications. The goal of the facility is to provide quality service with rapid turnaround times.

Services

- Routine and custom DNA synthesis
- Routine and custom RNA synthesis
- Routine and custom peptide synthesis
- Peptide purification

Equipment

- Dr. Oligo 192 DNA Synthesizer
- ABI 3900 DNA Synthesizer
- K&A H-8 Synthesizer (2)
- ABI 394 DNA Synthesizer (1)
- ABI 433 Peptide Synthesizer
- Beckman Coulter System Gold 125P HPLC System
- Beckman Coulter System Gold 126 HPLC System
- Hewlett Packard Series 1100 HPLC system (2)
- Beckman Coulter DU800 Spectrophotometer
- BioTek Epoch Plate Reader Spectrophotometer

Personnel

- Mike Hanson, Ph.D., Director
- Andrea Koehler, Lab Technician
- Meredith Ford, Lab Technician

Advisory Board Committee

Last meeting date: June 27, 2025

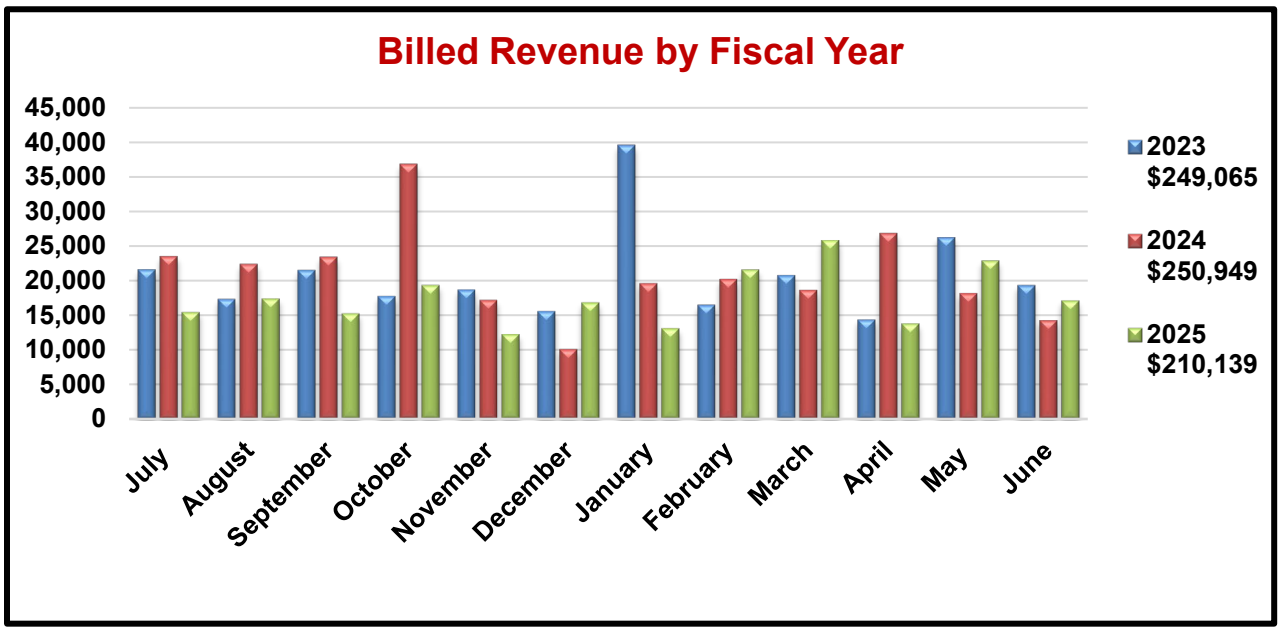
- Raphael Franzini, Professor, College of Pharmacy
- Ming Hammond, Professor, Chemistry Department
- Mahesh Chandrasekharan, Professor, Radiation Oncology

Revenue/Expenses

FY25 Expenses: **Total $282,897**

FY25 Revenue: **Total $260,139**

- VP of Health Sciences Support: $50,000
- FY25 Revenue Generated from Services: $210,139

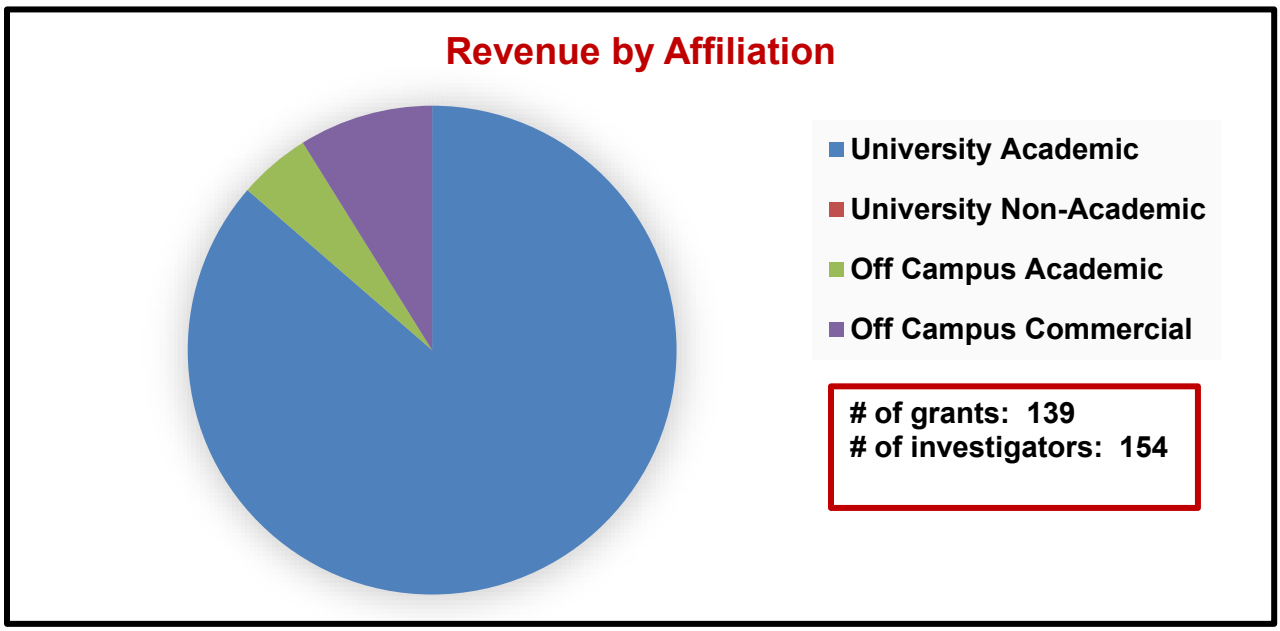


* Legend displays total annual revenue by year earned.

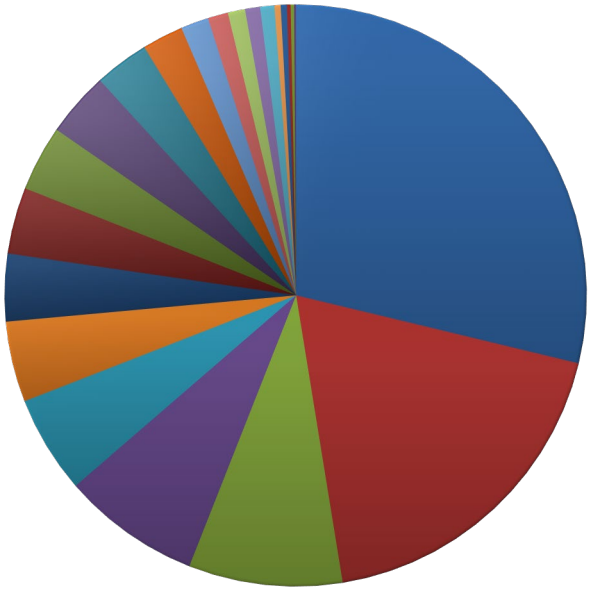
FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):



Revenue by Department



- Biochemistry
- College of Pharmacy
- Pathology
- Internal Medicine
- School of Biological Sciences
- CVRTI
- Orthopaedics
- Neurosurgery
- Human Genetics
- College of Engineering
- Ophthalmology/Visual Sciences
- Surgery
- College of Science
- HCI
- HSC Cores
- Neurobiology
- Pediatrics
- College of Health
- Molecular Medicine Program
- Biomedical Engineering
- Neurology
- Psychiatry
- CTSI

Top Users

1	BioFire Diagnostics	Off Campus Commercial
2	Wesley Sundquist	Department, NIH, University of Utah Research Foundation
3	Aaron Puri	NIH
4	Cynthia Burrows	NIH
5	Yang Liu	NIH
6	Jared Rutter	Department, NIH
7	Ming Hammond	NIH
8	Brenda Bass	NIH, Office of Naval Research
9	Washington University St Louis	Off Campus Academic
10	Eric Schmidt	NIH, NSF

Publications

1. Almestica-Roberts, M., N. D. Nguyen, L. Sun, S. N. Serna, E. Rapp, K. L. Burrell-Gerbers, T. A. Memon, B. L. Stone, F. L. Nkoy, J. G. Lamb, C. E. Deering-Rice, J. E. Rower and C. A. Reilly (2024). The Cytochrome P450 2C8*3 Variant (rs11572080) Is Associated with Improved Asthma Symptom Control in Children and Altered Lipid Mediator Production and Inflammatory Response in Human Bronchial Epithelial Cells. Drug Metab Dispos 52(8): 836-846.10.1124/dmd.124.001684
2. Bircher, J. S., F. Denorme, M. J. Cody, C. V. de Araujo, A. C. Petrey, E. A. Middleton, R. A. Campbell and C. C. Yost (2024). Neonatal NET-inhibitory factor inhibits macrophage extracellular trap formation. Blood Adv 8(14): 3686-3690.10.1182/bloodadvances.2024013094
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5. Hughes, E. P., A. K. Manna, W. Sun, S. M. Osburn-Staker, S. Aamodt, K. J. Warren, J. E. Cox and D. Tantin (2025). Transcriptional co-regulator OCA-B/Pou2af1 restricts Th2 differentiation. Front Immunol 16: 1548636.10.3389/fimmu.2025.1548636
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8. Pederson, N. J. and K. L. Diehl (2025). DNA stimulates the deacetylase SIRT6 to mono-ADP-ribosylate proteins with histidine repeats. J Biol Chem 301(6): 108532.10.1016/j.jbc.2025.108532
9. Scott, T. M., L. M. Arnold, J. A. Powers, D. A. McCann, A. B. Rowe, D. E. Christensen, M. J. Pereira, W. Zhou, R. M. Torrez, J. H. Iwasa, P. J. Kranzusch, W. I. Sundquist and J. S. Johnson (2025). Cell-free assays reveal that the HIV-1 capsid protects reverse transcripts from cGAS immune sensing. PLoS Pathog 21(1): e1012206.10.1371/journal.ppat.1012206
10. Smith, J. J., T. R. Valentino, A. H. Ablicki, R. Banerjee, A. R. Colligan, D. M. Eckert, G. A. Desjardins and K. L. Diehl (2025). A genetically encoded fluorescent biosensor for visualization of acetyl-CoA in live cells. Cell Chem Biol 32(2): 325-337 e310.10.1016/j.chembiol.2025.01.002
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12. Toshniwal, A. G., G. Lam, A. J. Bott, A. A. Cluntun, R. Skabelund, H. J. Nam, D. R. Wisidagama, C. S. Thummel and J. Rutter (2024). The fate of pyruvate dictates cell growth by modulating cellular redox potential. bioRxiv.10.1101/2024.09.23.614588

DNA Sequencing Facility

Overview

The DNA Sequencing Facility provides DNA sequencing services and employs the latest technologies to generate high quality data with the goal of rapid sample turnaround at competitive prices. DNA sequencing is accomplished with the use of DNA sequencers and lab robotics such as the Element Biosciences AVITI sequencer (sequencing by avidity), Oxford Nanopore P2Solo (long read sequencer), 10x Genomics and the Biomek FXp for liquid handling needs. For Illumina sequencing we also have the capability of sending samples out for sequencing with approximately 3-week turnaround time run on both the Illumina NovaSeq and the MiSeq instruments. In addition, we have a MinIon from Oxford Nanopore that we can work with you on completing runs of long read sequencing for your projects. Data from standard DNA sequencing services are typically reported to customers the same day as they are run. Sample information can be submitted online and sequencing data files are available for download using a simple and secure interface.

Services

DNA Sequencing

- Element Biosciences AVITI Sequencing (Sequencing by avidity)
- Standard Sanger DNA sequencing
- Primer walking on clones
- Mutation detection and resequencing custom projects
- Pyrosequencing
- 10x Genomics libraries for single cell sequencing
- Illumina Sequencing with 3-week turnaround
- Oxford Nanopore Sequencing
- Full Plasmid Sequencing

Cell Line Authentication

- Human cell line authentication by STR

Robotics

- Biomek FXp with Span-8 and 96 head

Fragment Analysis

- Fragment sizing and concentrations

10x Genomics Chromium Controller

- Single Cell RNA Seq
- ATAC Seq
- Immune cell profiling

Other Services

- Lab consumables for sample submission
- Life Technologies freezer program

Equipment

Sequencers

- Qiagen Q24 Pyrosequencer
- Applied Biosystems 3730xl
- Element Biosciences AVITI
- Oxford Nanopore P2Solo Long Read Sequencer
- Oxford Nanopore MinIon Long Read Sequencer

Liquid Handlers
- 1 Biomek FXp programmable liquid sample dispenser

Fragment Analysis
- AATI Fragment Analyzer

Personnel
- Derek Warner, Director
- Michael Powers, Senior Laboratory Specialist

Advisory Board Committee
Last meeting date: December 10th, 2024
- Lynn Jorde Ph.D., Professor, Human Genetics
- Robert Weiss Ph.D., Professor, Human Genetics
- Aaron Quinlan Ph.D., Professor, Human Genetics
- Deb Neklason Ph.D., Research Associate Professor, Huntsman Cancer Institute
- Nicola Camp Ph.D., Professor, Hematology

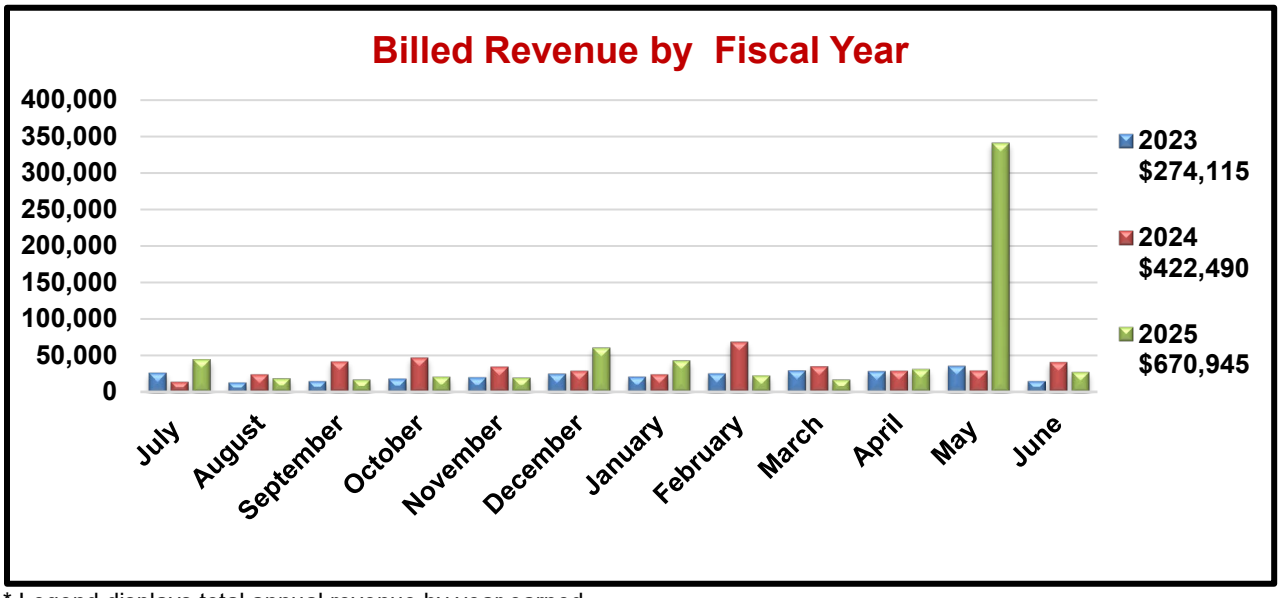
FY25 Annual Update

New Equipment
- The DNA Sequencing Facility did not acquire new equipment in FY25

New Services
- Full Plasmid Sequencing for University of Utah customers

Revenue/Expenses

FY25 Expenses: **Total $708,940**
FY25 Revenue: **Total $695,945**
- VP of Health Sciences Support: $25,000
- FY25 Revenue generated from services: $670,945

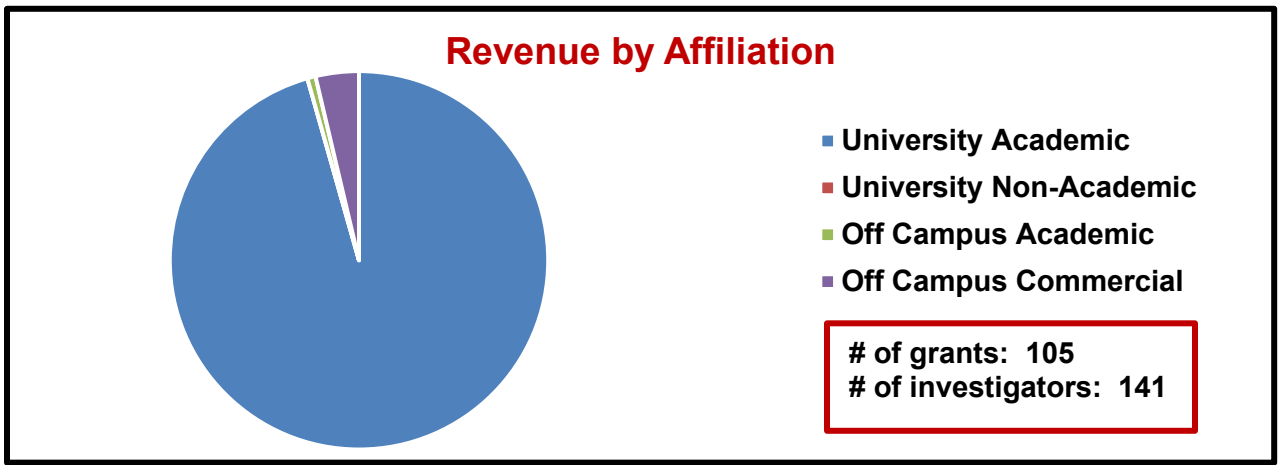


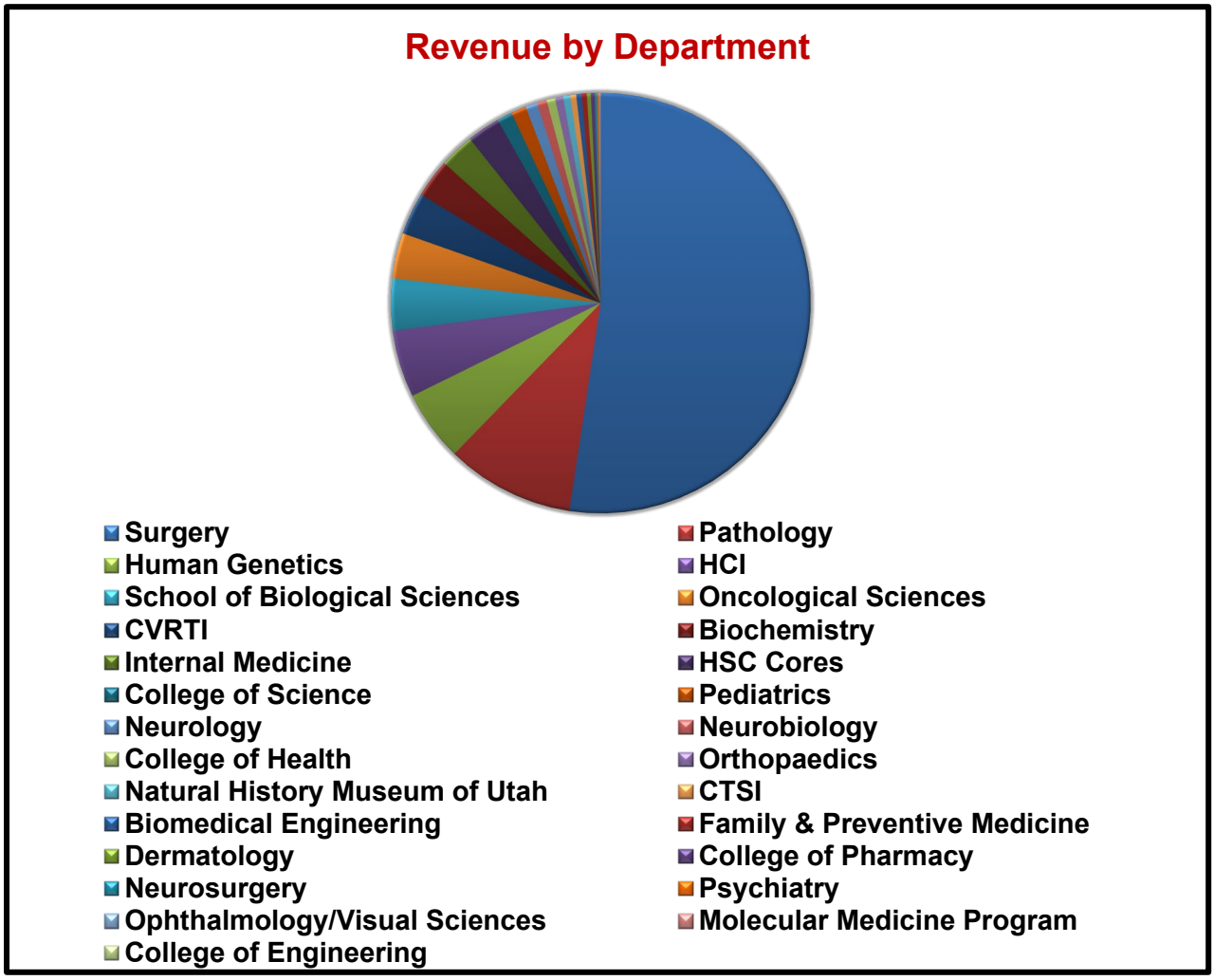
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	James Hotaling	NIH
2	Jarrod Johnson	NIH
3	Sean Tavtigian	Department, NIH
4	Aaron Quinlan	Department
5	Martin Tristan-Firouzi	NIH
6	Pathos AI	Off Campus Commercial
7	Crystal Davey-Hicks	Department
8	Katherine Varley	US Department of Defense
9	Wesley Sundquist	Department, NIH, University of Utah Research Foundation
10	Frederick Adler	Department

Publications

1. Baum, R., V. D. Nguyen, M. Maalouf, D. Shimura, M. Waghalter, S. Srapyan, Q. Jin, L. Kuzmanovich, A. T. Gaffney, B. R. Bell, S. Xiao, J. A. Palatinus, A. G. Kléber, E. E. Grintsevich, T. Hong and R. M. Shaw (2024). A truncated isoform of Connexin43 caps actin to organize forward delivery of full-length Connexin43. Journal of Cell Biology 224(3): e202402112.10.1083/jcb.202402112
2. Blackwell, A. M., Y. Jami-Alahmadi, A. S. Nasamu, S. Kudo, A. Senoo, C. Slam, K. Tsumoto, J. A. Wohlschlegel, J. Manuel Martinez Caaveiro, D. E. Goldberg and P. A. Sigala (2024). Malaria parasites require a divergent heme oxygenase for apicoplast gene expression and biogenesis. Elife 13.10.7554/eLife.100256
3. Cohen, A. J., W. R. Chidester, D. T. Wray, N. Jessen, A. Jones, C. Bitsui, J. Zhao, J. A. Maschek, J. E. Cox, C. R. Martin and L. A. Joss-Moore (2025). Docosahexaenoic Acid Supplementation in Postnatal Growth Restricted Rats Does Not Normalize Lung Function or PPARgamma Activity. Biomolecules 15(4).10.3390/biom15040551
4. Espino, S., M. Watkins, R. Probst, T. L. Koch, K. Chase, J. Imperial, S. D. Robinson, P. Florez Salcedo, D. Taylor, J. Gajewiak, M. Yandell, H. Safavi-Hemami and B. M. Olivera (2024). chi-Conotoxins are an Evolutionary Innovation of Mollusk-Hunting Cone Snails as a Counter-Adaptation to Prey Defense. Mol Biol Evol 41(11).10.1093/molbev/msae226
5. Fleming, A. M., J. C. Dingman and C. J. Burrows (2024). CO(2) protects cells from iron-Fenton oxidative DNA damage in E. coli and humans. bioRxiv.10.1101/2024.08.26.609766
6. Garcia-Guerrero, A. E., R. G. Marvin, A. M. Blackwell and P. A. Sigala (2025). Biogenesis of Cytochromes c and c(1) in the Electron Transport Chain of Malaria Parasites. ACS Infect Dis 11(4): 813-826.10.1021/acsinfecdis.4c00450
7. Giglio, M. L., P. Florez-Salcedo, L. Azam, M. Watkins, T. L. Koch, E. Basgall-De la Rosa, A. D. Douglass, J. M. McIntosh, B. M. Olivera and J. Gajewiak (2025). An N-Terminally Elongated Peptide From Conus rolani Defines a New Class of Ribbon alpha-Conotoxins Targeting Muscle nAChRs. FASEB J 39(12): e70698.10.1096/fj.202500721RR
8. Hastings, E. M., T. Skora, K. R. Carney, H. C. Fu, T. C. Bidone and P. A. Sigala (2025). Chemical propulsion of hemozoin crystal motion in malaria parasites. bioRxiv.10.1101/2025.04.25.650681
9. Kim, H. S., M. L. Sanchez, J. Silva, H. L. Schubert, R. Dennis, C. P. Hill and J. L. Christian (2025). Mutations that prevent phosphorylation of the BMP4 prodomain impair proteolytic maturation of homodimers leading to lethality in mice. Elife 14.10.7554/eLife.105018
10. Loveridge, K. M. and P. A. Sigala (2024). Identification of a divalent metal transporter required for cellular iron metabolism in malaria parasites. Proc Natl Acad Sci U S A 121(45): e2411631121.10.1073/pnas.2411631121
11. Madrigal, J., H. L. Schubert, M. A. Sdano, L. McCullough, Z. Connell, T. Formosa and C. P. Hill (2024). Tom1p ubiquitin ligase structure, interaction with Spt6p, and function in maintaining normal transcript levels and the stability of chromatin in promoters, eLife Sciences Publications, Ltd.10.7554/elife.101393.1
12. O'Toole, K. T., A. Martinez, B. Murphy, A. Proveyeka, G. Fort, F. Al-Sudani, S. Boggaram, E. L. Paine, D. Baral, J. L. Andersen, G. Parkman, E. L. Snyder, R. Judson-Torres and M. McMahon (2025). Characterization of the BRAF interactome identifies BRAF (V600E) <=>TP53 interaction in melanoma. bioRxiv.10.1101/2025.06.20.660711

13. Ramones, C. M. V., R. S. Taguchi, E. M. E. Gamba, E. I. A. E. Johann, M. Watkins, M. O. Chicote, M. C. Velarde, A. J. L. Villaraza, E. T. Yu, B. M. Olivera, G. P. Concepcion and A. O. Lluisma (2025). Variable peptide processing of a Conus (Asprella) neocostatus alpha-conotoxin generates bioactive toxiforms that are potent against distinct nicotinic acetylcholine receptor subtypes. Biochem Pharmacol 233: 116781.10.1016/j.bcp.2025.116781
14. Scott, T. M., L. M. Arnold, J. A. Powers, D. A. McCann, A. B. Rowe, D. E. Christensen, M. J. Pereira, W. Zhou, R. M. Torrez, J. H. Iwasa, P. J. Kranzusch, W. I. Sundquist and J. S. Johnson (2025). Cell-free assays reveal that the HIV-1 capsid protects reverse transcripts from cGAS immune sensing. PLoS Pathog 21(1): e1012206.10.1371/journal.ppat.1012206
15. Tekarli, B., L. Azam, A. J. Hone and J. M. McIntosh (2025). Human alpha10 nicotinic acetylcholine receptor subunits assemble to form functional receptors. J Biol Chem 301(2): 108182.10.1016/j.jbc.2025.108182
16. Watkins, M., J. Gajewiak, S. Espino, A. Rogalski, K. Chase, S. Raghuraman and B. M. Olivera (2025). Pionoconus: A Piscivorous Subgenus of Conus Gastropods. Malacologia 67(1-2): 65-116.10.4002/040.067.0104
17. Wienkers, H. J., H. Han, F. G. Whitby and C. P. Hill (2024). Vps4 substrate binding and coupled mechanisms of Vps4p substrate recruitment and release from autoinhibition. bioRxiv.10.1101/2024.09.07.611824

Drug Discovery Facility

Overview

The Drug Discovery Facility provides small molecule compound collections for screening in biologic assays. The facility delivers low-cost and efficient access to chemical libraries/CRISPR libraries for screening, a diverse array of equipment for automation, and synthetic chemistry support for the characterization and validation of compounds to be further developed as therapeutics, diagnostics and biological sensors or tools.

Uniqueness

The University of Utah possesses the scientific and medical talent, innovation research culture, and state-of-the-art research facilities to contribute substantially to the discovery of small molecule drugs. However, significant challenges still remain in translation of basic scientific discoveries into potential human therapeutics. The uniqueness of the Drug Discovery Facility is it coordinates the cooperative efforts of individual research groups in a wide variety of different drug discovery stuides, ultimately leading to discover novel chemical probes and new pharmaceutical lead compounds.

The most valuable assets at the facility are the private/proprietary chemical collections that could result in new intellectual property. These unique molecules of therapeutic potential offer the facility to assist in the translation of fundamental discoveries in biology into novel therapeutics and commercial opportunities. It's anticipated that the discovery of candidate lead compounds from the facility will stimulate interest in commercial development of technology at the University of Utah through licensing agreements with pharmaceutical industry partners and the production of new start-up biotechnology companies.

Services

- High-throughput screening
- Small molecule chemical libraries
- Pooled CRISPR-Cas9 libraries/Screening
- Assay development
- Consultation on target identification/validation, hit to lead optimization, PK/PD/Efficacy
- Chemical support for drug discovery

CRISPR Knockout/Knockin Cell Line Production – In collaboration with the Mutation Generation and Detection Core, we started to offer a full cell line generation service from sgRNA design/construction to final cell line generation/verification.

Viral Packaging Service

- Small/large scale viral (lentivirus, adeno-associated virus) packaging, titrations, concentrations and transductions of cells of interest.
- Lentivirus delivery of Cas9 and sgRNA

Equipment/Compound Collection

Automated Liquid Handling Stations:

- Tecan EVO100/MCA96 Liquid Handler with sterile bio-hoods
- Tecan EVO100/MCA384 Liquid Handler with sterile bio-hoods
- HP D300 Digital Dispenser
- Axygen Platemax semi-automatic plate sealer
- **KingFisher Duo Prime System – Automated DNA/RNA Extraction and Protein/Cell Purification**

Automated Detection Systems:

- Molecular Devices ImageXpress XLS Automated High-Content System
- Bio-tek Plate Neo 2 Plate Reader with stacker

CRISPR Libraries:

- The genome-scale CRISPR-Cas9 knockout (GeCKO) v2 library
- The human CRISPR Brunello lentiviral pooled libraries
- Subset CRISPR libraries: a) human Lentiviral sgRNA library-kinases, and b) human Lentiviral sgRNA library-nuclear proteins

Commercial Compound Libraries:

- Chembridge Diverset EXP(50K) and CL (50K)
- Microsource Spectrum Collection
- NIH Clinical Collection
- Epigenetics Screening Library
- Kinase Inhibitor Library
- NCI Diversity Set IV
- Natural Products Set III
- Enamine 3D Diversity Set (50K)
- NIH Approved Oncology Drugs Set II
- NIH Natural Products Set IV
- Mechanistic Set III
- **University of Utah metabolite library v1.0**

Private/Proprietary Chemical Collections:

- UUPCC – University of Utah Private Chemical Collection
- Dept. of Chemistry Library
- Ireland Natural Product Collection

Goals for FY26

- Expand large scale viral service
- Increase user base/revenue
- Replace aging instruments (Liquid Handler, Digital Dispenser)

Personnel

- Bai Luo, Ph.D., Director

Advisory Board Committee

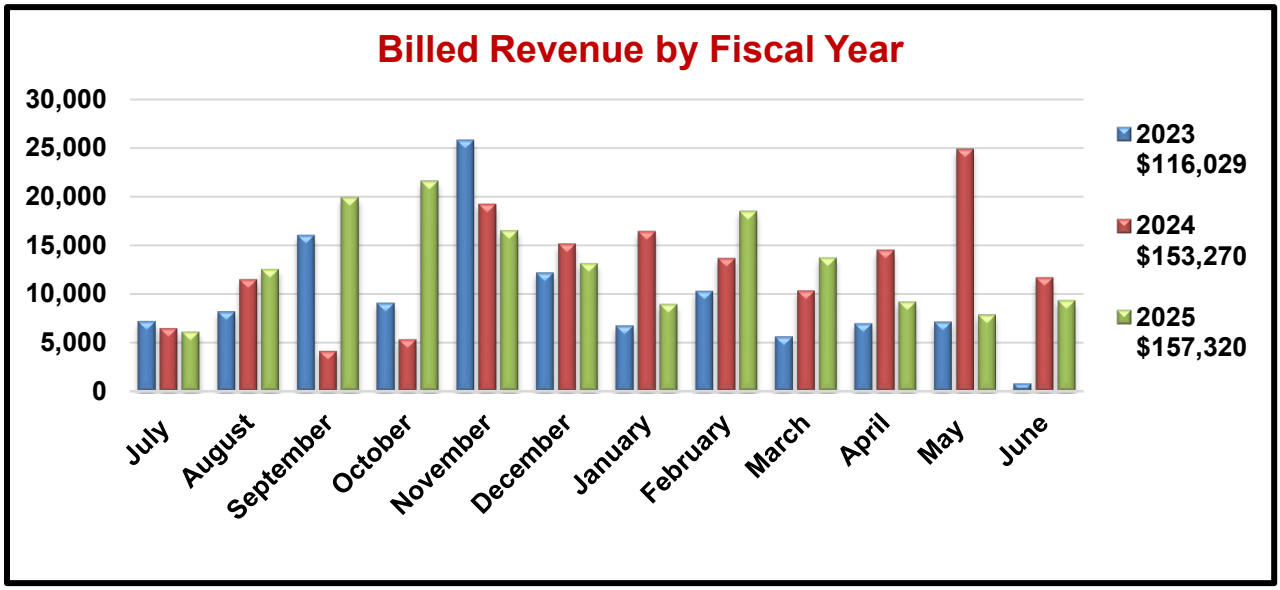
- Darrell Davis, Professor, Department of Medicinal Chemistry
- Ryan Looper, Professor, Department of Chemistry
- James Cox, Associate Professor, Department of Biochemistry
- Jared Rutter, Professor, Department of Biochemistry
- Bryan Welm, Associate Professor, Surgery Research

Revenue/Expenses

FY25 Expenses: **Total $214,974**

FY25 Revenue: **Total $232,320**

- VP of Health Sciences Support: $ 75,000
- FY25 Revenue Generated from Services: $157,320

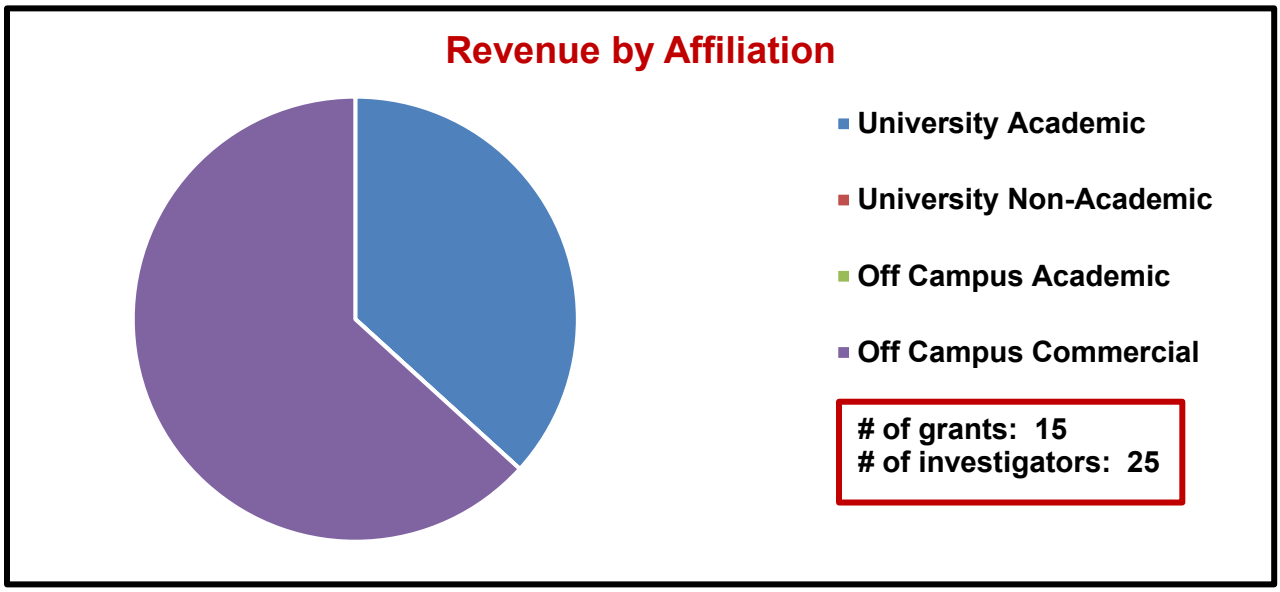


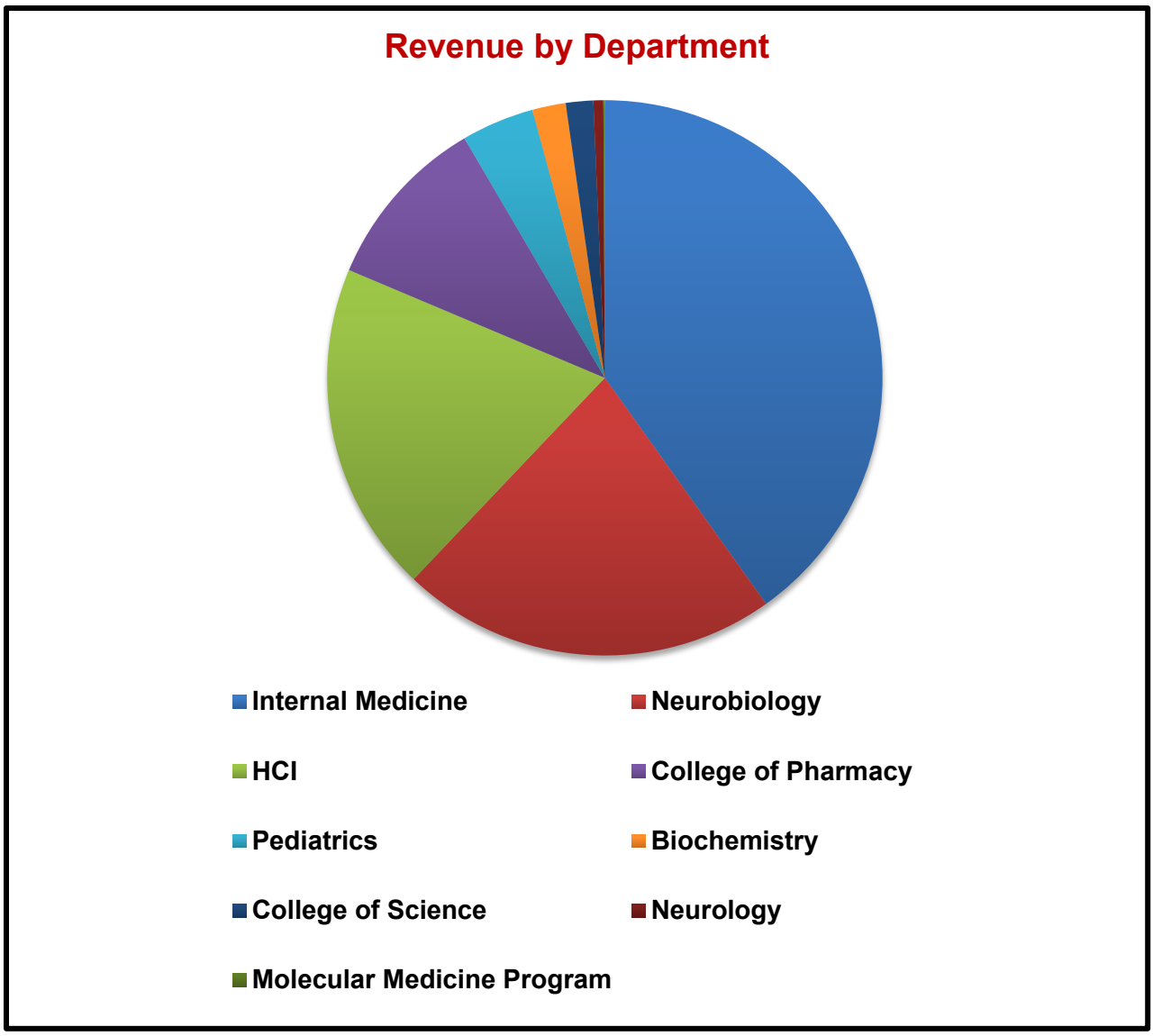
* Total annual revenue displayed in legend.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Reina Bio	Off Campus Commercial
2	Daniel Leung	Department, Johns Hopkins University, NIH
3	Jason Shepherd	Ionis Pharmaceuticals Inc
4	Jay Gertz	Department
5	Jonathan Constance	Department, NIH
6	Megan Williams	NIH
7	Mary Playdon	Department
8	Camille Fung	Department
9	Christopher Gregg	NIH
10	Raphael Franzini	Department, NIH

Publications

1. Gatlin, R. E., J. Gagon, D. Kwak, S. Park, H. Walker, L. Kronheim, T. Everett, A. Covington, M. M. Fluck, T. Zickmund, N. A. Frost and M. Zelikowsky (2025). Co-release of opposing signaling molecules controls the escalation and release of aggression. bioRxiv.10.1101/2025.03.13.643119
2. George, C. M., P. Sanvura, A. Namunesha, J. C. Bisimwa, K. Endres, W. Felicien, C. Williams, S. Trivedi, K. L. Davis, J. Perin, D. A. Sack, J. Bengehya, G. Maheshe, C. Cikomola, L. Bisimwa, D. T. Leung and A. Mwishingo (2024). Epidemiology of Vibrio Cholerae Infections in the Households of Cholera Patients in the Democratic Republic of the Congo: PICHA7 Prospective Cohort Study. medRxiv.10.1101/2024.12.16.24318937
3. Montoya, A. L., A. S. Hogendorf, S. Tingey, A. Kuberan, L. H. Yuen, H. Schüler and R. M. Franzini (2025). Widespread false negatives in DNA-encoded library data: how linker effects impair machine learning-based lead prediction. Chemical Science 16(24): 10918-10927.10.1039/D5SC00844A
4. Smith, J. J., T. R. Valentino, A. H. Ablicki, R. Banerjee, A. R. Colligan, D. M. Eckert, G. A. Desjardins and K. L. Diehl (2025). A genetically encoded fluorescent biosensor for visualization of acetyl-CoA in live cells. Cell Chem Biol 32(2): 325-337 e310.10.1016/j.chembiol.2025.01.002
5. Strnad, F. A., A. S. Brown, M. Wieben, E. Cortes-Sanchez, M. E. Williams and C. M. Fung (2024). Intrauterine Growth Restriction Alters Postnatal Hippocampal Dentate Gyrus Neuron and Microglia Morphology and Cytokine/Chemokine Milieu in Mice. Life (Basel) 14(12).10.3390/life14121627
6. Tyagi, M., R. Chadha, E. de Hoog, K. R. Sullivan, A. C. Walker, A. Northrop, B. Fabian, M. Fuxreiter, B. T. Hyman and J. D. Shepherd (2024). Arc mediates intercellular tau transmission via extracellular vesicles. bioRxiv.10.1101/2024.10.22.619703

Electron Microscopy

Overview

The Electron Microscopy (EM) Core Laboratory utilizes transmission electron microscopy and scanning electron microscopy to determine cellular structures, the morphology of biological macromolecules, the three-dimensional structures of biological macromolecules and cells, and the size and structure of nanoparticles and other small particles. The EM facility also prepares specimens for the microscope. The EM facility has two spatially distinct locations to serve research groups. The main facility is in SMBB, and one transmission electron microscope (TEM) and one scanning electron microscope are located there. Two TEMs and one scanning electron microscope (SEM) are located in CSC.

Services

Research Services:

- Training on the TEMs, SEM, microtomes, sample preparation, and 2D and 3D image processing
- Sections cut on microtome or ultramicrotome ("thick" and "thin", respectively)
- Prepare tissue and cellular specimens via embedding, drying, osmification, thin-sectioning, and cryogenic methods.
- Prepare particulate and macromolecular samples by staining, metal coating, and cryogenic methods
- Record SEM images
- Record TEM images of dry specimens or of cryogenic, hydrated specimens
- Image specimens via three-dimensional electron microscopy, including tomography
- High-resolution imaging (in many cases distances < 3 Å can be resolved)
- Remote access to TEMs and SEM

Equipment:

- JEOL JEM-1400 Plus, transmission electron microscope
- ThermoFisher Titan Krios, transmission electron microscope, with Ceta camera, Gatan energy filter, Volta phase plate, and Gatan K3 direct electron detector
- ThermoFisher Aquilos 2, scanning electron microscope with focused-ion-beam milling (designed for cryogenic specimens)
- Zeiss GeminiSEM 300 scanning electron microscope
- ThermoFisher Glacios 2, transmission electron microscope, Falcon 4 direct electron detector (to be installed FY25)
- Leica UC7 ultramicrotome, with cryogenic attachments
- Leica Enuity ultramicrotome
- Two Leica UC6 ultramicrotomes
- Leica UCT ultramicrotome
- Reichert Ultracut E ultramicrotome
- Leica JUNG RM2055, microtome
- ThermoFisher Vitrobot, vitrification robot
- Pelco laboratory microwave oven
- Glow discharger
- Access to high-pressure freezer and freeze-substitution machine
- Access to sputter coater
- Critical-point dryer
- High-performance computing nodes (maintained by CHPC)

Personnel

- David Belnap, Ph.D., Director
- Nancy Chandler, Senior Laboratory Specialist
- Willisa Liou, Ph.D., Senior Laboratory Specialist
- Linda Nikolova, Senior Laboratory Specialist
- Barbie Pornillos, Ph.D., Director of Cryo-EM

Advisory Board Committee

Last in-person meeting date: March 2, 2017. Email contact since.

- Erik Jorgensen Ph.D., Distinguished Professor, Department of Biology
- Patricia Revelo M.D. Ph.D., Professor, Department of Pathology
- Erhu Cao Ph.D., Assistant Professor, Department of Biochemistry
- Richard Rabbitt Ph.D., Professor, Department of Bioengineering

Cryo-EM Implementation Committee

Last meeting date: July 17, 2025.

- Brenda Bass, Ph.D., Distinguished Professor, Department of Biochemistry
- Julia Brasch Ph.D., Assistant Professor, Department of Biochemistry
- Erhu Cao Ph.D., Associate Professor, Department of Biochemistry
- Christopher Hill D.Phil., Distinguished Professor, Department of Biochemistry
- Owen Pornillos, Ph.D., Professor, Department of Biochemistry
- Wesley Sundquist Ph.D., Distinguished Professor & Chair, Department of Biochemistry
- Peter Shen Ph.D., Associate Professor, Department of Biochemistry
- Heidi Schubert Ph.D., Research Professor, Department of Biochemistry

FY26 Goals

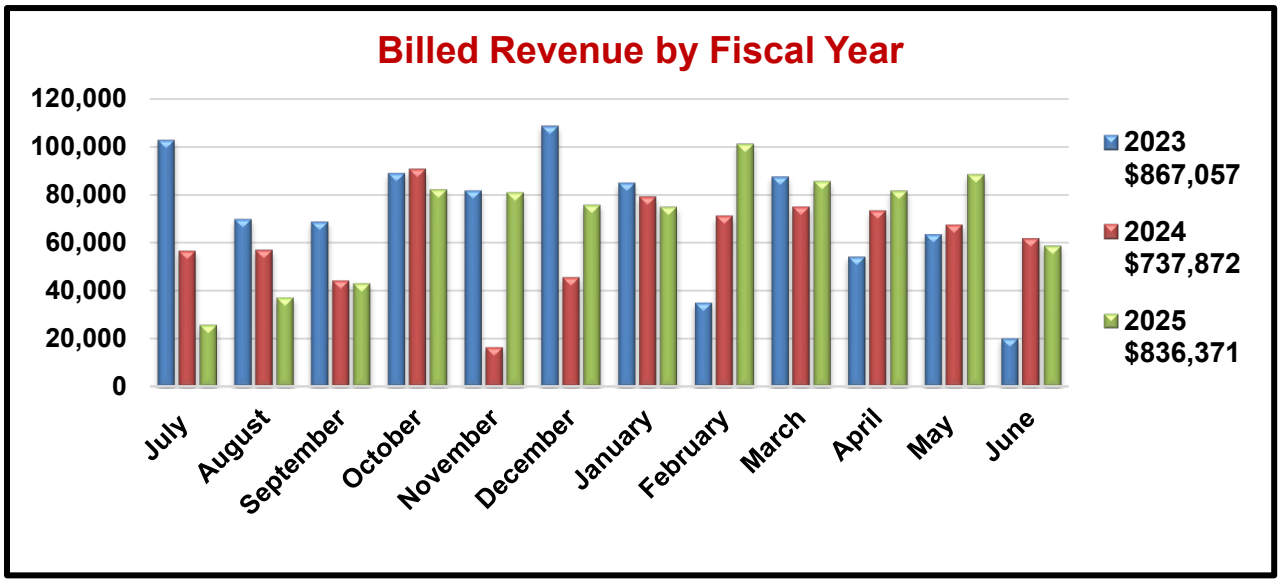
- Continue obtaining high-quality TEM data
- Increase research usage
- Increase usage of underutilized microscopes
- Improve efficiency of lab to serve all who wish to use our services
- Develop more image processing capabilities

Revenue/Expenses

FY25 Expenses: Total $1,124,654

FY25 Revenue: Total $1,115,895

- VP of Health Sciences: $200,000
- RIF Funds : $79,524
- FY25 Revenue generated from services: $836,371

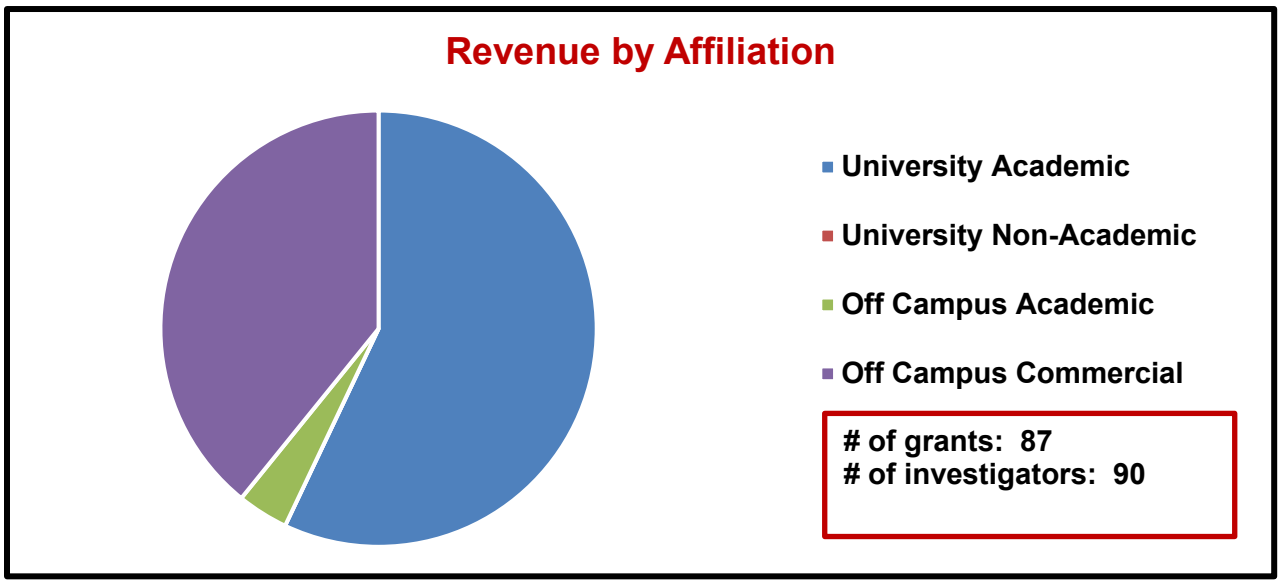


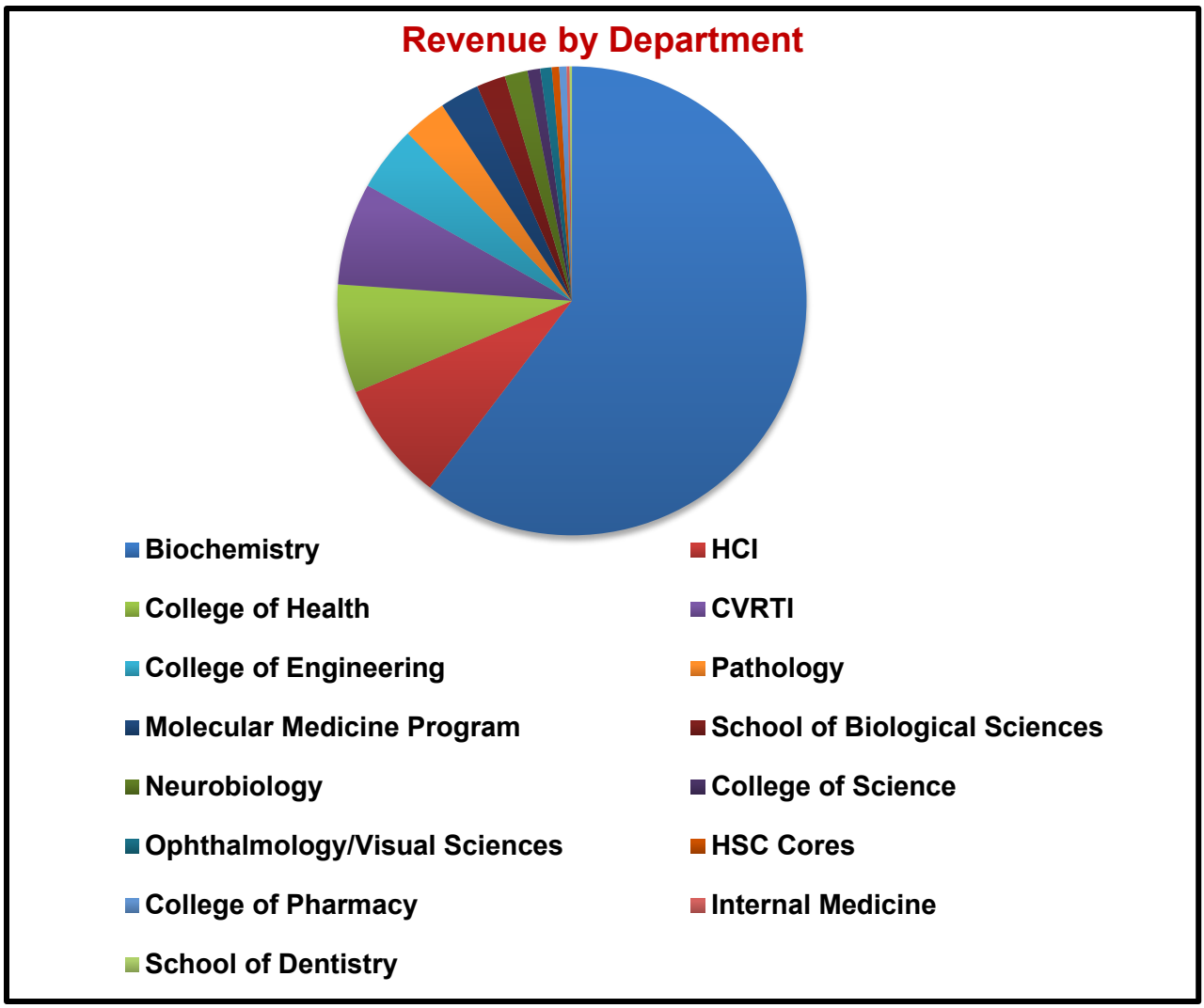
*Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Science Exchange Inc.	Off Campus Commercial
2	Owen Pornillos	NIH, Northwestern University, Washington University in St. Louis
3	Wesley Sundquist	Department, NIH, University of Utah Research Foundation
4	Peter Shen	Brigham Young University, Department, NIH, Northwestern University
5	Bristol-Myers Squibb	Off Campus Commercial
6	Erik Jorgensen	Department
7	Sanofi	Off Campus Commercial
8	Brigham Young University	Off Campus Educational
9	Brandon Trieu	NIH
10	Saveez Saffarian	Anonymous

Publications

1. Aderounmu, A. M., J. Maus-Conn, C. D. Consalvo, P. S. Shen and B. L. Bass (2025). Biochemical and structural basis of Dicer helicase function unveiled by resurrecting ancient proteins. Proc Natl Acad Sci U S A 122(22): e2500825122.10.1073/pnas.2500825122
2. Preece, B., W. Peppel, R. Gallegos, G. Ysassi, G. Clinger, N. Bohn, B. Adhikary, L. Mendonca, D. Belnap, M. Vershinin and S. Saffarian (2025). High-Yield and Quantitative Purification Method for HIV Which Minimizes Forces Applied to Virions Utilized to Investigate Maturation of HIV-1 via Cryo-Electron Tomography. Viruses 17(3).10.3390/v17030364
3. Sanchez Arias, L., B. Webb, K. Samsami, L. Nikolova, M. Silva and H. C. Fu (2024). Hydrodynamic Effects of Mastigonemes in the Cryptophyte Chilomonas paramecium. Hydrobiology 3(3): 159-182
4. Zhao, Y., H. Schubert, A. Blakely, B. Forbush, M. D. Smith, J. Rinehart and E. Cao (2024). Structural bases for Na(+)-Cl(-) cotransporter inhibition by thiazide diuretic drugs and activation by kinases. Nat Commun 15(1): 7006.10.1038/s41467-024-51381-y

Flow Cytometry Facility

Overview

The Flow Cytometry Facility offers quantitative, multi-parameter fluorescence analysis, and cell sorting services that assist over 90 investigators including a subset of industry clients. The expertise and instrumentation to perform most flow cytometric assays that have been described in the literature are available within the expertise of the collective personnel and the physical resources of the Flow Cytometry Facility. The facility offers investigators the entire spectrum of cytometric experiment management, if desired, all the way from initial design consultation to the creation of graphics for publication.

Uniqueness

The Flow Cytometry facility is recognized for the most part as an instrumentation-based service lab. However, we believe that education is a crucial component for the growth and sustainability of the facility. First, facility staff are encouraged to maintain state-of-the-art knowledge to pass this information along to the users for obtaining optimal experimental results. Secondly, we believe that education in the field of flow cytometry for users will lead to more complex experimental design that ensures positive outcomes that in turn will increase overall usage. To this end, we provide multiple levels of education from one-on-one consultation to routine seminars covering a variety of topics. Although this may not be unique when compared to other Core facilities, it is a noticeable quality of our services when compared to other non-centralized instrumentation on campus.

Services

The assays offered by the facility range from routine cell cycle analysis and immunophenotyping to complex multi-laser applications and high-speed cell sorting. Examples of the assays available include, but are not limited to the following:

- DNA content/cell cycle measurement
- Immunofluorescence analyses
- Characterization of cell populations based on scattered light intensity measurements and autofluorescence
- Cell sorting including viable, sterile cell sorting
- Intracellular calcium flux
- A range of apoptosis assays
- Fluorescence Resonance Energy Transfer (FRET)
- Nanoparticle characterization
- Bivariate and univariate chromosome analysis
- Receptor-ligand interactions
- Cell proliferation studies including BrdU incorporation and CFSE tracking
- Viability assays (membrane exclusion and metabolic viability)
- Various function assays including oxidative metabolism, neutrophil function (oxidative burst, phagocytosis) cytoplasmic pH, membrane potential
- Kinetic analyses
- Signal transduction pathway analyses (simultaneous assessment of multiple intracellular phosphorylated epitopes combined in complex multi-color assays)
- Sample preparation and staining

Consultation and training are provided to define projects in the early stages of development to make optimal and efficient use of flow cytometry. The staff will prepare samples including staining, data collection, quality control, data analysis/interpretation, and creation of graphics. Alternatively, if the investigator chooses, the facility can provide consultation only on any of the above services so that the research is entirely in the hands of the investigator.

Equipment

Sorters

- BD FACSAria-5 laser
- Propel Labs Avalon-2 laser
- BD FACSAria-4 laser
- Cytek Aurora Cell Sorter

Analyzers

- BD FACSCanto
- BD LSRFortessa
- Beckman Coulter Cytoflex LX
- Beckman Coulter Cytoflex LX
- Beckman Coulter Cytoflex S
- Beckman Coulter Cytoflex
- Beckman Coulter Cytoflex Nano
- BD Celesta
- Cytek Aurora
- Amnis Imagestream

Personnel

- James Marvin, Director
- Madison Smith, Research Associate
- Eduardo Salustiano Jesus dos Santos, Research Associate
- Rebecca Marvin, Senior Lab Specialist
- Sreeja Govindarajan, Lab Specialist

Advisory Board Committee

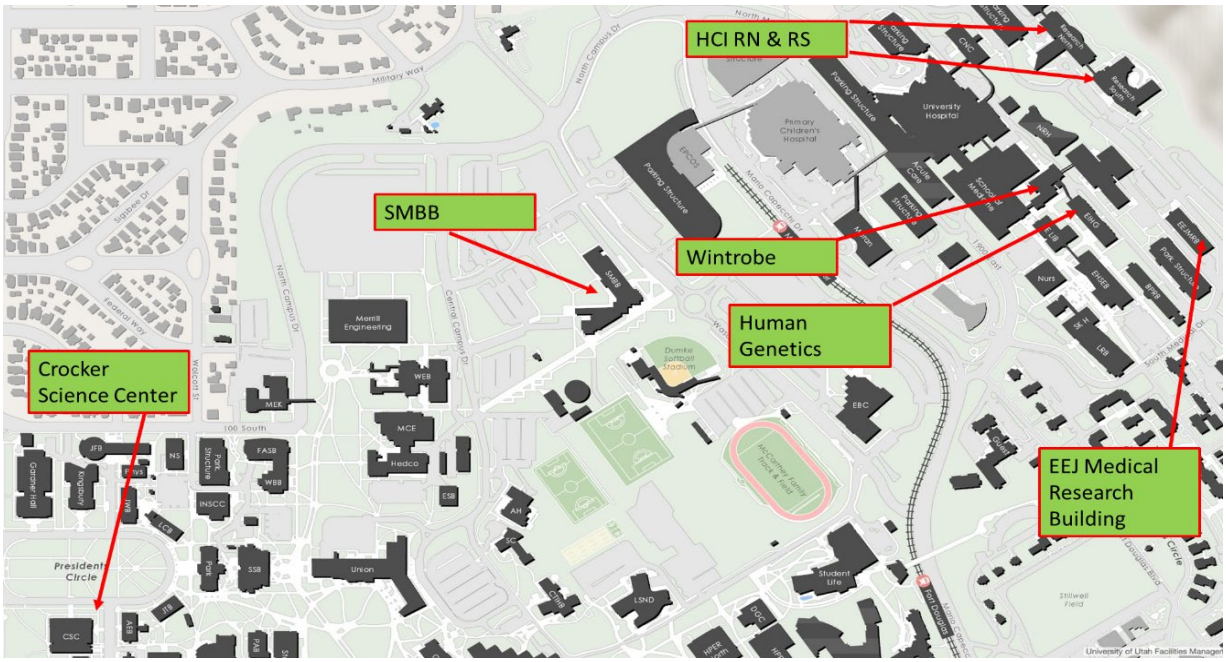
Last meeting date: 8-5-25

- Matthew Williams Ph.D., Professor, Pathology Advisory Board Chair
- Ryan O'Connell Ph.D., Professor, Pathology
- Anna Beaudin Ph.D., Associate Professor, Hematology
- Daniel Leung M.D., Associate Professor, Internal Medicine
- Matthew VanBrocklin Ph.D., Associate Professor, Dept of Surgery HCI

FY25 Annual Update

New Equipment

The Flow Core added another conventional analyzer in FY25. Although extracellular vesicles and other submicron particles are routinely analyzed on a variety of instruments within the core, none of these instruments have really been designed first and foremost for small particles. Because this is a growing field of study where current instrumentation was lacking, the Flow Core purchased a Cytoflex Nano. This instrument has already expanded the services provided by the core to both internal and external clients.



Staffing

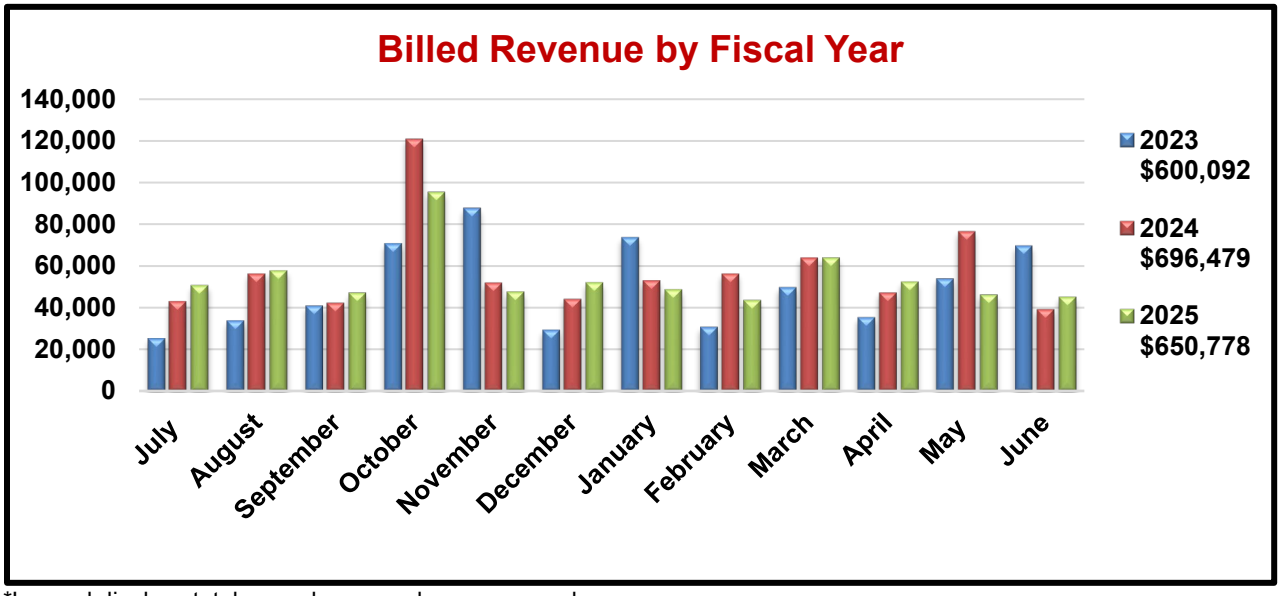
No new additions in FY25. This has been one of the most extended periods of time without staff turnover.

Revenue/Expenses

FY25 Expenses: Total $795,961

FY25 Revenue: Total $839,212

- FY25 Revenue generated from services: $650,778
- VP Support: $40,000
- RIF Funds: $148,434

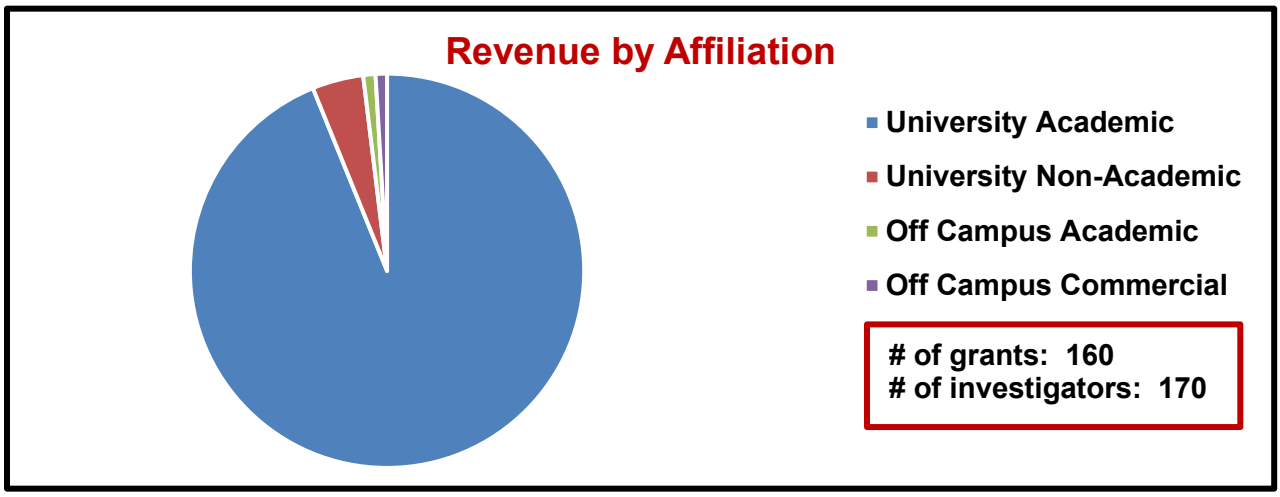


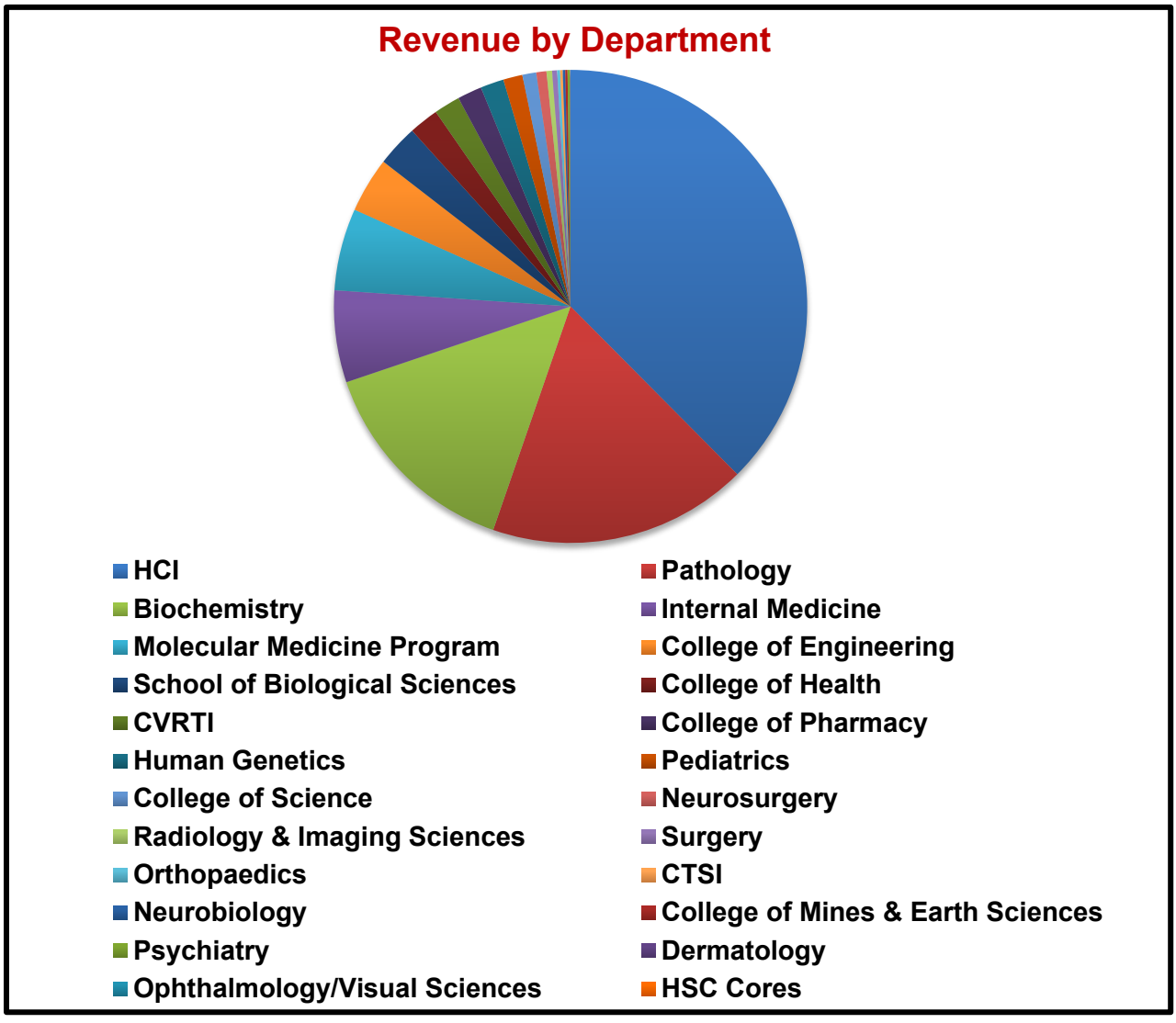
*Legend displays total annual revenue by year earned

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Matthew Williams	DOD, Department, NIH
2	ARUP	University Non-Academic
3	Tyler Starr	Anonymous, Department, Invivyd Inc, NIH, Searle Scholars Program, University of Washington
4	Adrienne Dorrance	Department
5	Anna Beaudin	Department, Hematology, NIH
6	Shannon Buckley	Department, NIH
7	Alana Welm	Breast Cancer Research Foundation, Department, DOD
8	Minna Roh-Johnson	Department, NIH, University of Utah Research Foundation
9	Eric Snyder	American Cancer Society Inc, Cincinnati Children's Hospital, Department, NIH
10	Shannon Elf	Department, NIH

Publications

1. Bircher, J. S., F. Denorme, M. J. Cody, C. V. d. Araujo, A. C. Petrey, E. A. Middleton, R. A. Campbell and C. C. Yost (2024). Neonatal NET-inhibitory factor inhibits macrophage extracellular trap formation. Blood Advances 8(14): 3686.10.1182/bloodadvances.2024013094
2. Blackwell, A. M., Y. Jami-Alahmadi, A. S. Nasamu, S. Kudo, A. Senoo, C. Slam, K. Tsumoto, J. A. Wohlschlegel, J. Manuel Martinez Caaveiro, D. E. Goldberg and P. A. Sigala (2024). Malaria parasites require a divergent heme oxygenase for apicoplast gene expression and biogenesis. Elife 13.10.7554/eLife.100256
3. Chhibber, T., M. T. Scherzer, A. Prokofyeva, C. Becker, R. G. Zitnay, E. Smith, N. Khurana, M. Skliar, D. C. Deacon, M. W. VanBrocklin, H. Ghandehari, R. L. Judson-Torres and P. Jafari (2024). Transdermal Delivery of Ultradeformable Cationic Liposomes Complexed with miR211-5p (UCL-211) Stabilizes BRAFV600E+ Melanocytic Nevi. bioRxiv.10.1101/2024.10.17.618694
4. DeWitt, W. S., A. A. Vora, T. Araki, J. G. Galloway, T. Alkutkar, J. Bortolatto, T. B. R. Castro, W. Dumm, C. Jennings-Shaffer, T. Jia, L. Mesin, G. Ozorowski, J. Pae, D. K. Ralph, J. D. Bloom, A. Nourmohammad, Y. S. Song, A. B. Ward, T. N. Starr, F. A. t. Matsen and G. D. Victora (2025). Replaying germinal center evolution on a quantified affinity landscape. bioRxiv.10.1101/2025.06.02.656870
5. Garcia-Guerrero, A. E., R. G. Marvin, A. M. Blackwell and P. A. Sigala (2025). Biogenesis of Cytochromes c and c(1) in the Electron Transport Chain of Malaria Parasites. ACS Infect Dis 11(4): 813-826.10.1021/acsinfecdis.4c00450
6. Greiner, D., Q. Xue, T. Q. Waddell, E. Kurudza, P. Chaudhary, R. L. Belote, G. Dotti, R. L. Judson-Torres, M. Q. Reeves, S. H. Cheshier and M. Roh-Johnson (2025). Human CSPG4-targeting CAR-macrophages inhibit melanoma growth. Oncogene 44(22): 1665-1677.10.1038/s41388-025-03332-0
7. Hastings, E. M., T. Skora, K. R. Carney, H. C. Fu, T. C. Bidone and P. A. Sigala (2025). Chemical propulsion of hemozoin crystal motion in malaria parasites. bioRxiv.10.1101/2025.04.25.650681
8. Hughes, E. P., A. K. Manna, W. Sun, S. M. Osburn-Staker, S. Aamodt, K. J. Warren, J. E. Cox and D. Tantin (2025). Transcriptional co-regulator OCA-B/Pou2af1 restricts Th2 differentiation. Front Immunol 16: 1548636.10.3389/fimmu.2025.1548636
9. Hughes, E. P., A. R. Syage, E. Mirzaei Mehrabad, T. E. Lane, B. T. Spike and D. Tantin (2025). OCA-B promotes pathogenic maturation of stem-like CD4+ T cells and autoimmune demyelination. J Clin Invest 135(13).10.1172/JCI187862
10. Rexhepaj, M., D. Asarnow, L. Perruzza, Y. J. Park, B. Guarino, M. McCallum, K. Culap, C. Saliba, G. Leoni, A. Balmelli, C. N. Yoshiyama, M. S. Dickinson, J. Quispe, J. T. Brown, M. A. Tortorici, K. R. Sprouse, A. L. Taylor, D. Corti, T. N. Starr, F. Benigni and D. Veesler (2024). Isolation and escape mapping of broadly neutralizing antibodies against emerging delta-coronaviruses. Immunity 57(12): 2914-2927 e2917.10.1016/j.immuni.2024.10.001

11. Rosen, L. E., M. A. Tortorici, A. De Marco, D. Pinto, W. B. Foreman, A. L. Taylor, Y. J. Park, D. Bohan, T. Rietz, J. M. Errico, K. Hauser, H. V. Dang, J. W. Chartron, M. Giurdanella, G. Cusumano, C. Saliba, F. Zatta, K. R. Sprouse, A. Addetia, S. K. Zepeda, J. Brown, J. Lee, E. Dellota, Jr., A. Rajesh, J. Noack, Q. Tao, Y. DaCosta, B. Tsu, R. Acosta, S. Subramanian, G. D. de Melo, L. Kergoat, I. Zhang, Z. Liu, B. Guarino, M. A. Schmid, G. Schnell, J. L. Miller, F. A. Lempp, N. Czudnochowski, E. Cameroni, S. P. J. Whelan, H. Bourhy, L. A. Purcell, F. Benigni, J. di Iulio, M. S. Pizzuto, A. Lanzavecchia, A. Telenti, G. Snell, D. Corti, D. Veesler and T. N. Starr (2024). A potent pan-sarbecovirus neutralizing antibody resilient to epitope diversification. Cell 187(25): 7196-7213 e7126.10.1016/j.cell.2024.09.026
12. Ruiz, F., W. B. Foreman, M. Lilly, V. A. Baharani, D. M. Depierreux, V. Chohan, A. L. Taylor, J. Guenthoer, D. Ralph, F. A. Matsen Iv, H. Y. Chu, P. D. Bieniasz, M. Cote, T. N. Starr and J. Overbaugh (2024). Delineating the functional activity of antibodies with cross-reactivity to SARS-CoV-2, SARS-CoV-1 and related sarbecoviruses. PLoS Pathog 20(10): e1012650.10.1371/journal.ppat.1012650
13. Tanaka, M., L. Lum, K. H. Hu, P. Chaudhary, S. Hughes, C. Ledezma-Soto, B. Samad, D. Superville, K. Ng, A. Chumber, C. Benson, Z. N. Adams, K. Kersten, O. A. Aguilar, L. Fong, A. J. Combes, M. F. Krummel and M. Q. Reeves (2025). Tumor cell heterogeneity drives spatial organization of the intratumoral immune response. J Exp Med 222(6).10.1084/jem.20242282
14. Taylor, A. L. and T. N. Starr (2024). Deep mutational scanning of SARS-CoV-2 Omicron BA.2.86 and epistatic emergence of the KP.3 variant.10.1101/2024.07.23.604853
15. Trivedi, S., O. J. Cheng, B. J. Brintz, R. C. Charles and D. T. Leung (2025). Mucosal-associated invariant T (MAIT) cell responses in Salmonella enterica serovar Typhi strain Ty21a oral vaccine recipients. Oxf Open Immunol 6(1): iqaf002.10.1093/oxfimm/iqaf002
16. van Vlimmeren, A. E., R. Voleti, C. A. Chartier, Z. Jiang, D. Karandur, P. A. Humphries, W.-L. Lo and N. H. Shah (2024). The pathogenic T42A mutation in SHP2 rewires the interaction specificity of its N-terminal regulatory domain. Proceedings of the National Academy of Sciences of the United States of America 121(30): e2407159121.10.1073/pnas.2407159121
17. Varady, S. R. S., D. Greiner and M. Roh-Johnson (2025). Macrophage subtypes inhibit breast cancer proliferation in culture. Mol Biol Cell 36(1): br2.10.1091/mbc.E24-06-0241

Genomics Facility

Overview

The Genomics Facility offers a variety of genetic analysis services including full-service genotyping, from PCR setup through analysis, and assistance to researchers performing genotyping projects. The facility has commercial and custom sets of fluorescent labeled microsatellite markers that can be used for whole genome linkage studies and fine mapping projects. Researchers can select genes or regions of interest, and the facility designs and optimizes the PCR primers, performs the initial PCR, runs the sequencing reactions, and analyzes the data using SoftGenetics Mutation Surveyor software.

Services

Fragment Analysis

- Full-service genotyping from PCR setup through analysis
- Capillary runs
- Microsatellite instability
- Loss of heterozygosity
- Multiplex ligation dependent amplification

SNP Genotyping

- Taqman SNP genotyping
- Illumina whole-genome genotyping and copy number variation analysis
- Methylation analysis
- Open array genotyping

Real Time PCR

- Gene expression
- Digitial PCR

Equipment

- Illumina iScan
- Two Quantstudio 12k Flex real-time PCR System
- Applied Biosystems QuantStudio Absolute Q digital PCR system

Personnel

- Derek Warner, Director
- Michael Klein, Manager

Advisory Board Committee

Last meeting date: December 10th, 2024

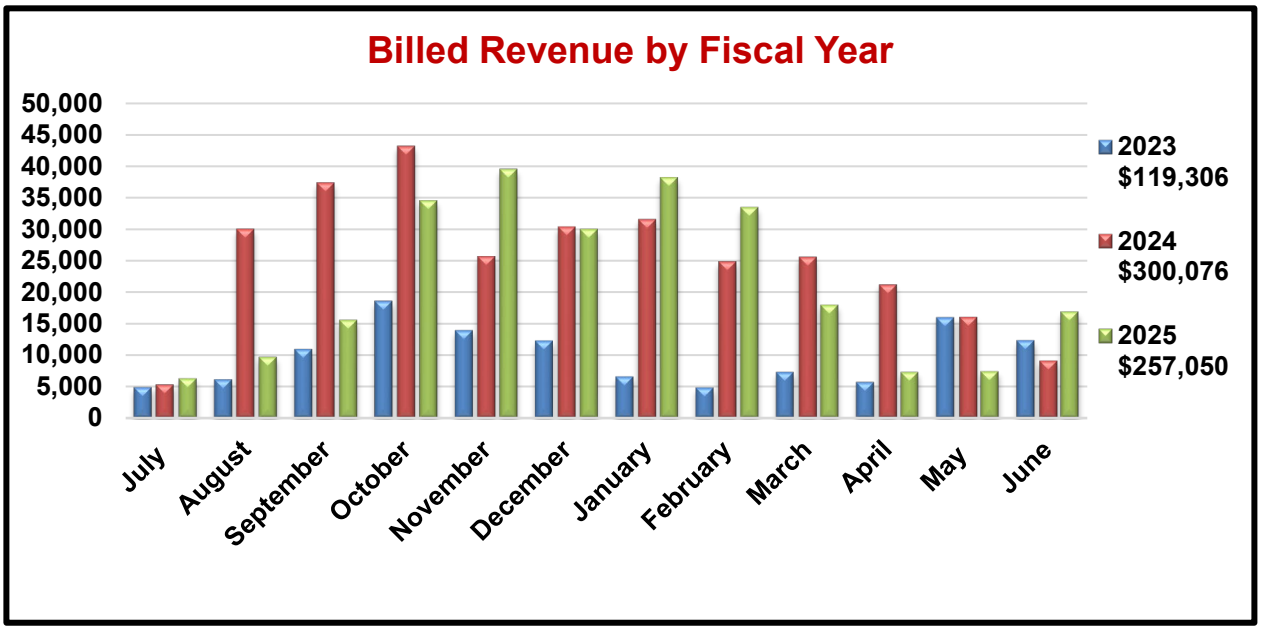
- Deborah Neklason Ph.D., Research Associate Professor, Huntsman Cancer Institute
- Nicola Camp Ph.D., Professor, Department of Pathology
- Lynn Jorde Ph.D., Professor, Human Genetics
- Robert Weiss Ph.D., Professor, Human Genetics
- Aaron Quinlan Ph.D., Professor, Human Genetics

Revenue/Expenses

FY25 Expenses: **Total $289,830**

FY25 Revenue: **Total $257,050**

- VP of Health Sciences Support: $0
- FY25 Revenue generated from services: $257,050

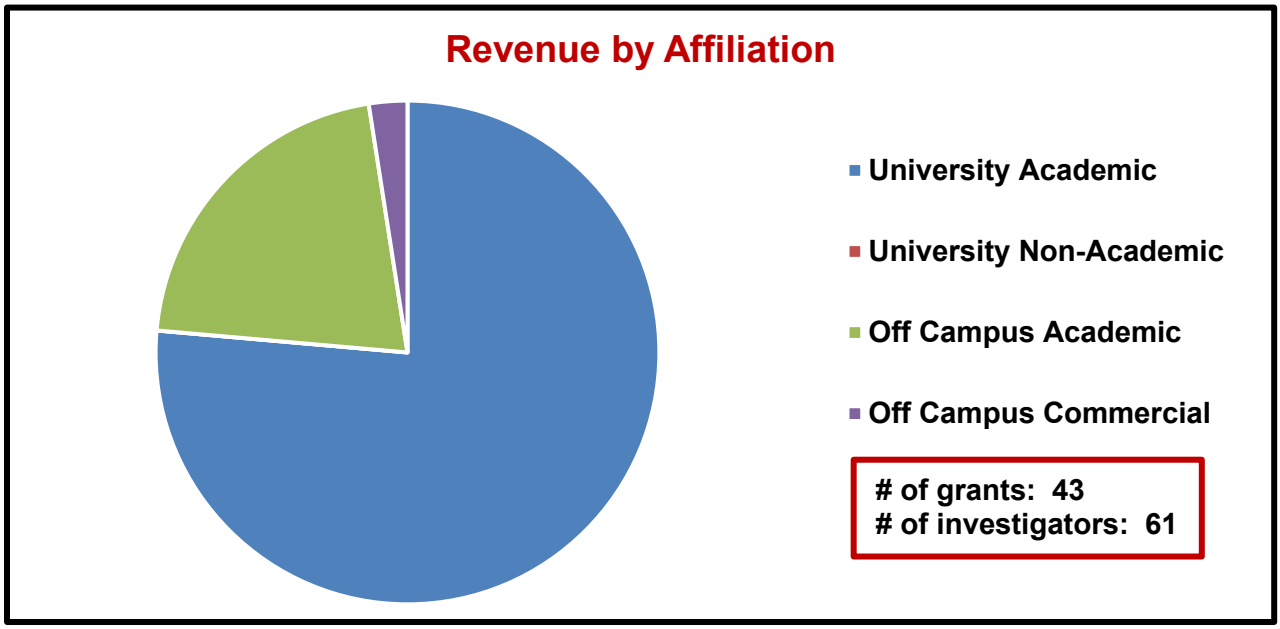


* Legend displays total annual billed revenue by year.

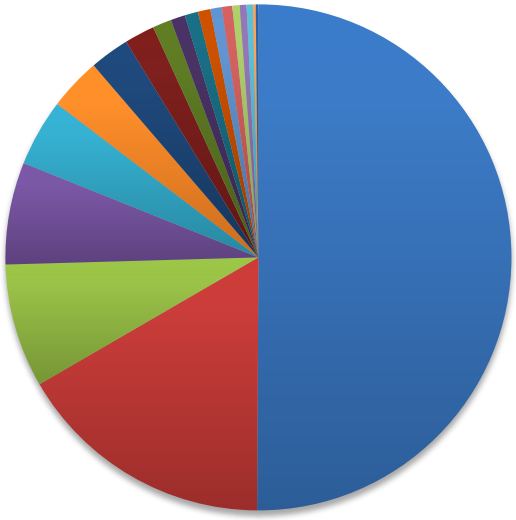
FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):



Revenue by Department



Top Users

1	Anna Docherty	NIH
2	Hilary Coon	NIH
3	University of Arizona	Off Campus Academic
4	University of Texas at San Antonio	Off Campus Academic
5	Stefan Pulst	Department
6	Afaf Osman	American Society of Hematology
7	Russell Butterfield	Department, Orphan Disease Center
8	Doug Grossman	V Foundation for Cancer Research
9	Karol Budohoski	Department
10	Alana Welm	Department

Publications

1. Baum, R., V. D. Nguyen, M. Maalouf, D. Shimura, M. Waghalter, S. Srapyan, Q. Jin, L. Kuzmanovich, A. T. Gaffney, B. R. Bell, S. Xiao, J. A. Palatinus, A. G. Kléber, E. E. Grintsevich, T. Hong and R. M. Shaw (2024). A truncated isoform of Connexin43 caps actin to organize forward delivery of full-length Connexin43. Journal of Cell Biology 224(3): e202402112.10.1083/jcb.202402112
2. Blackwell, A. M., Y. Jami-Alahmadi, A. S. Nasamu, S. Kudo, A. Senoo, C. Slam, K. Tsumoto, J. A. Wohlschlegel, J. Manuel Martinez Caaveiro, D. E. Goldberg and P. A. Sigala (2024). Malaria parasites require a divergent heme oxygenase for apicoplast gene expression and biogenesis. Elife 13.10.7554/eLife.100256
3. Cohen, A. J., W. R. Chidester, D. T. Wray, N. Jessen, A. Jones, C. Bitsui, J. Zhao, J. A. Maschek, J. E. Cox, C. R. Martin and L. A. Joss-Moore (2025). Docosahexaenoic Acid Supplementation in Postnatal Growth Restricted Rats Does Not Normalize Lung Function or PPARgamma Activity. Biomolecules 15(4).10.3390/biom15040551
4. Espino, S., M. Watkins, R. Probst, T. L. Koch, K. Chase, J. Imperial, S. D. Robinson, P. Florez Salcedo, D. Taylor, J. Gajewiak, M. Yandell, H. Safavi-Hemami and B. M. Olivera (2024). chi-Conotoxins are an Evolutionary Innovation of Mollusk-Hunting Cone Snails as a Counter-Adaptation to Prey Defense. Mol Biol Evol 41(11).10.1093/molbev/msae226
5. Fleming, A. M., J. C. Dingman and C. J. Burrows (2024). CO(2) protects cells from iron-Fenton oxidative DNA damage in E. coli and humans. bioRxiv.10.1101/2024.08.26.609766
6. Garcia-Guerrero, A. E., R. G. Marvin, A. M. Blackwell and P. A. Sigala (2025). Biogenesis of Cytochromes c and c(1) in the Electron Transport Chain of Malaria Parasites. ACS Infect Dis 11(4): 813-826.10.1021/acsinfecdis.4c00450
7. Giglio, M. L., P. Florez-Salcedo, L. Azam, M. Watkins, T. L. Koch, E. Basgall-De la Rosa, A. D. Douglass, J. M. McIntosh, B. M. Olivera and J. Gajewiak (2025). An N-Terminally Elongated Peptide From Conus rolani Defines a New Class of Ribbon alpha-Conotoxins Targeting Muscle nAChRs. FASEB J 39(12): e70698.10.1096/fj.202500721RR
8. Hastings, E. M., T. Skora, K. R. Carney, H. C. Fu, T. C. Bidone and P. A. Sigala (2025). Chemical propulsion of hemozoin crystal motion in malaria parasites. bioRxiv.10.1101/2025.04.25.650681
9. Kim, H. S., M. L. Sanchez, J. Silva, H. L. Schubert, R. Dennis, C. P. Hill and J. L. Christian (2025). Mutations that prevent phosphorylation of the BMP4 prodomain impair proteolytic maturation of homodimers leading to lethality in mice. Elife 14.10.7554/eLife.105018
10. Loveridge, K. M. and P. A. Sigala (2024). Identification of a divalent metal transporter required for cellular iron metabolism in malaria parasites. Proc Natl Acad Sci U S A 121(45): e2411631121.10.1073/pnas.2411631121
11. Madrigal, J., H. L. Schubert, M. A. Sdano, L. McCullough, Z. Connell, T. Formosa and C. P. Hill (2024). Tom1p ubiquitin ligase structure, interaction with Spt6p, and function in maintaining normal transcript levels and the stability of chromatin in promoters, eLife Sciences Publications, Ltd.10.7554/elife.101393.1
12. O'Toole, K. T., A. Martinez, B. Murphy, A. Proveyeka, G. Fort, F. Al-Sudani, S. Boggaram, E. L. Paine, D. Baral, J. L. Andersen, G. Parkman, E. L. Snyder, R. Judson-Torres and M. McMahon (2025). Characterization of the BRAF interactome identifies BRAF (V600E) <=>TP53 interaction in melanoma. bioRxiv.10.1101/2025.06.20.660711
13. Ramones, C. M. V., R. S. Taguchi, E. M. E. Gamba, E. I. A. E. Johann, M. Watkins, M. O. Chicote, M. C. Velarde, A. J. L. Villaraza, E. T. Yu, B. M. Olivera, G. P. Concepcion and A. O. Lluisma (2025). Variable peptide processing of a Conus (Asprella) neocostatus alpha-conotoxin generates bioactive toxiforms that are potent against distinct nicotinic acetylcholine receptor subtypes. Biochem Pharmacol 233: 116781.10.1016/j.bcp.2025.116781
14. Scott, T. M., L. M. Arnold, J. A. Powers, D. A. McCann, A. B. Rowe, D. E. Christensen, M. J. Pereira, W. Zhou, R. M. Torrez, J. H. Iwasa, P. J. Kranzusch, W. I. Sundquist and J. S. Johnson (2025). Cell-free assays reveal that the HIV-1 capsid protects reverse transcripts from cGAS immune sensing. PLoS Pathog 21(1): e1012206.10.1371/journal.ppat.1012206
15. Tekarli, B., L. Azam, A. J. Hone and J. M. McIntosh (2025). Human alpha10 nicotinic acetylcholine receptor subunits assemble to form functional receptors. J Biol Chem 301(2): 108182.10.1016/j.jbc.2025.108182
16. Watkins, M., J. Gajewiak, S. Espino, A. Rogalski, K. Chase, S. Raghuraman and B. M. Olivera (2025). Pionoconus: A Piscivorous Subgenus of Conus Gastropods. Malacologia 67(1-2): 65-116.10.4002/040.067.0104
17. Wienkers, H. J., H. Han, F. G. Whitby and C. P. Hill (2024). Vps4 substrate binding and coupled mechanisms of Vps4p substrate recruitment and release from autoinhibition. bioRxiv.10.1101/2024.09.07.611824

Iron & Heme

Overview

The Iron and Heme Core Facility provides analyses of the compounds involved in the heme biosynthesis pathway, together with the activities of the enzymes involved in this essential process. The core also provides analyses of biologically important metals. Quantification of heme and its precursors can be performed on cell pellets, tissue, whole blood and other complex biological materials. Analysis of enzyme activity can be performed on cell pellets, tissue and blood. An Agilent 7900-ICP mass spectrometer is used to measure iron content (as well as other metals) in biological samples.

Uniqueness

The Iron and Heme Core provides services that are not available at most universities. We perform UPLC/HPLC analyses of heme, porphyrins and tetrapyrrole precursors (ALA and PBG). We assay for activities of enzymes involved in heme biosynthesis. We receive and process samples and provide service for academic laboratories all over the United States. We can measure activity for each of the eight heme biosynthetic enzymes from tissue and cell sources. We specialize in small, biological samples (cells, tissue, blood). We homogenize and measure protein content for sample normalization, unusual for metal analysis centers and important for biological research.

Services

The Iron and Heme Core's primary mission is to facilitate research into the role of heme, heme precursors and transition metals in both normal and disease states. The Iron and Heme core lab has extensive experience with the separation and identification of tetrapyrroles and with running and developing heme biosynthesis pathway enzyme assays. We specialize in iron analysis by ICP-MS and also test for other metals. We are offering the following services:

- UPLC analysis of total heme and protoporphyrin IX
- UPLC analysis of tetrapyrrole precursors (ALA and PBG), intermediate porphyrins in heme biosynthesis
- Assays for the following heme biosynthetic enzymes (ALAS, ALAD/PBGS, PBGD, U3S, UROD, COPOX, PPOX & FECH)
- Metal analysis by ICP-MS
- Spectral analysis of hemes
- Sample homogenization (cells & tissues) with protein quantification
- UPLC analysis of related biological compounds like related tetrapyrroles and bilins; and enzyme activities such as reverse ferrochelatase.

FY26 Goals

- Increase awareness of our services
- Increase core efficiency and reduce turnaround time.
- Advise interested researchers in developing assay methods similar to that of the Core

Major Equipment

Heme and Porphyrin analysis:

- Two Waters Corporation ultra-performance liquid chromatography (UPLC) systems, ACQUITY UPLC classic and ACQUITY UPLC H-class PLUS (each including a sample manager, a solvent manager, a photodiode array detector, a fluorescence detector, a column heater and a reverse phase C18 column
- Agilent 8453 diode array spectrophotometer

Metal Analysis:

- Agilent 7900-ICP mass spectrometer system

Personnel

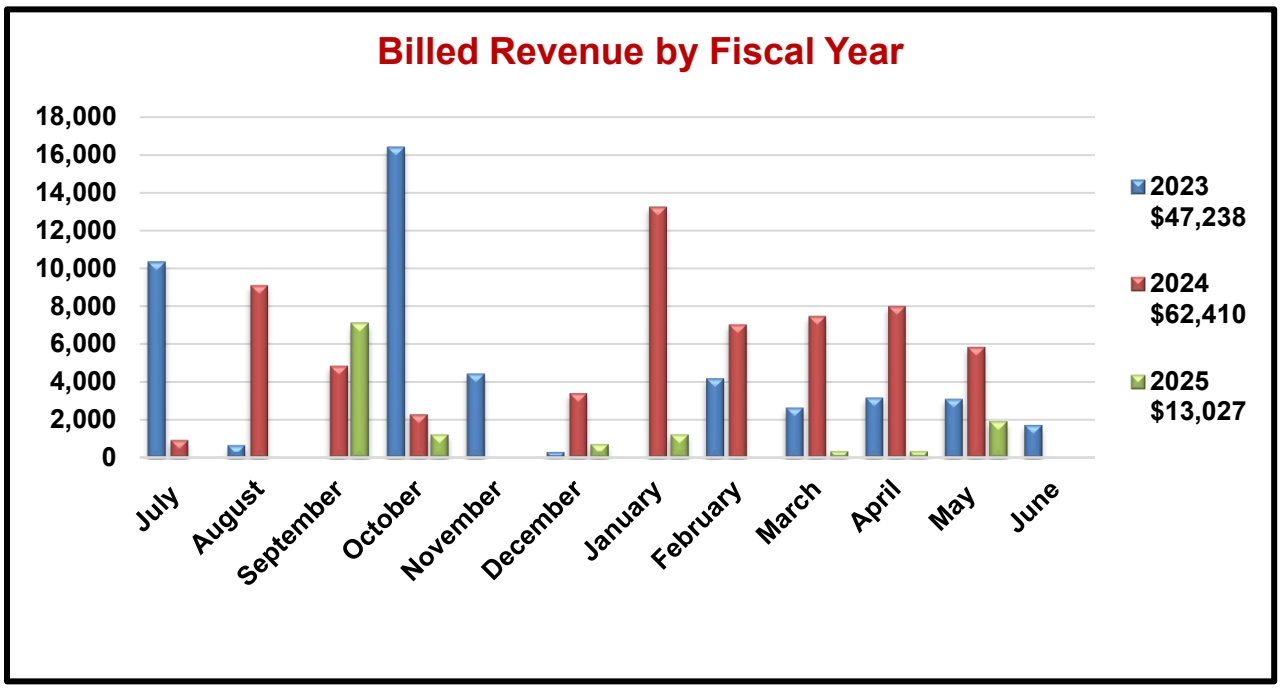
- Hector A. Bergonia, MS, Research Associate, Core Director, Tetrapyrrole Biochemist

Advisory Board Committee (CIHD Operations Committee)

- John D. Phillips, PhD, Hematology
- James Cox, PhD, Biochemistry
- Diane M Ward, PhD, Pathology

Revenue/Expenses

FY25 Total Expenses: **$123,950**
FY25 Total Revenue: **$13,027**
FY25 Revenue generated from services: $13,027

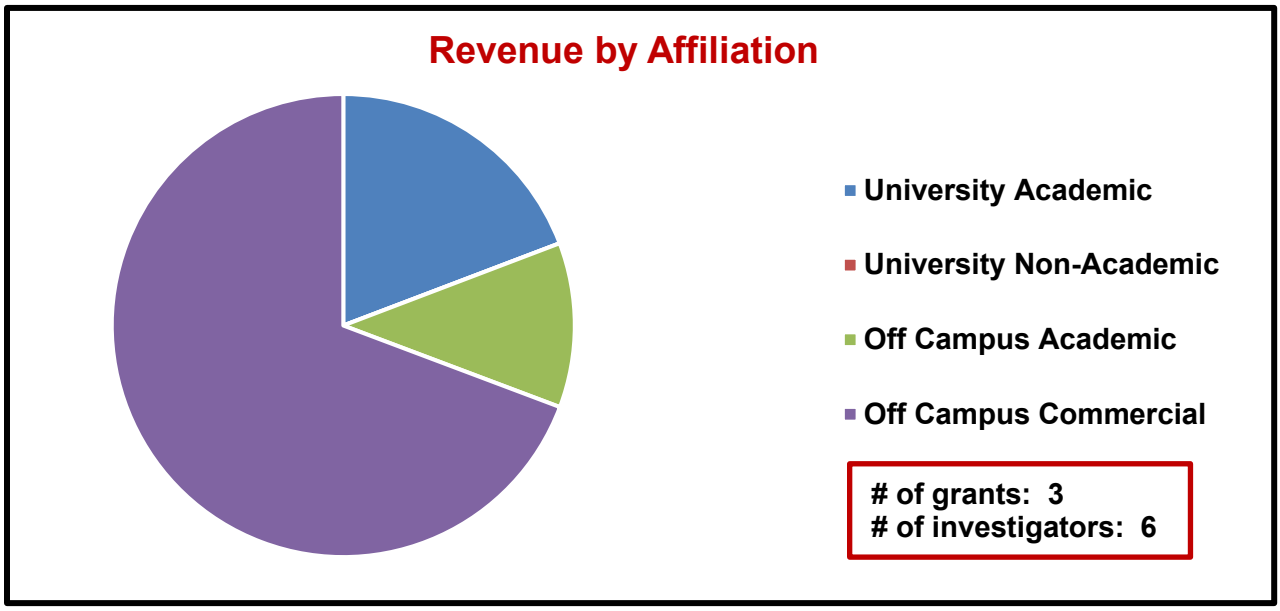


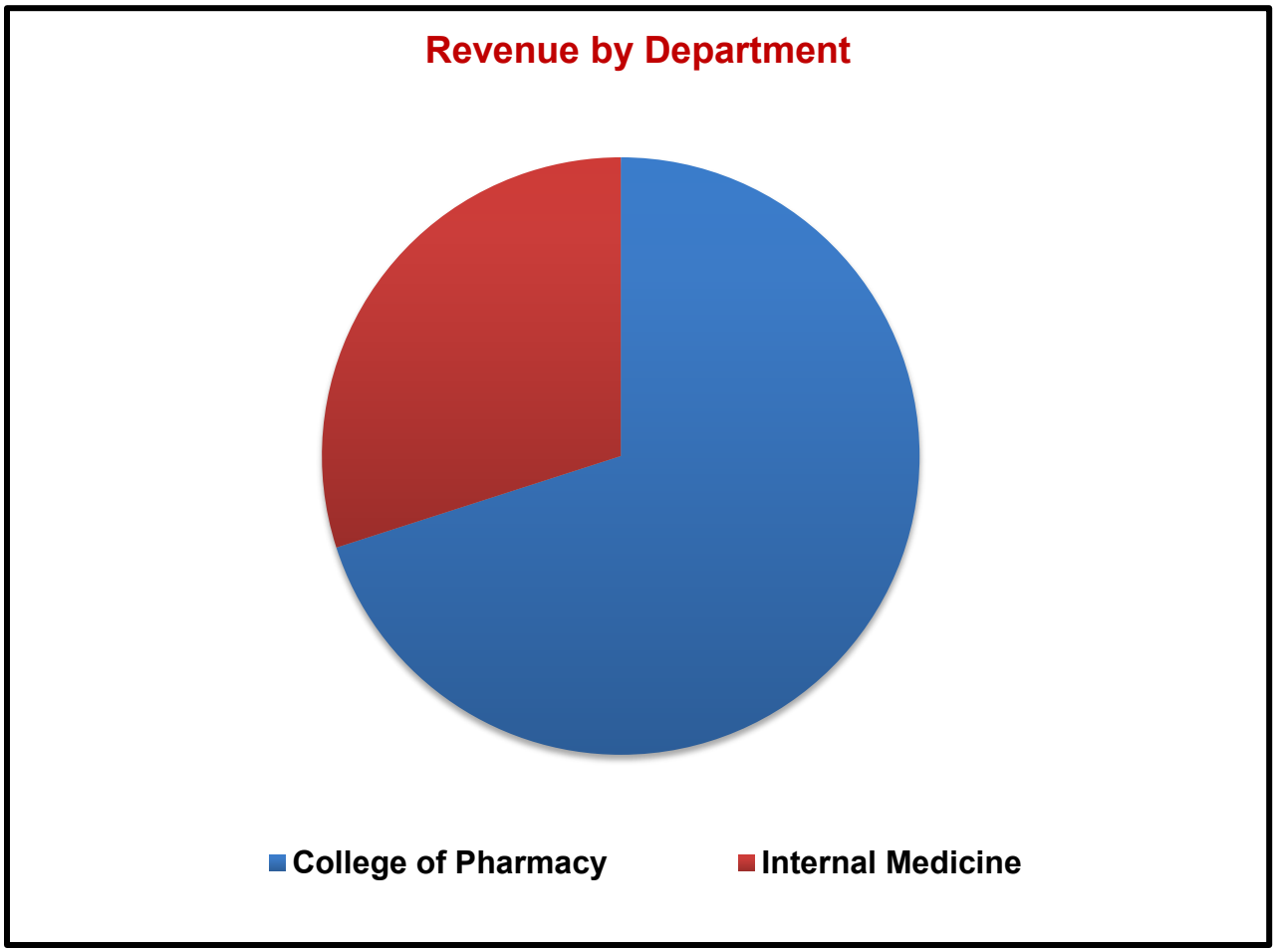
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Boston Children's Hospital	Off Campus Commercial
2	AG Biomolecules	Off Campus Commercial
3	Icahn School of Medicine at Mount Sinai	Off Campus Academic
4	Christopher Reilly	NIH
5	Anna Beaudin	NIH
6	Mei Yee Koh	DOD

Publication

1. Bergonia, H. A. and J. D. Phillips (2024). Ultra-Performance Liquid Chromatography (UPLC) Analysis of Heme Biosynthesis Intermediates. Methods Mol Biol 2839: 213-223.10.1007/978-1-0716-4043-2_11

Machine Shop

Overview

The Machine Shop Facility is equipped with a full complement of lathes, drills, mills, welders, grinders, and CNC lathe and milling systems, staffed by experienced CNC machinists and engineers capable of turning an idea into reality. The shop staff provides consultation to assist with the design process for products ranging from precise surgical instruments to large-scale testing equipment. The shop can also fabricate as well as repair devices and parts made from carbon-steel, stainless steel, brass, copper, plastics, and other materials depending upon the requirements of design specifications. The shop provides microscope parts, stages and assemblies, surgical tool modification, replications, alterations, and reverse engineering.

Services

- Device design/engineering from basic concept to finished product
- Manufacturability consulting
- CNC and manual 3 axis milling machines 2D and 3D machining
- CNC Tormach lathe and manual lathes
- CNC routing services and sign making capabilities
- Laser cutting and engraving services, 3D printing
- Silver soldering and brazing
- MIG/TIG welding of steel, aluminum, and other types of fabrication
- Anodizing, powder coating and laser cutting project assistance.
- Repair and maintenance of specialty surgical equipment
- Fast surgery tool replication/modifications
- Onsite assessments, pickup, delivery of equipment and repairs

Equipment

- Two CNC mills
- One Shapeoko HD CNC router (aluminum capable)
- One Shapeoko XL CNC Router
- One Matter Hackers Pulse XE 3D printer
- One EPAX E10 4K resolution resin 3D printer
- Two Bambu Labs Carbon X1 3D printers
- Two traditional mills
- Four manual lathes
- Two laser cutter/engraving machines.
- Grinders
- MIG, TIG, gas, arc, and spot welders
- Wood working equipment shop
- Band & table saws

Personnel

- Shawn Colby, Machinist, Director
- Joshua Tenny, Machinist, Surgery Tool Repair Specialist

Advisory Board Committee

- Perry Renshaw M.D. Ph.D., Professor, Psychiatry
- Michelle Ford, Materials Management Facilitator, Facilities Engineering
- Kyle Thomson Ph.D., Researcher, Pharm/Tox

FY25 Annual Update

New Equipment

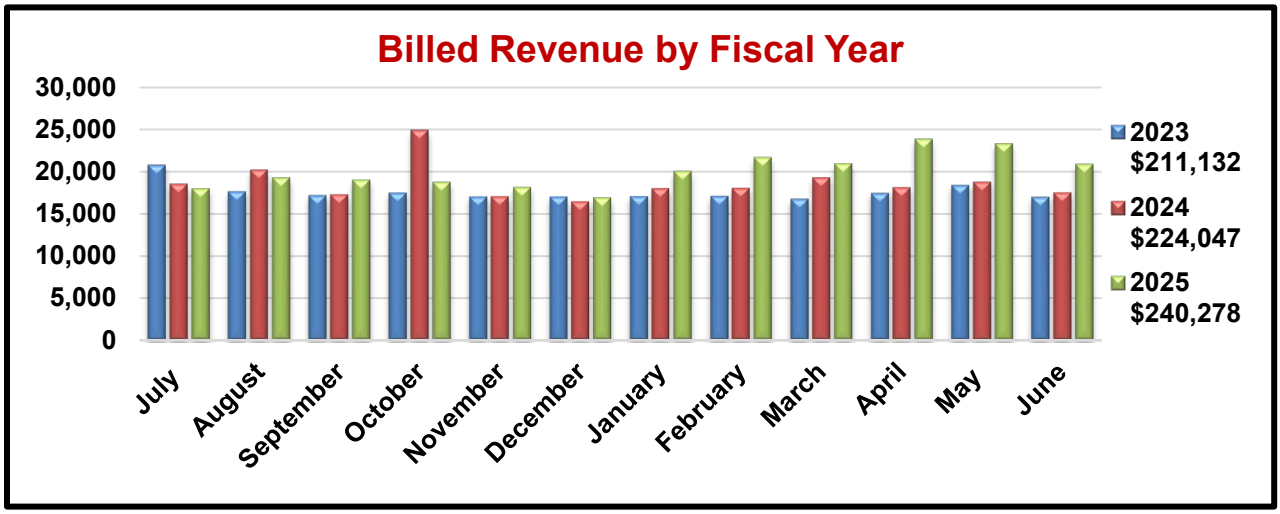
- One Epax E10 4K resolution resin 3D printer
- One Shapeoko XL CNC router
- Two Bambu labs X1 Carbon 3D printer for high speed and high-resolution prints
- Omtech 130-watt laser acrylic cutter 3x5 ft bed

Revenue/Expenses

FY25 Expenses: **Total $310,854**

FY24 Revenue: Total $300,278

- VP of Health Sciences Support: $60,000
- FY25 Revenue generated from services: $240,278

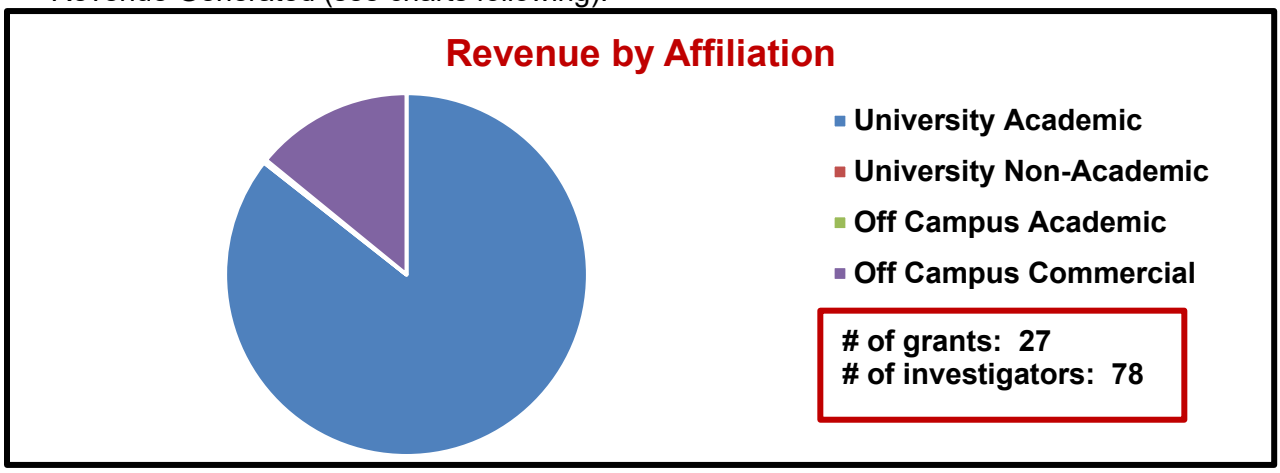


* Legend displays total annual revenue generated by year.

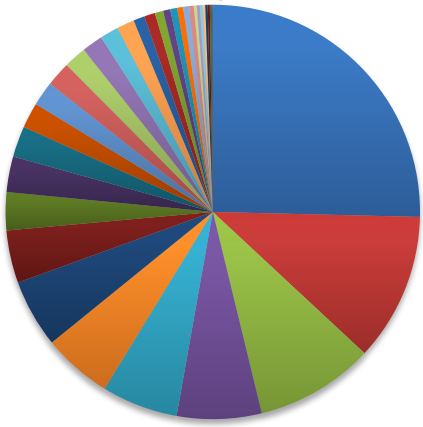
FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):



Revenue by Department



- Hospital Operating Room
- Hospital Surgical Services
- HCI
- College of Engineering
- HCH Radiation Oncology
- Neurobiology
- Ophthalmology/Visual Sciences
- Hospital Anesthesiology
- Orthopaedics
- Hospital Diagnostic Radiology
- Hospital Radiology
- Hospital Operating
- Hospital Carpenter Shop
- College of Pharmacy
- Pathology
- Hospital Capital Project
- Hospital Facilities Management
- Anesthesiology
- Surgery
- Hospital Rehab
- Office of Comparative Medicine
- College of Mines & Earth Sciences
- Pediatrics
- Molecular Medicine Program
- HSC Cores
- Neurology
- Hospital Disorder Clinic
- CVRTI
- Hospital Sterile Processing
- SVPHS Research
- Physcial Medicine & Rehabilitation
- College of Health
- Human Genetics
- Biochemistry

Top Users

1	Catherine Hiatt	Department
2	Utah's Hogle Zoo	Off Campus Academic
3	Dan Pectol	Department
4	Christine Haacke	HCH
5	Joey Henderson	Hospital Surgery Services
6	Jeffrey Yap	Department
7	Shiloh Myers	Department
8	Brian Dalley	Department
9	Darren Peacock	Department
10	Russ Maag	Department

Publications

No known publications acknowledged this facility in FY25.

Mass Spectrometry & Proteomics

Overview

The Mass Spectrometry & Proteomics Facility is geared toward supporting proteomics research as well as providing basic mass spectrometry (MS) support for a broad range of research and sample types. These include natural products, small synthetic molecules, peptides and large intact proteins. The facility is equipped with several high-performance mass spectrometers, including a Thermo Exploris480, a Bruker Maxis 2 with ETD and a Bruker timsTOF Pro 2. All are equipped with nano-LC/MS/MS for ultimate sensitivity and chromatographic performance. The mission of this facility is to provide the highest quality mass spectrometry analyses for protein and other biomolecule investigations. In July 2025, the Mass Spectrometry & Proteomics Facility hosted the first Utah Proteomics Affinity Group (UPAG) Summer Proteomics Workshop in collaboration with faculty at both University of Utah and BYU. The Mass Spectrometry & Proteomics Facility also continues to participate in coordinating monthly proteomics focused seminars with BYU through the UPAG organization.

Services

A range of proteomics and general mass spectrometry services are available. The following services are provided to investigators:

Proteomics Services:

- Protein ID from gel electrophoresis
- Protein ID from solution
- Protein ID from complex cell and tissue lysates in solution and IP pull-down experiments
- Identification of protein modifications/post-translational modifications
- Intact Protein MW analysis
- “Top-Down” and “Bottom-Up” proteomics
- Protein quantification analysis using TMT, SILAC, and label free strategies.
- Custom database searching
- Accurate protein mass measurement

General MS Services

- ESI-MS
- ESI-MS/MS
- LC/MS
- LC-MS/MS
- Special project/method development

Equipment

Mass Spectrometers

- Thermo Exploris480 for proteomics
- Bruker Maxis II HD for high mass accuracy intact protein and small molecule analysis.
- Bruker timsTOF Pro 2 for shotgun proteomics

HPLC Systems

- Agilent 1260 Preparative HPLC for MudPIT peptide preparation

Personnel

- James Cox Ph.D., Director
- Allison Manuel Ph.D., Associate Director

Advisory Board Committee

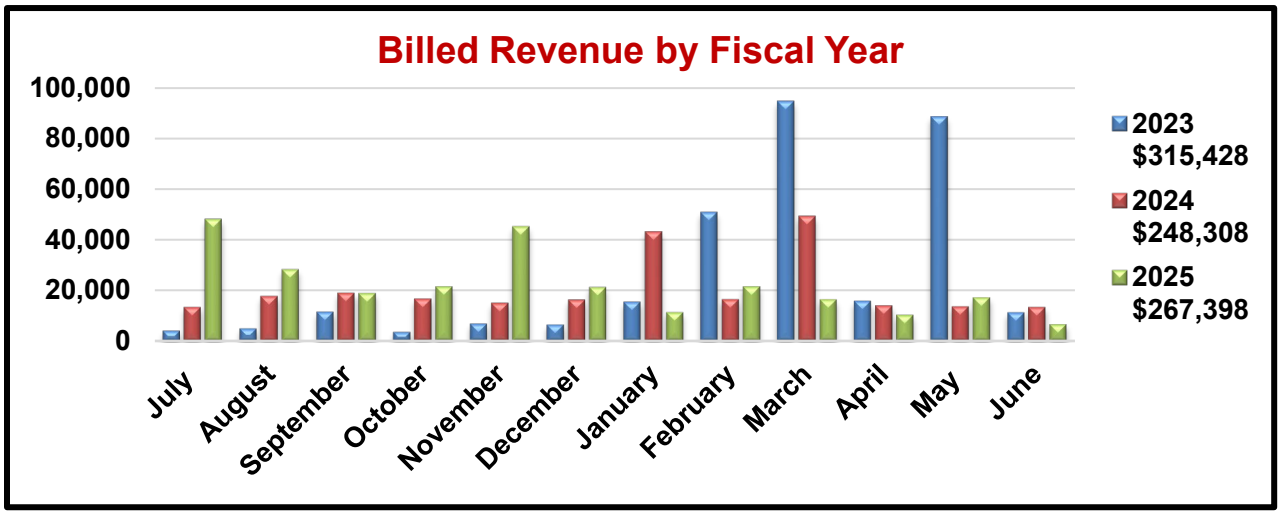
Last meeting date: September 20, 2024

- Chris Hill, DPhil. Professor, Biochemistry
- Hans Haecker, M.D., Ph.D., Professor, Pathology
- Sarah Franklin, Ph.D., Associate Professor, Internal Medicine
- Helena Safavi-Hemami, Ph.D., Assistant Professor, Biochemistry
- Martin Golkowski, Ph.D. Assistant Professor, Pharmacology and Toxicology

Revenue/Expenses

FY25 Expenses: **Total $1,015,393**
FY25 Revenue: **Total $691,359**

- VP of Health Sciences Support: $225,000
- Equipment Support: $198,961
- FY25 revenue generated from services: $267,398

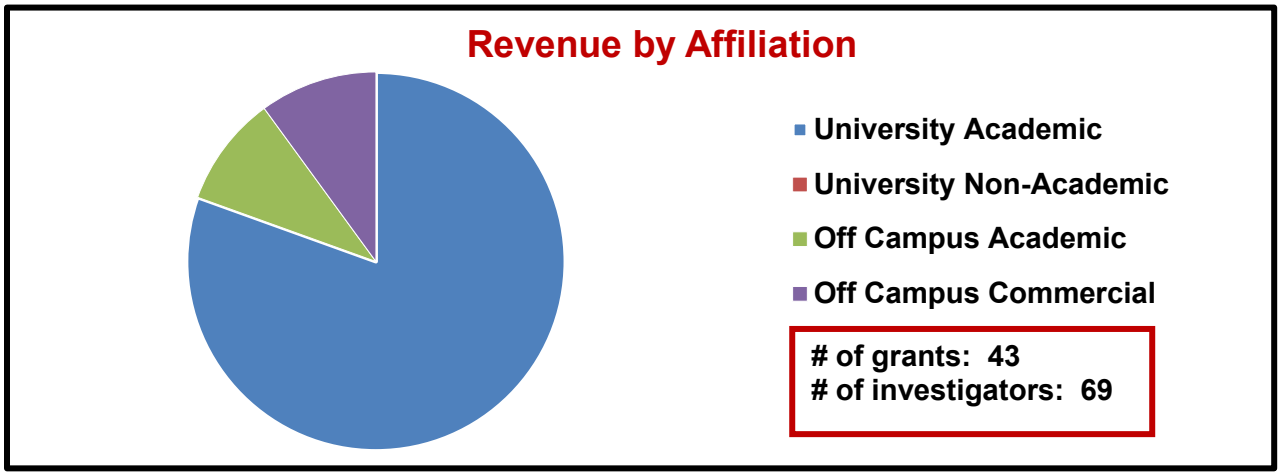


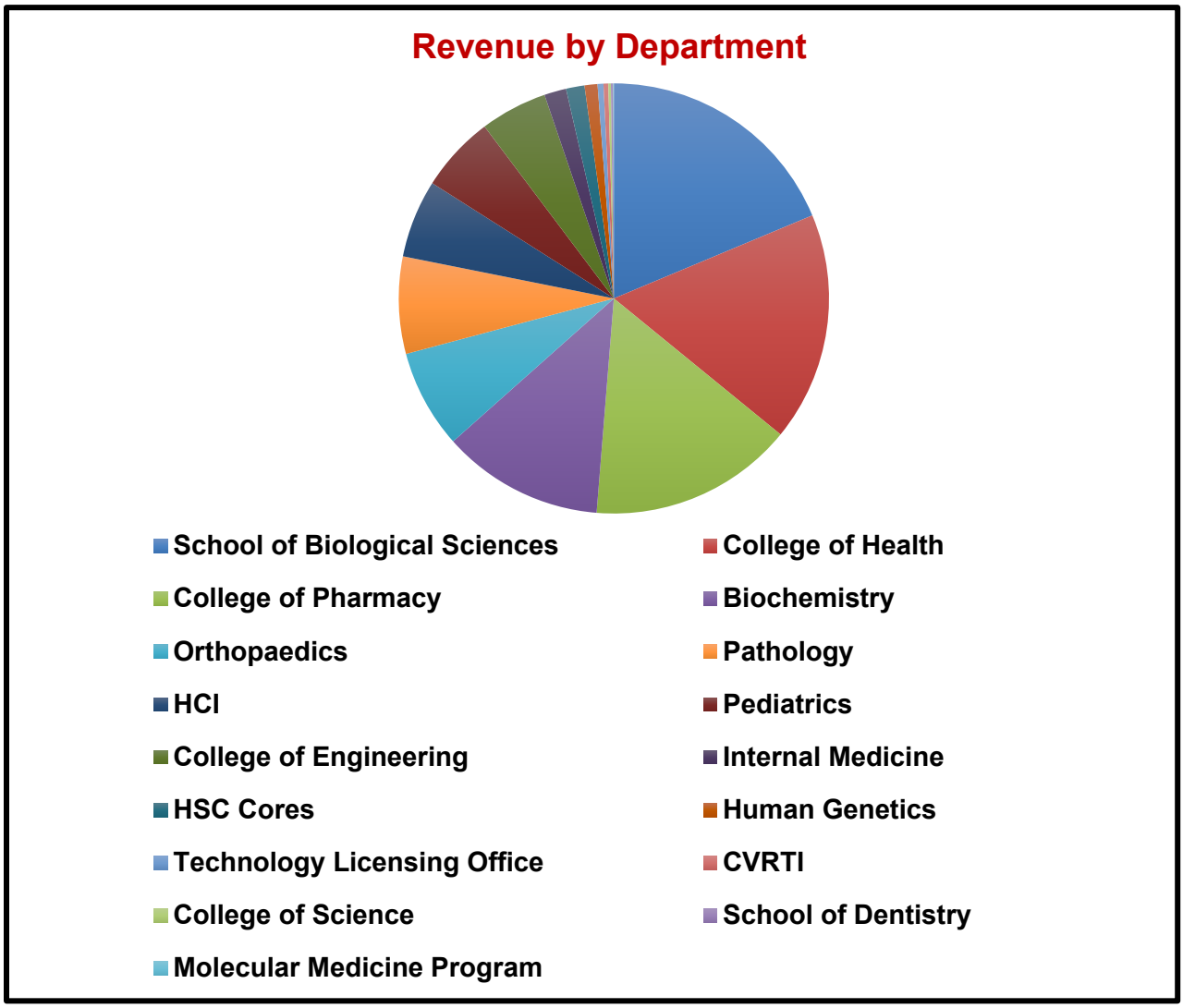
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Theodore Liou	Department
2	Katsuhiko Funai	NIH
3	Veteran Affairs Medical Center	Off Campus Academic
4	Justin Haller	Orthopaedic Trauma Association
5	Martin Golkowski	Department
6	3Helix	Off Campus Commercial
7	Scott Summers	NIH
8	Kent Lai	Department, NIH
9	Michael Yu	Anonymous
10	Helena Safavi-Hemami	Department, NIH, NOVO Nordisk A/S (1000)

Publications

1. Choi, R. H., T. Karasawa, C. A. Meza, J. A. Maschek, A. M. Manuel, L. S. Nikolova, K. H. Fisher-Wellman, J. E. Cox, A. Chaix and K. Funai (2025). Semaglutide-induced weight loss improves mitochondrial energy efficiency in skeletal muscle. Obesity (Silver Spring) 33(5): 974-985.10.1002/oby.24274
2. Brothwell, M. J., G. Cao, J. A. Maschek, A. M. Poss, A. D. Peterlin, L. Wang, T. B. Baker, J. L. Shahtout, P. Siripoksup, Q. J. Pearce, J. M. Johnson, F. M. Finger, A. Prola, S. A. Pellizzari, G. L. Hale, A. M. Manuel, S. Watanabe, E. R. Miranda, K. E. Affolter, T. S. Tippetts, L. S. Nikolova, R. H. Choi, S. T. Decker, M. Patil, J. L. Catrow, W. L. Holland, S. M. Nowinski, D. S. Lark, K. H. Fisher-Wellman, P. N. Mimche, K. J. Evason, J. E. Cox, S. A. Summers, Z. Gerhart-Hines and K. Funai (2025). Cardiolipin deficiency disrupts electron transport chain to drive steatohepatitis. bioRxiv.10.1101/2024.10.10.617517
3. Fleming, A. M., J. C. Dingman and C. J. Burrows (2024). CO(2) protects cells from iron-Fenton oxidative DNA damage in Escherichia coli and humans. Proc Natl Acad Sci U S A 121(49): e2419175121.10.1073/pnas.2419175121
4. Hughes, E. P., A. K. Manna, W. Sun, S. M. Osburn-Staker, S. Aamodt, K. J. Warren, J. E. Cox and D. Tantin (2025). Transcriptional co-regulator OCA-B/Pou2af1 restricts Th2 differentiation. Front Immunol 16: 1548636.10.3389/fimmu.2025.1548636
5. Marie Norris, Melanie Gillingham, Nicola Longo, Jeffrey Meeusen, Matthew Yim, Colin Maguire, Kaitlyn Bloom, Liping Wang, J Maschek, Ying Li, James Marvin, Quentinn Pearce, Allison Manuel, Linda Sandaklie-Nicolova, Christina Lam, Mary Playdon, Rachel Hoobler, Sara Salas, Ben Werbner, Sean Tatum, Jacob Taloa, Sharon Nejad, Sihem Boudina, Katsuhiko Funai, Trevor Tippetts, Jonathan Mahlow, Kyle Dunlap, Gregory Ducker, Jonathan Van Vranken, Jeremy Blitzer, Donna Romero, Ralph Deberardinis, Richard Proia, Jerry Vockley, William Holland, and Scott Summers. Inactivating lipotoxic ceramides to treat cardiomyopathy in long-chain fatty acid oxidation disorders. Circulation (*in review*)

Metabolic Phenotyping

Overview

The Metabolic Phenotyping Core (MPC) is a vital university resource offering standardized and high-quality metabolic and physiological tests for the phenotypic characterization of various organism models developed by UofU investigators. This invaluable resource supports research on human diseases such as diabetes, cardiovascular disorders, kidney diseases, neurological diseases, and cancer. The phenotyping tests include determining whole-body glucose metabolism and insulin sensitivity in animals through glucose and insulin tolerance tests and glucose clamps, assessing whole animal energy expenditure using the two indirect calorimetry systems (Promethion Core and Columbus Instrument's CLAMS/Oxymax system), and determining body composition with the Bruker Minispec NMR (LF90). Additionally, the MPC maps the metabolic phenotype of different cell types and tissues using Agilent-Seahorse XF analyzers. The MPC assists scientists in designing and optimizing phenotyping tests, aiming to expedite biomedical research by providing academic and non-academic researchers access to advanced metabolic phenotyping tests at a reasonable price.

Services

- Mitochondrial bioenergetics using an Agilent-Seahorse XF Pro and XFe 96 extracellular flux analyzers
- Assessment of energy balance in mice using both Promethion Core and CLAMS metabolic chambers
- Body composition (lean mass, fat mass, and fluid content) using Bruker Minispec NMR
- Determination of the calorific value of a solid/liquid sample using CAL3K-F bomb calorimeter from DDS Calorimeters
- Whole-body glucose metabolism and insulin sensitivity- glucose and insulin tolerance tests
- Quantification of free radicals using an electron spin resonance (ESR) spectrometer, ESR 5000, manufactured by Bruker
- Non-invasively measuring glomerular filtration rate (GFR) in real-time using the transdermal Mini GFR monitor from MediBeacon

Equipment

- Seahorse Flux Analyzer XF pro & XF_e96
- Sixteen Promethion Core metabolic chambers equipped with temperature-controlled enclosures, and 8 of the cages equipped with isotope analyzers.
- Eight Columbus Instruments CLAMS metabolic chambers equipped with running wheels and with the capability to measure core body temperature and heart rate.
- Bruker LF90 Minispec NMR
- CAL3K-F Bomb Calorimeter
- Bruker ESR 5000
- Transdermal Mini GFR Monitor (two sets)

Personnel

- Ying Li MD, PhD, Director
- Xue Yin, Laboratory Technician

Advisory Board Committee
Last meeting date: December 20, 2024

- Scott Summers Ph.D., Professor, Nutrition and Integrative Physiology
- Jared Rutter Ph.D., Professor, Biochemistry
- William Holland Ph.D., Associate Professor, Nutrition, and Integrative Physiology
- Katsuhiko Funai Ph.D., Associate Professor, Nutrition, and Integrative Physiology
- Amandine Chaix Ph.D., Assistant Professor, Nutrition and Integrative Physiology,
- James Cox Ph.D., Director HSC Cores

FY25 Annual Update

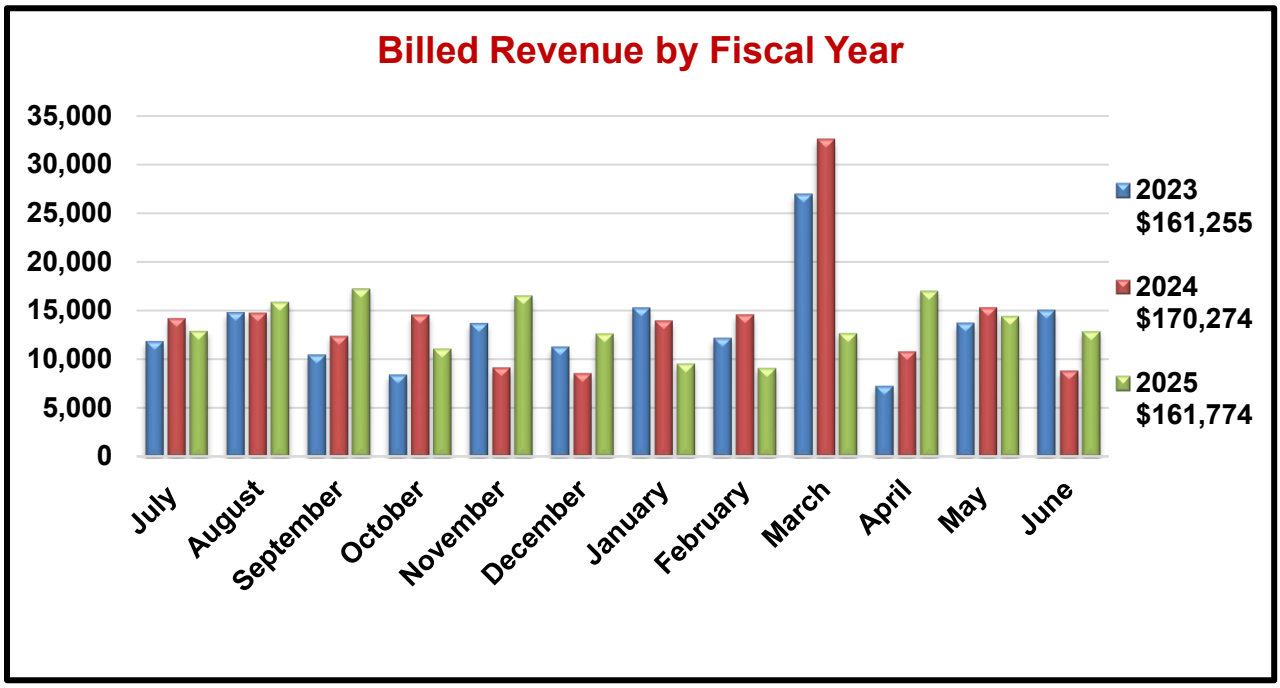
A new Promethion Metabolic Phenotyping System purchased through an NIH S10 grant is now in service.

The renovation of Room 162 is nearly complete, and the space will be ready for use third quarter FY25.

Revenue/Expenses

FY25 Expenses: **Total $305,403**
FY25 Revenue: Total $246,774

- VP of Health Sciences Support: $ 85,000
- FY25 revenue generated from services: $161,774

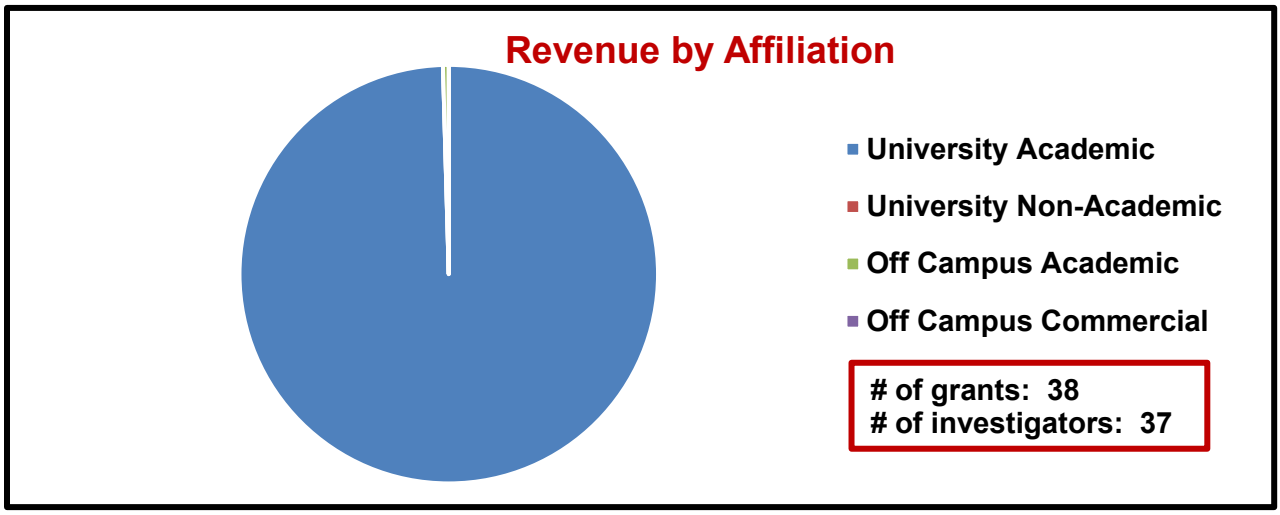


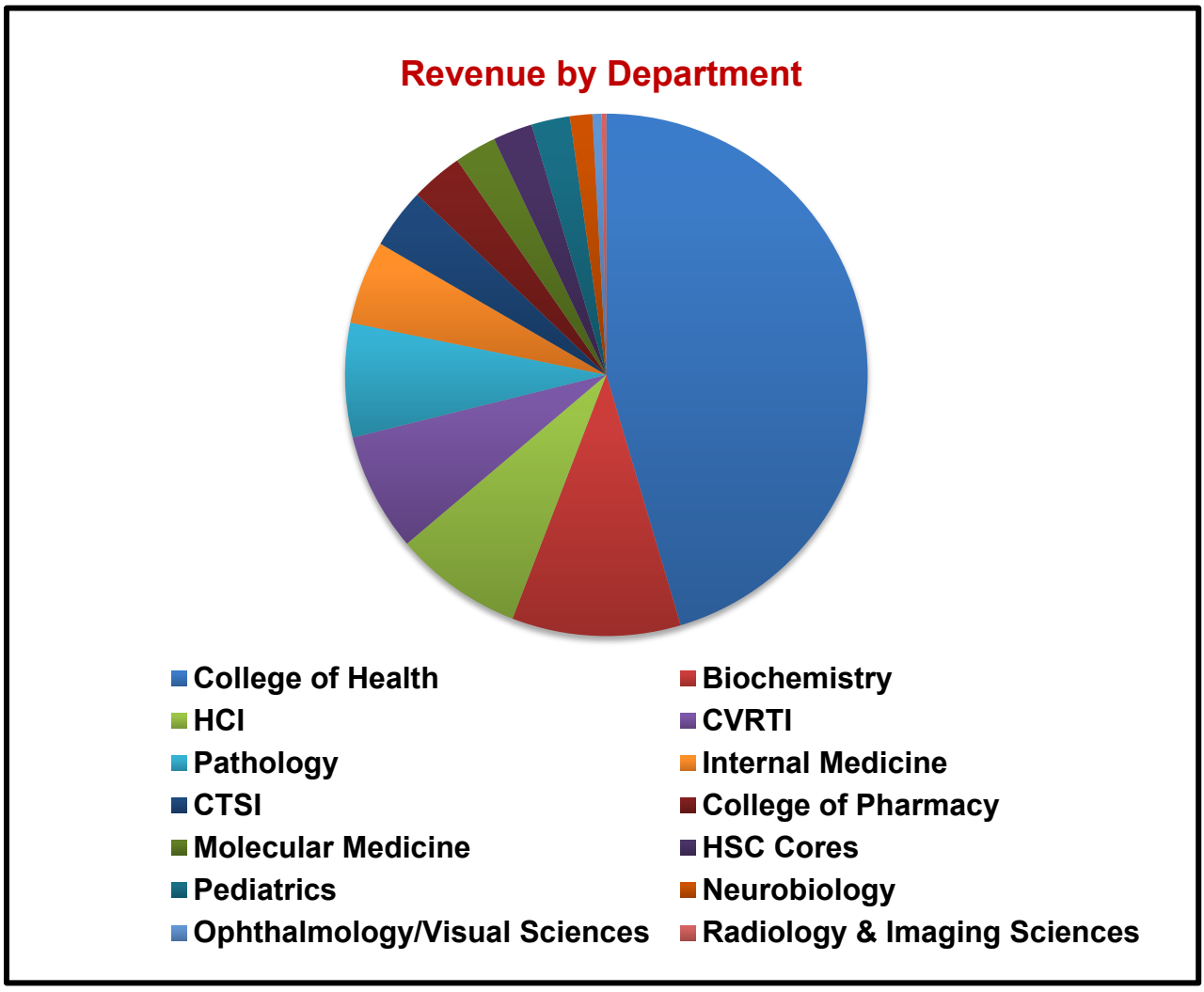
*Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Scott Summers	NIH
2	Jared Rutter	Chan Zuckerberg Initiative, Department, NIH
3	William Holland	American Diabetes Association, NIH
4	Keke Fairfax	NIH
5	Katsuhiko Funai	NIH
6	Sihem Boudina	Department
7	Willard Dere	Department
8	Amandine Chaix	Department
9	Micah Drummond	Department, NIH
10	Mei Yee Koh	NIH

Publications

1. Visker, J. R., A. A. Cluntun, J. N. Velasco-Silva, D. R. Eberhardt, L. Cedeno-Rosario, T. S. Shankar, R. Hamouche, J. Ling, H. Kwak, J. Y. Hillas, I. Aist, E. Tseliou, S. Navankasattusas, D. Chaudhuri, G. S. Ducker, S. G. Drakos and J. Rutter (2024). Enhancing mitochondrial pyruvate metabolism ameliorates ischemic reperfusion injury in the heart. JCI Insight 9(17).10.1172/jci.insight.180906

Metabolomics Facility

Overview

The Metabolomics Core at the University of Utah is a recognized leader in the field of metabolomics, lipidomics and metabolic tracer analysis. It was established 19 years ago with a mission to perform comprehensive global metabolomics and lipidomics analyses. Over the years Metabolomics Core has developed methods to analyze the metabolome and lipidome of a variety of biological systems and samples. The core is highly equipped with state-of-the-art equipment and expert staff. It provides both non-targeted analysis for biomarker discovery as well as targeted quantitation of metabolites for discovery validation. New, highly capable instrumentation has been acquired over the past several years to enhance our capabilities to perform these studies. No single method is fully capable of completely profiling the metabolome, to maximize the number of metabolites observed, the facility is equipped with two chemical analysis platforms, GC-MS and LC-MS.

Services

The primary mission of the facility is the metabolomics/lipidomics profiling of biological samples including serum, urine, tissues, *Drosophila*, *C. elegans*, yeast, and bacteria. The following metabolites can be analyzed from many biochemical pathways:

- Amino acids
- TCA cycle intermediates
- Organic acids including lactic acid and pyruvate
- Carbohydrates
- Nucleotides
- Lipids including sterols
- Di and tri peptides including glutathione
- Full lipid profiling by LC-MS
- Stable isotope label flux analysis by GC-MS

The facility processes samples using two distinct but overlapping procedures, a targeted analysis and a non-targeted analysis. The targeted analysis is used to search every chromatogram for known metabolites. The non-targeted analysis uses data mining software to detect chromatographic peaks that are altered in two different conditions. This procedure is done with Volcano Plots, Principle Components Analysis (PCA) and Partial Least Squares-Discriminate Analysis (PLS-DA).

Equipment

Chemical Analysis Platforms

- Two Agilent 5977B gas chromatograph-quadrupole mass spectrometers (GC-MS) for metabolic tracer analysis.
- Agilent 7200 gas chromatograph-quadrupole time of flight mass spectrometer (GC-QTOF-MS) for discovery metabolomics.
- Agilent 6545A Ultra Pressure Liquid Chromatograph-Quadrupole Time of Flight Mass-Spectrometer (UPLC-QToF-MS) for discovery lipidomics.
- Agilent 6545B Ultra Pressure Liquid Chromatograph-Quadrupole Time of Flight Mass-Spectrometer (UPLC-QTOF-MS) for discovery metabolomics.

- Agilent 6490 Triple quadrupole UPLC-MS for the targeted quantification of metabolites, lipids and peptides
- Sciex 6500 QTRAP Triple quadrupole UPLC-MS for the targeted quantification of metabolites, lipids and peptides
- Thermo QExactive Plus UPLC-MS for isotope tracer analysis.
- Sciex 7600 UPLC-QToF for metabolomics and lipidomics
- Sciex 7500+ UPLC-QQQ for targeted metabolomics and lipidomics quantification

Personnel

- James Cox, PhD, Director
- Alan Maschek, PhD, Associate Director
- Leon Catrow, PhD, Research Associate
- Quentinn Pierce, BS, Research Associate
- Jordan Reelitz, BS, Research Specialist
- Trevor Lonergan, BS, Research Specialist

Advisory Board Committee

Last meeting date: September 15, 2024

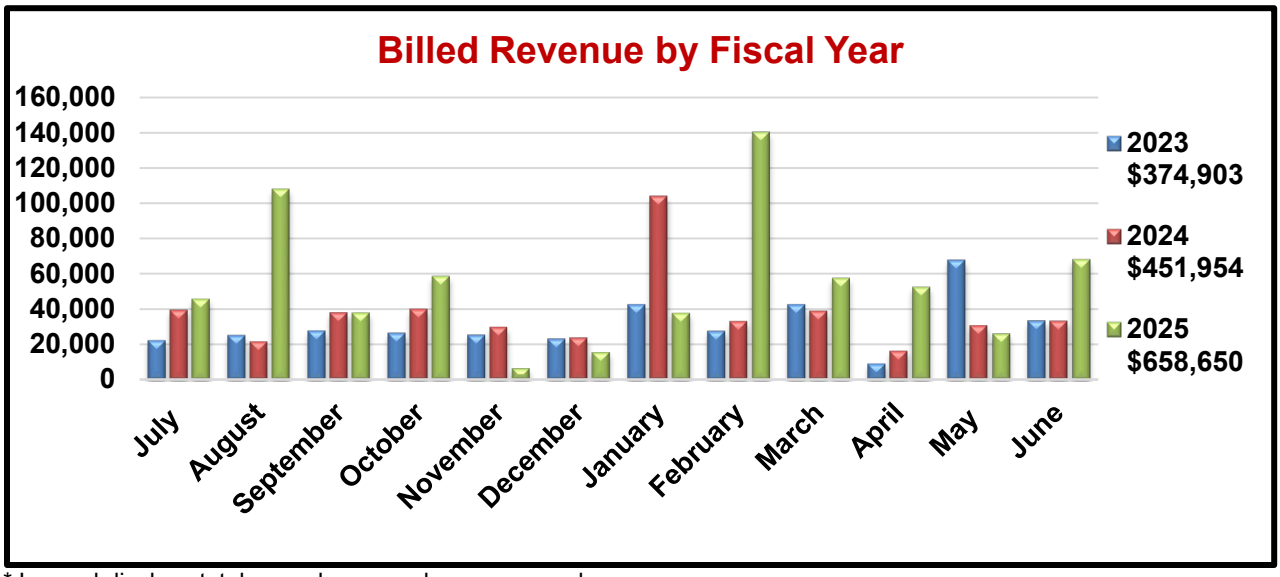
- Greg Ducker, PhD, Assistant Professor, Department of Biochemistry
- Keke Fairfax, PhD, Associate Professor, Department of Pathology
- William Holland, PhD, Associate Professor, Nutrition & Integrative Physiology
- Katsu Funai, PhD, Associate Professor, Nutrition & Integrative Physiology
- Jared Rutter, PhD, Professor, Department of Biochemistry

Revenue/Expenses

FY25 Expenses: **Total $2,120,980**

FY25 Revenue: **Total $2,092,195**

- VP of Health Sciences Support: $240,000
- Equipment Funds: $1,193,545
- FY25 Revenue generated from services: $658,650



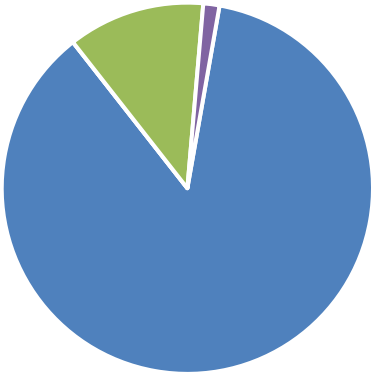
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):

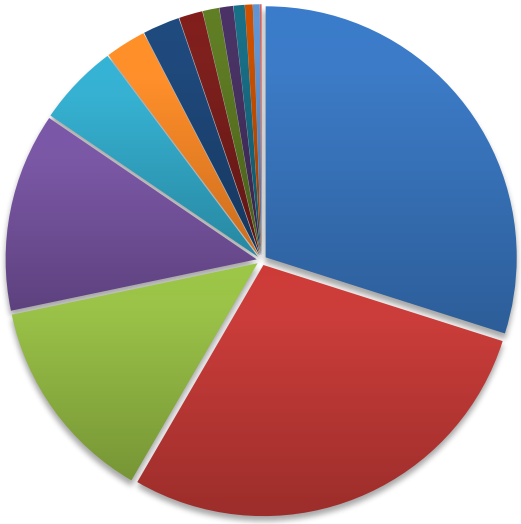
Revenue by Affiliation



- University Academic
- University Non-Academic
- Off Campus Academic
- Off Campus Commercial

# of grants: 42
# of investigators: 66

Revenue by Department



- HCI
- College of Health
- College of Pharmacy
- Biochemistry
- Family & Preventive Medicine
- Internal Medicine
- Ophthalmology/Visual Sciences
- CVRTI
- Pediatrics
- Pathology
- School of Biological Sciences
- Molecular Medicine
- College of Science
- CTSI

Top Users

1	Mary Playdon	Department, NIH
2	William Holland	American Diabetes Association, NIH
3	Joseph Rower	NIH
4	Scott Summers	Department, NIH
5	Gregory Ducker	Department, NIH
6	Kelly Baron	NIH
7	Jared Rutter	Calico Life Sciences LLC, Department
8	Neli Ulrich	NIH
9	Veterans Affairs	Off Campus Academic
10	Yale University	Off Campus Academic

Publications

1. Acuña-Pilarte, K., E. C. Reichert, Y. S. Green, L. M. Halberg, M. Golkowski, K. M. Maguire, P. N. Mimche, S. D. Kamdem, P. A. Hu, J. Wright, G. S. Ducker, W. P. Voth, R. M. O'Connell, S. A. McFarland, E. S. A. Egal, A. Chaix, S. A. Summers, J. W. Reelitz, J. A. Maschek, J. E. Cox, K. J. Evason and M. Y. Koh (2025). HAF prevents hepatocyte apoptosis and progression to MASH and HCC through transcriptional regulation of the NF-κB pathway. Hepatology 82(2): 438-453.10.1097/hep.0000000000001070
2. Andraska, E. A., F. Denorme, C. Kaltenmeier, A. Arivudainabi, E. P. Mihalko, M. Dyer, G. K. Annarapu, M. Zarisfi, P. Loughran, M. Ozel, K. Williamson, R. I. Mota Alvidrez, K. Thomas, S. Shiva, S. M. Shea, R. A. Steinman, R. A. Campbell, M. R. Rosengart and M. D. Neal (2025). Alterations in visible light exposure modulate platelet function and regulate thrombus formation. J Thromb Haemost 23(1): 123-138.10.1016/j.jtha.2024.08.020
3. Choi, R. H., T. Karasawa, C. A. Meza, J. A. Maschek, A. M. Manuel, L. S. Nikolova, K. H. Fisher-Wellman, J. E. Cox, A. Chaix and K. Funai (2025). Semaglutide-induced weight loss improves mitochondrial energy efficiency in skeletal muscle. Obesity (Silver Spring) 33(5): 974-985.10.1002/oby.24274
4. Cohen, A. J., W. R. Chidester, D. T. Wray, N. Jessen, A. Jones, C. Bitsui, J. Zhao, J. A. Maschek, J. E. Cox, C. R. Martin and L. A. Joss-Moore (2025). Docosahexaenoic Acid Supplementation in Postnatal Growth Restricted Rats Does Not Normalize Lung Function or PPARgamma Activity. Biomolecules 15(4).10.3390/biom15040551
5. Duerre, D. J., J. K. Hansen, S. V. John, A. Jen, N. D. Carrillo, H. Bui, Y. Bao, M. Fabregat, J. L. Catrow, L. Y. Chen, K. A. Overmyer, E. Shishkova, Q. Pearce, M. P. Keller, R. A. Anderson, V. L. Cryns, A. D. Attie, J. E. Cox, J. J. Coon, J. Fan and A. Galmozzi (2025). Haem biosynthesis regulates BCAA catabolism and thermogenesis in brown adipose tissue. Nat Metab 7(5): 1018-1033.10.1038/s42255-025-01253-6
6. Fasteen, T. D., M. R. Hernandez, R. A. Policastro, M. C. Sterrett, G. E. Zenter and J. M. Tennessen (2025). The Drosophila estrogen-related receptor promotes triglyceride storage within the larval fat body. J Lipid Res 66(6): 100815.10.1016/j.jlr.2025.100815
7. Naderi, J., A. K. Johnson, H. Thakkar, B. Chandravanshi, A. Ksiazek, A. Anand, V. Vincent, A. Tran, A. Kalimireddy, P. Singh, A. Sood, A. Das, C. L. Talbot, I. A. Distefano, J. A. Maschek, J. Cox, Y. Li, S. A. Summers, D. J. Atkinson, T. Turapov, J. A. Ratcliff, J. Fung, A. Shabbir, M. Shabeer Yassin, S. T. E. Shiow, W. L. Holland, G. S. Pitt and B. Chaurasia (2025). Ceramide-induced FGF13 impairs systemic metabolic health. Cell Metab 37(5): 1206-1222 e1208.10.1016/j.cmet.2025.03.002
8. Sanchez, S. E., T. J. Chiarelli, M. A. Park and J. A. Carlyon (2024). Orientia tsutsugamushi infection reduces host gluconeogenic but not glycolytic substrates. Infect Immun 92(11): e0028424.10.1128/iai.00284-24
9. Taiwo, A., R. A. Merrill, L. Wendt, D. Pape, H. Thakkar, J. A. Maschek, J. Cox, S. A. Summers, B. Chaurasia, N. Pothireddy, B. B. Carlson, A. Sanchez, P. Ten Eyck, D. Jalal, A. Dokun, E. B. Taylor and W. I. Sivitz (2025). Metabolite perturbations in type 1 diabetes associated with metabolic dysfunction-associated steatotic liver disease. Front Endocrinol (Lausanne) 16: 1500242.10.3389/fendo.2025.1500242
10. Verma, S., S. D. Giagnocavo, M. C. Curtin, M. Arumugam, S. M. Osburn-Staker, G. Wang, A. Atkinson, D. A. Nix, D. H. Lum, J. E. Cox and K. I. Hilgendorf (2024). Zinc-alpha-2-glycoprotein Secreted by Triple-Negative Breast Cancer Promotes Peritumoral Fibrosis. Cancer Res Commun 4(7): 1655-1666.10.1158/2767-9764.CRC-24-0218

Mutation Generation & Detection Facility

Overview

The Mutation Generation & Detection (MGD) Core Facility supports researchers by providing access to the latest DNA nuclease technologies, reagents, and optimized protocols for targeted genome modification. The MGD Core specializes in delivering customized CRISPR reagents for gene editing across multiple model systems, including but not limited to *M. musculus*, *D. rerio*, *D. melanogaster*, *C. elegans*, *S. cerevisiae*, and mammalian cell lines. Beyond reagent production, the MGD Core has established valuable partnerships with the Transgenic & Gene Targeting (TG) Mouse Core Facility, the Drug Discovery Core, and the Cellular Translational Research Core, supporting the creation of engineered mouse models, immortalized cell lines, and human stem cell lines, respectively. The Core also offers key molecular services such as custom genotyping, High Resolution Melt Analysis (HRMA), CRISPR validation, homology-directed repair donor template synthesis, custom cloning, and targeted sequencing. To date, the MGD Core has contributed to the research progress of over 100 laboratories worldwide by providing more than 500 unique reagents.

Main Services

CRISPR Services

- CRISPR sgRNA
- High fidelity Cas9 protein
- Custom CRISPR plasmid design and construction
  - CRISPRa, CRISPRi, AAV, Cas12a and other CRISPR based technologies
- Delivery of CRISPR reagents to cells

High Resolution Melt Analysis

- HRMA PCR plates (10 pack)
- HRMA PCR sealing film (10 pack)
- Mineral Oil (500ml bottle)
- HRMA Training
- Help with optimization and analysis of HRMA assays
- Custom Mutation Detection upon request

Genotyping Services

- Custom RFLP genotyping of mutant and transgenic mice
- Detection of transgene insertion
- Custom HRMA genotyping
- Sequence verification of genome edits

Other Services

- Custom cloning of mammalian and bacterial expression vectors
- Custom cloning of homology directed repair vectors
- Plasmid purification services
- Short ssDNA homology directed repair donor design and production
- Long ssDNA homology directed repair design and production
- Production of CRISPR constructs for generating transgenic *D. melanogaster*
- Mouse model generation (partnership with TG Mouse Core Facility)
- Blastocyst validation of CRISPR reagents (partnership with TG Mouse Core Facility)
- Generation of modified cell lines (partnership with Drug Discovery Core)
- Generation of modified human stem cell lines (partnership with Cellular Translational Research Core)

Equipment

- BioFire LightScanner
- 1X Eppendorf Mastercycler ProS
- Eppendorf centrifuge 5430
- 2X Eppendorf 5424 microcentrifuges
- Innova 43 bacterial shaker
- Innova 42 bacterial shaker
- Frigidaire -20°C freezer
- Lonza 4D Nucleofector system:
  - 4D-Nucleofector Core Unit
  - 4D-Nucleofector X Unit
  - 4D-Nucleofector Y Unit
  - 4D-Nucleofector 96-well Shuttle
- CCI biological safety cabinet
- NapCo Model 6300 CO_2 incubator
- ThermoFisher TSX600 -80 ºC freezer
- Sorvall RT 6300 centrifuge

Personnel

- Crystal Davey, Ph.D., Director
- Lilian Hayes, B.S., Lab Technician

Advisory Board Committee

Last meeting date: December 17, 2024

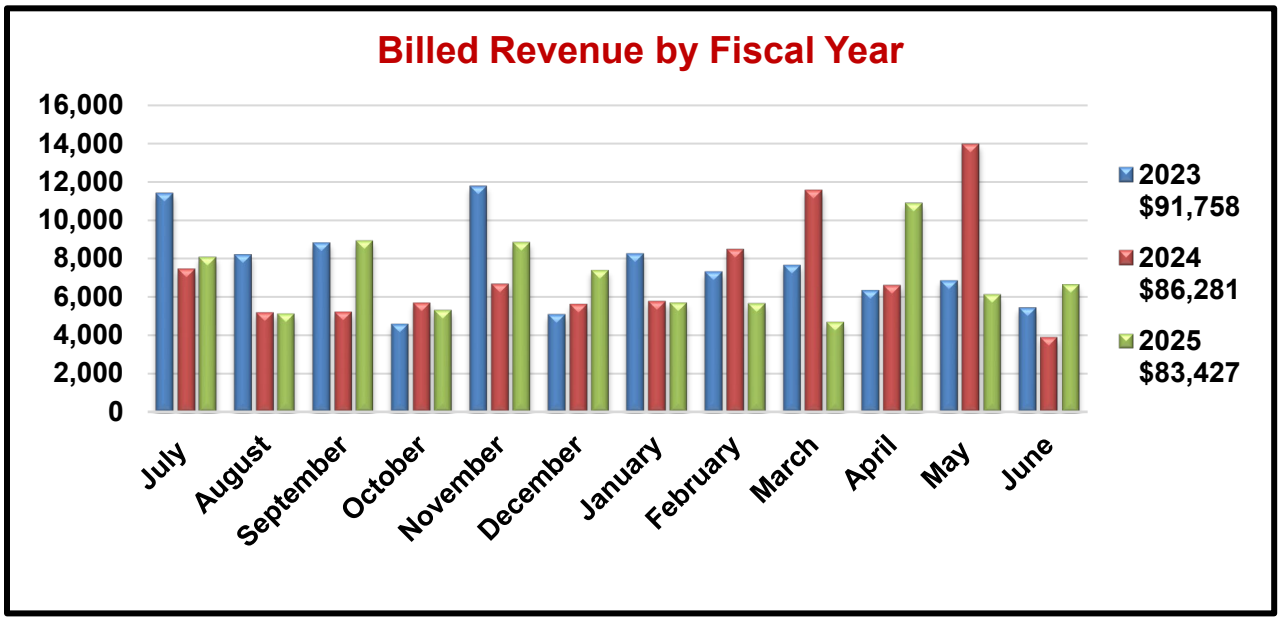
- David Grunwald, Ph.D., Professor, Department of Human Genetics (Senior Faculty Advisor)
- Christopher Gregg, Ph.D., Professor, Department of Neurobiology & Anatomy
- Lewis Charles Murtaugh, Ph.D., Associate Professor, Department of Human Genetics
- Yang Liu, Ph.D., Assistant Professor, Department of Biochemistry

Revenue/Expenses

FY25 Expenses: **Total $147,526**

FY25 Revenue: **Total $153,427**

- VP of Health Sciences Support: $70,000
- FY25 Revenue generated from services: $83,427

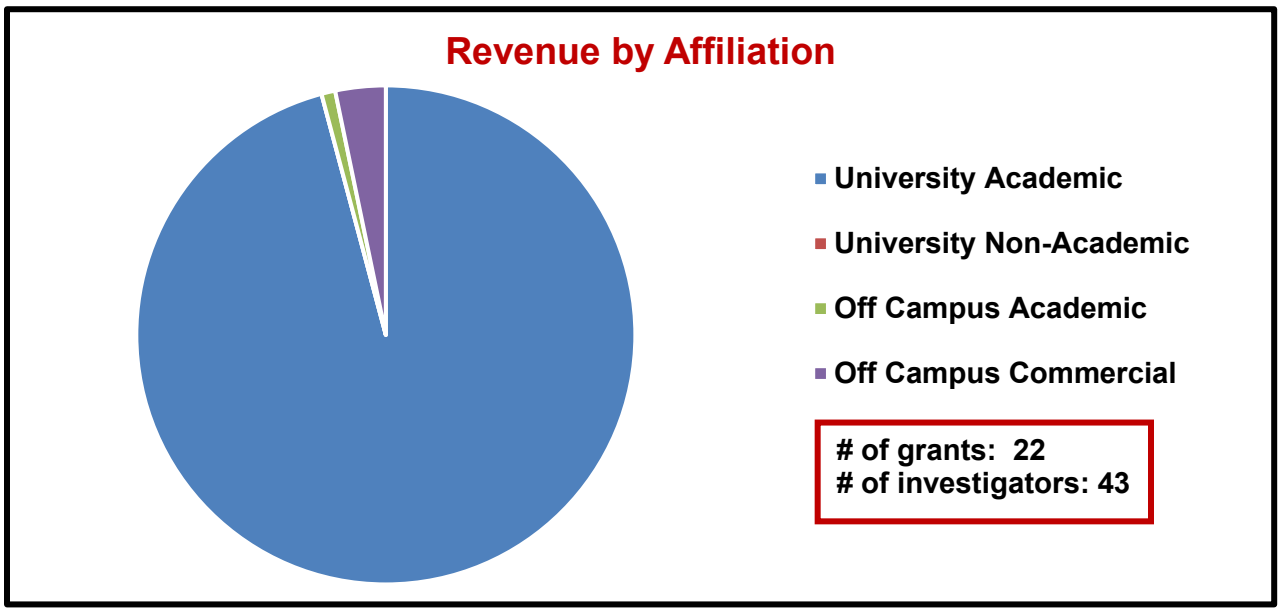


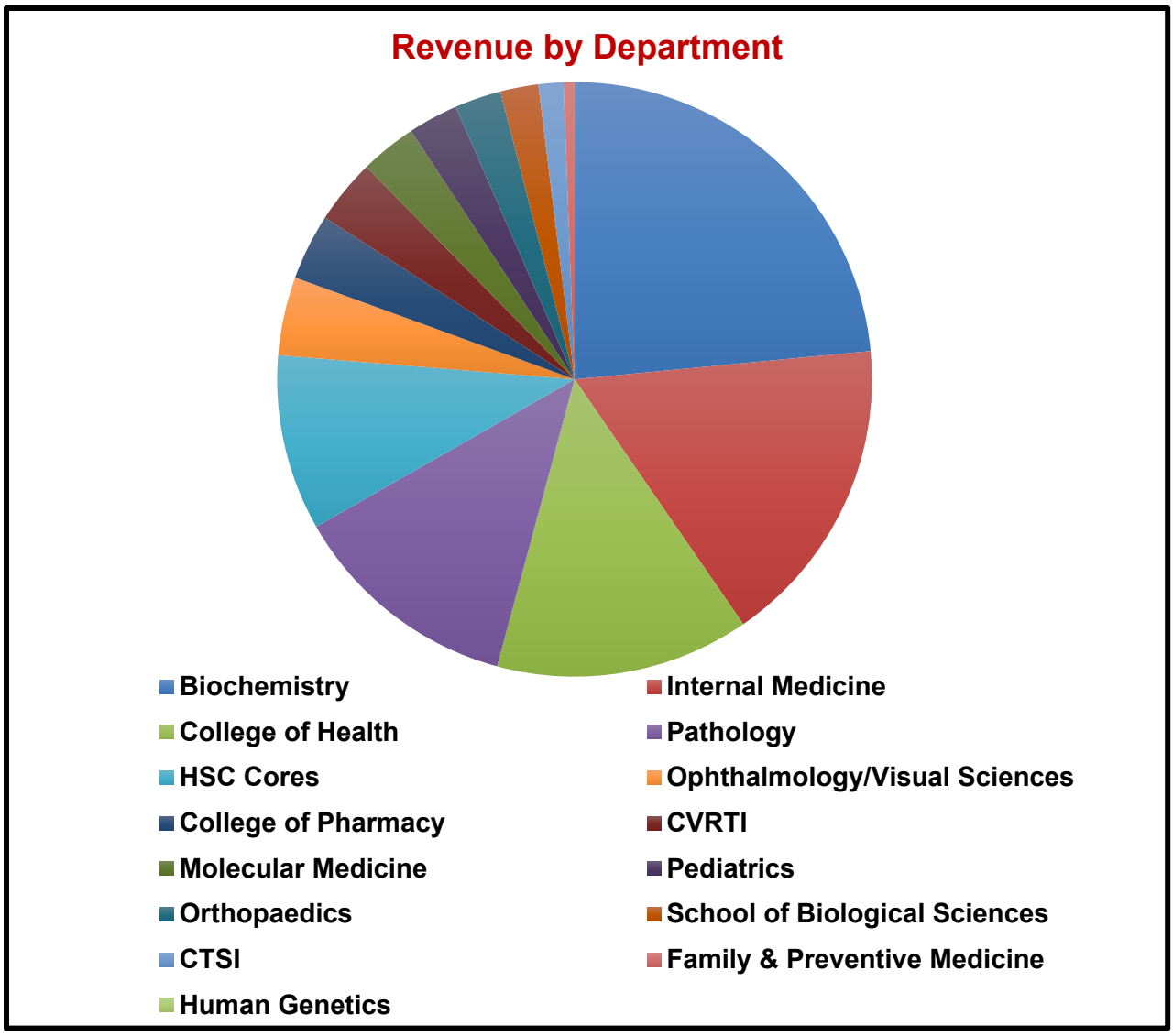
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Christopher Gregg	NIH
2	Jared Rutter	Chan Zuckerberg Initiative, Department
3	Maria Bettini	Department
4	Bai Luo	Department
5	Matt Wachowiak	NIH, University of Colorado Boulder
6	Yang Liu	NIH
7	Sungjin Park	Department
8	Neli Ulrich	NIH
9	Alejandro Sanchez	HCI
10	William Holland	Department

Collaboration and Support of Other HSC and University Facilities:

DNA Sequencing Facility

The MGD Core spent $12,610 with the DNA Sequencing Core in FY25.

DNA Peptide Facility

The MGD Core spent $3,948 with the DNA/Peptide Synthesis Core in FY25.

Mouse Transgenic Facility

During FY25 the MGD Core's partnership with the Mouse Transgenic Facility to produce custom mouse models brought in 11 different projects to the Mouse Transgenic Facility totaling $62,120 in chargebacks for that facility.

Total FY25 chargeback impact of the MGD Core on other University Core Research facilities is $78,678.

Non-billable Invoice Hours

One of the central purposes of the MGD Core is to serve as an educational resource for researchers at the University of Utah. The Core fulfills this role through formal avenues, such as departmental seminars delivered across campus. However, the primary mode of education provided by the MGD Core is through informal, one-on-one, in-person communication with researchers. While these interactions were previously tracked, the Core discontinued formal tracking in FY16 due to their frequency and unpredictability. Based on earlier data, the MGD Core estimates that it spends approximately 250–300 hours per year in direct engagement with researchers.

Letters of Support

Written and provided to faculty and trainees for support of grant applications:

1. Dr. Hans Haecker's proposal to generate the IRF8-Y110F mouse line for analysis of stress hematopoiesis, September 2024.
2. Dr. Thankhoe Rants'o's Postdoctoral Fellowship ACA proposal entitled "DAPK3 Drives Hepatocellular Carcinoma Cell Polarity Switching and Invasion," September 2024.
3. Dr. Charles Murtaugh's R03 proposal, "One Cell, One Cancer: A Novel Genetic Approach to Mouse Models of Human Cancer Initiation," October 2024.
4. Dr. Laith Al-Rabadi's ASN grant application, November 2024.
5. Dr. Maira Bettini's grant, "Cholesterol Metabolism in Regulatory T Cell Function," November 2024.
6. Dr. Kimberley Evason and Dr. Ryan O'Connell's NIH/NCI R01 grant, "Understanding and Targeting miR-21 in Hepatocellular Carcinoma," November 2024.
7. Dr. Jonathan Constance's grant, "Prescription Opioid-Induced Epigenetic Changes in ALL and AML Affecting Chemotherapeutic Response," January 2025.
8. Dr. Christopher Reilly's proposal to generate humanized TRPV3 mouse models, November 2024.
9. PhD candidate Omid Tavakoli-Rouzbehani's F31 application, April 2025.
10. Dr. Lisa M. Abegglen's NCI Program Project Grant, May 2025.
11. Dr. Sungjin Park's proposal to generate a HaloTag-Hapln4 knock-in line, May 2025.
12. Dr. Minna Roh-Johnson's NIGMS R01 application, June 2025.

Publications

1. Acuna-Pilarte, K., E. C. Reichert, Y. S. Green, L. M. Halberg, M. Golkowski, K. M. Maguire, P. N. Mimche, S. D. Kamdem, P. A. Hu, J. Wright, G. S. Ducker, W. P. Voth, R. M. O'Connell, S. A. McFarland, E. S. A. Egal, A. Chaix, S. A. Summers, J. W. Reelitz, J. A. Maschek, J. E. Cox, K. J. Evason and M. Y. Koh (2025). HAF prevents hepatocyte apoptosis and progression to MASH and HCC through transcriptional regulation of the NF-kappaB pathway. Hepatology 82(2): 438-453.10.1097/HEP.0000000000001070
2. Barnea-Zohar, M., M. Stein, N. Reuven, S. Winograd-Katz, S. Lee, Y. Addadi, E. Arman, J. Tuckermann, B. Geiger and A. Elson (2024). SNX10 regulates osteoclastogenic cell fusion and osteoclast size in mice. J Bone Miner Res 39(10): 1503-1517.10.1093/jbmr/zjae125

3. Cowley, J. M., C. E. Deering-Rice, J. G. Lamb, E. G. Romero, M. Almestica-Roberts, S. N. Serna, L. Sun, K. E. Kelly, R. T. Whitaker, J. Cheminant, A. Venosa and C. A. Reilly (2025). Pro-inflammatory effects of inhaled Great Salt Lake dust particles. Part Fibre Toxicol 22(1): 2.10.1186/s12989-025-00618-9
4. Fuentes, R., F. L. Marlow, E. W. Abrams, H. Zhang, M. Kobayashi, T. Gupta, L. D. Kapp, Z. DiNardo, R. Heller, R. Cisternas, P. Garcia-Castro, F. Segovia-Miranda, F. Montecinos-Franjola, W. Vought, C. E. Vejnar, A. J. Giraldez and M. C. Mullins (2024). Maternal regulation of the vertebrate oocyte-to-embryo transition. PLoS Genet 20(7): e1011343.10.1371/journal.pgen.1011343
5. Garcia-Guerrero, A. E., R. G. Marvin, A. M. Blackwell and P. A. Sigala (2025). Biogenesis of Cytochromes c and c(1) in the Electron Transport Chain of Malaria Parasites. ACS Infect Dis 11(4): 813-826.10.1021/acsinfecdis.4c00450
6. Kim, H. S., M. L. Sanchez, J. Silva, H. L. Schubert, R. Dennis, C. P. Hill and J. L. Christian (2025). Mutations that prevent phosphorylation of the BMP4 prodomain impair proteolytic maturation of homodimers leading to lethality in mice. Elife 14.10.7554/eLife.105018
7. Niazi, A., J. A. Kim, D. K. Kim, D. Lu, I. Sterin, J. Park and S. Park (2025). Microvilli control the morphogenesis of the tectorial membrane extracellular matrix. Dev Cell 60(5): 679-695 e678.10.1016/j.devcel.2024.11.011
8. Tanaka, M., L. Lum, K. H. Hu, P. Chaudhary, S. Hughes, C. Ledezma-Soto, B. Samad, D. Superville, K. Ng, A. Chumber, C. Benson, Z. N. Adams, K. Kersten, O. A. Aguilar, L. Fong, A. J. Combes, M. F. Krummel and M. Q. Reeves (2025). Tumor cell heterogeneity drives spatial organization of the intratumoral immune response. J Exp Med 222(6).10.1084/jem.20242282
9. Zhong, M. L. and K. Lai (2025). AAV-based gene replacement therapy prevents and halts manifestation of abnormal neurological phenotypes in a novel mouse model of PMM2-CDG. Gene Ther 32(3): 246-254.10.1038/s41434-025-00525-w
10. Zimmerman, E., A. Sturrock, C. A. Reilly, K. L. Burrell-Gerbers, K. Warren, M. Mir-Kasimov, M. A. Zhang, M. S. Pierce, M. N. Helms and R. Paine, 3rd (2024). Aryl Hydrocarbon Receptor Activation in Pulmonary Alveolar Epithelial Cells Limits Inflammation and Preserves Lung Epithelial Cell Integrity. J Immunol 213(5): 600-611.10.4049/jimmunol.2300325

Nuclear Magnetic Resonance

Overview
Nuclear Magnetic Resonance (NMR) is a highly versatile tool for studying molecules, providing insights into their structure, dynamics, and interactions in the diverse fields of chemistry, biology, medicine and material sciences. With its ability to provide detailed atomic resolution information, NMR is a unique tool for studying proteins, nucleic acids, polysaccharides, and small molecules. This core requires basic to advanced training prior to use of our high field NMR spectrometers. Researchers will independently prepare NMR samples, setup experiment parameters, and collect and analyze data. A formal NMR course is occasionally offered. The facility director has 35+ years of experience using NMR in structural biology, enzyme dynamics, protein-ligand interactions, and protein biochemistry; facility director for 22+ years. External to the University of Utah, the NMR facility will share our resources with other Utah universities, colleges, and not-for-profit and for-profit companies. Finally, the University of Utah is a full member of the Rocky Mountain NMR Consortium that allows access to the Colorado 900 MHz at Anschutz Medical Campus in Denver, Colorado. NMR spectrometers and capabilities are detailed below.

Varian INOVA 600 MHz NMR spectrometer. This instrument is our work horse for NMR of proteins, peptides, natural products, and samples having low concentrations. NMR training and advance reservation is required. Varian INOVA console with three full radio frequency (RF) channels, a dedicated ^{2}H decoupling accessory, and Z-axis PFG capability. Four probes, **1)** Varian Mark-2 5 mm triple resonance (^{1}H,^{13}C,^{15}N) cryogenic probe, Proton S/N is 4800/1, **2)** Nalorac 5 mm triple resonance (^{1}H,^{13}C,^{15}N) room temperature (RT) probe, **3)** Nalorac 8 mm triple resonance (^{1}H,^{13}C,^{15}N) RT probe, **4)** Nalorac 5 mm quad resonance (^{1}H,^{13}C,^{15}N,^{31}P) RT probe.

Varian INOVA 500 MHz spectrometer. This instrument is used for NMR of chemistry, peptides, natural products, x-detection. NMR training and advance reservation is required. Varian INOVA console has three full radio frequency (RF) channels and dedicated ^{2}H decoupling accessory. Three probes with Z-axis PFG capability, **1)** 5 mm Nalorac triple resonance HCN (^{1}H,^{13}C,^{15}N) RT probe, **2)** 5 mm Nalorac triple resonance HXC (^{1}HX=50-203 MHz,^{13}C), **3)** and a 3 mm Nalorac MDBG500 Dual Broadband (^{1}H/^{19}F, X=50-203 MHz).

Varian MERCURY 400 MHz spectrometer. Console with three full RF channels. Equipped with 4NG400-5+ 5 mm four nuclei (^{1}H,^{19}F,^{31}P,^{13}C) RT probe with PFG capability and direct detection of ^{1}H, ^{13}C, ^{19}F, and ^{31}P. NMR training and advance reservation is required.

Rocky Mountain NMR Consortium Varian 900 MHz NMR spectrometer. We are full members of the Rocky Mountain NMR consortium and have access to a Varian DirectDrive 900 housed at University of Colorado Anschutz Medical Campus in Denver. This instrument is "fully loaded" and includes four complete RF channels, XYZ-axis Pulsed Field Gradient, and salt-tolerant and carbon-enhanced triple resonance cryogenic probe. Remote data collection is through a secure network portal. The instrument is used primarily for NOESY and TROSY based experiments for protein structure determination. Proton signal/noise is 7500/1. Advance reservation is required. Director will coordinate with Colorado and lead the data collection.

Services

- NMR consultation
- NMR data collection and analysis
- NMR project collaboration
- Basic and advanced NMR training for individuals and groups
- Formal course in NMR spectroscopy

Equipment

- Varian Mercury 400 MHz NMR (University of Utah)
- Varian Inova 500 MHz NMR (University of Utah)
- Varian Inova 600 MHz NMR with HCN cryogenic probe (University of Utah)
- Varian DD2 900 MHz NMR with HCN cryogenic probe (University of Colorado Anschutz Medical Campus)

Personnel

- Jack Skalicky, Ph.D., NMR Core Director, Research Associate Professor of Biochemistry
- Derek Schlotfeldt, NMR Technician

Advisory Board Committee

Last updates: July 2024.

- Darrell Davis Ph.D., Department of Medicinal Chemistry
- Eric Schmidt Ph.D. Department of Medicinal Chemistry
- Jaclyn Winter Ph.D., Department of Pharmacology and Toxicology
- Jessica Kramer Ph.D., Department of Bioengineering

FY25 Annual Update

New Equipment

- Installed newest version (v3.2) of openVnmrJ software
- New Agilent IDP-7 scroll pump

New Services

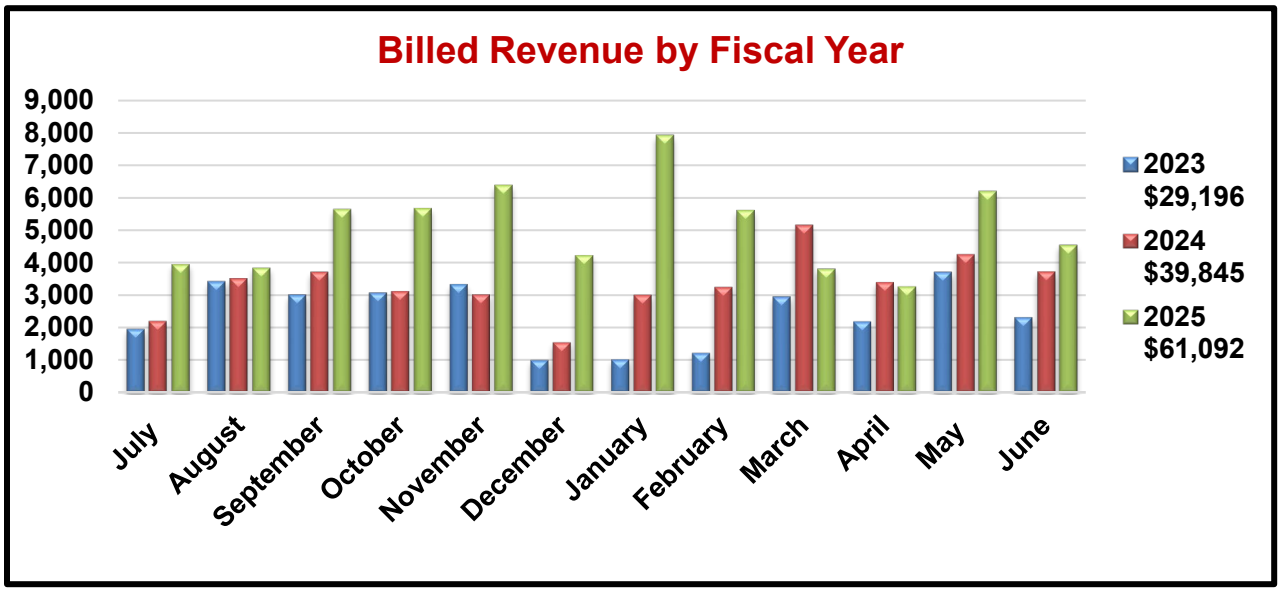
- The NMR Facility did not implement additional services in FY25

Revenues/Expenses

FY25 Expenses: **Total $107,723**

FY25 Revenue: **Total $131,092**

- VP of Health Sciences Support: $70,000
- FY25 Revenue generated from services: $61,092

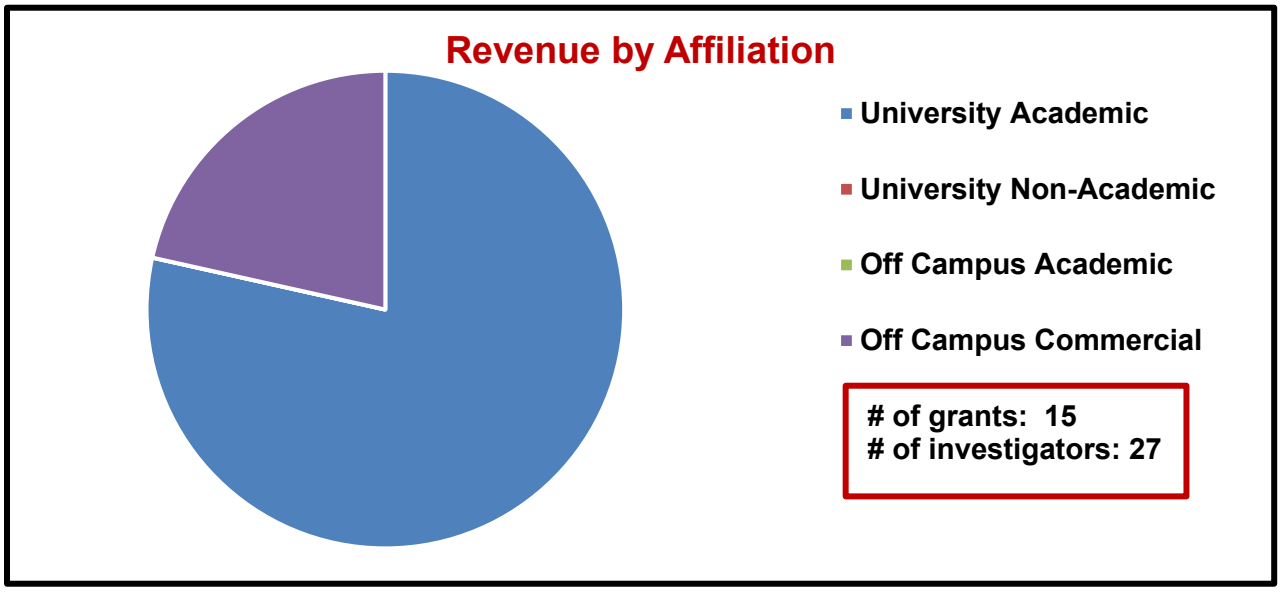


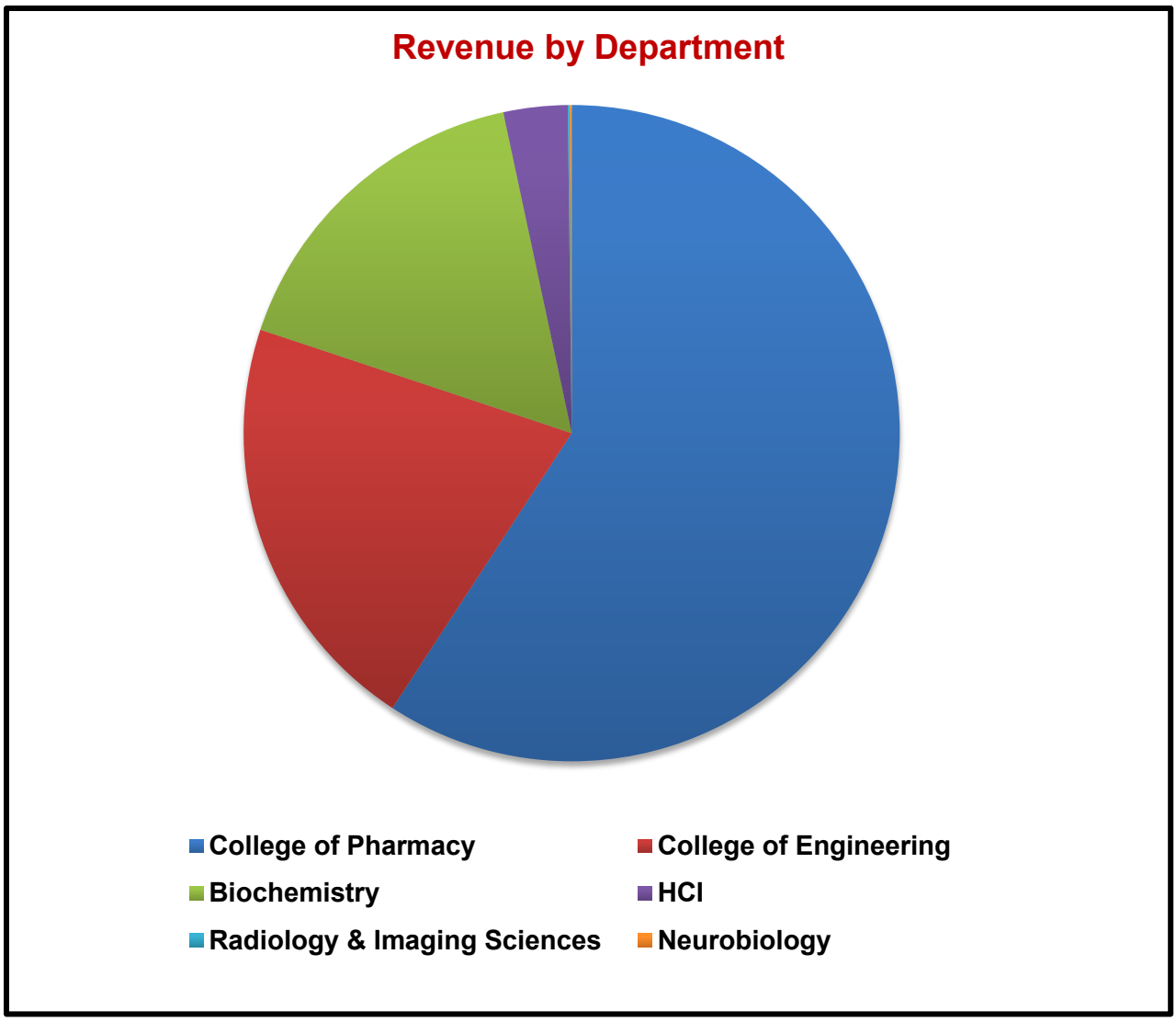
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated: (see charts following)





Top Users

1	Darrell Davis	Department
2	Eric Schmidt	NIH
3	Ling Zang	Gentex Corporation
4	Jared Rutter	Department
5	Echelon Biosciences	Off Campus Commercial
6	Gentex Corporation	Off Campus Commercial
7	Jaclyn Winter	NIH
8	Raphael Franzini	NIH, Department
9	CleanJoule, Inc	Off Campus Commercial
10	Jessica Kramer	NSF, NIH

Publications

1. Acuna-Pilarte, K., E. C. Reichert, Y. S. Green, L. M. Halberg, M. Golkowski, K. M. Maguire, P. N. Mimche, S. D. Kamdem, P. A. Hu, J. Wright, G. S. Ducker, W. P. Voth, R. M. O'Connell, S. A. McFarland, E. S. A. Egal, A. Chaix, S. A. Summers, J. W. Reelitz, J. A. Maschek, J. E. Cox, K. J. Evason and M. Y. Koh (2025). HAF prevents hepatocyte apoptosis and progression to MASH and HCC through transcriptional regulation of the NF-kappaB pathway. Hepatology 82(2): 438-453.10.1097/HEP.0000000000001070
2. Campara, B., N. Khurana, A. De Nadai, V. Yellepeddi, K. Watt, G. Pasut and H. Ghandehari (2025). PEGylation of Propofol Reduces Its Adsorption to Extracorporeal Membrane Oxygenator (ECMO) Components. Pharm Res.10.1007/s11095-025-03879-3
3. Chhibber, T., M. T. Scherzer, A. Prokofyeva, C. Becker, R. G. Zitnay, E. Smith, N. Khurana, M. Skliar, D. C. Deacon, M. W. VanBrocklin, H. Ghandehari, R. L. Judson-Torres and P. Jafari (2025). Transdermal delivery of ultradeformable cationic liposomes complexed with miR211-5p (UCL-211) stabilizes BRAFV600E+ melanocytic nevi. J Control Release 381: 113586.10.1016/j.jconrel.2025.113586
4. Dalapati, R., S. Manickam, J. Shi, M. Hunter and L. Zang (2025). Perylene diimide based fluorescent sensors for aqueous detection of perfluorooctane sulfonate (PFOS). Anal Chim Acta 1341: 343670.10.1016/j.aca.2025.343670
5. Gao, L., R. Dalapati, B. Gao, X. Huang, D. Zhao, F. Wang and L. Zang (2024). Mitochondrial STED Imaging and Membrane Potential Monitoring with a Cationic Molecular Probe. Small Methods 8(12): e2400525.10.1002/smtd.202400525
6. Grayson, N. E., P. D. Scesa, M. L. Moore, J. B. Ledoux, J. Gomez-Garrido, T. Alioto, T. P. Michael, I. Burkhardt, E. W. Schmidt and B. S. Moore (2025). A widespread metabolic gene cluster family in metazoans. Nat Chem Biol.10.1038/s41589-025-01927-y
7. Grunberger, J. W., H. S. Newton, D. Donohue, M. A. Dobrovolskaia and H. Ghandehari (2024). Role of physicochemical properties in silica nanoparticle-mediated immunostimulation. Nanotoxicology 18(7): 599-617.10.1080/17435390.2024.2418088
8. Grunberger, J. W., M. A. Dobrovolskaia and H. Ghandehari (2024). Immunological properties of silica nanoparticles: a structure-activity relationship study. Nanotoxicology 18(6): 542-564.10.1080/17435390.2024.2401448
9. Hansen, D. T., J. Tu, A. W. Bouck, C. L. Mathis and A. M. Barrios (2024). Multipartite Fluorogenic Sensors for Monitoring Tyrosine Phosphatase Activity. Chembiochem 25(24): e202400607.10.1002/cbic.202400607
10. Heard, S. C. and J. M. Winter (2024). Structural, biochemical and bioinformatic analyses of nonribosomal peptide synthetase adenylation domains. Nat Prod Rep 41(7): 1180-1205.10.1039/d3np00064h
11. Li, F., Z. Lin and E. W. Schmidt (2024). Molecular basis of pigment structural diversity in echinoderms. iScience 27(9): 110834.10.1016/j.isci.2024.110834
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14. Moos, P. J., A. F. Carey, J. Joseph, S. Kialo, J. Norrie, J. M. Moyarelce, A. Amof, H. Nogua, A. L. Lim and L. R. Barrows (2024). Description of Bacterial RNA Transcripts Detected in Mycobacterium tuberculosis - Infected Cells from Peripheral Human Granulomas using Single Cell RNA Sequencing. bioRxiv.10.1101/2024.08.20.608852
15. Montoya, A. L., A. S. Hogendorf, S. Tingey, A. Kuberan, L. H. Yuen, H. Schüler and R. M. Franzini (2025). Widespread false negatives in DNA-encoded library data: how linker effects impair machine learning-based lead prediction. Chem Sci 16(24): 10918-10927.10.1039/d5sc00844a
16. Nervig, C. S., M. Rice, M. Marelli, R. J. Christie and S. C. Owen (2025). Modular Synthesis of Anti-HER2 Dual-Drug Antibody-Drug Conjugates Demonstrating Improved Toxicity. Bioconjug Chem 36(2): 190-202.10.1021/acs.bioconjchem.4c00398
17. Pederson, N. J. and K. L. Diehl (2025). DNA stimulates the deacetylase SIRT6 to mono-ADP-ribosylate proteins with histidine repeats. J Biol Chem 301(6): 108532.10.1016/j.jbc.2025.108532

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19. Scesa, P., H. Nguyen, P. Weiss, A. P. Rodriguez, M. Garchow, S. I. Ohlemacher, E. Prappas, S. A. Caplins, C. A. Bewley, L. Bohnert, A. J. Zellmer, E. M. Wood, E. W. Schmidt and P. J. Krug (2024). Defensive polyketides produced by an abundant gastropod are candidate keystone molecules in estuarine ecology. Sci Adv 10(44): eadp8643.10.1126/sciadv.adp8643
20. Scesa, P. D. and E. W. Schmidt (2025). Pseudopterosin Biosynthesis: Unravelling a Decades Old Problem in Animal Specialized Metabolism. J Am Chem Soc 147(4): 3072-3079.10.1021/jacs.4c09925
21. Schubert, H. L., F. Li, C. P. Hill and E. W. Schmidt (2025). The structure of full-length AFPK supports the ACP linker in a role that regulates iterative polyketide and fatty acid assembly. Proc Natl Acad Sci U S A 122(6): e2419884122.10.1073/pnas.2419884122
22. Stow, P. R., K. O. Forsch, E. Thomsen, H. Naka, M. G. Haygood, K. A. Barbeau and A. Butler (2025). Stereospecific control of microbial growth by a combinatoric suite of chiral siderophores. Proc Natl Acad Sci U S A 122(10): e2423730122.10.1073/pnas.2423730122
23. Sun, L., J. G. Lamb, C. Niu, S. N. Serna, E. G. Romero, C. E. Deering-Rice, E. W. Schmidt, M. Golkowski and C. A. Reilly (2025). Bryostatins 1 and 3 inhibit TRPM8 and modify TRPM8- and TRPV1-mediated lung epithelial cell responses to a proinflammatory stimulus via protein kinase C. Mol Pharmacol 107(6): 100042.10.1016/j.molpha.2025.100042
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25. Van Scoyk, A. N., O. Antelope, D. E. Ayer, R. T. Peterson, A. D. Pomicter, S. C. Owen and M. W. Deininger (2024). Bioluminescence assay of lysine deacylase sirtuin activity. Cell Chem Biol 31(11): 2002-2014 e2004.10.1016/j.chembiol.2024.10.006
26. Venugopalan, A. and E. W. Schmidt (2024). Animal-encoded nonribosomal pathway to bursatellin analogs. bioRxiv.10.1101/2024.11.12.622736
27. Wichert, M., L. Guasch and R. M. Franzini (2024). Challenges and Prospects of DNA-Encoded Library Data Interpretation. Chem Rev 124(22): 12551-12572.10.1021/acs.chemrev.4c00284
28. Woods, K., T. A. Rants'o, A. M. Chan, T. Sapre, G. E. Mastin, K. M. Maguire, S. E. Ong and M. Golkowski (2024). diaPASEF-Powered Chemoproteomics Enables Deep Kinome Interaction Profiling. bioRxiv.10.1101/2024.11.22.624841
29. You, W., A. L. Montoya, S. Dana, R. M. Franzini and C. Steegborn (2024). Elucidating the Unconventional Binding Mode of a DNA-Encoded Library Hit Provides a Blueprint for Sirtuin 6 Inhibitor Development. ChemMedChem 19(20): e202400273.10.1002/cmdc.202400273

HEALTH
UNIVERSITY OF UTAH

POWDER

Overview

POWDER is an end-to-end platform for conducting research on mobile wireless networks. With equipment distributed across the University of Utah campus, POWDER provides radios that are programmable down to the waveform, attached to a network that can be configured by the user, connected to a wide variety of compute, storage, and cloud resources. Each wireless base station in POWDER includes a number of SDRs, a RF front end and antennas, a complement of control hardware for managing and accessing the devices, and a fiber connection to a near-edge compute cluster. Specialized massive multi-input multi-output (mMIMO) base stations consist of SDRs and antennas in a dedicated configuration to support mMIMO research. In addition to base stations, POWDER provides both fixed-location and mobile (shuttle-based) wireless endpoints with SDR, RF, and control resources similar to that found at the base stations. While most of POWDER's wireless sites are outdoors, POWDER includes an indoor lab for performing more controlled and smaller-scale wireless experiments. Researchers can use the POWDER platform to build their own wireless networks, using existing protocols or technologies (such as 4G, 5G, and MIMO), up-and-coming ones (such as massive MIMO), or new ones that they invent and build from the ground up. In this environment, they can experiment with novel networks, devices, and applications.

Services

POWDER provides researchers with remote, over-the-Internet access to equipment, software, configurations, and data for carrying out experiments. A user begins an experiment by visiting POWDER's web portal and provisioning a "slice" of the facility. The researcher interacts with the resources in that slice via standard Internet tools and protocols to orchestrate and conduct experiments. POWDER staff provide training and assistance to users of the facility: e.g., design expertise, on-site equipment management, and problem diagnosis and resolution.

Equipment

- 8 rooftop base stations
- 6 "dense deployment" (lamppost) base stations
- 2 massive MIMO rooftop base stations and 4 clients
- 10 fixed-location wireless endpoints
- 17 mobile wireless endpoints
- 2 portable wireless endpoints
- front-haul fiber network and near-edge compute: CWDM + 31 compute servers + GPU
- 6 GPU-equipped servers for "wireless + AI"
- metro cloud (Emulab/CloudLab): 100s of compute servers
- indoor over-the-air laboratory: 4 base station-class radios + 4 endpoint-class radios
- indoor controlled RF environment: 8 radios + programmable wired RF switching fabric
- RF bench: 2 directly wired radio pairs

Personnel

- Jacobus Van der Merwe, PhD, PI and Director
- Eric Eide, PhD, Co-PI
- Neal Patwari, PhD, Co-PI
- Robert Ricci, PhD, Co-PI
- Kirk Webb, MS, Associate Director
- Jonathon Duerig, BS, Research Associate
- Mike Hibler, MS, Systems Programmer
- David M. Johnson, MS, Research Associate
- Dustin Maas, PhD, Research Associate
- Alex Orange, BS, Research Associate
- Leigh Stoller, MS, Systems Programmer
- Gary Wong, MS, Research Associate
- Sam Zachary, BS, Technician

Advisory Board Committee

Last meeting date: March 10, 2022.

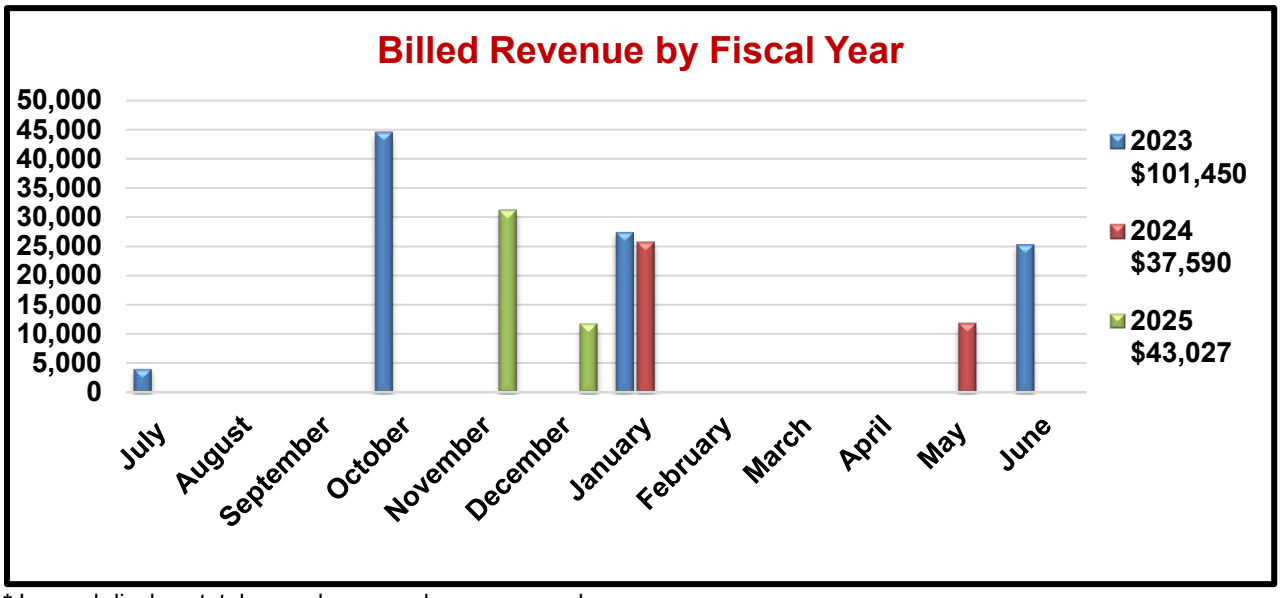
- Suman Banerjee, PhD, Professor, University of Wisconsin-Madison
- Arup Bhuyan, PhD, Technical Director, Idaho National Laboratory
- David DeTienne, PhD, Principal Engineer, Raytheon Technologies
- Monisha Ghosh, PhD, Professor, University of Notre Dame
- Raymond Knopp, PhD, Professor, EURECOM
- Zhi-Li Zhang, PhD, Professor, University of Minnesota
- Lin Zhong, PhD, Professor, Yale University

Revenue/Expenses

FY25 Expenses: **Total $74,671**

FY25 Revenue: **Total $43,027**

- VP of Health Sciences Support: $ 0
- FY25 revenue generated from services: $43,027

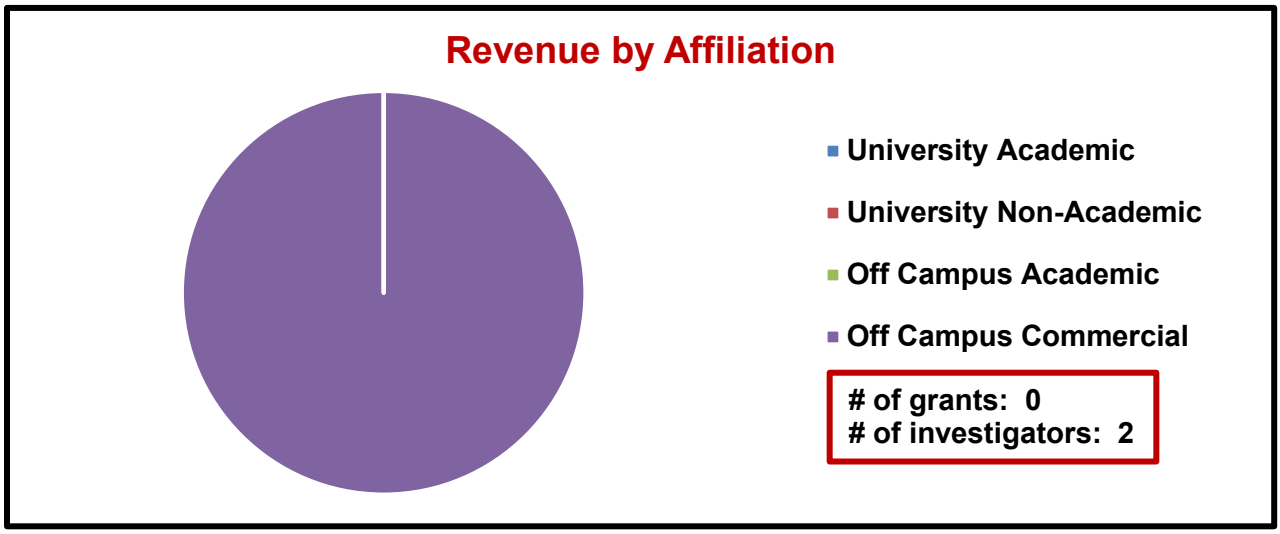


* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):



Top Users

1	L3Harris Technologies	Off Campus Commercial
2	O-Ran Alliance	Off Campus Commercial

Publications

1. Bukhari, J. and Z. Zhang (2024). Understanding Long Range-Frequency Hopping Spread Spectrum (LR-FHSS) with Real-World Packet Traces. ACM Trans. Sen. Netw. 20(6): Article 117.10.1145/3694971
2. Chuprov, S., L. Reznik and R. Zatsarenko (2025). KISS: Knowledge Integration System Service for ML End Attacks Detection and Classification. IEEE Transactions on Dependable and Secure Computing: 1-12.10.1109/TDSC.2025.3553807
3. Horton, D., T. Vu, T. Nguyen, K. Suo, A. Lee, S. He and Y. Shi (2024). A Hardware-in-the-Loop Wireless System Design: Benchmarking NFV Network Services.10.1109/CAMAD62243.2024.10942865
4. Hosseini, H., A. Almutairi, M. Hashir, E. Aryafar and J. Camp (2024). An experimental study on beamforming architecture and full-duplex wireless across two operational outdoor massive MIMO networks. Performance Evaluation 166: 102447.10.1016/j.peva.2024.102447
5. Johnson, D., D. Maas, S. Tadik, A. Orange, L. Stoller, K. Webb, M. Awan, J. Bills, M. Gomez, A. Sarbhai, G. Durgin, S. Kasera, N. Patwari, D. Schurig and J. Merwe (2025). Building Radio Dynamic Zones with openZMS. IEEE Transactions on Cognitive Communications and Networking PP: 1-1.10.1109/TCCN.2025.3562855
6. Urumkar, S., B. Ramamurthy, S. Tirupathi and S. Sharma (2025). Power Utilization in Open RAN: Key Findings From a USA Testbed. IEEE Communications Letters PP: 1-1.10.1109/LCOMM.2025.3557715
7. Wang, J., M. G. Weldegebriel and N. Patwari (2025). Augmenting channel estimation via loss field: Site-trained Bayesian modeling and comparative analysis. Computer Networks 258: 110993.https://doi.org/10.1016/j.comnet.2024.110993
8. Yaqoob, M., R. Trestian and H. Nguyen (2025). ORBIT-DT: Bridging Simulation and Reality with Digital Twin Design for O-RAN in Beyond 5G Networks.10.1109/WCNC61545.2025.10978421
9. Zhang, X., Y. Hu, I. Nasim, S. Eggers, V. Agarwal, A. Mishra, J. Daw, A. Bhuyan, S. Kasera and M. Ji (2024). A Bayesian Learning Approach to Wireless Outdoor Heatmap Construction Using Deep Gaussian Process.10.1109/IEEECONF60004.2024.10942780
10. Zhang, Z. (2024). ZChirp: Speeding Up LPWANs by Combining the Chirp with Binary Sequences.10.1109/SECON64284.2024.10934871

Preclinical Imaging Facility

Overview

The Preclinical Imaging Facility extends the benefits of modern diagnostic medical imaging technologies to the studies of anatomy and physiology in small animals. The facility features state-of-the-art MRI, CT, PET, SPECT, and MSOT scanners. All instruments are equipped with supporting and monitoring hardware that allows a wide variety of imaging experiments, including longitudinal studies, to be performed on live animals and specimens. Imaging scientists, full-time imaging personnel, and animal support technicians are available for technical consultation and experimental assistance.

Services

The Preclinical Imaging Facility has a variety of modalities to choose from such as MRI, CT, PET and SPECT. Examples of scanning capabilities include the following:

7.1 T Preclinical MRI system

- Diffusion-weighted and diffusion tensor imaging
- Relaxometry (T1, T2, T2*) mapping
- Perfusion MRI
- Functional and awake-state functional MRI
- MR angiography
- Cardiac MRI
- NMR spectroscopy (localized and non-localized)
- Chemical shift imaging
- Parallel imaging techniques

CT/PET/SPECT Scanners

- Automatic transition between modes and seamless coordination of CT, SPECT, and PET data
- System can be configured as an ultra-high resolution preclinical CT scanner; a high-resolution, high-sensitivity preclinical PET scanner; or as a dual modality preclinical PET/CT scanner
- The Inveon 2-Head SPECT Module is designed to efficiently detect gamma rays ranging in energy from 30 keV to 250 keV, the SPECT system is ideal for use with most single photon-emitting radionuclides
- Includes two Inveon Research Workplace workstations for multimodality image review, fusion, and analysis which CT, PET, SPECT, and MR data in DICOM and Siemens Inveon CT, PET, and SPECT formats, as well as raw data import

MSOT Scanner

- In-vivo molecular imaging
- Uses fluorescent excitation of molecular tracers or endogenous hemoglobin with ultrasound signal transduction to create real-time images and video of blood flow, perfusion, and oxygenation

Equipment

- 7 Tesla Bruker BioSpec MRI Scanner
- Siemens Inveon CT/PET/SPECT
- iThera MSOT Multispectral Opto-Acoustic Tomography
- Perkins-Elmer Wizard 2 Gamma counter

Personnel

- Edward Hsu, Ph.D., Director
- Sixiang Shi, Ph.D., Associate Director, Radioimaging
- E.K. Jeong, Ph.D., Associate Director, MRI
- Stewart Yeoh, Ph.D., Manager

Advisory Board Committee

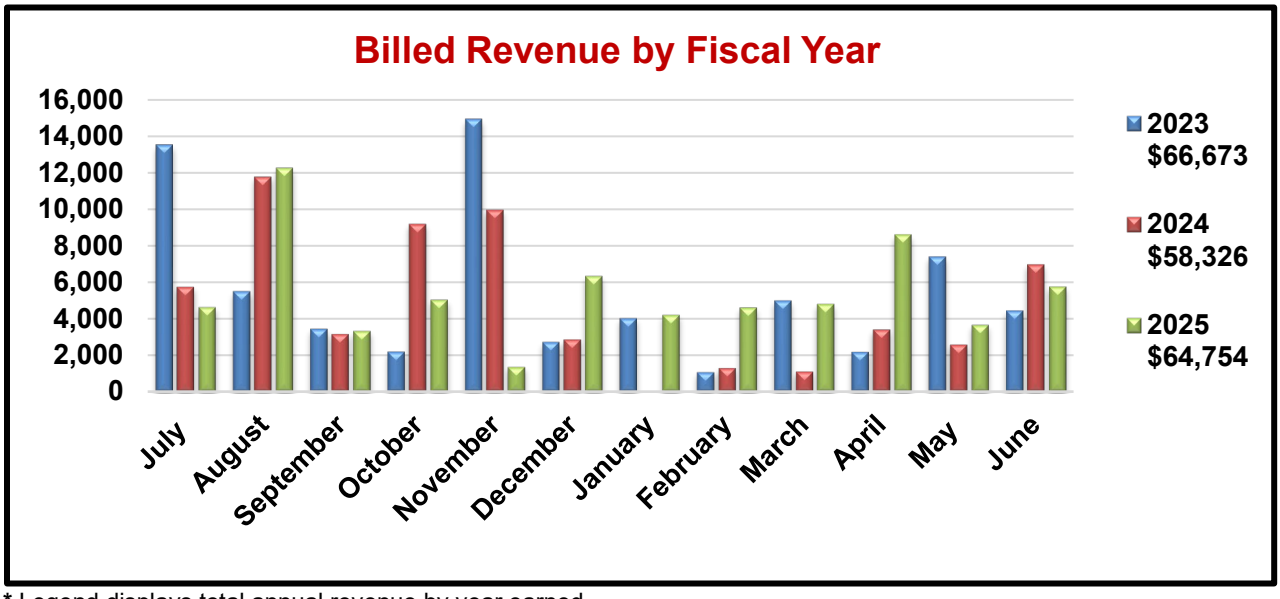
Last meeting date: January 14, 2025

- Rob MacLeod Ph.D., Professor, Bioengineering/SCI/CVRTI
- Satoshi Minoshima, M.D., Ph.D., Professor, Chair, Radiology
- James E. Cox, Ph.D., Research Associate Professor, Biochemistry
- Donna Cross Ph.D., Associate Professor, Radiology

Revenue/Expenses

FY25 Expenses: **Total $206,138**
FY25 Revenue: **Total $204,754**

- VP of Health Sciences Support: $120,000
- VP of Research Support: $20,000
- FY25 Revenue generated from services: $64,754



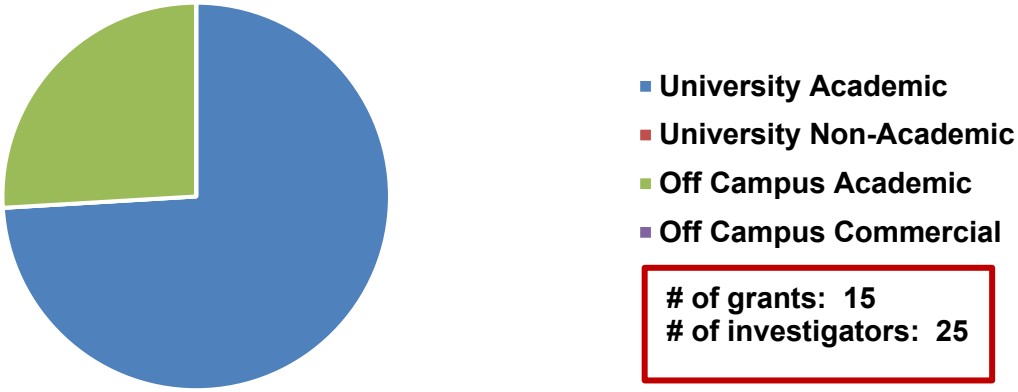
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

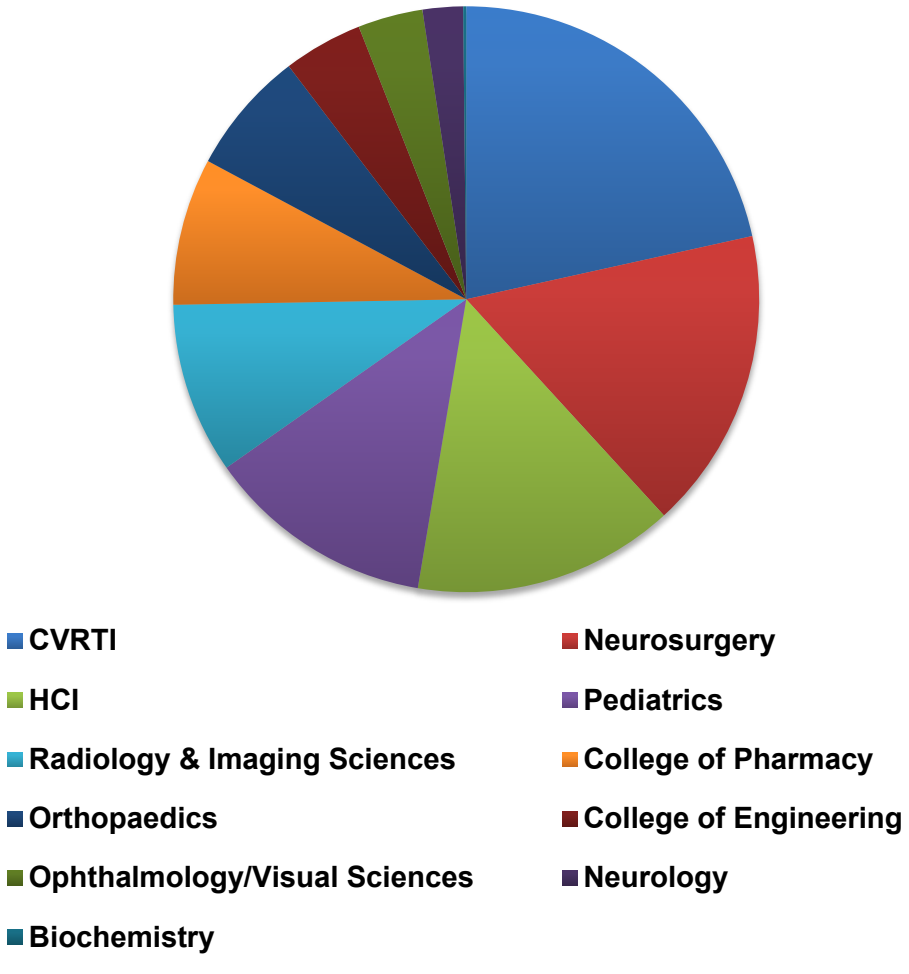
Research Support

Revenue Generated (see charts following)

Revenue by Affiliation



Revenue by Department



Top Users

1	Veteran Affairs	Off Campus Academic
2	Sixiang Shi	Department, HCI, University of Utah Research Foundation
3	Mark Mahan	Barrow Neurological Institute, NIH, Renerva LLC
4	Michelle Schober	NIH
5	Ravi Ranjan	Treadwell
6	Peter Chalmers	University of Utah Research Foundation
7	Utah State University	Off Campus Academic
8	Joseph Palatinus	Department
9	Ademuyiwa Aromolaran	NIH
10	Hamid Ghandehari	NIH, University of Utah Research Foundation

Publications

1. Kwan, E., B. Hunt, E. Paccione, B. Orkild, J. Bergquist, K. Yazaki, S. Yeoh, A. Olsen, I. Polejaeva, E. Hsu, R. MacLeod, D. Dosdall and R. Ranjan (2025). PO-05-145 HETEROGENEOUS FIBROTIC ARCHITECTURE INFLUENCES ATRIAL FIBRILLATION (AF) INDUCIBILITY: INSIGHTS FROM A TRANSGENIC GOAT MODEL. Heart Rhythm 22: S629.10.1016/j.hrthm.2025.03.1543
2. Singh, N., W. Xia, E. Need, K. McManus, J. Huang, S. Shi and S. Goel (2025). Tumor agnostic ultrasmall nanoprobes for fluorescence-guided surgical resection in peritoneal metastasis. Eur J Nucl Med Mol Imaging 52(3): 1149-1165.10.1007/s00259-024-06950-0
3. Xia, W., E. Need, C. Schiavone, N. Singh, J. Huang, M. Goff, J. Cave, D. L. Gillespie, R. L. Jensen, M. D. Pagel, P. Dogra, S. Shi and S. Goel (2025). Image-guided targeting of mitochondrial metabolism sensitizes pediatric malignant rhabdoid tumors to low-dose radiotherapy. Sci Adv 11(21): eadv2930.10.1126/sciadv.adv2930

Scalable Analytics & Informatics

Overview

The University of Utah Center for Scalable Analytics and Informatics (USAI) provides support to research and operations groups inside and outside the University of Utah. These services include Annotation and Chart Review, Natural Language Processing, EMR-driven Clinical Trial Recruitment, Analytics and Data Services, and Enterprise Architecture and Application Development.

Uniqueness

Utah Scalable Analytics and Informatics (USAI) provides multiple services for researchers utilizing electronic medical records. EMR-driven Clinical Trial Recruitment provides the ability to identify patients during an encounter with a healthcare provider that potentially could participate in a clinical trial and could drastically reduce cost and increase recruitment. Annotation and chart review products help machines and subject matter experts mark-up and abstract data for classification. Natural Language Processing (NLP) processes text data to extract structured data to infer concepts that can be understood by machines and humans for further analysis. USAI's annotation and chart review product line focuses on easing the burden and increasing consistency of manual chart review and annotation tasks. While annotation and chart review are time consuming and expensive, they are vital to many parts of the research process: data exploration, feasibility, defining study variables, identifying information in text notes, classifying information within a document, at the document level, at the encounter or patient level, and validating study results. Natural language processing algorithms can help automate the identification of relevant clinical data from the medical record. Data science and machine learning are new areas that expand the capability from traditional statistical modeling. USAI provides Enterprise Architecture and Application Development and has developed tools to improve efficiency and outcomes in health services research, reduces the costs to researchers. Education is also important to USAI and therefore USAI has recruited and trained computer science students.

Services

The following services are offered by USAI:

- Annotation and Chart Review
- Natural Language Processing
- EMR-driven Clinical Trial Recruitment
- Analytics and Data Services
- Data Science and Machine Learning
- Enterprise Architecture and Application Development

Consultation is provided to define a projects scope and budget in the early stages of development to make optimal and efficient use of USAI's services. The staff will also handle regulatory requirements and project management if needed.

FY26 Goals

USAI has lost some key members of our natural language processing, data and analytics, and data science and machine learning service lines to companies in the technology and healthcare industries. We have been working on recruitment. In addition, we have made great advances in designing the next generation chart review tool, called Abstract, and new methods for probabilistic phenotyping that are ongoing. We have also implemented transformer models into our Natural Language Processing team and are planning how to incorporate Large Language Models in FY26.

Specialized Software

Chart Review

- eHOST
- ChartReview
- Abstract

Natural Language Processing

- Leo
- Chex
- MedSpaCy

Clinical Trial Management

- ProjectFlow

Data Exploration and Visualization

- OHDSI Atlas

Personnel

- Patrick Alba, NLP Analyst
- Siamack Ayandeh, Research Associate
- Lacy Castleton, Clinical Annotator
- Amy Cox, Clinical Annotator
- Scott L DuVall, PhD, Director
- Jeffrey Ferraro, Data Science Lead
- Qiwei Gan, NLP Analyst
- Brent Hill, Annotation Manager
- Mengke Hu, NLP Analyst
- Cassandra Jacobson, Clinical Annotator
- David Kotter, Clinical Annotator
- Chris Ledding, Financial Analyst
- Qingzhu Liu, Software Designer and Programmer
- Julie A Lynch, PhD, Adjunct Professor
- Tiffany Quilter, Clinical Annotator
- Della Richter, Operations Manager
- Hamid Saoudian, Enterprise Architect
- Ramana Seerapu, IT Project Manager
- Jianlin Shi, Research Assistant Professor
- Johnathan Stanley, NLP Analyst
- Denise Stone, Clinical Annotator
- Shaoyu Su, Software Designer and Programmer
- Alexis Tabish, Clinical Annotator
- Craig Teerlink, Research Assistant Professor
- Bin Yu, Software Designer and Programmer

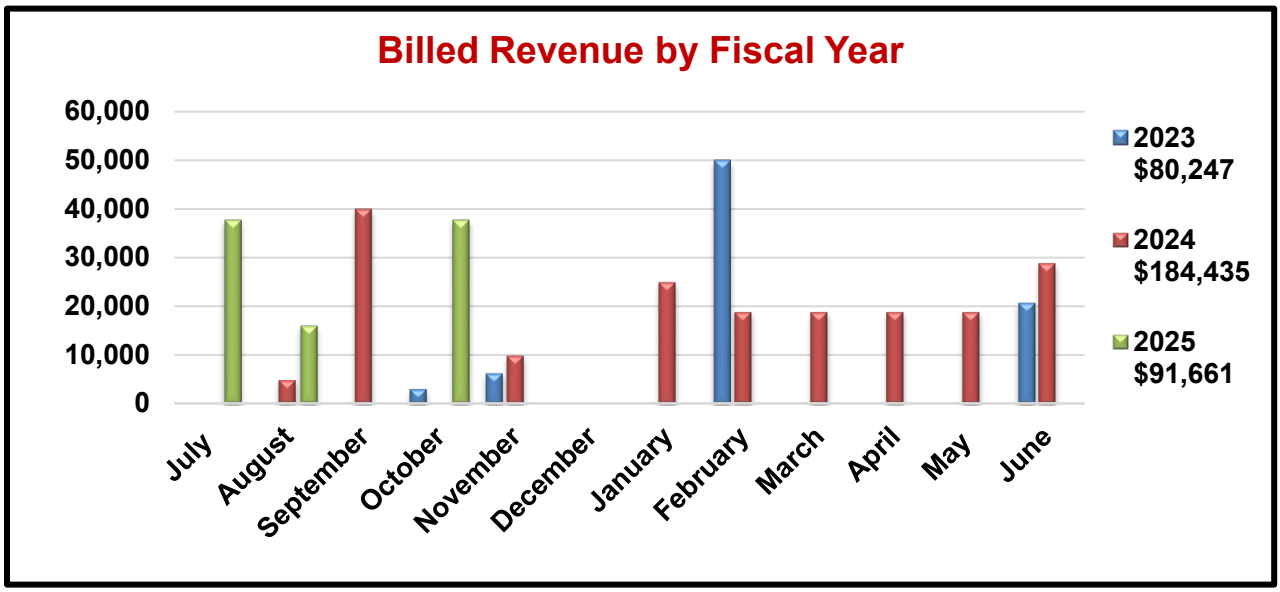
Management Meeting
Last meeting date: We meet weekly on Wednesday afternoons.

- Scott L DuVall, PhD, Director
- Christopher Ledding, MBA, Financial Analyst

Revenue/Expenses

FY25 Expenses: **$39,639**
FY25 Revenue: **$91,661**

- VP of Research Support: $0
- Revenue generated from services: $91,661

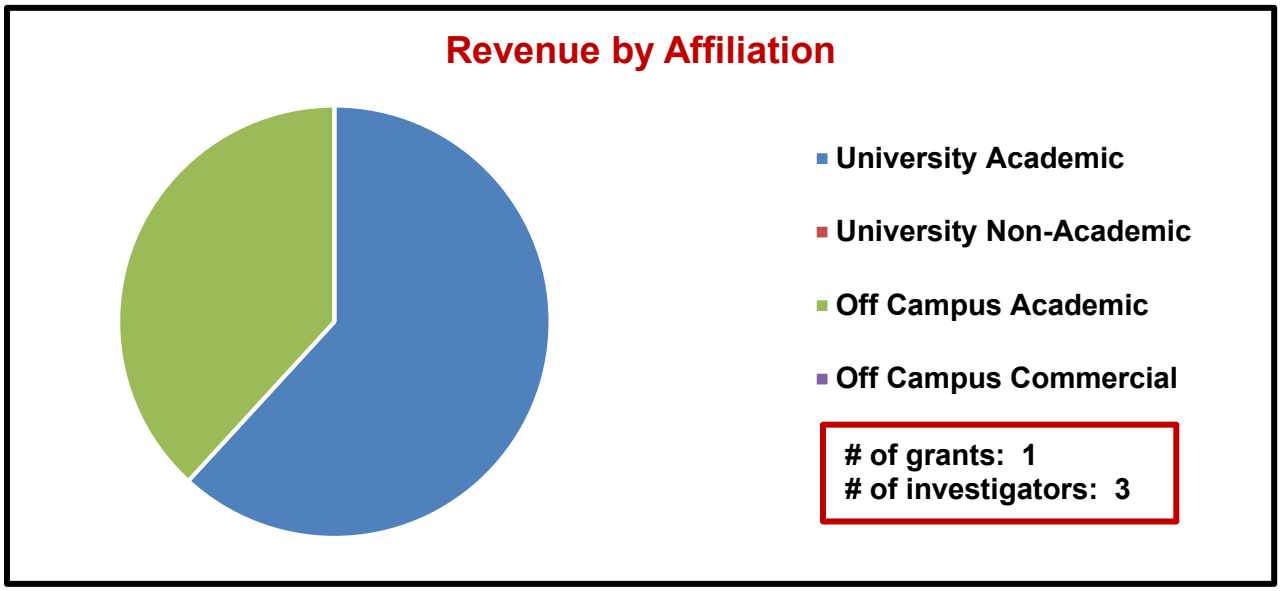


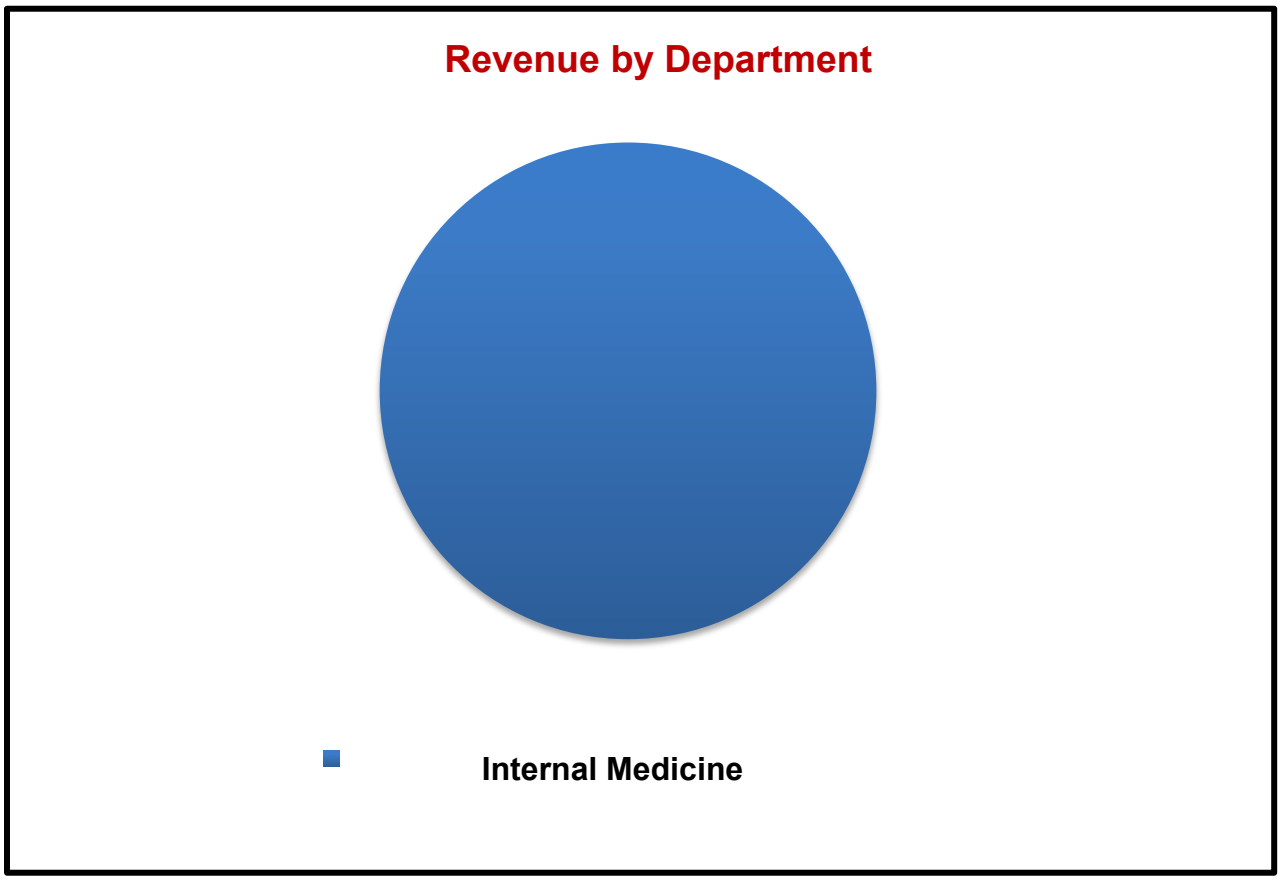
* Legend displays total annual revenue earned (not collected) by fiscal year.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts):





Top Users

1	Scott DuVall	Parexcel
2	Memorial Sloan Kettering Cancer Center	Off Campus Academic
3	University of California San Francisco	Off Campus Academic

Publications

No known publications acknowledged this facility in FY25.

Small Animal Ultrasound Facility

Overview

The Small Animal Ultrasound Facility has VisualSonics Vevo 2100 ultrasound machines capable of imaging mice, rats, and other animal models with excellent spatial and temporal resolution. The facility has probes that cover the spectrum from 9-70 MHz (standard human clinical ultrasound covers the spectrum from 2.5-12 MHz). These instruments are capable of real-time 2D imaging as well as a full spectrum of Doppler techniques (pulsed-wave, color, tissue, power). One of the two machines is also capable of 3D imaging and contrast imaging (both targeted and non-targeted). Software is available for advanced image analysis of cardiac mechanics with speckle tracking that allows analysis of strain and strain rate. These tools allow near-histologic resolution imaging of live animals and are well suited to challenging applications such as resolving the rapid heart rates of mice, the microscopic size and function of early and mid-gestation embryos, and everything in between. The facility has long been an extremely important tool in the practice of clinical medicine because it offers real-time imaging, providing an understanding of anatomy and physiology, is non-invasive, and can be repeated serially.

Services

The facility has the capability for anesthesia and monitoring of mice and rats, and will support training laboratory personnel in the design of protocols and the use of the equipment for acquiring images. An offline image analysis station is also available for later review and analysis of studies.

- Ultrasound imaging access
- Training in the use of equipment
- Experiment design and assistance with protocol optimization
- Offline image review and analysis

Equipment

- Two VisualSonics 2100 ultrasound machines
- Offline image analysis station and network storage for backing up data files

Personnel

- Ying Li, MD, PhD, Director
- Xue Yin, Laboratory Technician

Advisory Board Committee

Last meeting date: November 11, 2024.

- Tingting Hong, MD, PhD, Associate Professor, College of Pharmacy
- Sihem Boudina, PhD, Associate Professor, Department of Nutrition and Integrative Physiology
- Erik Blackwood, PhD, Assistant Professor, CVRTI
- James Cox, PhD, Director of HSC

FY25 Annual Update

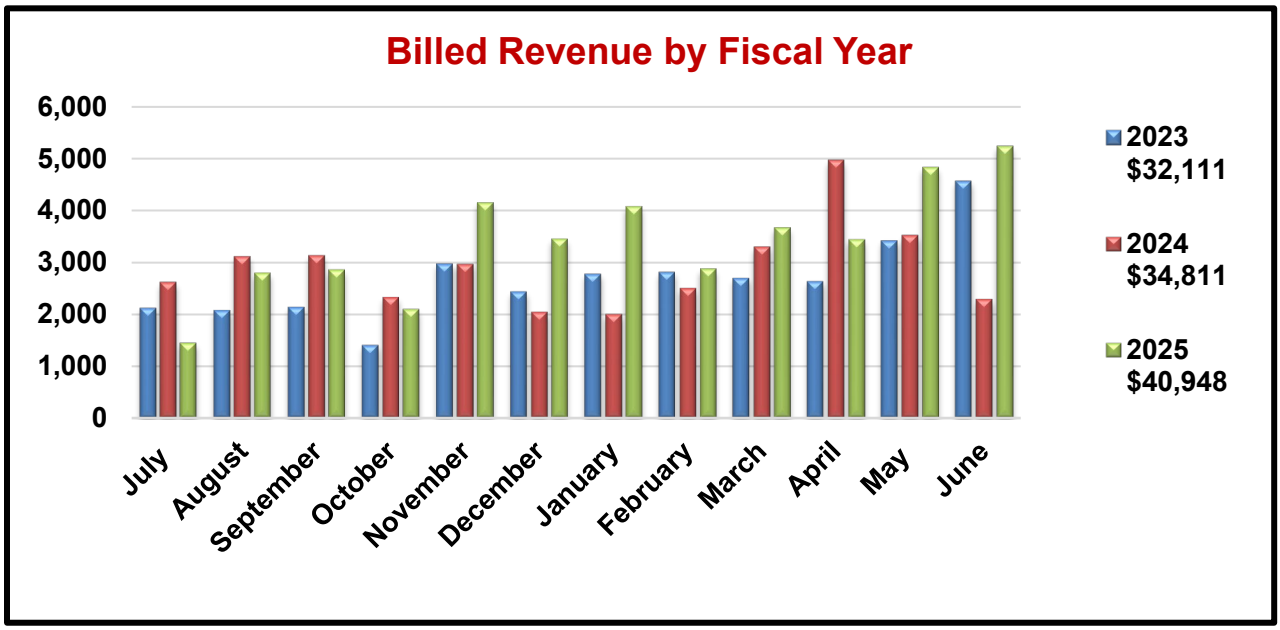
VisualSonics phased out the Vevo 2100 at the end of 2023. We submitted an S10 in June 2025 to obtain a Vevo F2 to replace it.

Revenue/Expenses

FY25 Expenses: **Total $48,061**

FY25 Revenue: **Total $60,948**

- VP of Health Sciences Support: $20,000
- FY25 Revenue generated from services: $40,948

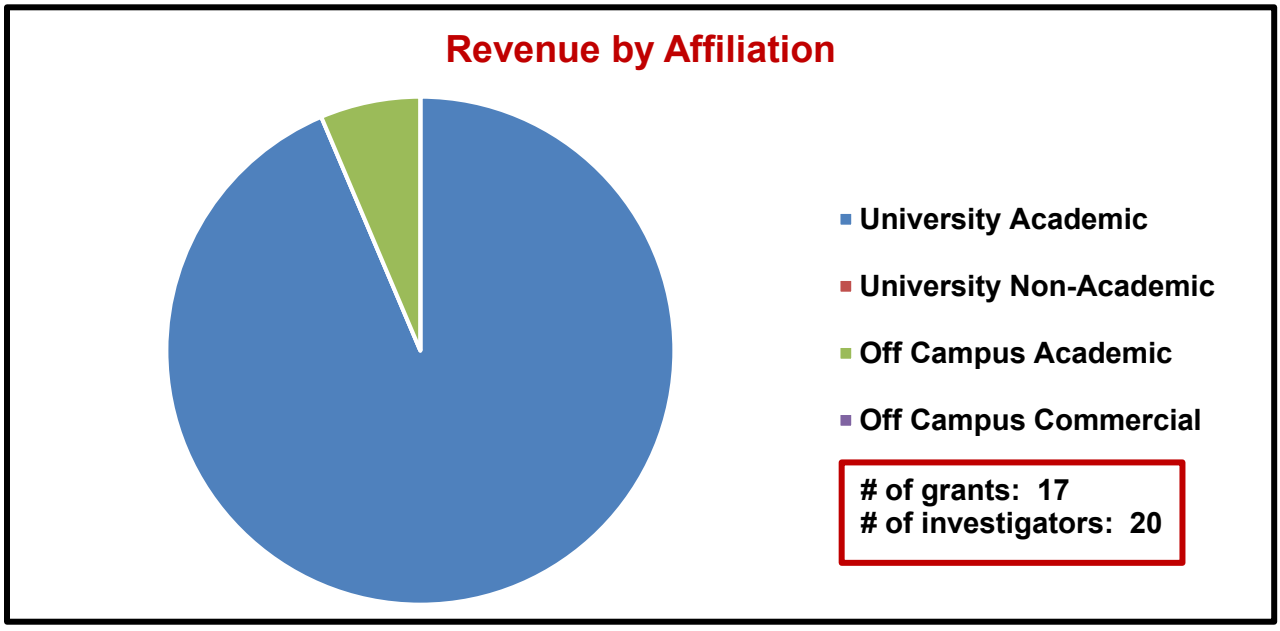


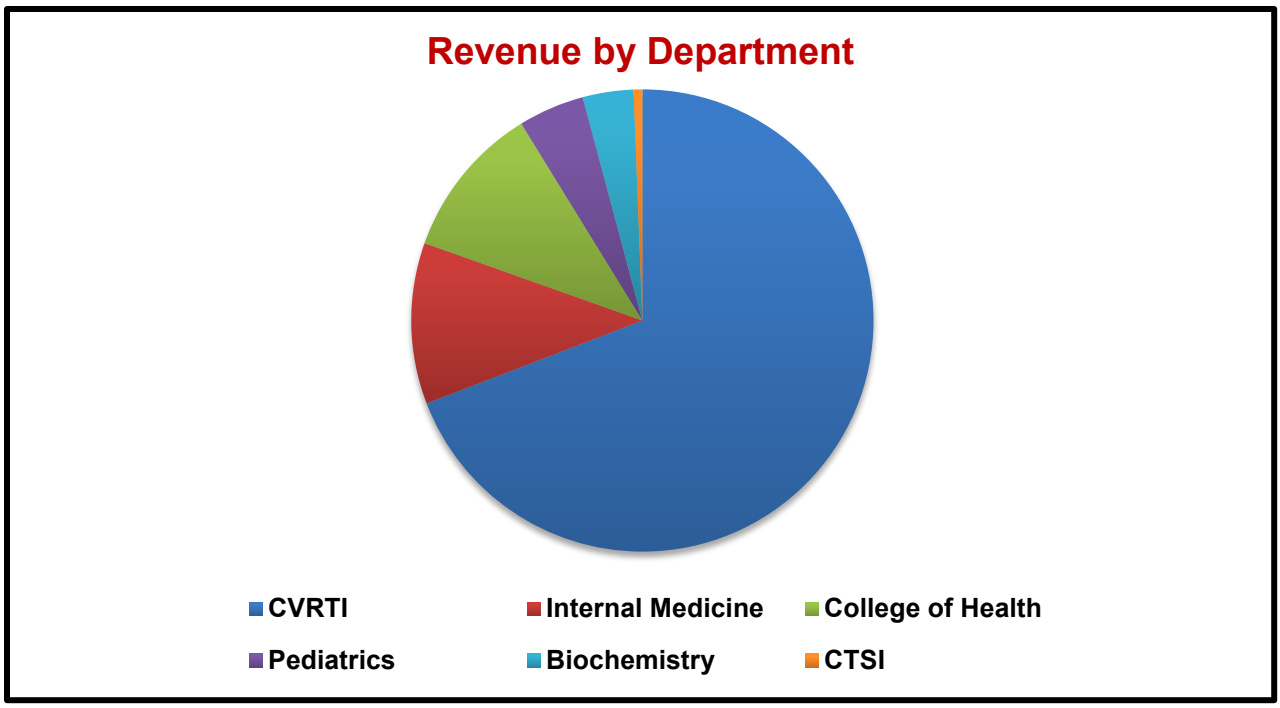
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Stavros Drakos	NIH, Veterans Affairs
2	Robin Shaw	Department, TikkunLev Therapeutics, NIH
3	Joseph Palatinus	Department
4	Ademuyiwa Aromolaran	NIH
5	Craig Selzman	Department
6	Sarah Franklin	NIH, University of Utah Research Foundation
7	Sihem Boudina	Department
8	Kent Lai	Department, NIH
9	Eleni Tseliou	NIH
10	William Holland	NIH

Publications

1. Cluntun, A. A., J. R. Visker, J. N. Velasco-Silva, M. J. Lang, L. Cedeno-Rosario, T. S. Shankar, R. Hamouche, J. Ling, J. E. Kim, A. G. Toshniwal, H. K. Low, C. N. Cunningham, J. Carrington, J. L. Catrow, Q. Pearce, M. Y. Jeong, A. J. Bott, A. J. Narbona-Perez, C. E. Stanley, Q. Li, D. R. Eberhardt, J. T. Morgan, T. Yadav, C. E. Wells, D. K. A. Ramadurai, W. I. Swiatek, D. Chaudhuri, J. D. Rothstein, D. M. Muoio, J. A. Paulo, S. P. Gygi, S. A. Baker, S. Navankasattusas, J. E. Cox, K. Funai, S. G. Drakos, J. Rutter and G. S. Ducker (2024). Direct mitochondrial import of lactate supports resilient carbohydrate oxidation. bioRxiv.10.1101/2024.10.07.617073
2. Visker, J. R., A. A. Cluntun, J. N. Velasco-Silva, D. R. Eberhardt, L. Cedeno-Rosario, T. S. Shankar, R. Hamouche, J. Ling, H. Kwak, J. Y. Hillas, I. Aist, E. Tseliou, S. Navankasattusas, D. Chaudhuri, G. S. Ducker, S. G. Drakos and J. Rutter (2024). Enhancing mitochondrial pyruvate metabolism ameliorates ischemic reperfusion injury in the heart. JCI Insight 9(17).10.1172/jci.insight.180906
3. Werbner, B., S. L. Stephens, D. Stuart, T. M. Hotchkiss, J. Chapman, K. Funai, N. Ramkumar and S. Boudina (2024). Hypertension and obesity independently drive hypertrophy and alter mitochondrial metabolism in a mouse model of heart failure with preserved ejection fraction. Physiol Rep 12(18): e70072.10.14814/phy2.70072

Software Development & Systems Design Core (SD2C)

Overview

The Software Development and Systems Design Core (SD2C) is a technology development studio which specializes in website, game, and app prototyping for digital health needs and bioscientific applications. The SD2C also handles software for use in both prototyped hardware development and data engineering applications. The SD2C utilizes low-cost, state-of-the-art technology alongside Agile processes across the entire software development lifecycle (see SD2C Resources for more information).

Uniqueness

The Software Development and System Design Core offers a valuable service often missing on research university campuses. Software design, development, and deployment is highly variable in scope and is typically initiated through one of four means in academia: 1) hiring project-specific software engineers, 2) working with intra/inter-institutional collaborators, 3) working with outside vendors, or 4) soliciting work from campus IT services. Each of these strategies can have downsides; where they can be either expensive with little cost-benefit, lack in expertise, and/or drive vendor lock-in; risking IP rights to those outside the University ecosystem. The SD2C is uniquely positioned to solve these disadvantages; by allowing for collaborative digital innovation with an expert team at competitive rates and ensuring a smooth transition for projects seeking commercialization or further development outside of the core.

Services

The mission of the SD2C is to provide technological excellence for the advancement of scientific research performed across campus. The SD2C has extensive expertise with the software development lifecycle with developers who have worked across both academic and industry environments. We specialize in early/mid-stage, software/hardware integration across design, development, and deployment stages. We offer the following services:

- Automated data collection services
- Custom database creation and deployment
- Data pipeline engineering solutions
- Hardware-software co-design and integration
- Mobile app and video game prototyping
- Dynamic web development

FY26 Goals

- Increase awareness of our services
- Increase core efficiency and reduce turnaround time.

Major Tools

Software Design/Collaboration/Support Tools:

- Kanboard, Penpot, Bookstack, UVDesk, Gitea

Software Development Software

- Unity, MATLAB, Jetbrains IDE (Python, C#, Javascript, CSS/HTML), Articy, Inky

Software Development Hardware

- Synology NAS1823xs+ server with upgraded components
- Meta Quest 2, 3, Pro VR headsets
- Microsoft Hololens headset
- Laptops with upgraded components for game development
- Mac Studio/Mini with upgraded components
- Android and Apple mobile devices and tablets

Software Cloud Deployment Access

- Google Cloud Platform
- Amazon Web Services
- Center for High Performance Computing (CHPC)

Personnel

- Andrew K. Moran, PhD (Director)
- Jared Slawski, MBA (Software Developer)
- Jonah Brooks, MA (Software Design Engineer)
- Jashpranav Shah, MS (Assoc. Software Design Engineer)
- You (Oscar) Zuo, MS (Assoc. Software Design Engineer)
- Junkai (Alex) Chen, MS (Assoc. Software Design Engineer)
- Amelia Curley, BA (UI/UX Designer)

Advisory Board Committee

Last meeting date: TBD

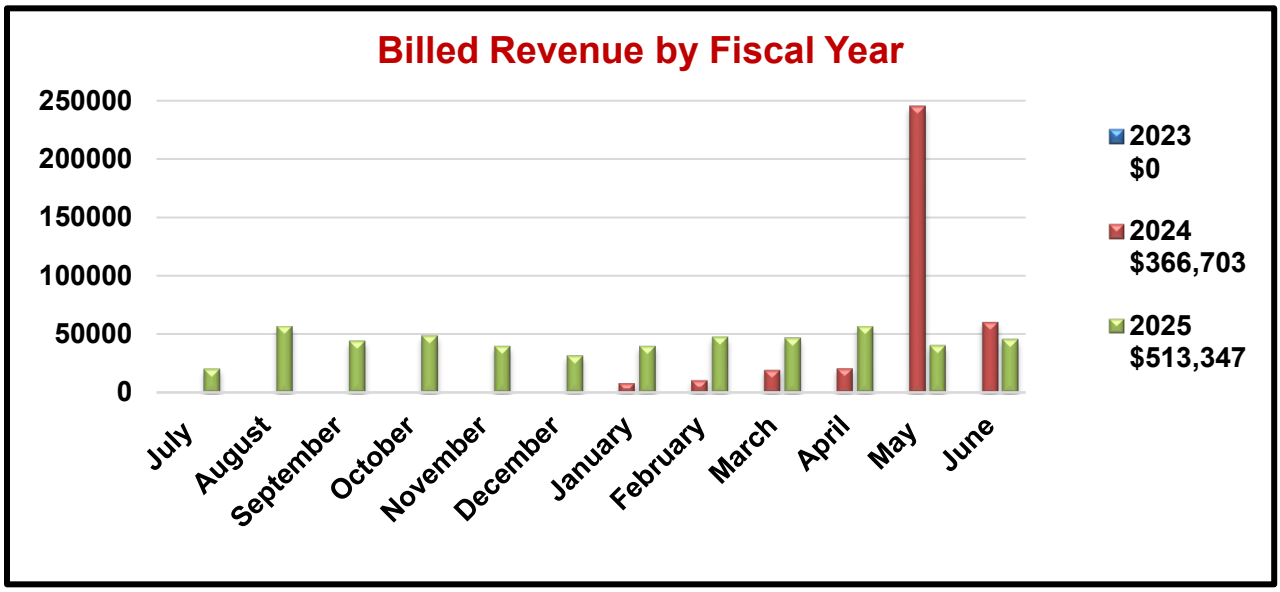
- Andrew K. Moran, PhD, HSC Cores
- Roger Altizer, PhD, Population Health Sciences
- Victoria Tiase, RN, PhD, Biomedical Informatics
- Angie Fagerlin, PhD, Population Health Sciences
- Jacob George, PhD, Bioengineering

Revenue/Expenses

FY25 Total Expenses: **$758,090**

FY25 Total Revenue: **$613,347**

- DHI Funding: $100,000
- FY25 Revenue generated from services: $513,347

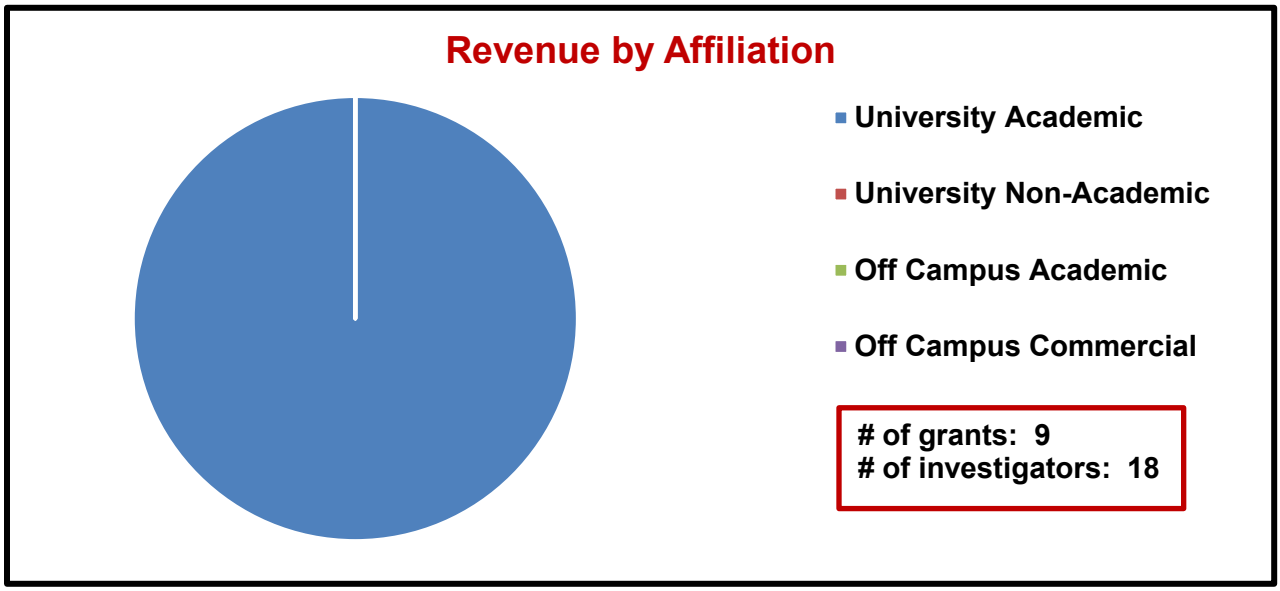


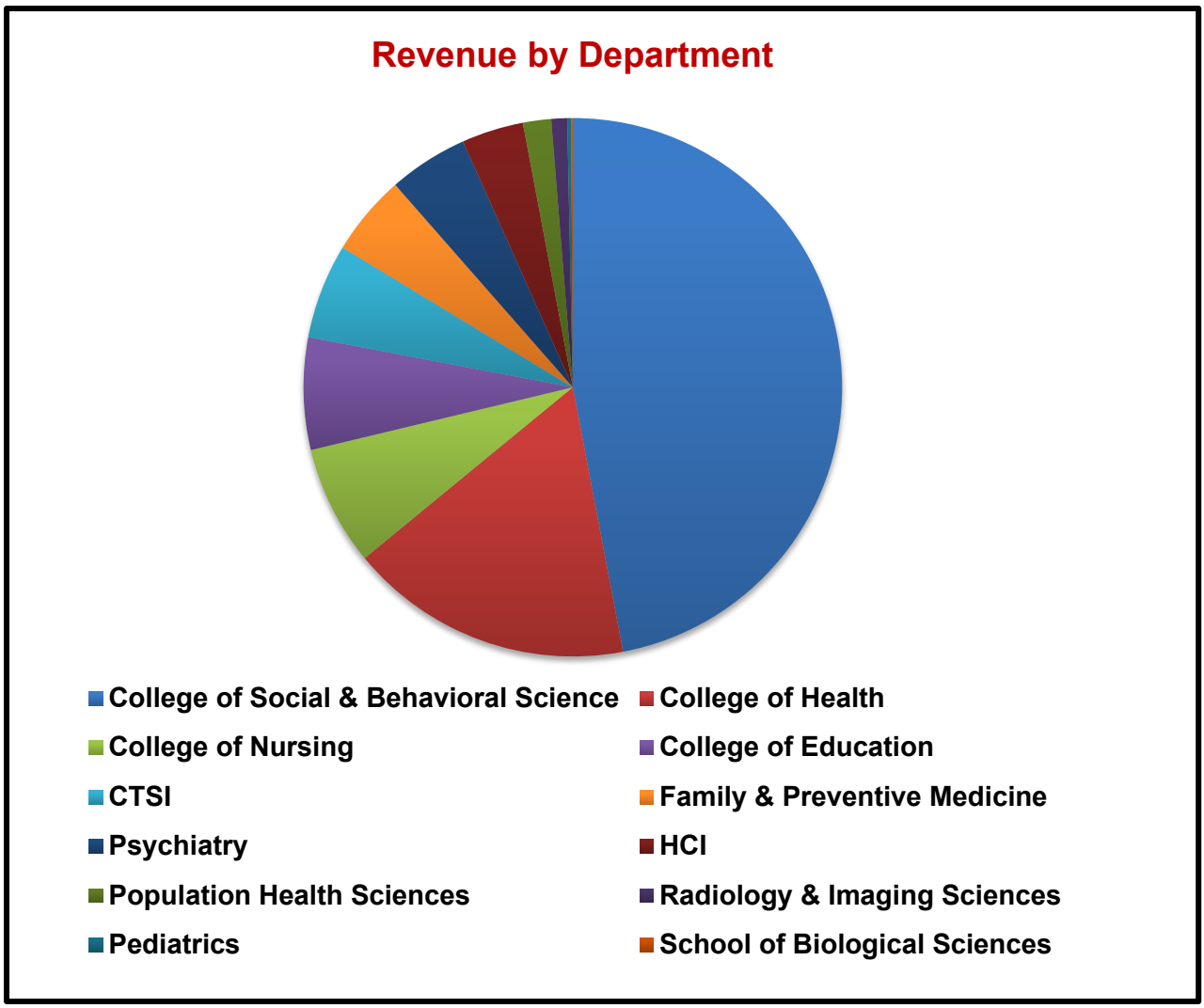
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Chad McDonald	Utah Department of Health
2	Shizuko Morimoto	Department
3	Alexandra Terrill	Craig H. Nelson Foundation
4	Rhonda Nelson	Department
5	Aaron Fischer	College of Education
6	Rebecca Delaney	NIH
7	Alysse Loomis	Department
8	Geoff Erickson	Department
9	Andrea Wallace	Department
10	Lauri Linder	Intramural, National Cancer Institute

Publications

1. Benson, C., M. Davis, B. Lundahl, C. McDonald and M. Bowles Developing the Virtual Motivational Interviewing (VMI) Application for Child Welfare Workers: Usability, Satisfaction, and Initial Efficacy. Journal of Technology in Human Services: 1-16.10.1080/15228835.2024.2448256
2. Benson, C., & Lundahl, B. (October 2024) Virtual Motivational Interviewing: Engaging Technology to Strengthen Social Work Skills. [Presentation]. University of Utah, College of Social Work, Beyond the Classroom Series, Salt Lake City, UT, United States. Virtual
3. Benson, C., McDonald, C., & Davis, M. (January 2025) Developing and Evaluating BSW Students' Skills Using the Virtual Home Simulation (VHS). [Conference oral presentation]. Society for Social Work and Research, Seattle, Washington, United States
4. Davis, M., McDonald, C., Smith, P., & Benson, C. (October 2024) Using Generative AI Technologies to Assist with Training Development. [Conference presentation]. National Staff Development and Training Association 2024 Annual Education Conference, Albuquerque NM, United States.
5. Hammer, H., Davis, M., Benson, C., & McDonald, C. (2025) Bridging Training and Real-World Readiness Through Simulation. [Conference presentation]. North Carolina Social Services Institute, North Carolina, United States.
6. Marks, E., Jensen, K., Benson, C., Harvey, C., & McDonald, C. (2025) Elevating Child Welfare Workforce Development Efforts: Innovative Skills Training using Virtual Reality and other Technologies. [Conference presentation]. National Title IV-E Roundtable, University of Alabama, Tuscaloosa, Alabama, United States.
7. McDonald, C., Davis, M., & Benson, C. (2025). Technology in Child Welfare: Balancing Innovation and Ethics. CW360 The Evolving Role of Technology in Child Welfare, 9
8. Wagner, C., Luther, J., Lundahl, B., Ingersoll, K., Lundahl, B., Benson, C., & Soma, T. (2025) Past, Present, Future: The Evolution of Technology in Treatment & Training. [Conference presentation]. Motivational Interviewing Summit, Florida State University, Tallahassee, Florida, United States

Transgenic & Gene Targeting

Overview

The goal of the Transgenic & Gene Targeting (TG) Mouse Core Facility is to provide state-of-the-art services and expert assistance in mouse transgenesis and gene targeting. The TG Mouse Core actively develops gene targeting technologies, maintains cutting-edge instrumentation, offers project consultation, and partners in the execution of research to support its role as a leader in mouse genetic engineering.

Our primary service is the generation of transgenic and gene-targeted mouse models. We employ CRISPR/Cas9-based technologies to efficiently and cost-effectively produce knockout, knockin, and conditionally targeted alleles. Additional services include conventional gene targeting using mouse embryonic stem cells (ESCs), followed by blastocyst injection to generate germline chimeras, as well as the generation of traditional transgenic mice through random integration of transgenes. Additionally, the TG Mouse Core also offers specialized expertise in a variety of mouse-assisted reproductive technologies, including embryo and sperm cryopreservation, in vitro fertilization (IVF), karyotyping of ESCs, rederivation of mice from frozen embryos, and derivation of primary ESCs.

Our facility is equipped with a dedicated cell culture suite, multiple incubators, three microinjection stations for both pronuclear and blastocyst injections, a surgical suite, and on-site mouse housing and breeding space. The TG Mouse Core staff brings extensive experience in the generation and characterization of genetically modified mouse models and works closely with University of Utah regulatory bodies to ensure full compliance with IACUC and USDA guidelines.

Services

- Mouse generation of targeted mutations using CRISPR/Cas technology to create specific genetic mutations including knockout, knockin, and conditional knockout
  - CRISPR mouse generation via microinjection of reagents
  - CRISPR mouse generation via ZEN (zygote electroporation of nucleases)
  - CRISPR mouse generation via GONAD (genome editing via oviductal nucleic acids delivery)
- *In vivo* validation of CRISPR reagents
- Blastocyst injection of targeted ES cells
- Pronuclear injection of DNA to produce transgenic mice
- Traditional and CRISPR mediated gene targeting of ES cells
- Primary ES cell generation
- Sperm cryopreservation
- Embryo cryopreservation
- IVF, in vitro fertilization
- Rederivation of mouse lines via embryo transfer
- Ovary transfer
- Import/export sperm and embryos
- Karyotyping of ESCs
- Sperm and embryo long-term cryostorage

Equipment

- Nikon Eclipse Ti2 microinjection station, with fluorescence, CO_2, heating/cooling stage
- Leica Dmi8 microinjection stations (2)
- Eppendorf Transferman NK2 micromanipulators
- Eppendorf Femtojet microinjectors
- Eppendorf Peizo drills
- Leica S9i stereomicroscopes (2)
- Olympus SZX16 dissection microscopes (2), one with fluorescence option
- Nikon Eclipse TS100 inverted microscopes
- Zeiss Stemi508 stereomicroscope
- Sutter P-97 pipette puller
- Narashige MF-900 microforges
- TMC vibration isolation tables (3)
- ESCO, Forma, New Brunswick CO2 incubators
- MINC IVF incubator
- Brinkman benchtop autoclave
- Forma cell culture hood
- BioRad Gene Pulser Xcell electroporator
- NepaGene21 Electroporator system, with concave electrodes for in vivo GONAD, and with glass slide electrode for ZEN
- Neon NxT Electroporation System
- KingFisher Duo Prime
- 96-well VeritiPro PCR thermal cycler (2)
- ProFlex 3 x 32-well PCR system
- Thermo Cryomed controlled rate embryo freezer
- Thermo TSX Series -80°C freezer
- 340L Thermo Scientific CryoPlus liquid nitrogen storage system (2)
- Centrifuges, microfuges

Personnel

- Crystal Davey, Ph.D., Director
- He Lan, Ph.D., Research Associate
- Nicholas Black, Lab Specialist
- Lilian Hayes, B.S., Lab Technician

Advisory Board Committee

Last meeting date: December 17, 2024

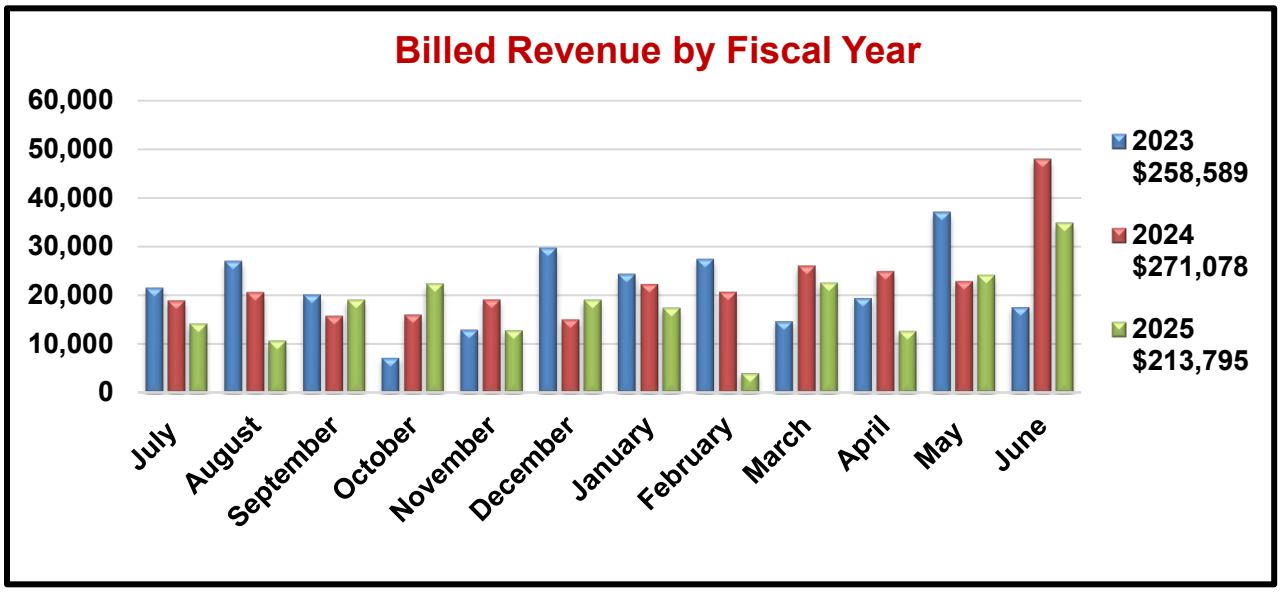
- Lewis Charles Murtaugh, Ph.D., Associate Professor, Department of Human Genetics (Sr. Faculty Advisor)
- Christopher Gregg, Ph.D., Associate Professor, Department of Neurobiology & Anatomy
- Kevin B. Jones, MD, Professor, Huntsman Cancer Institute
- Dean Tantin, Ph.D., Professor, Department of Pathology

Revenue/Expenses

FY25 Expenses: **Total $580,369**

FY25 Revenue: Total $463,795

- VP of Health Sciences Support: $250,000
- FY25 Revenue generated from services: $213,795

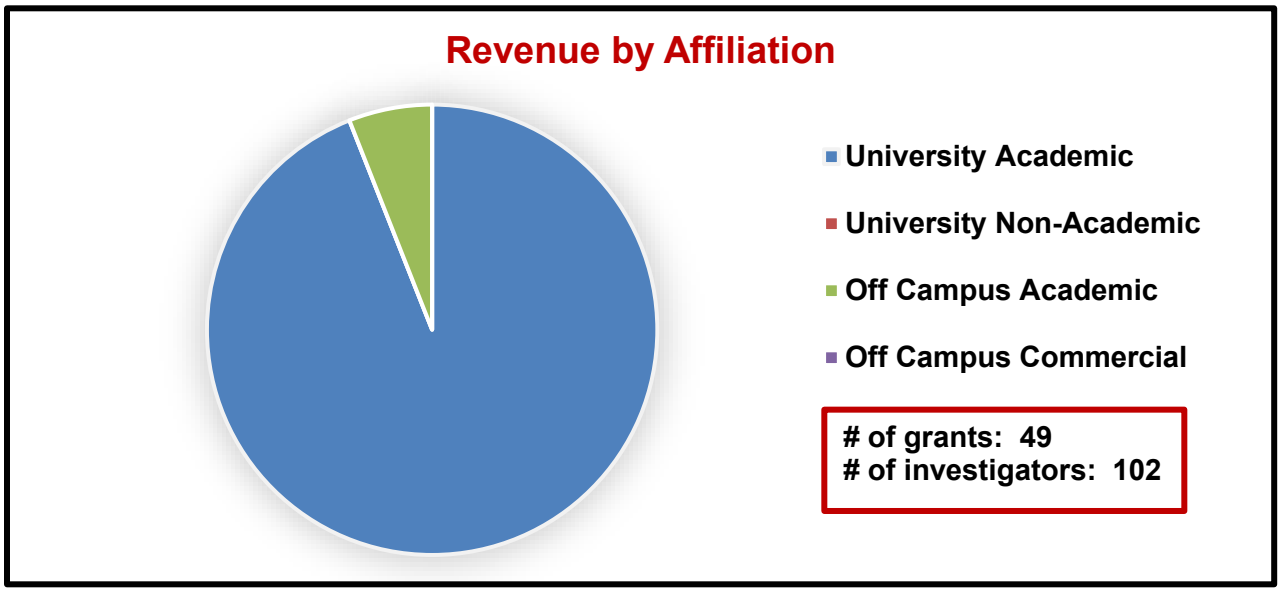


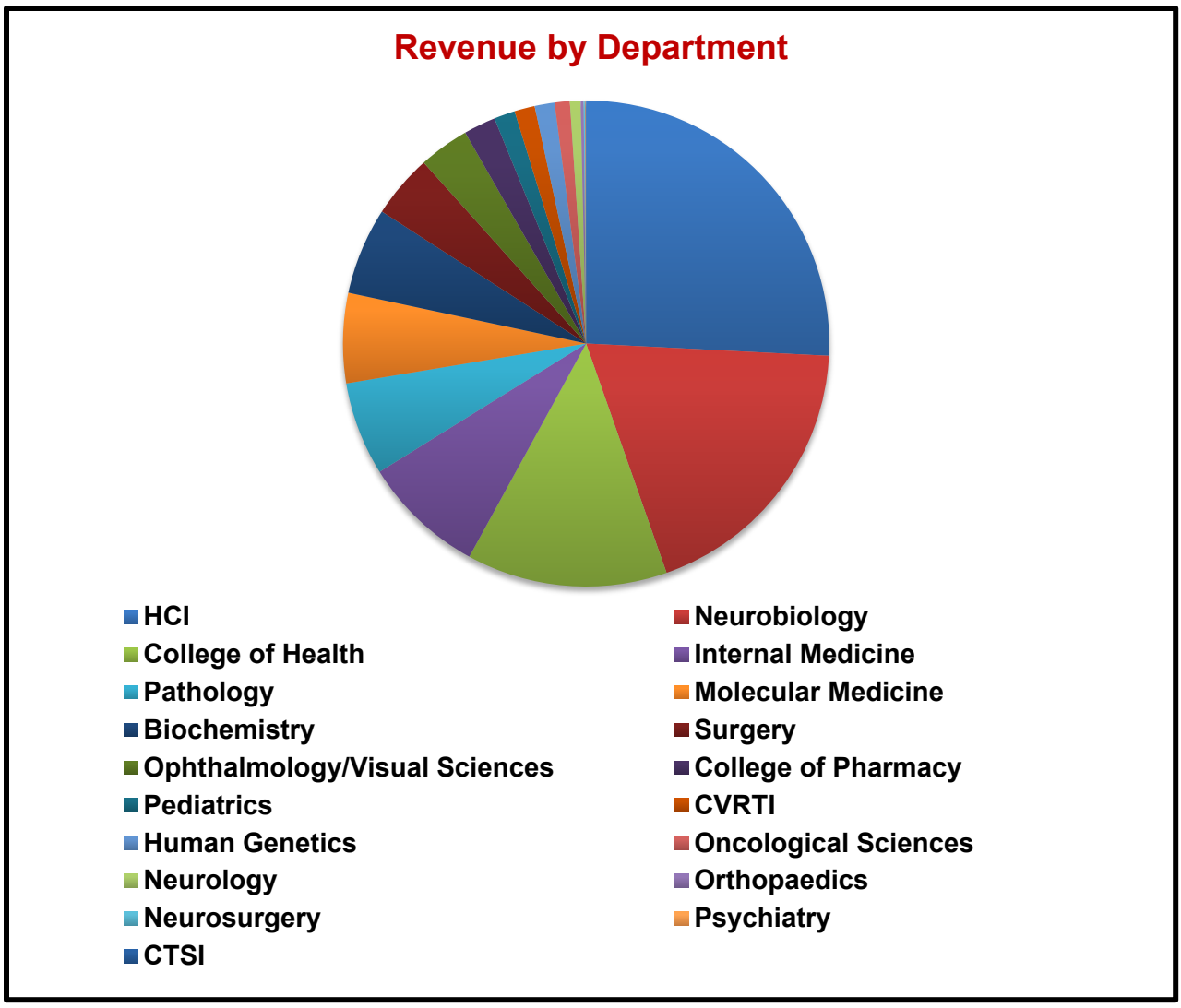
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Neli Ulrich	NIH
2	Matt Wachowiak	NIH, University of Colorado Boulder
3	Alex Pastuszak	NIH
4	Alana Welm	Department
5	Yang Liu	Department, NIH
6	Sungjin Park	Department, NIH
7	Elizabeth Leibold	NIH
8	Maria Bettini	Department
9	John Phillips	NIH
10	William Holland	Department

Letters of Support

Written and provided to faculty for support of grant applications:

1. LOS for Dr Hans Haecker's proposal to generate the IRF8-Y110F mouse line for analysis of stress hematopoiesis, September 2024
2. LOS for Dr. Charles Murtaugh's R03 proposal, "One cell, one cancer: a novel genetic approach to mouse models of human cancer initiation," October 2024
3. LOS for Dr. Maria Bettini's grant: "Cholesterol Metabolism in Regulatory T cell function.", November 2024
4. LOS for Dr. Laith Al-Rabadi's ASN grant application, November 2024
5. LOS for Dr. Christopher Reilly's proposal to generate humanized TRPV3 mouse models, November 2024
6. LOS for Dr. Sungjin Park's proposal, proposal to generate a HaloTag-Hapln4 knock-in line, May 2025

Publications

1. Acuna-Pilarte, K., E. C. Reichert, Y. S. Green, L. M. Halberg, M. Golkowski, K. M. Maguire, P. N. Mimche, S. D. Kamdem, P. A. Hu, J. Wright, G. S. Ducker, W. P. Voth, R. M. O'Connell, S. A. McFarland, E. S. A. Egal, A. Chaix, S. A. Summers, J. W. Reelitz, J. A. Maschek, J. E. Cox, K. J. Evason and M. Y. Koh (2025). HAF prevents hepatocyte apoptosis and progression to MASH and HCC through transcriptional regulation of the NF-kappaB pathway. Hepatology 82(2): 438-453.10.1097/HEP.0000000000001070
2. Cowley, J. M., C. E. Deering-Rice, J. G. Lamb, E. G. Romero, M. Almestica-Roberts, S. N. Serna, L. Sun, K. E. Kelly, R. T. Whitaker, J. Cheminant, A. Venosa and C. A. Reilly (2025). Pro-inflammatory effects of inhaled Great Salt Lake dust particles. Part Fibre Toxicol 22(1): 2.10.1186/s12989-025-00618-9
3. Kim, H. S., M. L. Sanchez, J. Silva, H. L. Schubert, R. Dennis, C. P. Hill and J. L. Christian (2025). Mutations that prevent phosphorylation of the BMP4 prodomain impair proteolytic maturation of homodimers leading to lethality in mice. Elife 14.10.7554/eLife.105018
4. Moriwaki, M., L. Liu, E. R. James, N. D. Tolley, A. M. O'Connor, B. Emery, K. I. Aston, R. A. Campbell and C. K. Welt (2025). Heterozygous Eif4nif1 Stop-Gain Mice Replicate the Primary Ovarian Insufficiency Phenotype in Women. Endocrinology 166(3).10.1210/endocr/bqaf014
5. Naderi, J., A. K. Johnson, H. Thakkar, B. Chandravanshi, A. Ksiazek, A. Anand, V. Vincent, A. Tran, A. Kalimireddy, P. Singh, A. Sood, A. Das, C. L. Talbot, I. A. Distefano, J. A. Maschek, J. Cox, Y. Li, S. A. Summers, D. J. Atkinson, T. Turapov, J. A. Ratcliff, J. Fung, A. Shabbir, M. Shabeer Yassin, S. T. E. Shiow, W. L. Holland, G. S. Pitt and B. Chaurasia (2025). Ceramide-induced FGF13 impairs systemic metabolic health. Cell Metab 37(5): 1206-1222 e1208.10.1016/j.cmet.2025.03.002
6. Niazi, A., J. A. Kim, D. K. Kim, D. Lu, I. Sterin, J. Park and S. Park (2025). Microvilli control the morphogenesis of the tectorial membrane extracellular matrix. Dev Cell 60(5): 679-695 e678.10.1016/j.devcel.2024.11.011
7. Zhong, M. L. and K. Lai (2025). AAV-based gene replacement therapy prevents and halts manifestation of abnormal neurological phenotypes in a novel mouse model of PMM2-CDG. Gene Ther 32(3): 246-254.10.1038/s41434-025-00525-w

Utah Center for Genetic Discovery

Overview

The UCGD Core supports bioinformatic analysis at the University of Utah with expertise in massively scalable data processing, and it maintains shared computational infrastructure as well as web-based data portals for data access and collaborative analysis. We help investigate the genetic basis for human disease by providing whole exome and genome sequence analyses for research and clinical projects. We also provide analysis of RNA-seq, metagenomic, lipidomic, and other related datasets to support the Immunology, Inflammation, and Infectious Disease (3i) Initiative as well as other research projects. Our shared genomics infrastructure consists of 100 computate nodes with 3108 CPU cores and 3 A100 GPUs, over 5.1 PB of network attached disk storage, and an expansive library of computational software tools and workflows.

Services

- Sequence alignment and variant calling in NGS datasets to identify small nucleotide variants (SNVs), small insertions/deletions (INDELs), and structural variants (SVs).
- Prioritization and interpretation of variants using filtering and/or statistical methods.
- Disease gene discovery in cohorts and families.
- Project and data management using our HIPAA compliant Mosaic data sharing portal.
- Bulk and single cell RNA-seq processing and analysis.
- Microbial Isolate Genome Assembly and Annotation.
- Metagenomics and metatranscriptomics analysis.
- Marker Gene Sequencing Analysis (16S, ITS or other single gene amplicon analysis with preferred taxonomic reference).
- Custom computational workflow development.

Personnel

- Carson Holt Ph.D., UCGD Core Director
- Barry Moore, Director of Research and Science
- Shawn Rynearson, Senior Software Developer
- Steven Boyden Ph.D., Director of Research and Science
- Joselin Hernandez Ph.D., Research Associate
- Marco Marchetti Ph.D., Research Associate

Advisory Board Committee

- Mark Yandell, PhD, Professor of Human Genetics
- Gabor Marth, DSc, Professor of Human Genetics
- Aaron Quinlan, PhD, Professor of Human Genetics
- Daniel Leung, MD/MSc, Associate Professor of Internal Medicine

FY25 Annual Update

Grant Support – UCGD Core supported the following grant submissions in FY24:

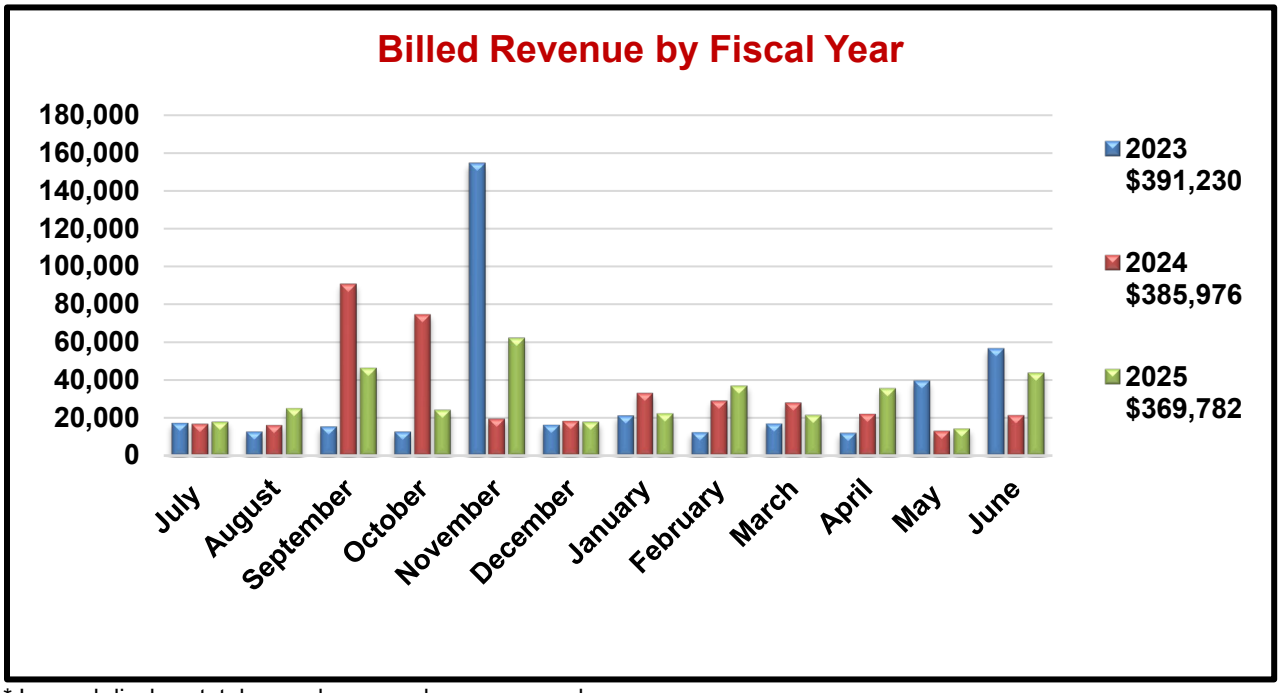
- *Novel food antigen test for early pathogenesis of Eosinophilic Esophagitis **(R03)**. PI: Kathryn Peterson*
- *Beyond SGLT2i, niclosamide as a novel agent retards the progression of CKD **(R01)**. PI: Srinivasan Beddhu*
- *Gene regulation of hematopoietic cells during stress hematopoiesis in the context with SPOP **(R01)**. PI: Hans Haecker*
- *One cell, one cancer: a novel genetic approach to mouse models of human cancer initiation **(R03)**. PI: Lewis Charles Murtaugh*
- *Role of inhibitory Fc receptor in regulating long-lasting humoral immunity **(R01)**. PI: Koushik Roy*
- *Genetic Contributors of Placental Insufficiency: Pedigree and Trio-Based Whole Genome Sequencing **(R01)**. PI: Tsegaselassie Workalemahu*
- *Unmasking the Immunomodulatory Roles of CD7 Signaling **(R01)**. PI: Wan-Lin Lo*
- *Mechanistic Role of the Zap70–LAT–PLCγ1 Signaling Axis in Neonatal T Cell Development and Function **(R01)**. PI: Wan-Lin Lo*
- *Immune Cell reprogramming by pathogens in early life **(R01)**. PI: Keke Fairfax*

Revenue/Expenses

FY25 Expenses: **Total $501,413**

FY25 Revenue: **Total $579,332**

- VP of Health Sciences Support UCGD: $175,000
- SVPHS- Data Storage: $34,550
- FY25 Revenue generated from services: $369,782

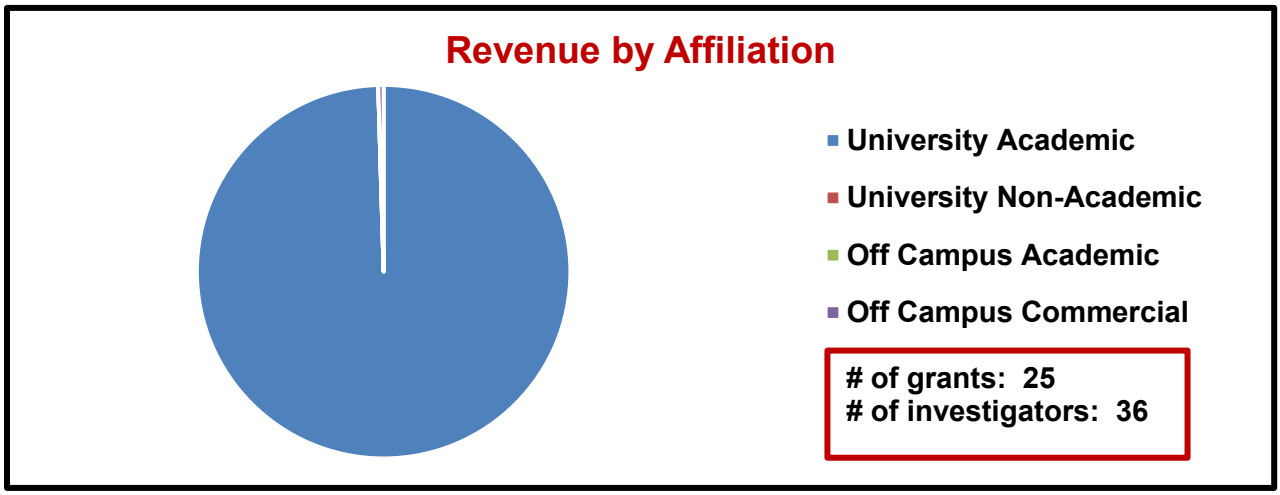


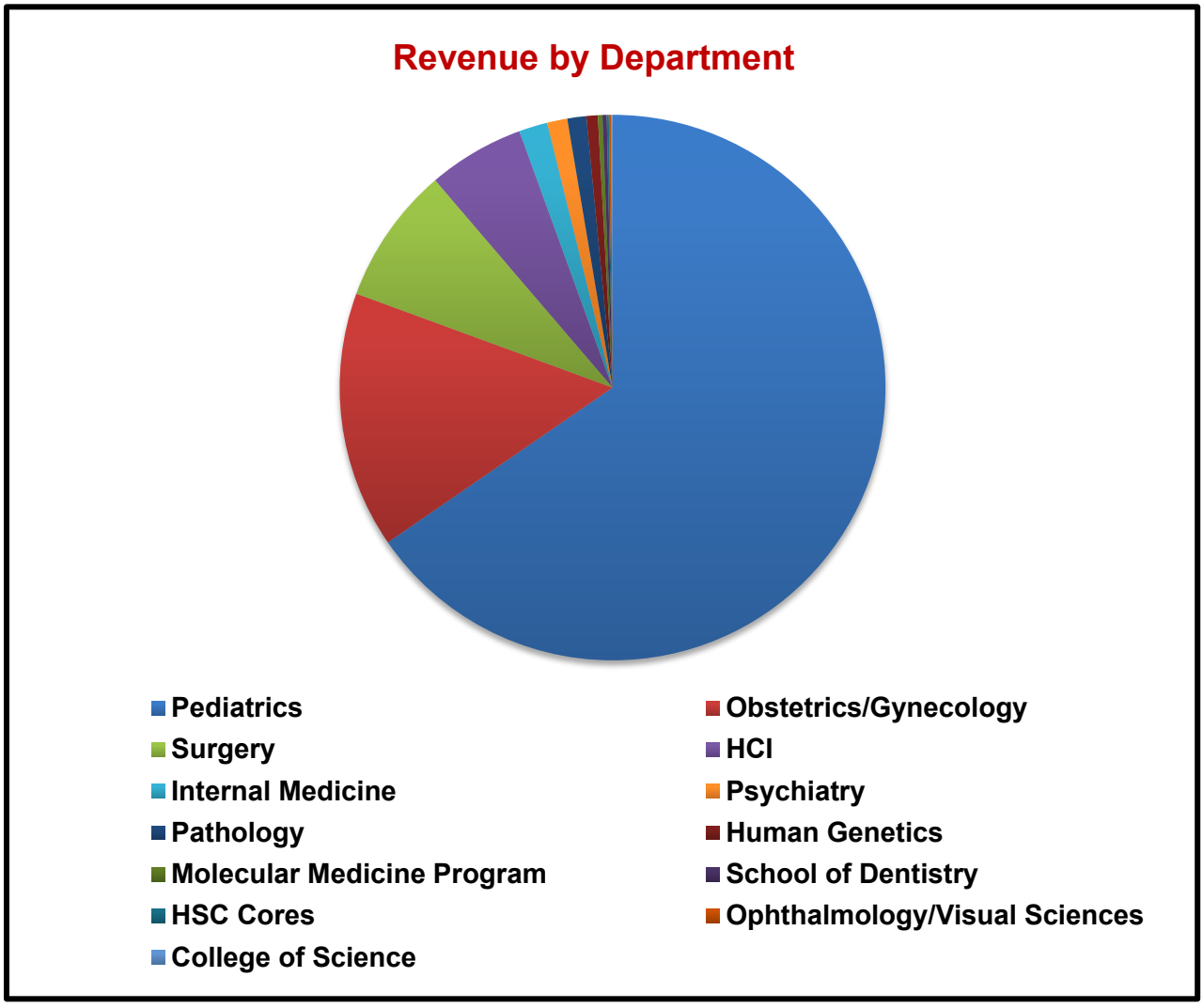
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Sabrina Malone-Jenkins	Department
2	Lorenzo Botto	Department, NIH
3	Nathan Blue	Department, NIH
4	Kenneth Aston	Oregon Health & Science University
5	Tsegaselassie Workalemahu	NIH
6	Deborah Neklason	Janssen Research & Development LLC
7	Bruce Edgar	Department, NIH
8	Hilary Coon	NIH
9	Martin McMahon	Department
10	Shannon Elf	Department, NIH

Publications

1. Allen-Brady, K., B. Moore, L. E. Verrilli, M. A. Alvord, M. Kern, N. Camp, K. Kelley, J. Letourneau, L. Cannon-Albright, M. Yandell, E. B. Johnstone and C. K. Welt (2025). Breast Cancer Is Increased in Women With Primary Ovarian Insufficiency. J Clin Endocrinol Metab 110(5): e1678-e1686.10.1210/clinem/dgae480
2. Arellano, N. S., W. L. Heaton, M. C. Nauman, A. E. Runnels, J. Gomez-Villa, D. Vanni, M. Gaviria, M. Fujita, N. M. Krah, M. Ciboddo, S. Yadav, C. T. Brown, P. D. Bowden, A. K. Chen, C. Henning, S. Catricala, I. C. Casetti, O. Borsani, E. Rumi, D. Pietra, I. Plo, C. Marty, M. Marchetti, C. Saygin, A. B. Patel and S. E. Elf (2025). Type 2 calreticulin mutations activate ATF6 to promote BCL-xL-mediated survival in myeloproliferative neoplasms. Blood.10.1182/blood.2024026940
3. DiBlasi, E., A. A. Shabalin, T. J. Nicholas, E. T. Monson, E. Ferris, L. Yefimov, S. Han, L. M. Baird, W. B. Callor, M. J. Staley, Q. Li, V. L. Willour and H. Coon (2025). Intragenic deletions from whole genome sequencing of 1054 suicide deaths. medRxiv.10.1101/2025.02.28.25323104
4. Fonseca, E., S. Fox, A. Carey, B. Barker, M. Marchetti, M. Hirschi, K. Hanson and K. Walter (2025). Coccidioides genomes from low-incidence states reveal complex migration history across the Western United States.10.1101/2025.05.19.25327631
5. Hiatt, L., B. Weisburd, E. Dolzhenko, V. Rubinetti, A. K. Avvaru, G. E. VanNoy, N. E. Kurtas, H. L. Rehm, A. R. Quinlan and H. Dashnow (2025). STRchive: a dynamic resource detailing population-level and locus-specific insights at tandem repeat disease loci. Genome Med 17(1): 29.10.1186/s13073-025-01454-4
6. Kandelouei, T., M. E. Houghton, M. R. Lewis, C. C. Keller, M. Marchetti, X. Kang and B. A. Edgar (2024). Mating and ecdysone signaling modify growth, metabolism, and digestive efficiency in the female Drosophila gut. bioRxiv.10.1101/2024.11.19.624434
7. Malone Jenkins, S., R. N. Palmquist, B. Moore, S. E. Boyden, T. J. Nicholas, P. Bayrak-Toydemir, R. Mao, J. A. R. Farrell, C. H. Holt, S. G. Rynearson, C. M. Solorzano, A. Ward, D. H. Best, N. Al-Sweel, D. L. Bentley, L. Brunelli, C. Y. Chow, D. W. Close, M. J. Cormier, M. J. Deshotel, J. Durtschi, E. J. Eide, L. Floyd, E. K. Fredrickson, M. L. Fulmer, E. J. Hernandez, A. L. Kapron, M. A. Karren, R. G. Lewis, C. E. Miller, L. C. Murtaugh, K. E. Nicholson, K. Noble, B. D. O'Fallon, J. M. O'Shea, D. C. Pattison, B. S. Pedersen, B. J. Petersen, B. D. Peterson, L. Pizzo, H. M. Reynolds, P. Rindler, C. B. Torr, T. Wen, H. J. Yost, J. Zhao, M. Yandell, G. T. Marth, A. R. Quinlan, J. C. Carey, B. J. Shayota, M. Tristani-Firouzi and J. L. Bonkowsky (2025). The Utah NeoSeq Project: a collaborative multidisciplinary program to facilitate genomic diagnostics in the neonatal intensive care unit. NPJ Genom Med 10(1): 26.10.1038/s41525-025-00483-7
8. Marchetti, M., E. Fonseca, K. Hanson, B. Barker and K. Walter (2025). cocci-call: a species-aware variant identification pipeline for Coccidioides spp. in genomic epidemiology.10.1101/2025.01.14.25320518
9. Oviedo, J. M., D. Cortes-Selva, M. Marchetti, L. Gordon, L. Gibbs, J. A. Maschek, J. Cox, S. Frietze, E. Amiel and K. C. Fairfax (2025). Schistosoma mansoni antigen induced innate immune memory features mitochondrial biogenesis and can be inhibited by ovarian produced hormones. bioRxiv.10.1101/2025.01.14.632838

10. Peterson, B., E. F. Juarez, B. Moore, E. J. Hernandez, E. Frise, J. Li, Y. Lussier, M. Tristani-Firouzi, M. G. Reese, S. Malone Jenkins, S. F. Kingsmore, M. N. Bainbridge and M. Yandell (2025). MPSE identifies newborns for whole genome sequencing within 48 h of NICU admission. NPJ Genom Med **10**(1): 47.10.1038/s41525-025-00506-3
11. Rahman, M. M., C. Kraft, C. Clark, R. J. Nicholson, M. Marchetti, E. Williams, C. Zhang, W. L. Holland, S. A. Summers and B. A. Edgar (2024). Bwa, an ortholog of alkaline ceramidase-ACER2, promotes intestinal stem cell proliferation through pro-inflammatory cytokine signaling in Drosophila melanogaster. bioRxiv.10.1101/2024.11.26.624044
12. Shankar, T., M. Marchetti, H. Srinivasan, T. Lunde, C. Selzman, E. Fernandez, M. Tristani-Firouzi, S. Drakos and O. Wever-Pinzon (2025). DNA Methylation And Transcriptional Markers Of Myocardial Reverse Remodeling In HF Patients On Lvad Support. Journal of Cardiac Failure 31: 304.10.1016/j.cardfail.2024.10.312
13. Srinivasan, H., T. Shankar, M. Marchetti, C. Selzman, E. Hernandez, M. Tristani-Firouzi, S. Drakos and O. Wever-Pinzon (2025). Sex Dependent Molecular Changes In Heart Failure Patients On Lvad Support: Implications On Myocardial Recovery. Journal of Cardiac Failure 31: 314-315.10.1016/j.cardfail.2024.10.339
14. Taliercio, V., J. Zhao, S. E. Boyden, R. Mao, P. Bayrak-Toydemir, A. Pflaum, J. Palumbos, A. Andrews, E. E. Baldwin, C. Welt, M. Fait, N. Undiagnosed Diseases, L. D. Botto and D. Viskochil (2025). Worth the Effort: Lessons for Discovery and Care From an Unusual Case of Gorlin Syndrome. Am J Med Genet A 197(9): e64108.10.1002/ajmg.a.64108
15. Thorpe, H. J., B. S. Pedersen, M. Dietze, N. Link, A. R. Quinlan, J. L. Bonkowsky, A. Thomas and C. Y. Chow (2025). Identification of CNTN2 as a genetic modifier of PIGA-CDG in a family with incomplete penetrance and in Drosophila. Am J Hum Genet 112(3): 572-582.10.1016/j.ajhg.2025.01.017
16. Vong, K. I., Y. D. Alvarez, G. Noel, S. T. Barton, C. Chung, R. Howarth, N. Meave, Q. Zhang, F. Jiwani, C. Barrows, A. Patel, J. X. Wang, N. Chi, S. F. Kingsmore, M. D. White, X. Yang and J. G. Gleeson (2024). Genomic mosaicism reveals developmental organization of trunk neural crest-derived ganglia. bioRxiv.10.1101/2024.09.25.615004
17. Wen, T., S. E. Boyden, C. M. Hocutt, R. G. Lewis, E. E. Baldwin, J. Vagher, A. Andrews, T. J. Nicholas, A. Chapin, E. M. Fan, L. D. Botto, P. Bayrak-Toydemir, R. Mao and J. A. Meznarich (2025). Identification of 2 novel noncoding variants in patients with Diamond-Blackfan anemia syndrome by whole genome sequencing. Blood Adv 9(10): 2443-2452.10.1182/bloodadvances.2024015347
18. Workalemahu, T., M. Madsen, S. Lopez, J. Page, N. Blue, C. Avery, R. Sargent, Z. Yu, E. Guinto, D. Branch, S. Leisher, L. Jorde, A. Quinlan, H. Coon, M. Varner, C. Roberts, D. Neklason, N. Camp and R. Silver (2024). Inherited Genetic Risk in Stillbirth: A Shared Genomic Segments Analysis of High-Risk Pedigrees.10.21203/rs.3.rs-4858244/v1

Service Recharge Centers

Overview

The HSC Administration Office also manages Service Recharge Centers. These Centers are not cores but follow most of the same guidelines as the HSC Cores. The Administration Office processes the billing, collections and ordering of supplies for these Centers. Each Center receives monthly reports showing revenue and expenses and has access to the internal tracking system which shows in real time what their account balances are. The Administration Office charges a fee of 5% on revenue collected from billed services. These Centers are listed on the HSC Cores website under Service/Recharge Centers. If it is determined at a later time that a Center would benefit from becoming a Core, then all guidelines must be followed. Service Recharge Centers are primarily created to provide services to the University Community but can also provide services to external customers. The administration of these facilities is performed by the home department. Only recharge activity for these groups is managed by the Administrative Office.

BioMedical Microfluids Lab

Overview

The Biomedical Microfluidics Core (BMC) is a user research facility managed by the State of Utah Center of Excellence for Biomedical Microfluidics managed by Bruce Gale and the Department of Mechanical Engineering. The lab offers clients design, engineering, and prototyping services for a wide variety of biomedical assays, medical devices, and high-throughput automation instruments. These devices can be custom designed and focused on answering specific research questions or optimized for commercial manufacturing.

The BMC has significant experience with a wide range of microfluidic devices and manufacturing methods. The BMC can prototype devices using a wide range of polymers, glass, and semiconductors (such as Si). Devices can be manufactured using photolithography tools (in conjunction with the Nanofab), soft lithography, laminates, 3D printing, or molding processes. The BMC has significant experience in including a variety of pumps, valves, sensors, separation components, analytical elements, input/output components, and flow control devices, which combined allow for rapid development of custom devices. Past applications include: bacteria and virus detection, cell sorting, high speed PCR devices, chemical analysis, complex reaction engineering, multiplexed cell culture and analysis, drug delivery, nanoparticle generation and analysis, and miniature medical devices for blood vessel and peripheral nervous system repair. The BMC is especially adept at working with companies developing new products.

Uniqueness

The BMC has an extensive history of successful collaborations with academia, government, and industry clients ranging from startups to multinational corporations in the medical, chemical, drug development, drug delivery, analytical, and other markets.

The BMC staff can help with custom design of microfluidic devices to fit your research and analytical needs. The BMC staff can also help with the design of custom microfluidic devices that have key characteristics for commercialization, including low-cost manufacturing, high repeatability, and simplification of complex operations.

The BMC has expertise in:

- Biomedical materials and devices
- Packaging and interfaces
- Automated sample preparation
- Sensor integration
- High throughput analysis
- General biomedical miniaturization

Services & Equipment

The BMC provides the following services:

- Custom microfluidic device design
- Microfluidic device prototyping
- Device engineering
- Device testing
- Low volume manufacturing
- Consulting services for commercialization of microfluidic devices

FY26 Goals

- Expand the range of services offered.

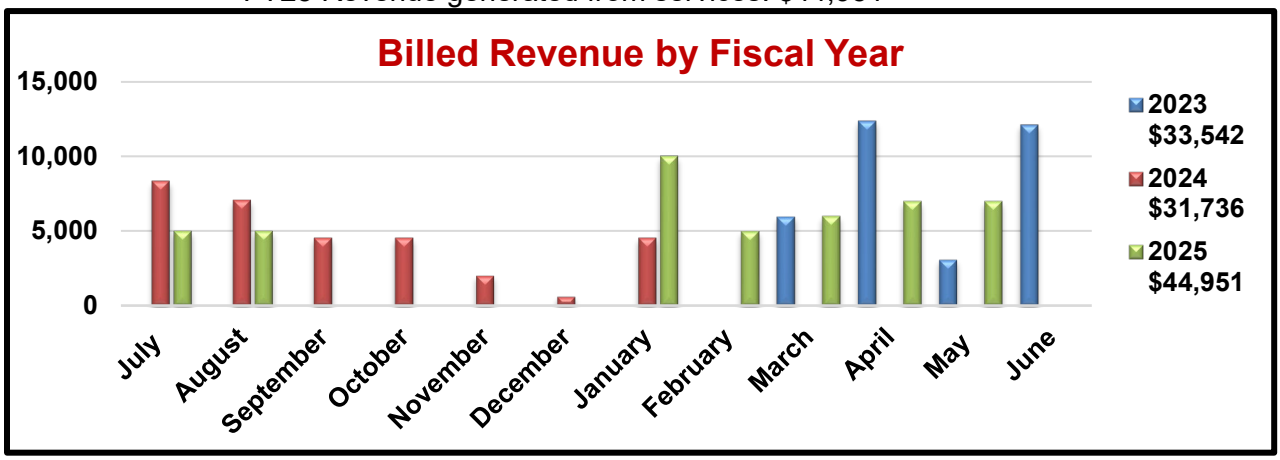
Personnel

- Bruce Gale PhD, Director

Revenue/Expenses

FY25 Expenses: Total $34,408
FY25 Revenue: Total $44,951

- VP of Research Support: $ 0
- FY25 Revenue generated from services: $44,951

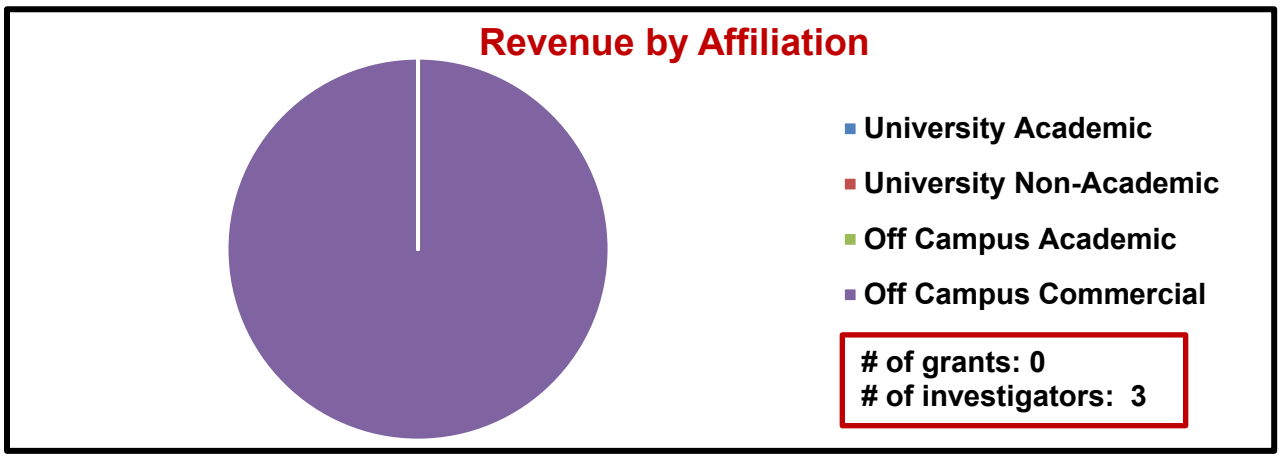


* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):



Top Users

1	Patrick Manou	Off Campus Commercial
2	Sanare Enterprises	Off Campus Commercial
3	Varex Imaging	Off Campus Commercial

Publications

No known publications acknowledged this facility in FY25.

Biophysical Interactions

Overview

The Biophysical Interactions Core characterizes macromolecular biophysics and interaction energetics using a wide variety of state-of-the-art instrumentation including: an SPR-32 Pro real-time, label-free surface plasmon resonance biosensor; an analytical ultracentrifuge with UV-Vis and Rayleigh interference optics; an PEAQ-ITC and iTC200 Microcalorimeter for isothermal titration calorimetry; and an Aviv 410 circular dichroism spectrometer. With these techniques researchers can analyze association and kinetic binding constants, enthalpies and entropies of binding, secondary structure, shape, molecular weight, stoichiometry, stability, and homogeneity.

Uniqueness

The Biophysical Interactions Core provides unique services with specialized equipment not commonly available. Our ITC and SPR instruments can be applied to a wide variety of biological systems to quantify different parameters of interactions, such as association and dissociation kinetics and enthalpy/entropy of binding events. Additionally, our structural instruments (CD and AUC) provide a detailed look at many aspects of the physical shape and stability of the molecules being analyzed. We work with numerous academic labs to design experiments, train users, and deliver publication quality data in a timely manner. Although we traditionally focus on protein-protein and protein-ligand interactions, these techniques can be applied to many different systems.

Services

The Biophysical Interactions Core's mission is to help researchers investigate several biomolecular characteristics in different contexts. We specialize in binding event analysis through SPR and ITC, and structural analysis via CD and AUC and are pleased to offer the following services:

- ITC analysis of chemical dynamics of binding interactions
- High-throughput SPR analysis of binding events
- CD analysis of secondary structure and stability
- AUC analysis of shape, molecular weight, and stability of biomolecules

FY26 Goals

- Increase awareness of our services and generate more users

Major Equipment

Binding Event Analysis:

- Bruker Sierra SPR-32 Pro surface plasmon resonance instrument with eight individual channels and three spots per channel, and Bruker SPR analysis 4 software.
- Malvern Panalytical Microcal iTC200 instrument and MicroCal ITC Origin 7 analysis software

Structural Analysis:

- Aviv 410 circular dichroism spectrometer with a RTE-100 Neslab refrigerated bath circulator, and 1 and 10 mm quartz cuvettes
- Beckman Coulter XLI Optima AUC, rotors, and the corresponding analysis software

Personnel

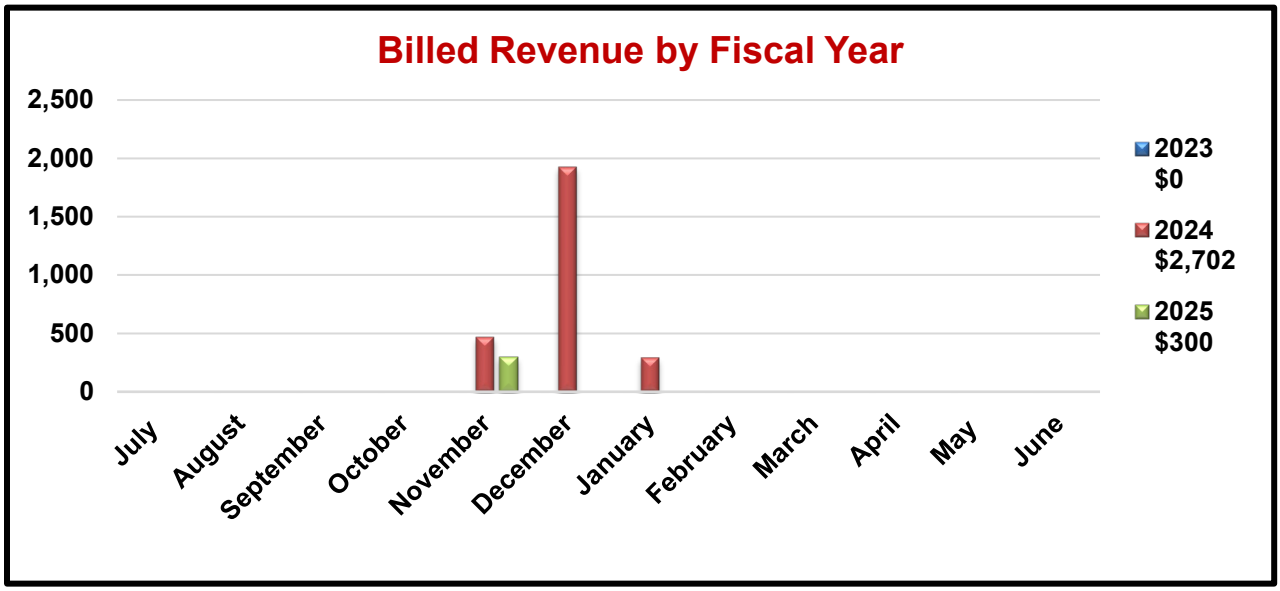
- Riley J. Giesler, PhD, Core Director

Revenue/Expenses

FY25 Total Expenses: **$10,811**

FY25 Total Revenue: **$300**

- FY25 Revenue generated from services: $300

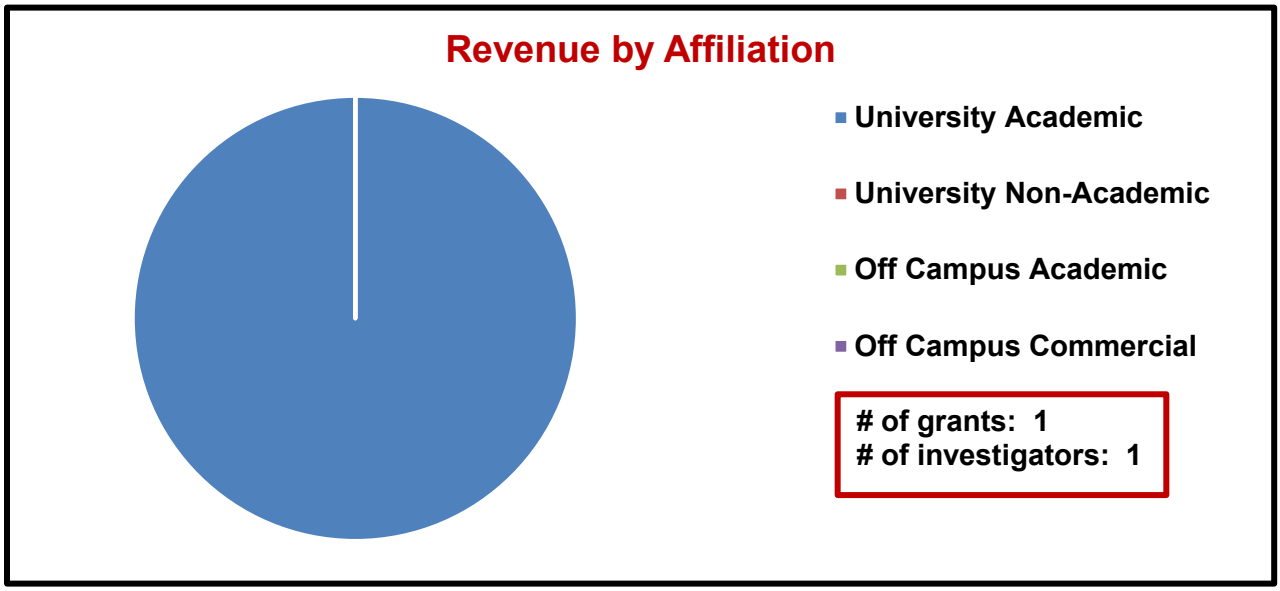


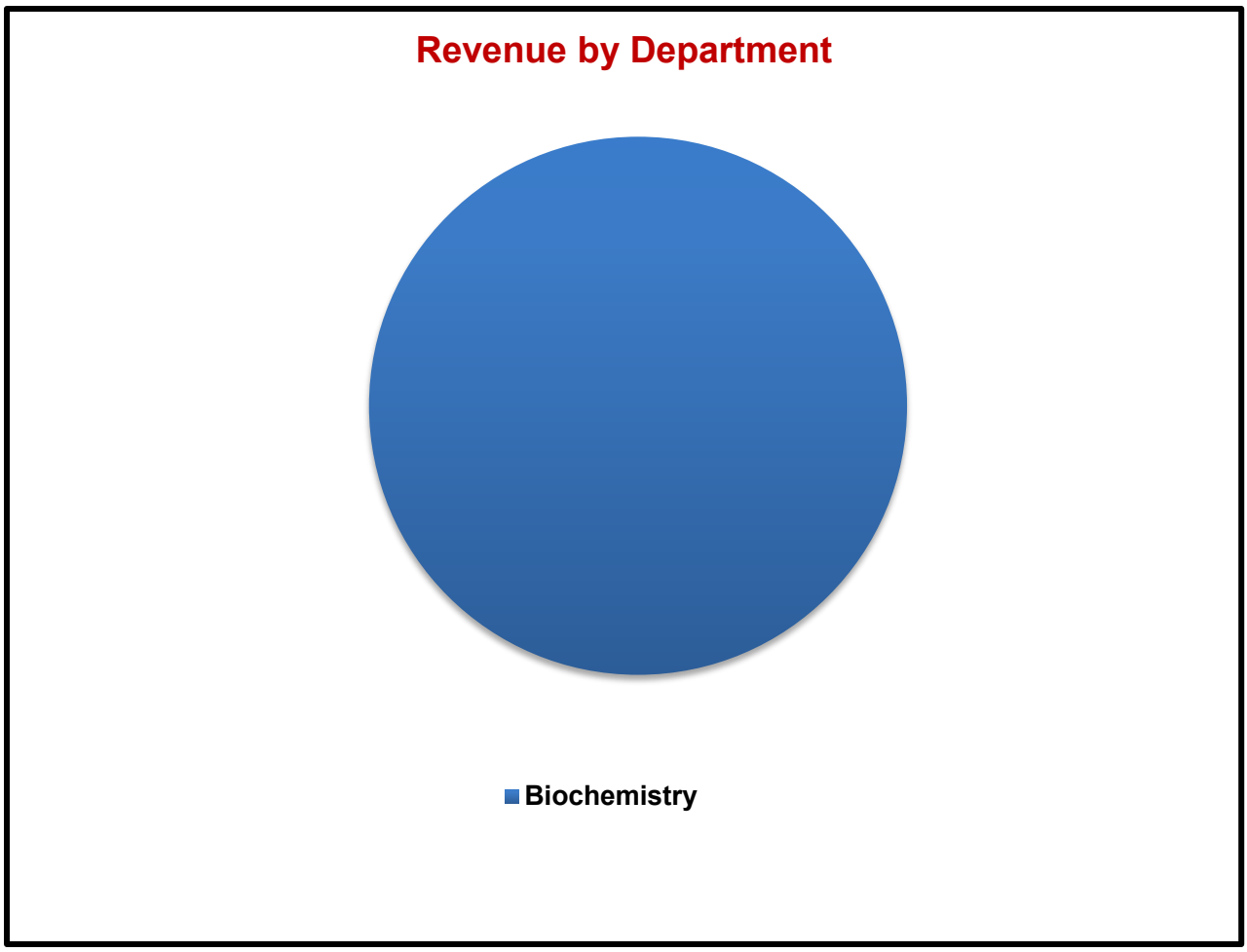
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Wesley Sundquist	NIH

Publications

No known publications acknowledged this facility in FY25.

Center for Human Toxicology

Overview

The Center for Human Toxicology (CHT) provides targeted, quantitative bioanalysis that supports studies throughout the drug development pipeline. The Center offers customized assay development and sample analysis to generate data for a vast array of therapeutically active compounds.

Uniqueness

The CHT's ability to develop customized quantitative assays for targeted novel therapeutic compounds and adapt previously published assays for use within the Center is a unique service within the University of Utah. The capability to provide these services have been honed over 30+ years of serving as the contract bioanalytical laboratory for NIDA, in addition to the directorship leading cutting-edge forensic toxicology and clinical pharmacology research throughout the storied history of the Center.

The CHT is home to several liquid chromatography-tandem mass spectrometery (LC-MS/MS) systems that are maintained and operated by experienced staff members. LC-MS/MS instrumentation requires infrastructure and costs that are prohibitive for many laboratories. By providing these resources to investigators on- and off-campus, the Center facilitates critical drug studies by academic researchers in both basic and clinical sciences.

In contrast to external Clinical Research Organizations (CROs) offering similar services, the CHT provides transparent, high quality analyses at affordable prices, which is of particular benefit to academic investigators seeking preliminary data that will support a grant application. Furthermore, the CHT can help investigators design sample collection schemes within a study and conduct advanced pharmacokinetics analyses after data collection to support the broader utility of data generated within the Center.

Services

- Schedule 1 DEA License
- Custom Assay Development by LC-MS/MS
- Sample Analysis by LC-MS/MS
- Sample Analysis by ELISA
- Optimal Sampling Design
- Non-Compartmental Pharmacokinetic Analysis
- Pharmacometric Modeling
- Genotyping

Equipment

LC-MS/MS

- ThermoScientific Vanquish Flex LC and Velos Pro MS
- ThermoScientific Vanquish Flex LC and TSQ Quantis Plus MS/MS
- Waters Acquity UPLC and ThermoScientific TSQ Vantage MS/MS
- Waters Acquity UPLC and Xevo TQD MS/MS
- Waters Acquity UPLC and Micromass Quattro Premier XE MS/MS

Developed Assays

Compounds (Matrix)

- Cannabis and metabolites (plasma, urine, hair)
- Endocannabinoids (plasma, tissue)
- Buprenorphine and metabolites (plasma)
- Ganciclovir (plasma, dried blood spots, tissue)
- Methamphetamine/Amphetamine (plasma, oral fluid)
- Glucocorticoids (plasma)
- Cocaine/metabolites (plasma)
- Antibiotics (plasma, cerebrospinal fluid)
- Opioids [morphine, oxycodone, fentanyl, fentalogues and metabolites] (plasma, urine)
- Anti-Seizure Medications [clobazam, valproate, carbazamepine, stiripentol, levetiracetam] and their metabolites (plasma, brain tissue)

Personnel

- Christopher Reilly, Ph.D., ATS, Director
- Joseph Rower, Ph.D., DABCP, Associate Director
- Cassandra Deering-Rice, Ph.D. Assistant Director
- Tia Freeman, BS
- Brent Lindquist-Kleissler, Ph.D.
- Lizz Kralik, BS
- Kalii Caldwell, MS

FY26 Goals

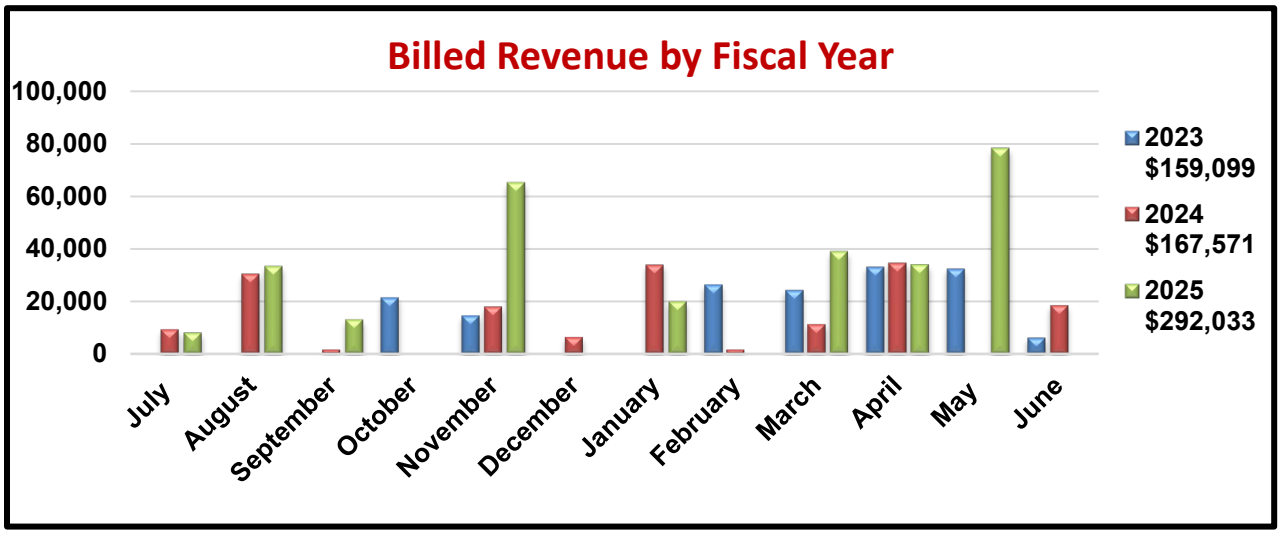
- Continue to streamline assay development and sample analysis procedures.
- Expand knowledge of our services across and beyond campus.
- Build CHT infrastructure to enable more efficient support of client projects.

Revenue/Expenses

FY25 Expenses: **Total $198,883**

FY25 Revenue: **Total $292,033**

- FY25 Revenue generated from services: $292,033

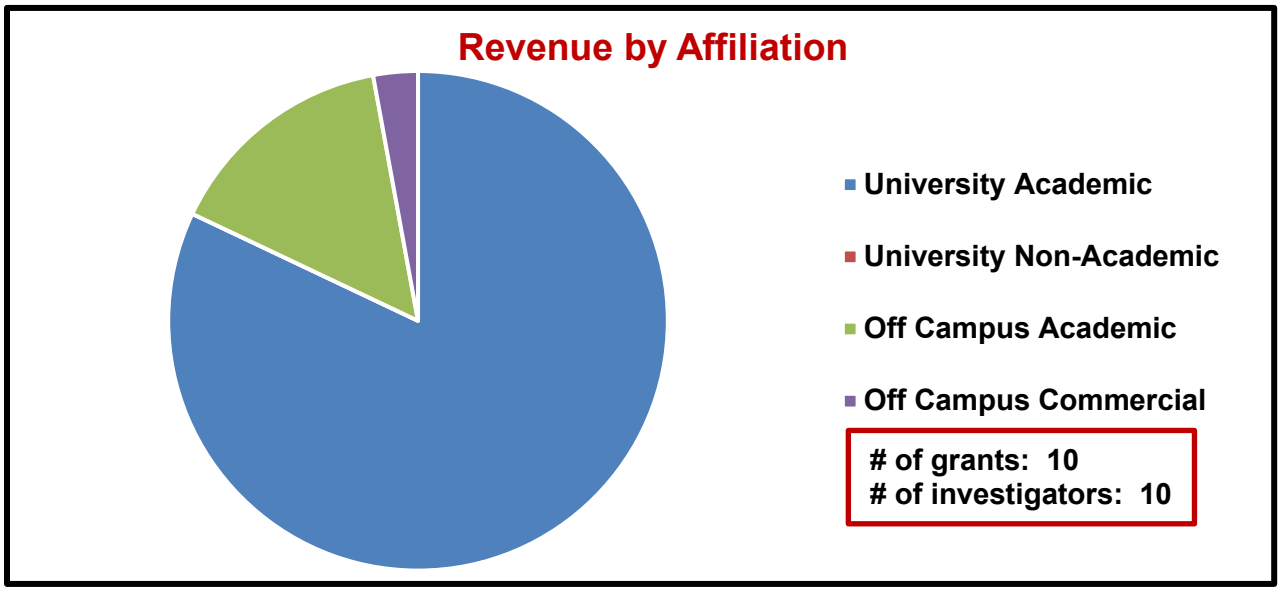


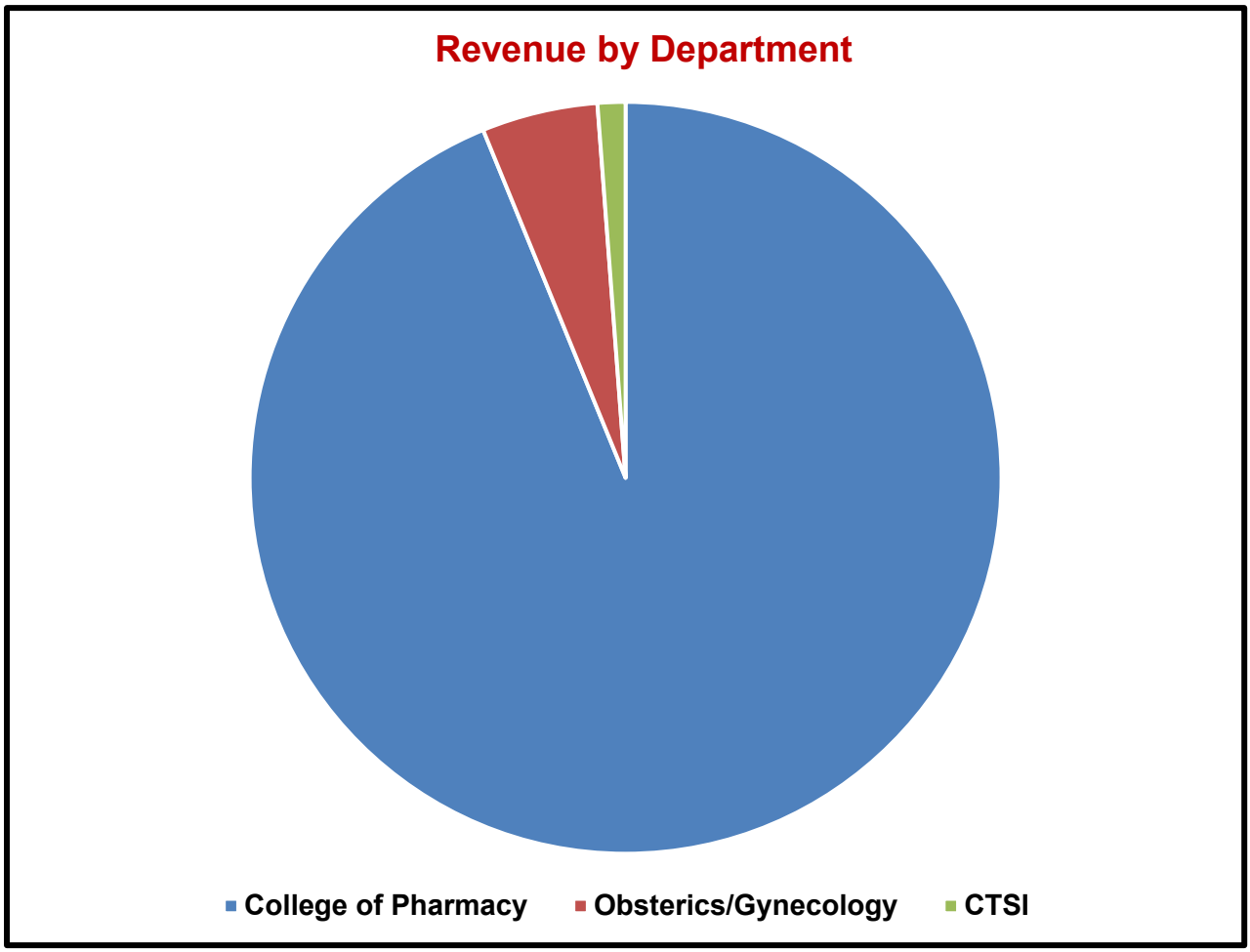
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Joseph Rower	Brigham & Womens Hosp, Department, NIH, University of California Irvine, University of Chicago
2	Massachusetts Inst. Technology	Off Campus Academic
3	The Hospital for Sick Children	Off Campus Academic
4	Jonathan Constance	NIH
5	Ann Bruno	Foundation for Women & Girls with Blood Disorders, NIH
6	Kathleen Job	NIH
7	ClearPoint Advanced Laboratories	Off Campus Commercial
8	Young Living Essentials Oils	Off Campus Commercial
9	University of South Dakota	Off Campus Academic
10	Kevin Watt	NIH

Publications

1. Almestica-Roberts, M., N. D. Nguyen, L. Sun, S. N. Serna, E. Rapp, K. L. Burrell-Gerbers, T. A. Memon, B. L. Stone, F. L. Nkoy, J. G. Lamb, C. E. Deering-Rice, J. E. Rower and C. A. Reilly (2024). The Cytochrome P450 2C8*3 Variant (rs11572080) Is Associated with Improved Asthma Symptom Control in Children and Altered Lipid Mediator Production and Inflammatory Response in Human Bronchial Epithelial Cells. Drug Metab Dispos 52(8): 836-846.10.1124/dmd.124.001684
2. Chevalier, A., A. McKnite, A. Whelan, C. Imburgia, J. E. Rower, K. M. Watt and D. J. Green (2024). Interaction of azithromycin and methylprednisolone with ex-vivo extracorporeal membrane oxygenation circuits (ECMO). Perfusion: 2676591241297401.10.1177/02676591241297401
3. Dubinsky, S., A. Hamadeh, C. Imburgia, A. McKnite, J. Porter Hunt, K. Wong, C. Rice, J. Rower, K. Watt and A. Edginton (2024). Physiologically Based Pharmacokinetic Modelling in Critically Ill Children Receiving Anakinra While on Extracorporeal Life Support. Clin Pharmacokinet 63(9): 1343-1356.10.1007/s40262-024-01424-w
4. Lynch, W. B., S. A. Miracle, S. I. Goldstein, J. A. Beierle, R. Bhandari, E. T. Gerhardt, A. Farnan, B. M. Nguyen, K. K. Wingfield, I. Kazerani, G. A. Saavedra, O. Averin, B. M. Baskin, M. T. Ferris, C. A. Reilly, A. Emili and C. D. Bryant (2025). Validation studies and multiomics analysis of Zhx2 as a candidate quantitative trait gene underlying brain oxycodone metabolite (oxymorphone) levels and behavior. J Pharmacol Exp Ther 392(5): 103557.10.1016/j.jpet.2025.103557
5. McKnite, A. M., C. E. Imburgia, D. J. Green, J. P. Hunt, R. E. Hudson, A. J. Whelan, C. L. Mathis, W. E. Kelley, J. E. Rower, C. A. Reilly and K. M. Watt (2025). Clearance of Amlodipine, Fentanyl, Fluconazole, Methylprednisolone, and Midazolam by Continuous Renal Replacement Circuits. ASAIO J 71(7): 603-610.10.1097/MAT.0000000000002422
6. Mensah, J. A., K. Johnson, T. Freeman, C. A. Reilly, J. E. Rower, C. S. Metcalf and K. S. Wilcox (2024). Utilizing an acute hyperthermia-induced seizure test and pharmacokinetic studies to establish optimal dosing regimens in a mouse model of Dravet syndrome. Epilepsia 65(10): 3100-3114.10.1111/epi.18104

Crus Center

Overview

The Crus Center is a user research facility managed by the Materials Science and Engineering (MSE) Department at the University of Utah. The lab offers clients access to analytical instrumentation and services for a variety of samples.

The Crus Center provides researchers with training on the care and operation of equipment used in materials characterization. In addition to providing training for new users, our staff is available to help users in the design of experiments and the interpretation of results.

The Crus Center also supports the undergraduate Crus Scholar program which allows students to get paid for certain research projects, generously supported by Dawn and Roger Crus.

Uniqueness

The Crus Center is an open space dedicated to research both within the MSE department, as well as across the University of Utah campus.

Services & Equipment

The Crus Center serves as a facility for Materials Science and Engineering undergraduate and graduate level courses that involve materials characterization.

Staff also provide consultations and experiment design suggestions based on the needs of the user. The services offered by the Crus Center include characterization with the following techniques:

- Hitachi S-4800 FE-SEM
  - Ultra-high resolution down to 1 nm
  - Back Scatter, Secondary, and Energy Dispersive X-Ray Spectroscopy
- Rigaku Miniflex 600 x-ray diffraction
  - Powder diffraction
  - 5-sample auto-sampler
- TA Instruments Q600 SDT – DSC, TGA
  - Room temp to 600 Celsius
  - Argon purge gas
- Anton Paar SurPASS 3 Electrokinetic Analyzer (EKA)
  - Automated isostatic point detection
  - pH-relative zeta potential
- Denton Vacuum Desk V – Thin Film Deposition System
  - Automatic timed gold sputtering
- Thermo Scientific Niton XL3T 500 XRF
  - Elemental analysis

FY26 Goals

- Free up space from broken or unused equipment to make room for more techniques.
- Increase online visibility.

Personnel

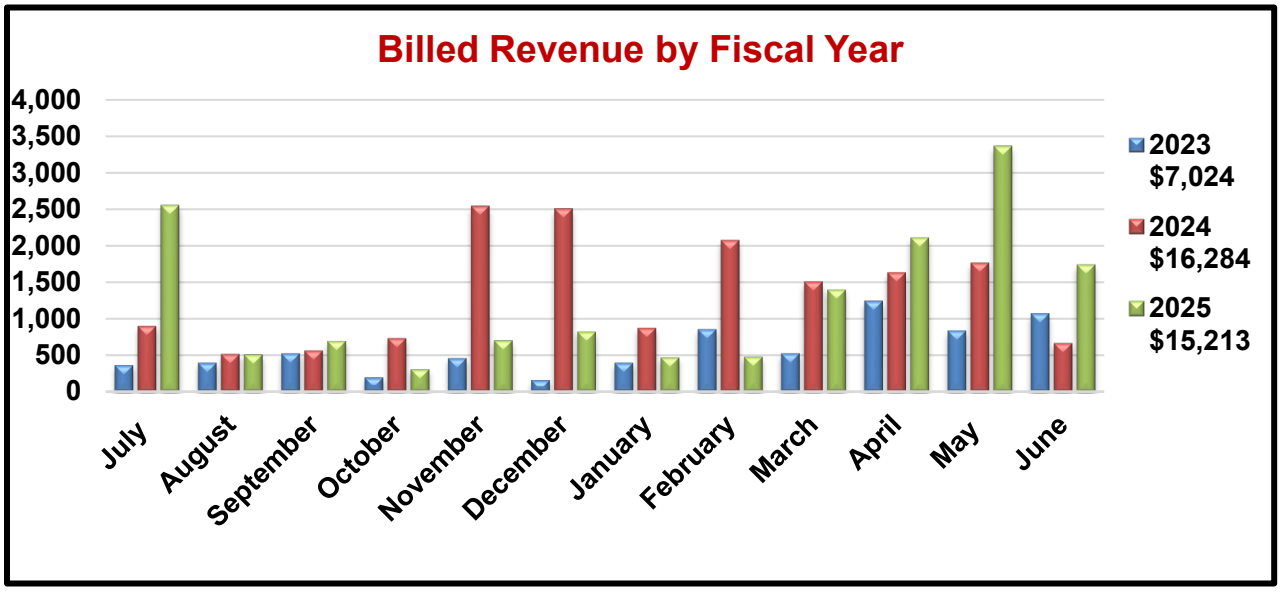
- Bobby Mohanty, Faculty Director
- Kimberly Watts, Lab Manager
- Joy Walker, Executive Secretary
- Christian Norman, Technician

Revenue/Expenses

FY25 Expenses: Total $6,666

FY25 Revenue: Total $15,213

- VP of Research Support: $ 0
- FY25 Revenue generated from services: $15,213

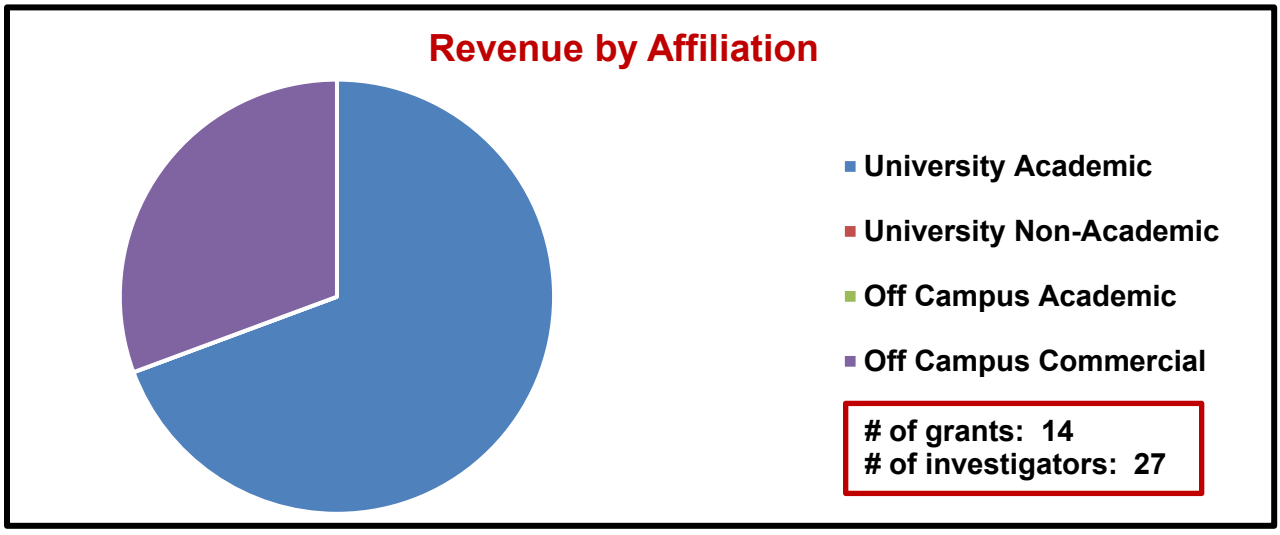


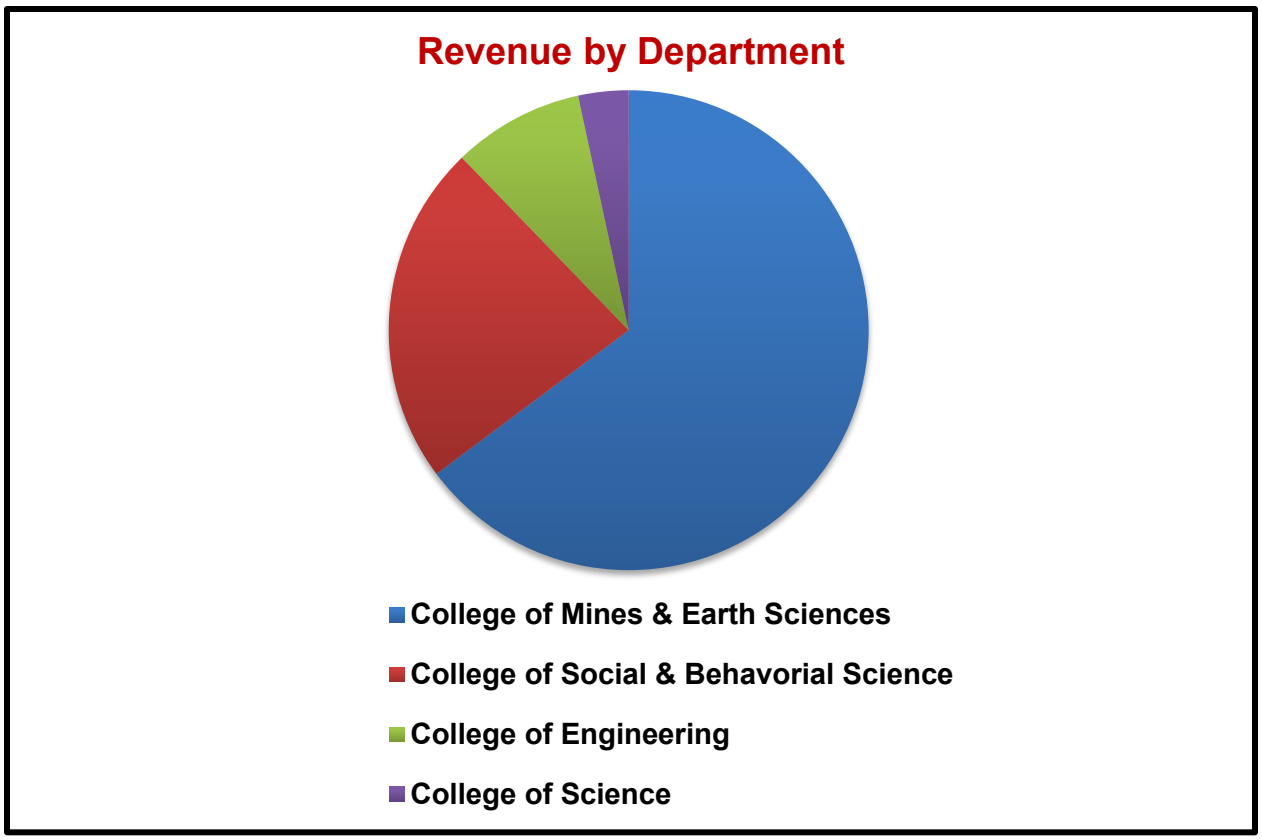
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Andrea Brunelle	DOE
2	Bahamas Marine Ecocentre	Off Campus Commercial
3	Pei Sun	DOE
4	Zak Fang	Blacksand Technology, IperionX Technology
5	Xuming Wang	Michigan Technological University, University of Utah Research Foundation
6	Ravi Chandran	DOE
7	Ilya Zharov	Department, University of Utah Research Foundation
8	ProCost American Coin & Supply	Off Campus Commercial
9	James Karner	NASA
10	American Battery Technology	Off Campus Commercial

Publications

No known publications acknowledged this facility in FY25.

Genetic Science Learning Center

Overview

The GSLC specializes in making science and health easy for everyone to understand, with a focus on digital interventions, applications, and educational materials. The team collaborates with investigators and research teams to develop all components of digital health interventions from “front end” patient/caregiver/user experience to “back end” and data collection.

Uniqueness

The GSLC brings together in one team synergistic expertise in design and production of digital interventions, applications, and educational materials. Its team is unique among similar groups at US academic institutions in that it includes expertise in multimedia animation and interactivity, graphic design, video production, website and app development, instructional design, science and health writing, community and patient engagement, and research and evaluation; other groups outsource some of these functions.

The GSLC designs and produces digital materials for research studies, clinical trial recruitment, patient education, decision aids for shared decision making, simplified informed consent materials, education and training materials, and Broader Impacts for NSF grants.

Services

The GSLC offers the following services:

Digital Materials Development

- Digital design and software development
  - Web apps and websites
  - Mobile apps and games
  - Decision aids
  - Interactive multimedia
  - Animation (2D and 3D)
  - Embedding data collection for interventions via REDCap and other methods
- Video production
  - Script writing, production and scheduling, videography, editing, and post-production
- Music and audio production
  - Original music composition and scoring, and audio engineering
- Multimedia and visual design
  - Animated segments for videos
  - Illustration
  - Graphic design and layout
  - Brochures and infographics
- Science and health writing
  - Translate complex concepts for patients and other lay audiences
  - Video and multimedia scripts
  - Website and app content
  - Educational and recruitment materials
  - Instructional design

Research and Evaluation Services

- Evaluation of educational training programs and materials via:
  - Quantitative, qualitative and mixed-methods designs
  - Developing valid knowledge assessment (test) items
  - Developing surveys
  - Conducting focus groups and key informant or participant interviews

A project's scope and budget are discussed during an initial consultation(s). For grant proposals, text describing the GSLC and its contributions to the project, a budget and justification are provided. Once a project is agreed to and/or funded, a MOU is prepared, outlining project deliverables, expectations by both parties, a timeline, and budget. A project lead is assigned, who serves as the primary GSLC contact for the project.

FY26 Goals

The GSLC will continue to produce high-quality digital interventions, applications, and materials, as well as conduct evaluations of training programs. We will work to inform researchers and units across the University of Utah campus and elsewhere about our capabilities and our availability to collaborate on projects. In this way, we will seek to increase our visibility and expand our users.

Personnel

- Janet Iwasa, PhD, Director
- Claudia Morales, BA, Project Manager
- Kagan Breitenbach, BMu, Audio/Video Producer
- Ashe Erickson, BS, Web Systems Manager
- Brooklee Watters, AS, User Experience Developer
- John Maxwell Kelly, BFA, Art Director
- Matt Beecham, BS, Interactive Developer
- Nathan Holland, BA, Graphic Designer
- Moriah Davies, AA, Graphic Designer
- Kristin Fenker, PhD, Science Writing Lead
- Paul Gabrielsen, MS, Science Writer
- Molly Malone, MA, Senior Education Specialist
- Jen Taylor, BS, Education Specialist
- Rebecca Peterson, PhD, Assistant Director of Research and Evaluation
- Liyun Li, PhD, Research Associate

FY25 Annual Update

New Services

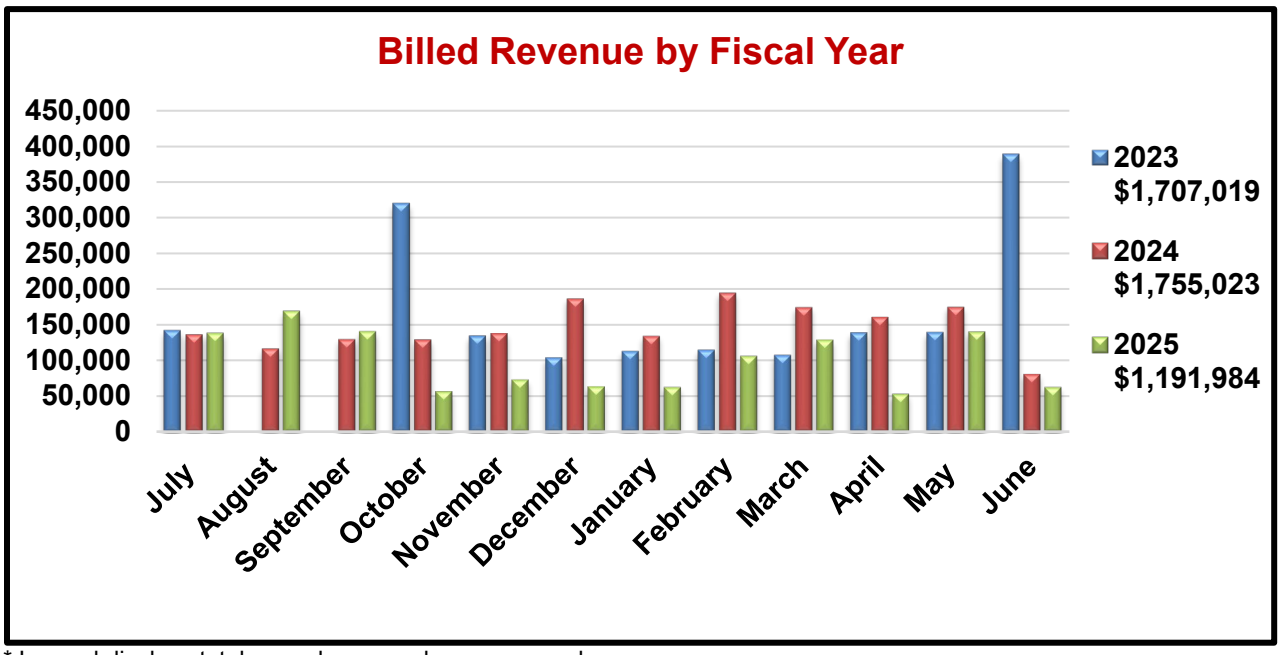
Evaluation of training programs

Revenue/Expenses

FY25 Expenses: **$2,144,781**

FY25 Revenue: **$1,357,953**

- Other Revenue Sources: $75,969
- Benning Award: $90,000
- FY25 revenue generated from services: $1,191,984

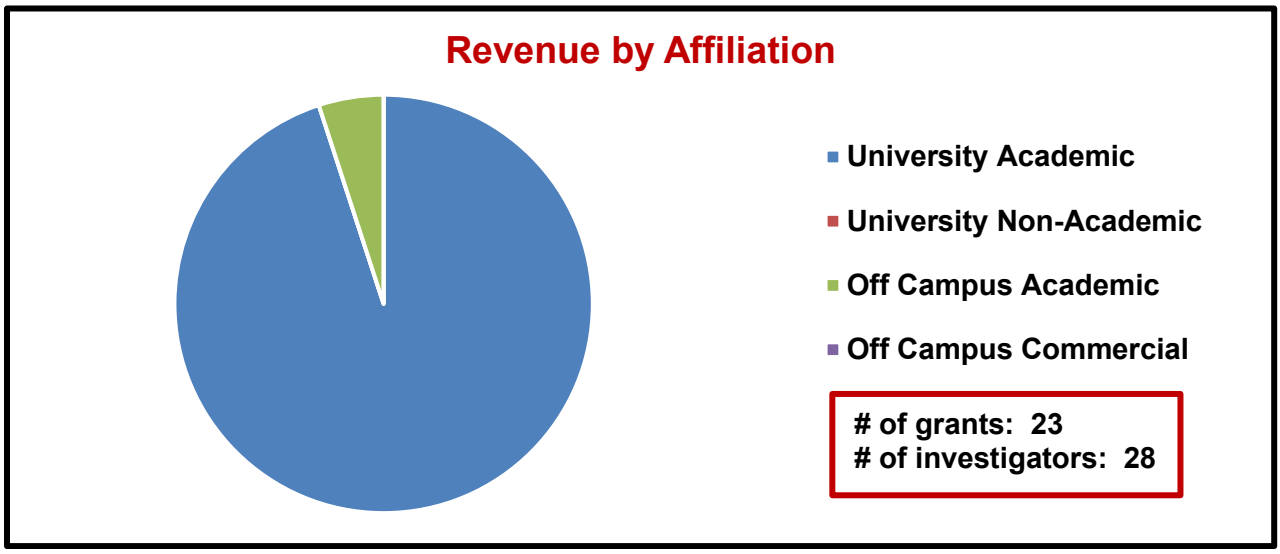


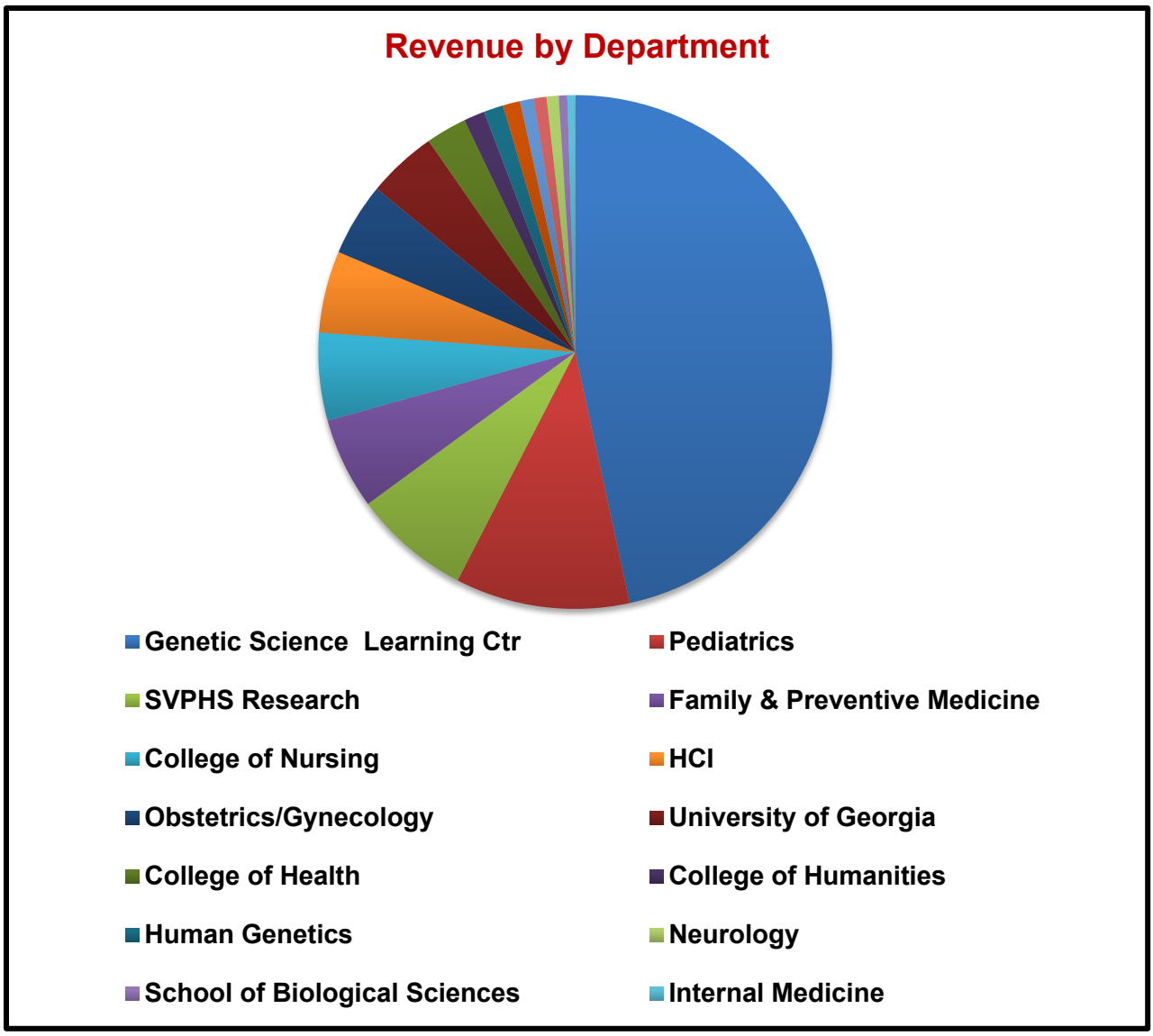
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts):





Top Users

1	Louisa Stark	NIH, NSF
2	Kristin Fenker	NIH
3	Brooks Keeshin	SAMHSA's Center for Substance Abuse Prevention
4	Kara Dassel	NIH
5	Erin Rothwell	NIH
6	Amy Tanner	Department
7	Donald Ayer	NIH
8	University of Georgia	Off Campus Academic
9	Emily Ahonen	CDC
10	Gerald Cochran	Department

Educational Modules Published Online

1. *Genes, Traits & Change Over Time* unit [Web]. Available https://learn.genetics.utah.edu/content/change/ and https://teach.genetics.utah.edu/content/change/
2. *Exploring Big Data* module [Web]. Available https://learn.genetics.utah.edu/content/allofus/ and https://teach.genetics.utah.edu/content/allofus/

Materials Developed

1. UU Center for Medical Cannabis Research – Completed 3 Spanish Language videos for patient and provider education.
2. UU Center for Medical Cannabis Research – Developing an educational infographic and video about chronic pain.
3. Center of Excellence in Total Worker Health: U-Power – developed a 2-hour training module on Total Worker Health. PI: Emily Ahonen, UU Department of Family and Preventive Medicine.
4. PROSE Surgical Decision Aide – Developed a one-page paper-based intervention to ensure the goals of surgical treatment are valuable to older adults. PI: Jessica Cohan, Surgical Oncology Division.
5. Polygenic Risk Score animated video – Developing a 4-minute animated educational video about polygenic risk scores. Hillary Coon, Psychiatry, Bioinformatics, Neurobiology, and Genetic Epidemiology.
6. Insects and Symbiont Card Game – Developing an NSF Broader Impacts project to create a card game that teaches players about the fundamentals of insect-microbe symbiosis and how these relationships shape interactions between species. PI: Kevin Vogel, Associate Professor of Entomology.
7. Organic resource guide for farmers – Designed and illustrated a 5-6 page guide that features flowcharts, checklists, and information that farmers can use to understand and walk through the organic certification process. Hannah Talton, Extension Specialist- Plant Pathology & IPM.
8. Care Process Model for Pediatric Traumatic Stress (CPM-PTS) learning module – developing a 5-module course training for Children's Advocacy Center Staff. PI: Lindsay Abdulahad, Pediatric Behavioral Health.
9. Pacific islander stroke education video – produced, filmed, and edited a stroke education video tailored to a Polynesian audience. Jennifer Majersik, Vascular Neurology.

Evaluation Studies for Training Programs

1. GURU: Graduate and Undergraduate Researchers of UCEER program. PIs: James Tabery, PhD, UU Department of Philosophy, and Erin Rothwell, PhD, UU Department of Obstetrics and Gynecology.
2. Genomics Summer Research for Minorities: A Pathway to Promote Diversity in Science Research. PI: Joseph Yost, PhD, UU Department of Pediatrics.
3. Huntsman Cancer Institute PathMaker Programs for Cancer Research. PIs: Donald Ayer, Huntsman Cancer Institute, and Kolawole Okuyemi, UU Department of Family and Preventive Medicine.
4. BRIDGES (RII-BEC: Boosting Retention, Interest, and Diversity throuch Guided Experiences in STEM. PI: Kankshita Swaminathan, HudsonAlpha Instiute for Biotechnology, Huntsville, AL
5. Beginnings: Experiential Learning for Emerging Biotechnology Careers. PI: Kelly East, HudsonAlpha Instiute for Biotechnology, Huntsville, AL
6. University of Utah Program to Provide Pain Research Knowledge (UP3RK). PIs: Julie Fritz, PhD, UU Department of Physical Therapy and Athletic Training, and Adam Gordon, MD, UU Department of Internal Medicine
7. Biomedical Research Education Office. Sean Flynn, PhD, Director of Research Training Programs, University of Utah Health

Developed Websites

1. Building Healthy Families. Jenny Hill, UU Department of Population Health Sciences
2. Life Planning in Early Alzheimers and other Dementias (LEAD), Kara Dassel, UU College of Nursing
3. UU Department of Human Genetics – website maintenance [Web]. Available https://www.genetics.utah.edu/

Publications

1. Baskir, R., M. Lee, S. J. McMaster, J. Lee, F. Blackburne-Proctor, R. Azuine, N. Mack, S. D. Schully, M. Mendoza, J. Sanchez, Y. Crosby, E. Zumba, M. Hahn, N. Aspaas, A. Elmi, S. Alerte, E. Stewart, D. Wilfong, M. Doherty, M. M. Farrell, G. B. Hebert, S. Hood, C. M. Thomas, D. D. Murray, B. Lee, L. A. Stark, M. A. Lewis, J. D. Uhrig, L. R. Bartlett, E. G. Rico, A. Falcon, E. Cohn, M. R. Lunn, J. Obedin-Maliver, L. Cottler, M. Eder, F. T. Randal, J. Karnes, K. Lemieux, N. Lemieux, Jr., N. Lemieux, 3rd, L. Bradley, R. Tepp, M. Wilson, M. Rodriguez, C. Lunt and K. Watson (2025). Research for all: building a diverse researcher community for the All of Us Research Program. J Am Med Inform Assoc 32(1): 38-50.10.1093/jamia/ocae270
2. Stark, L. A., K. E. Fenker, H. Krishnan, M. Malone, R. J. Peterson, R. Cowan, J. Ensrud, H. Gamboa, C. Gayed, P. Refino, T. Tolk, T. Walters, Y. Crosby and R. Baskir (2024). Research to classrooms: a co-designed curriculum brings All of Us data to secondary schools. J Am Med Inform Assoc 31(12): 2837-2848.10.1093/jamia/ocae167
3. Thompson, A.D., Terrill, A.L., Caserta, M., Wong, B., Iacob, E., Sparks, C., Stark, L., Utz, R.L. Assessing feasibility of an online caregiver intervention to improve respite: The time for living and caring (TLC) study. *JMIR Aging (forthcoming*). doi:10.2196/71792 http://dx.doi.org/10.2196/71792

Materials Characterization Lab

Overview

The Materials Characterization Lab (MCL) is a research facility managed by the Materials Science and Engineering (MSE) Department at the University of Utah. The lab offers clients access to a wide range of analytical instrumentation and services for a variety of biochemical, organic, inorganic, and environmental samples.

The MCL provides researchers with training on the care and operation of equipment used in materials characterization. In addition to providing training for new users, our staff is available to help users in the design of experiments and the interpretation of results.

The MCL maintains a ~1300 sq. ft. lab facility, including optical and electron microscopy, x-ray diffraction, thermal analysis, surface analysis, mechanical testing, physical testing, spectrophotometry along with some sample preparation resources.

Uniqueness

The MCL has an extensive history of successful collaborations with academia, government, and industry clients ranging from startups to multinational corporations in the aerospace, automotive, coatings, geochemical, medical, semiconductor, and other markets.

MSE faculty and staff serve as resources in the following areas of specialization: biofuel cells, ceramics, composites, computational electronic materials and polymers, electronic materials and assemblies, explosive sensing, nanomaterials, nanotechnology, and more.

The MCL has expertise in:

- Biomedical materials and devices
- Ceramics
- Composites
- Electronic materials
- Metals and metal oxides
- Polymers

The MCL provides the following:

- Cross-sectional analysis
- Materials analysis, comparison, and identification
- Microphotography suitable for advertising and training purposes
- Routine analysis for quality assurance and control

Services & Equipment

The MCL serves as a facility for Materials Science and Engineering undergraduate and graduate level courses that involve materials characterization. In addition to supporting undergraduate classes, student interns can work for two semesters in the lab to gain experience with machines and professional communication.

The MCL staff also provide consultations and experiment design suggestions based on the needs of the user. The services offered by the MCL include materials characterization with the following techniques:

Optical Microscopy

- Olympus BH2 Series System Microscope
- Olympus Tokyo PME Inverted Stage / Metallographic Microscope
- Olympus VANOX Universal Research Microscope

Scanning Electron Microscopy

- Hitachi TM3030Plus Tabletop Microscope (SEM) with SE, BSE detectors, and Thermo Scientific Pathfinder SDD energy dispersive x-ray spectrometer (EDS).

Spectroscopy

- Nicolet iS50 FT-IR with Diamond ATR attachment
- Perkin-Elmer LAMBDA 950 UV-Vis-NIR Spectrophotometer with 150 mm Integrating Sphere, 2D Detector Module, and Universal Reflectance (URA) Accessories

X-Ray Diffraction

- Philips PANalytical X'Pert X-Ray Diffractometer (XRD) with powder diffraction and thin film detectors.
- Bruker D2 Phaser X-Ray Diffractometer (XRD) with Phi axis rotation abilities.

Thermal Analysis

- Anter Corporation Work Horse IB Dilatometer
- NETZSCH DSC 3500 Sirius Differential Scanning Calorimeter (DSC)
- TA Instruments SDT 650 thermogravimetric analyzer and differential scanning calorimeter (DSC-TGA) with autosampler

Macroscopic & Physical Testing

- TA Instruments DHR 20 Rheometer with Dynamic Mechanical Analysis (DMA) and dielectric testing mode
- Anton Paar MCR viscometry, rheology, and tribology
- Anton Paar Ultrapyc 5000 helium pycnometer
- Instron 5969 Dual Column Tabletop Testing System
- Micromeritics 3Flex physisorption analyzer for BET surface area and pore size
- Micromeritics FlowPrep 060 Sample Degas System
- Beckman Coulter LS230 particle size analyzer (PSA) with polarized light detectors
- MetrOhm Karl Fisher Titrator

Sample Preparation

- Mettler AE100 Analytical Balance
- Cressington 108carbon/A Carbon Coater for Conductive Carbon Coatings
- Cressington 108auto Sputter Coater for Conductive Gold and other precious metal Coatings

Cross-Sectioning / Microsectioning

- Buehler SimpliMet II Mounting Press
- LECO Spectrum System 1000 with Oscillating Polishing Head and Six Sample Holder

FY26 Goals

- Improve sample submission turnaround times.

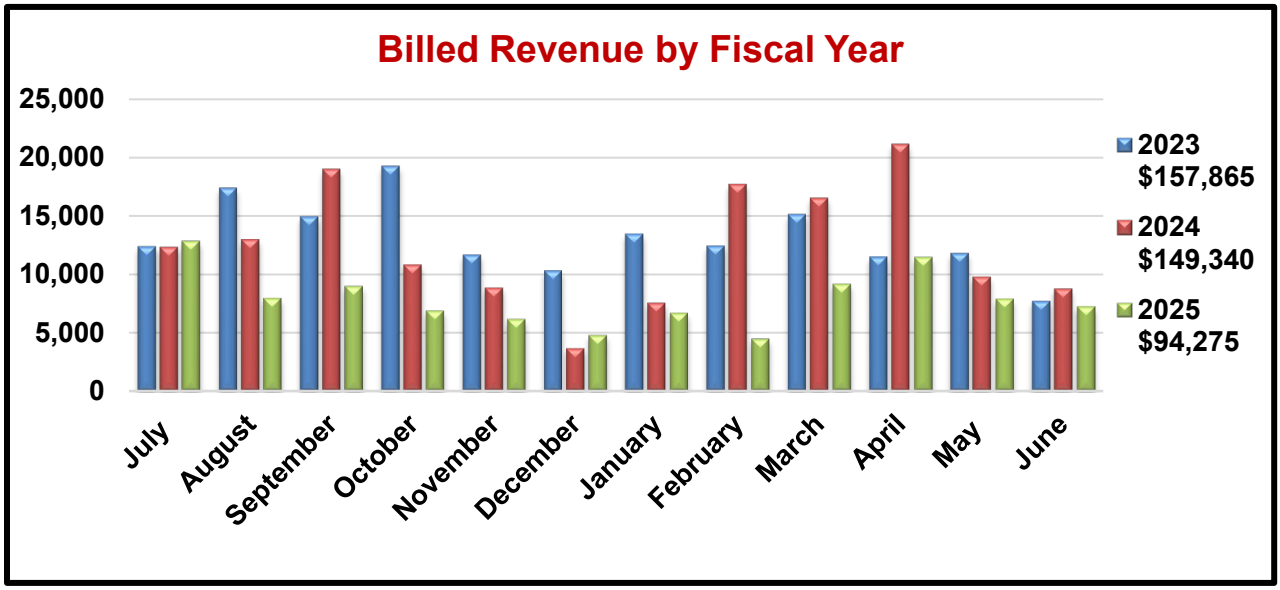
Personnel

- Angela Nelson, Administrative Officer
- Kimberly Watts, Lab Manager
- Joy Walker, Executive Secretary
- Hannah Braeger, Technician

Revenue/Expenses

FY25 Expenses: Total $134,064
FY25 Revenue: Total $94,275

- FY25 Revenue generated from services: $94,275

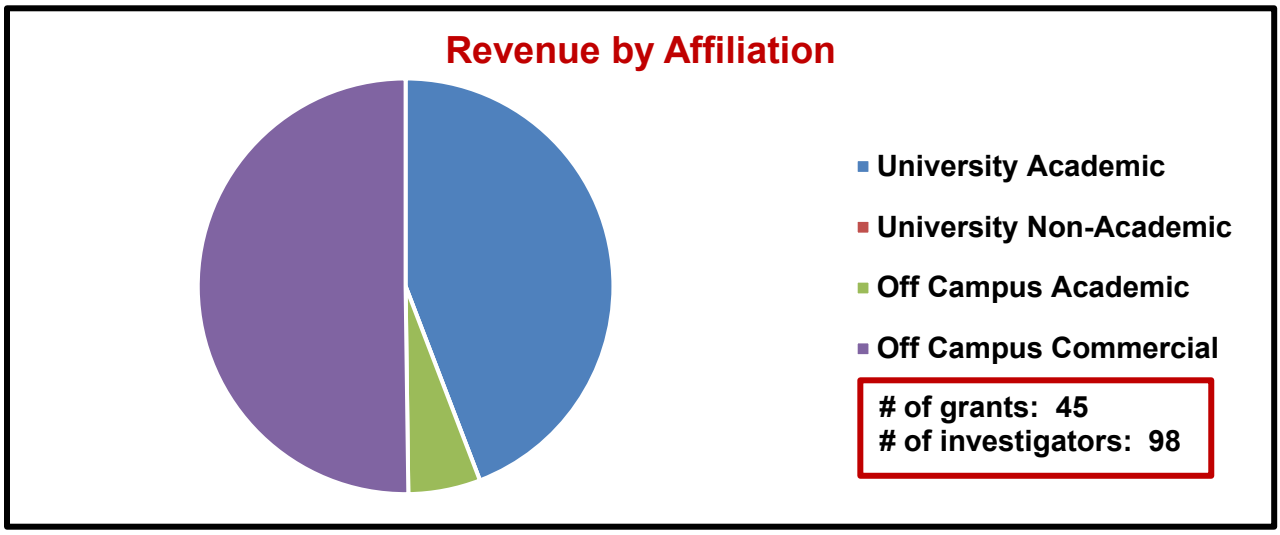


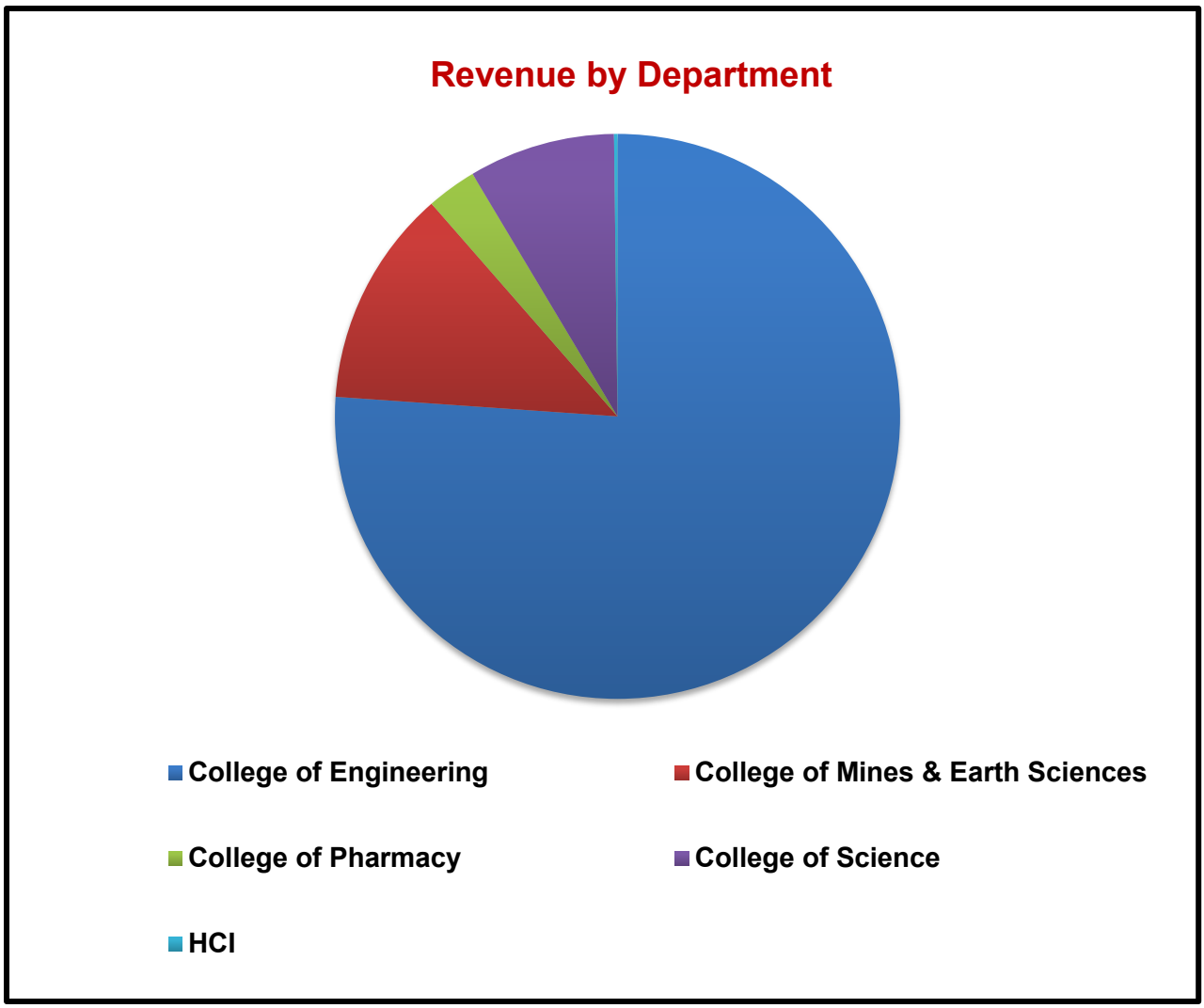
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Purple Innovation LLC	Off Campus Commercial
2	BioMerieux	Off Campus Commercial
3	University of Colorado Boulder	Off Campus Academic
4	Milind Deo	Department, DOE
5	Jeff Bates	Department
6	Chen Wang	Department, DOE
7	OxEon Energy	Off Campus Commercial
8	Storagenergy Technologies	Off Campus Commercial
9	Michael Simpson	Department, DOE, LNLL, TerraPower, University of Nevada Reno
10	Kim Watts	Department

Publications

No known publications acknowledged this facility in FY25.

Metabolic Kitchen

Overview

The University of Utah Metabolic Kitchen is an integrated resource between the University of Utah Nutrition and Integrative Physiology Department and the Utah Clinical and Translational Science Institute (CTSI) Clinical Research Unit (CRU) located on the University of Utah campus at 260 1850 E, Salt Lake City, UT 84112. This 770 ft^2 professional kitchen facility is equipped with industrial cooking appliances, supplies, and research-grade dietary analysis software for precision nutrition services. Its primary mission is to provide researchers with expertise and resources in the fields of nutrition science, disease management, and related academic research pertaining to food and wellbeing.

Uniqueness

Metabolic kitchens are novelty facilities not available to all researchers. They represent a cutting-edge advancement in nutrition research and health sciences by offering precise, customizable dietary solutions for research participants. Their ability to provide controlled meals tailored to specific study protocols, dietary restrictions, and cultural preferences enhances the accuracy and reliability of research findings. These facilities support complex, long-term studies by integrating seamlessly into the research workflow, ensuring consistency and compliance. Moreover, metabolic kitchens facilitate interdisciplinary collaboration among nutritionists, researchers, and healthcare providers, contributing to a deeper understanding of the relationship between diet and health outcomes and fostering the development of innovative dietary interventions and therapies.

Services

The Metabolic Kitchen offers a variety of services, including study consultations led by a registered dietitian, covering topics such as nutrition science, research protocols, interventions, epidemiological tools, and best practices. Additionally, the metabolic kitchen assesses energy and nutritional requirements of research study participants, creates customized menus and recipes, prepares meals to precise standards, conducts diet assessments and analyses, and provides diet counseling, diet record guidance, and review for study subjects.

FY26 Goals

- Increase awareness of services
- Ensure the successful completion of 4 ongoing studies
- Increase efficiency in procedures & protocols
- Recruit student volunteers & interns
- Initiate services for at least 3 new research projects

Major Equipment

Induction Burners:
- Avantco IC1800
- Hatco IRNG-PC2F-36

Combination Oven:
- Rational ICP 10-FULL E 208/240V 3 PH (LM100EE)

Dishwasher:
- Hobart AM16VL-BASX

Hood:
- Captivaire DCV-1111

Steamer:
- Accutemp E32081D060

Stainless Steel Work Table:
- Advance Tabco SKG-3012
- Advance Tabco SKG-306 x 3

Clean Dishtable:
- Advance Tabco DTC-S60-36R-X

Stainless Steel Work Table w/Sink:
- Advance Tabco KMS-11B-305L

Refrigerator:
- True Mfg T-23-HC x 2
- True Mfg T-49G-HC-FGD01

Freezer:
- True Mfg T-23F-HC
- True Mfg T-23FG-HC-FGD01
- True Mfg T-72F-HC x2
- Whirlpool WZF34X20DW

Blast Freezer:
- Irinox Balance XPR4001S

Wire Shelving:
- Olympic J2460C
- Olympic J2442C
- Olympic J1824K
- Olympic J1842K

Three-Compartment Sink:
- Advance Tabco RC-3-1620-18RL-X

Precision Food Scales:
- Uline H-1653 x3
- Uline H-9885

Personnel
- Rachael Jones, MS, RDN, Metabolic Kitchen Director
- Zachary Hartlyn, Culinary Operations Manager
- Robert Angelilli, Chef

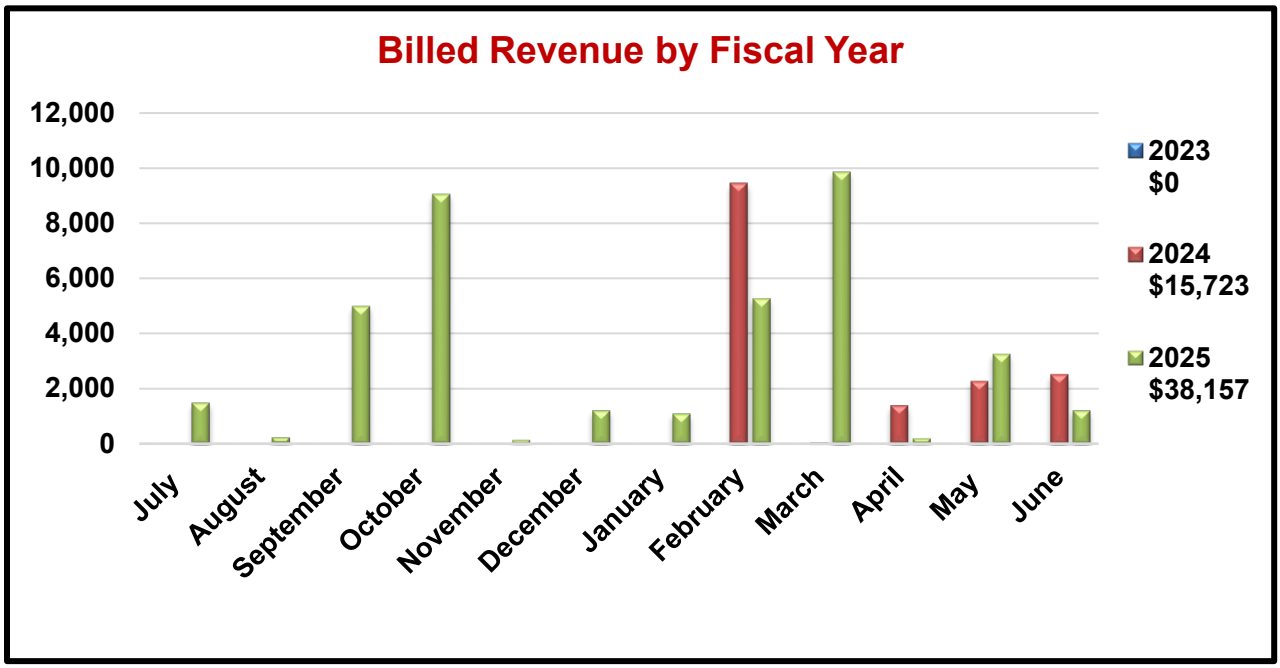
Advisory Board Committee
- Scott Summers, Nutrition & Integrative Physiology
- Mary Playdon, Nutrition & Integrative Physiology
- Tanya Halliday, Health, Kinesiology & Recreation

Revenue/Expenses

FY25 Total Expenses: **$34,049**

FY25 Total Revenue: **$38,157**

- VP of Research Support: $0
- FY25 Revenue generated from services: $38,157

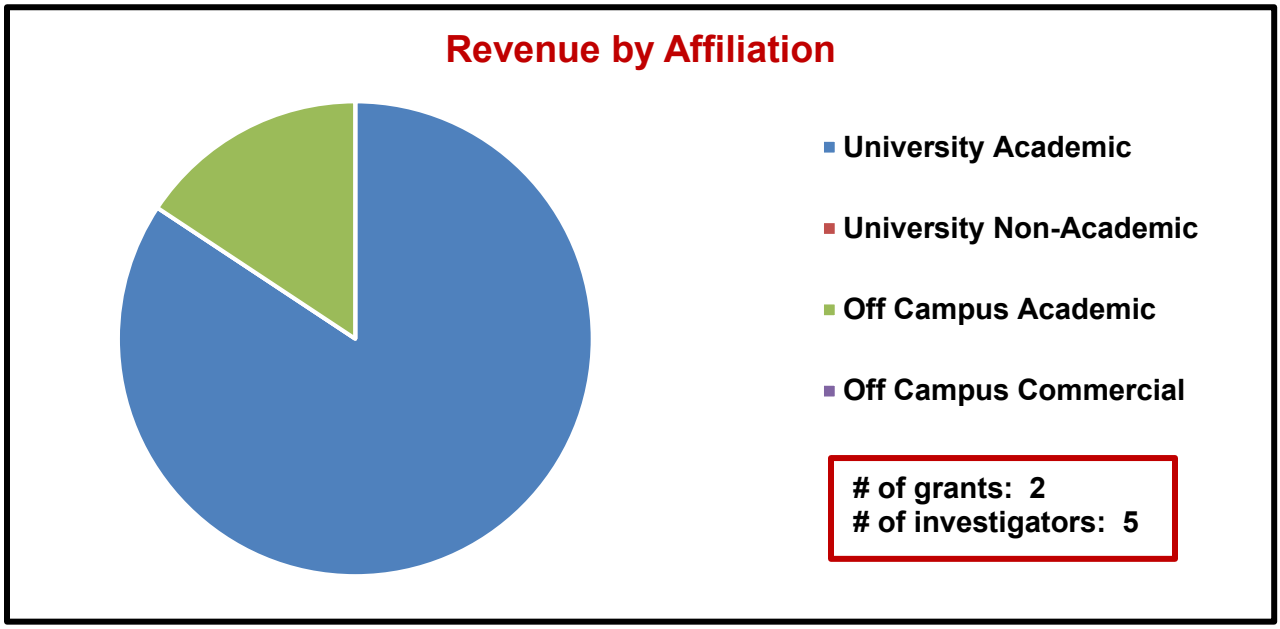


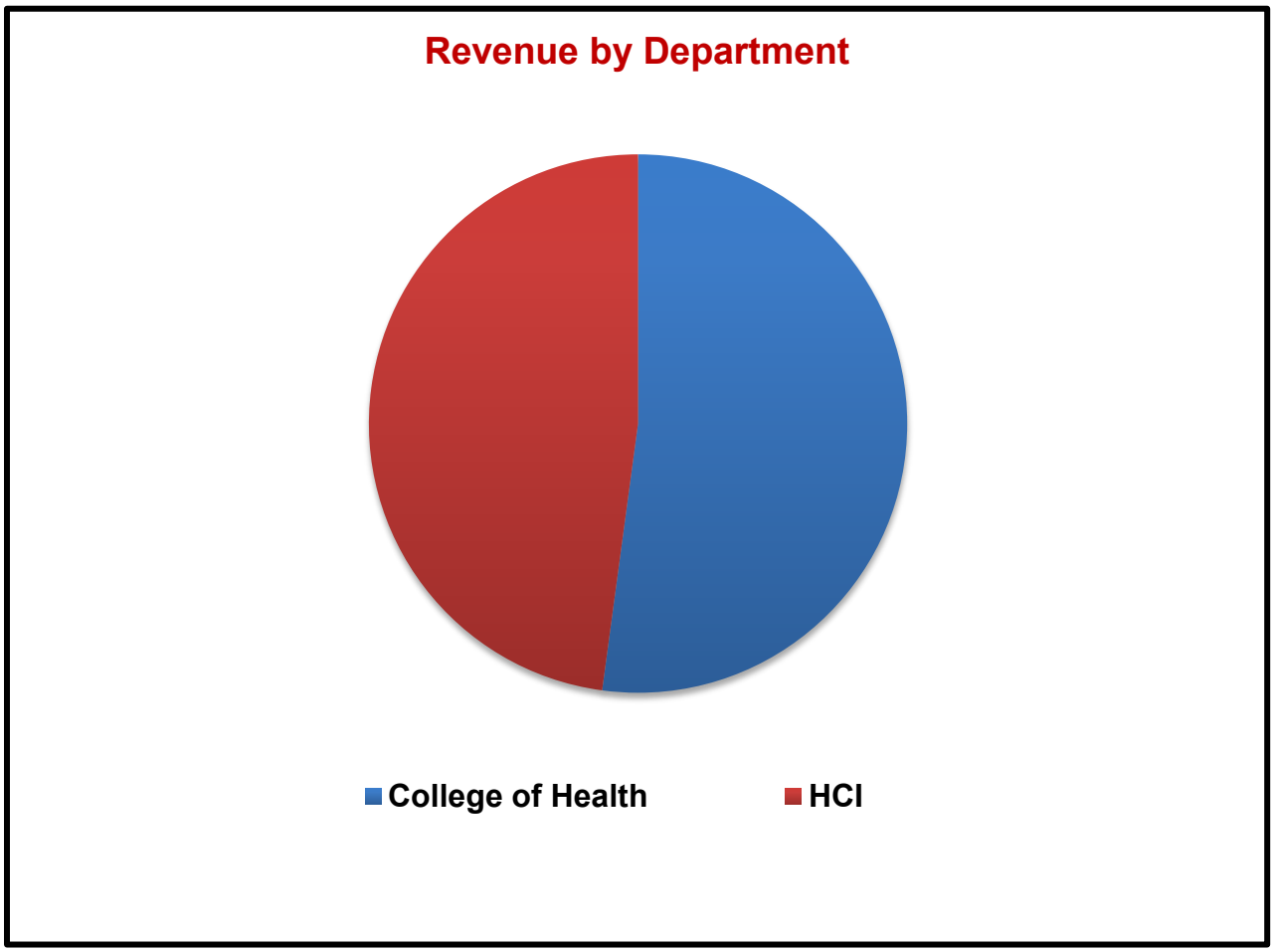
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Mary Playdon	Department
2	Christopher Depner	NIH
3	Western Institute for Biomedical Research	Off Campus Academic
4	Tanya Halliday	Department
5	Veteran Affairs Medical Center	Off Campus Academic

Publications

No known publications acknowledged this facility in FY25.

Metal 3D Printing

Overview

The Metal 3D Printing Core Facility provides AM (additively manufactured) parts. This manufacturing process includes parts consultation with customers to ensure feasibility. Parts are then modified by the Metal 3D Printing Core Facility as needed so that they are suitable for print. Modifications include adding support material, adding drain holes, part scaling, or modifying print parameters upon request. Parts can then be heat treated to remove any residual stress leftover by the printing process, providing strong, lightweight components with geometries that are otherwise unobtainable by subtractive manufacturing.

Uniqueness

The Metal 3D Printing Core provides services not available at most universities. Printing of dangerous metal powder requires specialized equipment and training which are now a luxury to the University of Utah. These printing services are available to anyone, as the service is provided by trained personnel within the core facility. This provides many opportunities to the University of Utah such as performing in-house research on AM parts and being able to contribute to national/global research priorities in advanced manufacturing.

Services

The Metal 3D Printing Core's primary mission is to provide students, faculty, labs, research organizations, and members of Utah's valley with 3D printed metal parts while maintaining part parameter and part process clarity. We are offering the following services:

- Part feasibility consultation.
- Application of necessary support structure.
- Providing various powder and build plate material types.
- Part printing with parameter/environmental logging as necessary to maintain consistent part quality and advance AM processes.
- Part/support removal and heat treatment if necessary.

FY26 Goals

- Increase awareness of our services
- Increase core efficiency and reduce turnaround time.

Major Equipment

AM Metal Printing:

- Aconity MIDI dual laser AM printer.
- Aconity (optional) 1200C Inducting heating element.
- Aconity sieving station with inertization for sieving reactive materials.
- HK Sieve ultrasonic powder filter.
- Mitsubishi MV2400-S M800 wire electrical discharge machining (EDM).
- Basic machine shop capabilities.

Personnel

- Ashley Spear, Ph.D., Dept. of Mechanical Engineering, Core Account Executive
- Alik Nielsen, B.S., Dept. of Mechanical Engineering, Associate Engineer/Lab Technician

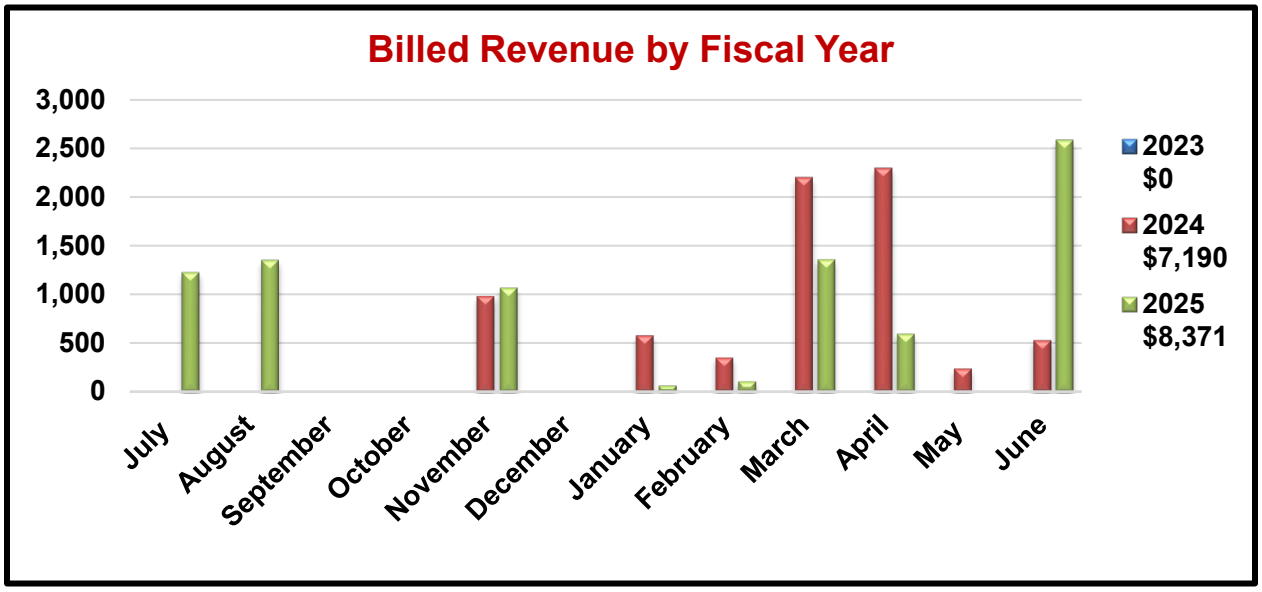
Advisory Board Committee

- N/A

Revenue/Expenses

FY25 Total Expenses: **$3,950**
FY25 Total Revenue: **$8,371**

- VP of Research Support: $0
- FY25 Revenue generated from services: $8,371

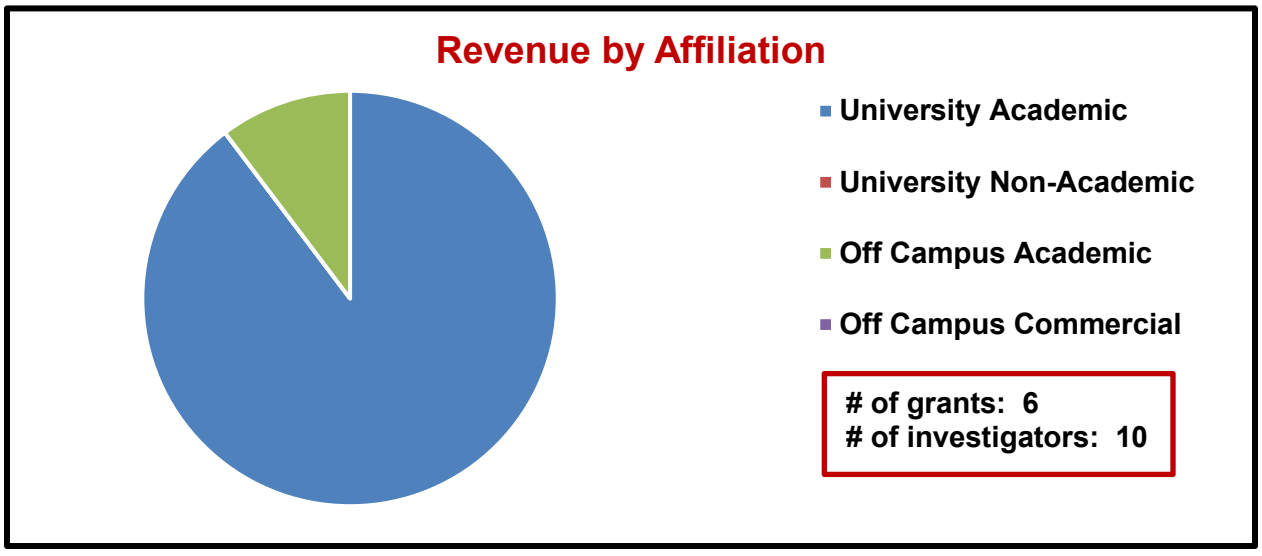


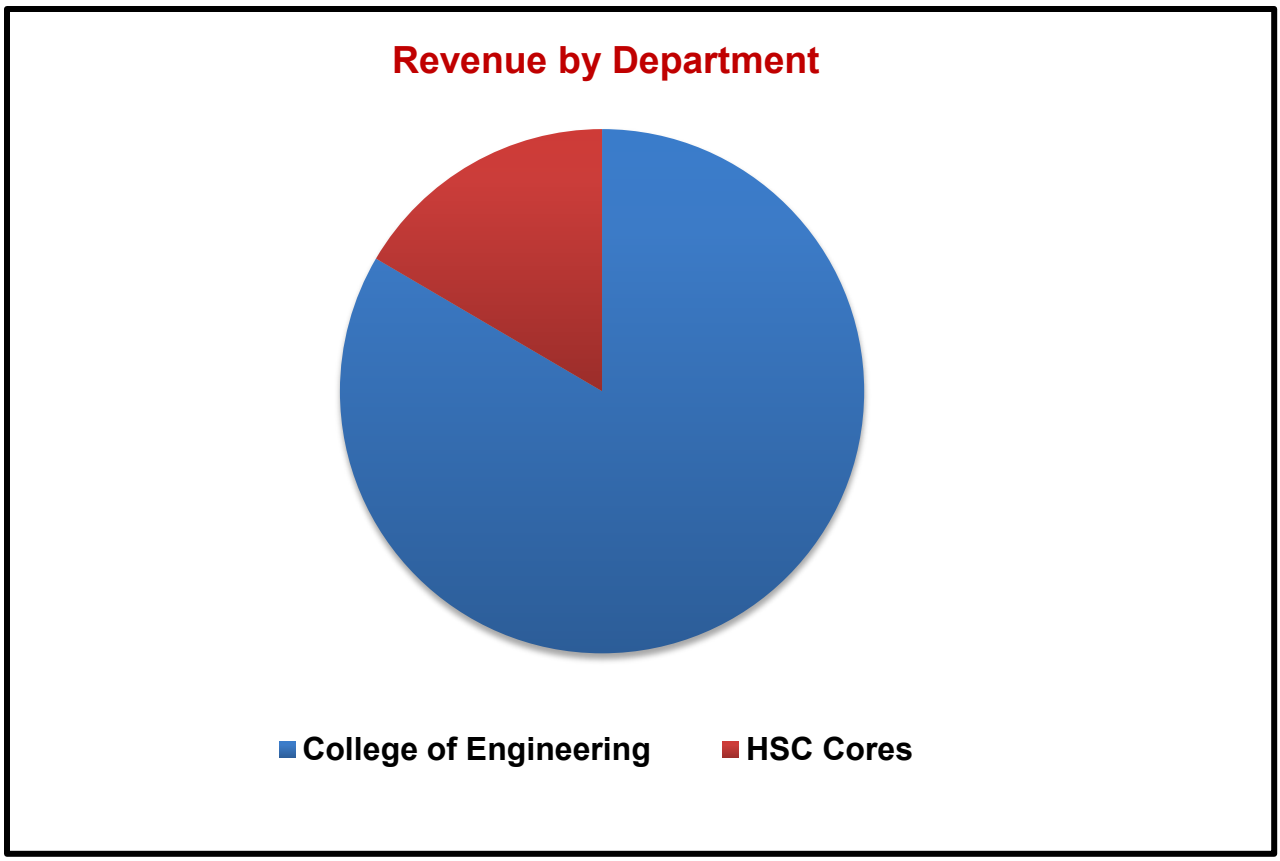
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Shuaihang Pan	Department, Medtronic Inc
2	Kevin Whitty	DOE
3	Shawn Colby	Department
4	Justin Brunson	Department
5	Brigham Young University	Off Campus Academic
6	Pai Wang	Department
7	Tommaso Lenzi	DOD
8	Ashley Spear	Department
9	Florian Solzbacher	Sentiomed Inc
10	Jennifer Weidhaas	CDC, University of Utah Research Foundation

Publications

1. Islam, T., B. Zhao, D. Piccone, R. Bertelsen, D. Lin, Z. Fan, J. Klemm-Toole and S. Pan (2025). A holistic corrosion understanding in IN625 alloy based on additive manufacturing history and microstructure modification. Electrochimica Acta 535: 146697.https://doi.org/10.1016/j.electacta.2025.146697
2. Zhao, B., K. Hutt, H. Yamaguchi and S. Pan (2025). Surface corrosion in laser powder bed fusion-fabricated Inconel 718 with magnetic field-assisted post-processing. Journal of Manufacturing Processes 143: 277-292.https://doi.org/10.1016/j.jmapro.2025.04.001

Creative Samples- Metal 3D

MIDAS

Overview

Direct regulatory interactions between proteins or RNAs and metabolites provides a rapid and adaptive mechanism of metabolic control of cellular processes. Despite their integral importance to cellular function, the protein- and RNA-metabolite interactomes are almost completely undefined. The MIDAS Core provides unique services for targeted protein- or RNA-metabolite ligand interaction discovery.

Uniqueness

Central to MIDAS Core services is the Mass Spectrometry Integrated with Equilibrium Dialysis for the Discovery of Allostery Systematically (MIDAS) platform. MIDAS is a unique and robust interactomics platform developed at the University of Utah by core director Dr. Kevin Hicks in Dr. Jared Rutter's laboratory (DOI: 10.1126/science.abm3452). Using a custom compound library of human metabolites, the MIDAS platform provides users with specific protein- or RNA-metabolite interaction information for their target protein or RNA. MIDAS has the unique capacity to simultaneously discovery high and low affinity protein- or RNA-metabolite interactions (Kd < 5 mM) including substrates, products, cofactors, and orthosteric and allosteric regulators.

Services

The MIDAS Core's primary mission is to facilitate the discovery of interactions between metabolites and proteins or RNAs. We are offering the following services:

- MIDAS analysis of user proteins to identify metabolite ligands.
- MIDAS analysis of user RNAs to identify metabolite ligands.
- Metabolite ligand validation services.

FY26 Goals

- Increase awareness of our services
- Increase core efficiency and reduce turnaround time.
- Increase core usage.
- Provide new services.

Major Equipment and Reagents

MIDAS platform:

- Two Shimadzu HPLC systems coupled to two SCIEX X500R ESI-QTOF mass spectrometers.
- Biomek NX_p liquid handling robot with SPAN-8 cherry-picker arm and gripper.
- Arrayed MIDAS metabolite library (703 human metabolites).

Personnel

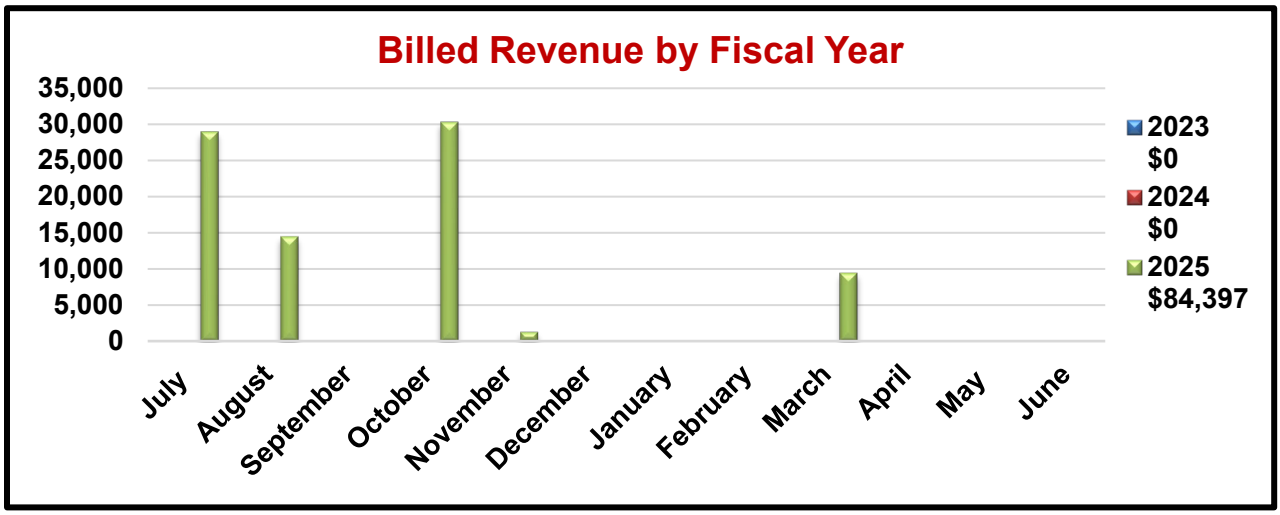
- Kevin G. Hicks, PhD, MIDAS Core Director, MIDAS Core Account Executive, Assistant Professor in the Department of Nutrition and Integrative Physiology
- Zihan Monshad, BS, Lab Technician
- Christina Volz, BS, Lab Technician

Revenue/Expenses

FY25 Total Expenses: $90,120

FY25 Total Revenue: $94,397

- DMRC: $10,000
- FY25 Revenue generated from services: $84,397

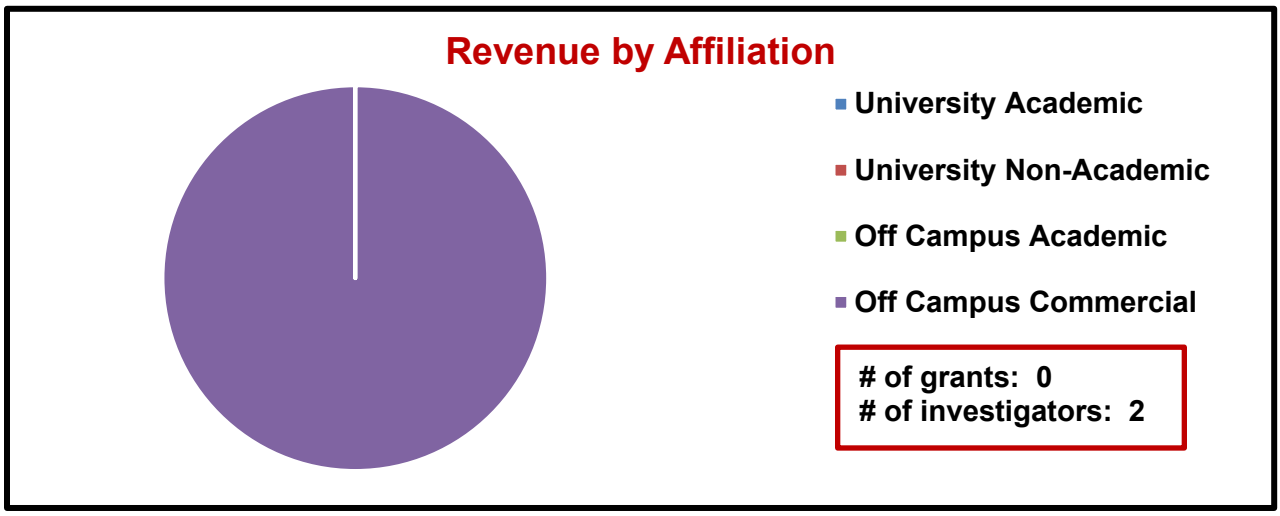


* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):



Top Users

1	Reina Bio	Off Campus Commercial
2	Altos Labs	Off Campus Commercial

Publications

No known publications acknowledged this facility in FY25.

Utah Nanofab Administration

Overview

The Utah Nanofab is made up of two labs: a cleanroom, and an electron microscopy and materials characterization lab – the EMSAL. This is the largest academic Nanofab Lab in the Northwestern US, with ~23,000 sq. ft of lab space. The cleanroom has the facilities to fabricate small scale devices and has equipment for: lithography, thin film deposition, etching, packaging, micro 3D printing, laser patterning and more. The EMSAL is the leading EM and materials characterization lab on campus, with 4 SEMs, the only analytical TEM/STEM on campus, XRD, and a variety of other techniques to image and measure the chemical, electrical, optical and mechanical properties of materials. The technical expertise of the Nanofab's staff is essential in making sure that students are properly trained in these capabilities.

In FY25, Utah Nanofab (Cleanroom and EMSAL) have $23.4M in equipment. There were 119 faculty, 266 students, 19 academic institutions and 92 private companies that used our facilities. The Utah Nanofab is a hub of activity on campus, where in FY25 our staff delivered 57 lab tours/department seminars/and presentations to 850 people. These include departmental faculty recruitments, graduate student recruitments, undergraduate and graduate level class demos, local industry representatives and state government officials. Having an outstanding set of instrumentations is critical for attracting the best new faculty to the university. We also teach and host 13 university courses, which teach 210 students. The staff and equipment in the Nanofab are integral to these classes. The combined Nanofab, cleanroom and EMSAL, helped to enable $186M in university research in FY25. This is the sum of all active research grants, not necessarily awarded in FY25, that utilized the Nanofab.

https://www.nanofab.utah.edu/

Personnel

- Hanseup Kim, Director
- Amy Lash, Administrative Manager
- Brian Baker, Cleanroom Manager
- Brian Van Devener, EMSAL Manager
- Rachel Henderson, Accountant

Utah Nanofab Administration Revenue & Expenses

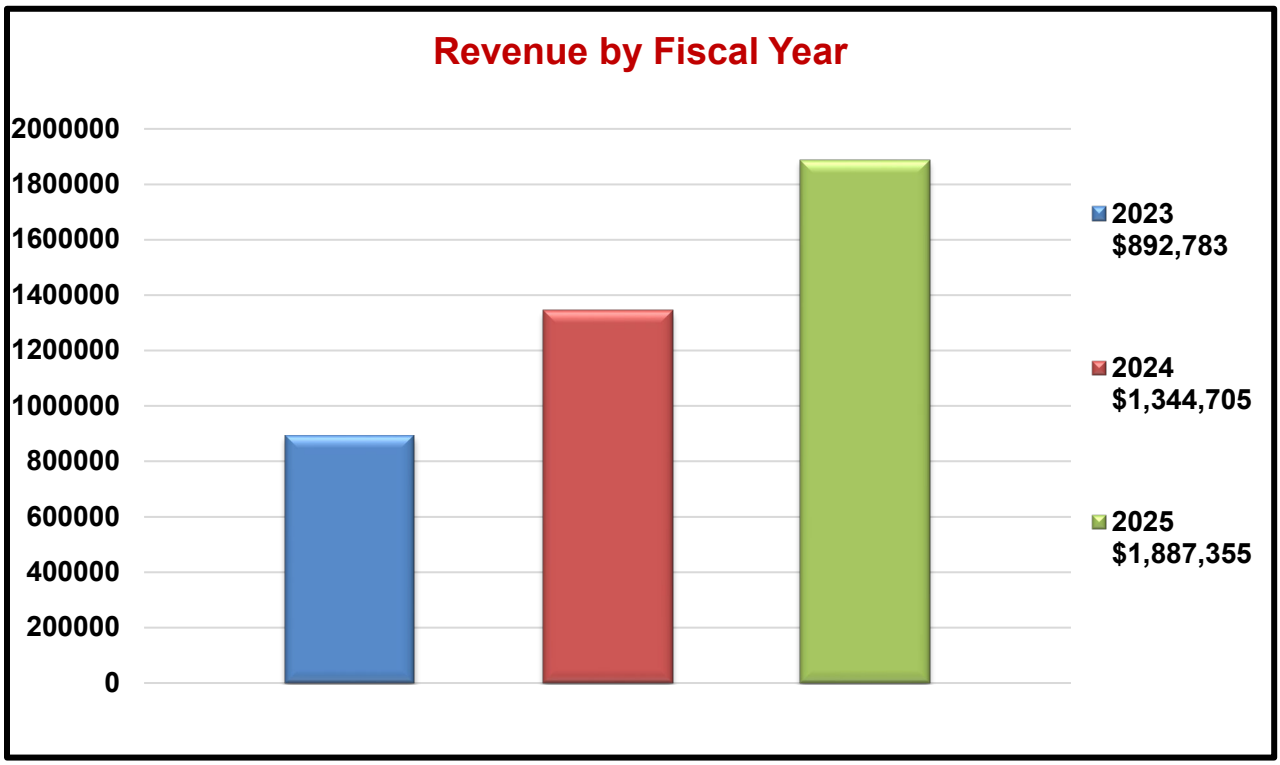
FY25 Expenses: Total $1,545,879

The Administration Budget covers the following expenses:

- Salaries/Benefits: $361,713
- Fixed Expenses: $904,166

FY25 Revenues: Total $1,887,354

- FY25 The John & Marcia Price College of Engineering Revenue: $655,241
- The John & Marcia Price College of Engineering equipment funds for the Electron Beam Lithography system: $561,000
- FY25 VP for Research: $50,000
- FY25 RIF Funds for Cleanroom: $280,000
- RIF Funds for EMSAL: $85,680
- Other Sources: $255,433



Utah Nanofab Cleanroom Facility

Overview

FY2025 Cleanroom Use Metrics:

- Research enabled at U of U: $186M*
- Student Users: 106
- Faculty: 59
- Private Companies: 37
- Other Academic Institutions: 11
- Students Using Cleanroom for Hands-On Lab Courses: 151
- Peer reviewed publications: 53

*Note: This is the sum of all active research grants, not necessarily awarded in FY25, that utilized the combined Nanofab, cleanroom and EMSAL, in FY25.

The Utah Nanofab Cleanroom is a state-of-the-art facility that provides access to advanced nanofabrication equipment, expertise, and materials to support research and development across the fields of nanotechnology, microfluidics, nanophotonics, microoptics, microsensors, microelectronics, materials, bio-implantable microdevices, and related areas. Our class 100/1000/10,000 cleanroom provides equipment for nanolithography, thin-film deposition, etching, micro 3D printing, laser patterning, microchip packaging, and more.

Our 4 full-time staff have more than 85 combined years of experience in micro and nanofabrication. The Nanofab Cleanroom has more than $11.8M in state-of-the-art equipment available for use. There were 106 students, 59 faculty, 37 private companies and 11 academic institutions that used the Nanofab Cleanroom. During the past year, lab members produced 54 peer reviewed publications that made use of cleanroom equipment and resources. The combined Nanofab, cleanroom and EMSAL, helped to enable $170M in University research in FY2025. This is the sum of all of the research grants that used and relied on the Nanofab.

Services

The Utah Nanofab Cleanroom enables researchers to access facilities, micro/nanofabrication tools, and process design expertise that enable the realization of custom R&D prototype microchips.

- Thin film deposition of insulators, semiconductors, alloys, and precious metals
- Photolithography for patterning micro and nanoscale features on substrates
- Photomask design and fabrication
- Liftoff, wet chemical, and dry plasma etching of thin films on substrates
- Packaging including wafer bonding, wire bonding, and dicing
- 3D printing of micro/nanoscale patterns, devices, and structures
- Microfluidics chip fabrication
- Training and ongoing support to students, researchers, and engineers to enable them to use the equipment and facilities safely, effectively, and efficiently.
- Microchip design and fabrication assistance are available from our professional scientists and engineers. More information at: www.nanofab.utah.edu

FY26 Goals

- Install, qualify, and train researchers on the new Raith Voyager Electron Beam Lithography tool.
- Install indium deposition electron beam evaporator tool
- Design, specify, and pursue funding to purchase and install cleanroom nitrogen generator to reduce liquid nitrogen expenditures
- Improve silicon carbide processing capabilities
- Continue to upgrade 200mm wafer processing capabilities
- Hold summer hands-on workforce development cleanroom internship training program to support semiconductor industry technician demand

Equipment (SMBB 2221)

LITHOGRAPHY

- Raith Voyager E-Beam Lithography system >8nm feature sizes
- Nanoscribe Professional GT-2 micro/nano 3D printer
- Heidelberg DWL66+ Laser 300nm Pattern Generator
- Heidelberg µPG 101 Laser Pattern Generator (x2)
- Nanofrazor 30nm-200nm nanolithography tool
- EVG EV-420, Suss MA1006, OAI 800 front & backside mask aligners
- Spinners, ovens, hot plates, fume hoods, SRDs, ultrasonic lift-off.

THIN FILM DEPOSITION

- Sputtering: TMV SS-40C, Denton Discovery 18, Denton 635LL, Precious Metals
- Evaporation: Denton e-beam DV-SJ/20C with four crucible hearths
- PECVD: Oxford PlasmaPro 100 Cobra ICPCVD: Si, low-stress Si3N4, SiO2
- CVD: SCS PDS 2010 Parylene-C
- MOCVD: Agnitron Agilis-IH: Gallium Oxide, Germanium Oxide
- ALD: Cambridge Fiji F200 w/ thermal & plasma (Pt, HfO2, ZnO, Al2O3, SiO2, TiO2)

FURNACES and DIFFUSION

- LPCVD: Expertech LTO, low-stress Si3N4, polysilicon
- ANNEALING: Allwin 610 RTP/RTA with O2, N2, Ar, H2 forming gas, 200-1250 °C
- FURNACES: ProTemp wet/dry thermal silicon oxidation with DCE

ETCH

- RIE and DRIE: Oxford PlasmaPro 100 Cobra 300mm, Oxford Plasmalab 100+ ICP DRIE Bosch & cryo, Plasmalab 80+, Plasmatherm 790 metal RIE (BCl_3, Cl_2)
- ISOTROPIC: Xactix Xetch XeF2 silicon isotropic dry etch
- WET CHEMICAL: Bold wet benches (acids, bases, organics), Gold wet-etch station

LASER MICROMACHINING

- ULS CO2 flatbed laser (25W + 75W, 1090nm)
- DPSS Samurai UV laser (355nm, 10um spot size, 3 W)

PACKAGING & ASSEMBLY

- EVG 520IS wafer bonder (anodic, eutectic, polymer, fusion)
- Disco DAD 641 & Disco 3220 dicing saws (std or UV tape)
- MEI wedge wirebonder with Au and Al wire
- LPKF Protomat S104 and Electroplating PCB printed circuit board manufacturing system

CLEAN MICROFLUIDICS

- SU-8 soft lithography
- Vacuum oven and O_2 RIE for PDMS to glass bonding

CLEANROOM METROLOGY

- JEOL JSM-IT200LV Inspection SEM
- Keyence VHX-5000 & VHX-X1 3D measuring microscopes
- n&k NKT 1500 thin film analyzer with wafer mapping
- Nanometrics NanoSpec 3000 film thickness
- Filmetrics F20 & F40 small spot film thickness
- Magnetron Instruments 4-point probe
- Polyvar Met with DIC + many optical microscopes
- Tencor P-10, P-20, and Alpha-Step D-600 stylus profilometers
- Tencor Flexus 2320 film stress analyzer

ELECTRICAL TESTING

- Keithley 4200A semiconductor parameter analyzer probe station

FY25 Annual Update

New Equipment

- Raith Voyager E-Beam Lithography system
- KLA-Tencor Alpha-Step D600

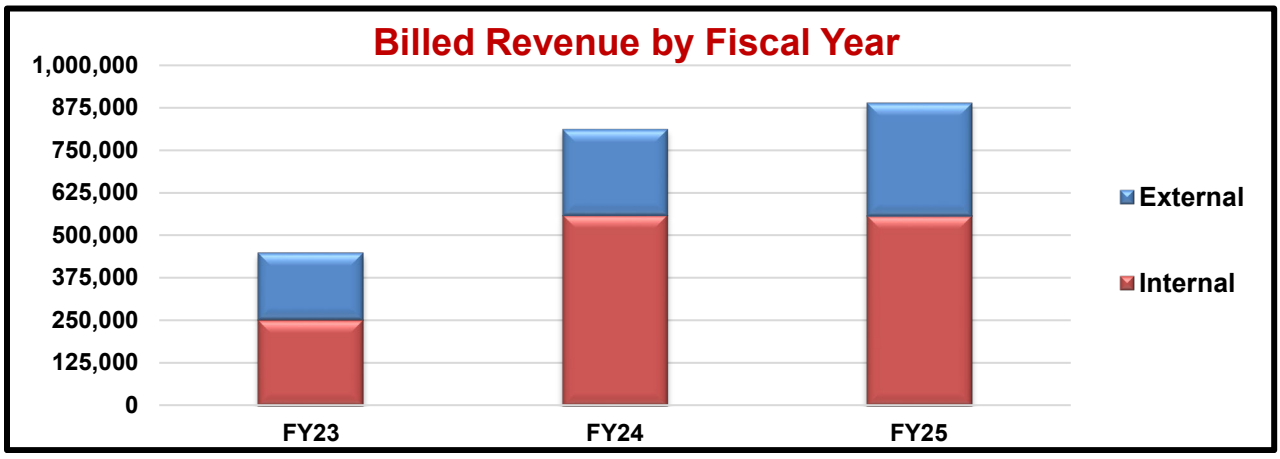
Personnel

- Hanseup Kim PhD, Director
- Brian Baker, Cleanroom Manager
- Kathy Anderson, Process Engineer, Lab Safety Officer
- Joseph Jacob, Research Device Specialist
- Jim Pierce, Process Engineer
- Steve Pritchett, Process Engineer

Revenue/Expenses

FY25 Expenses: **Total $1,268,489**
FY25 Revenue: **Total $888,808**

- FY25 Revenue billed from services: $888,808
- VP for Research: $0
- The John & Marcia Price College of Engineering: $0
- The Nanofab Cleanroom has a monthly cap of $3,000 per total tool use per on-campus lab member, per project. Tool use above the cap is subsidized by the Nanofab Cleanroom. $166,394 in monthly equipment cap credits were issued to on-campus users.



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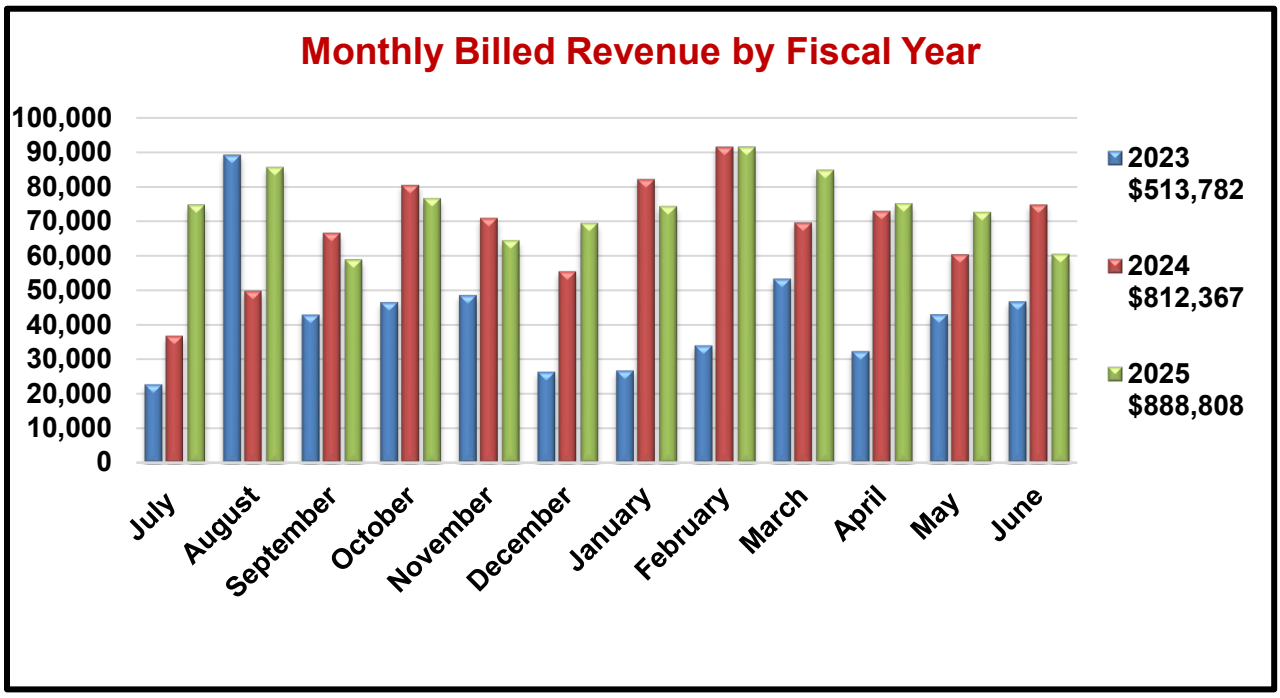
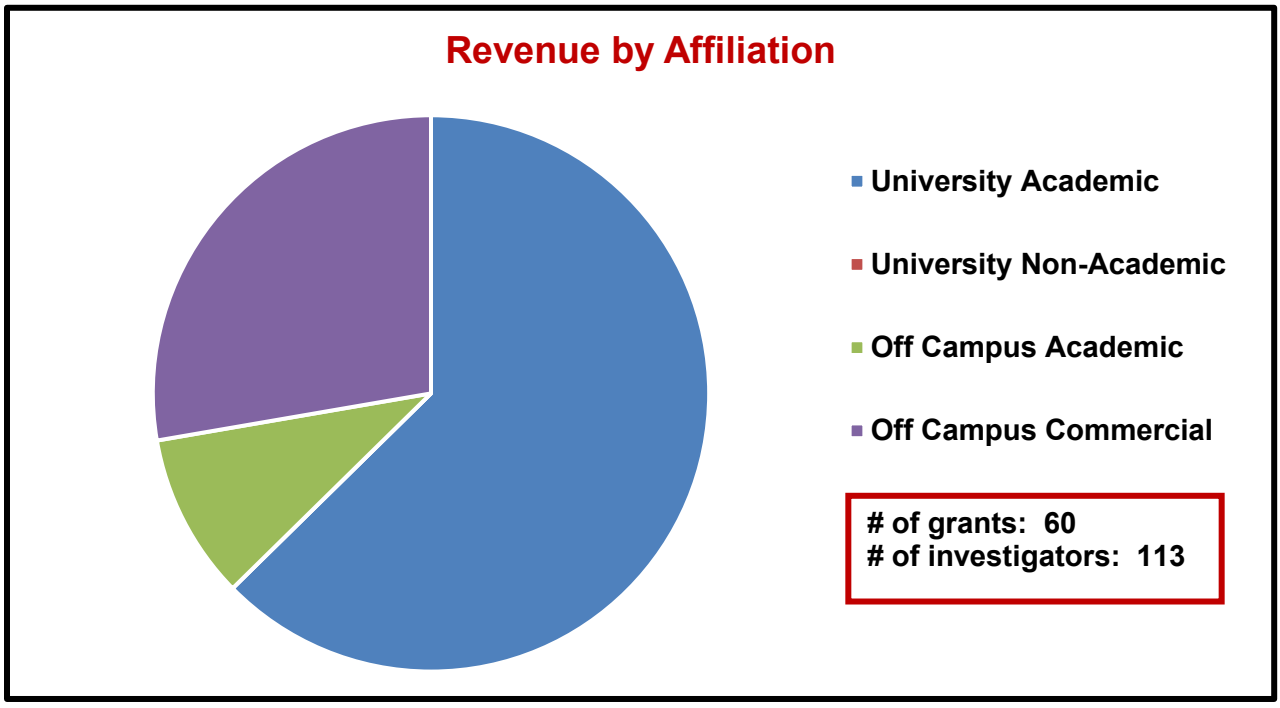
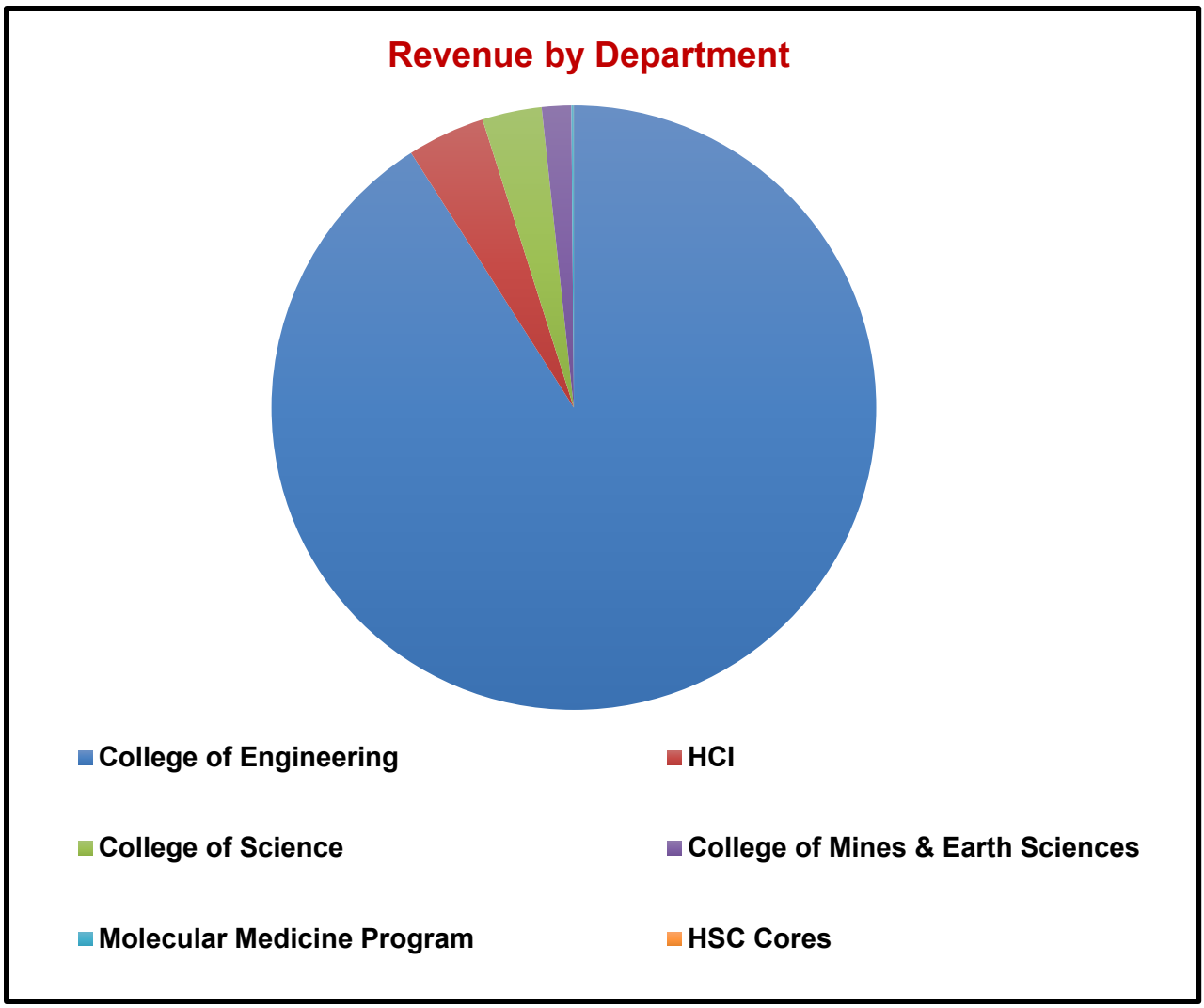


FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	Hanseup Kim	Afflo Sensors, Department, DOE
2	Kai Fu	Department, University of Utah Research Foundation
3	University of Maryland	Off Campus Academic
4	Berardi Sensale-Rodriguez	NSF, University of Utah Research Foundation
5	Electronic Biosciences	Off Campus Commercial
6	Gentex Corporation	Off Campus Commercial
7	American Semiconductor	Off Campus Commercial
8	Florian Solzbacher	Balckrock Microsystems/Neurotech, Department, Sentiomed
9	Rajesh Menon	DOD, Office of Naval Research, University of Texas Austin
10	Heayoung Yoon	Department, DOE, NSF

Publications

1. Alessandra, A. and B. Steve (2025). The Utah Optrode Array for large volume optogenetic manipulation in the non-human primate brain. Proc.SPIE.10.1117/12.3059485
2. Alessandra, A., M. C. Andrew, F. Frederick, D. Jordane, M. Niall, R. Loren, M. Keith and B. Steve (2025). Optogenetic approaches for circuit dissection in the non-human primate. Proc.SPIE.10.1117/12.3047229
3. Atwood, S. I., S. Hosseinzadeh, V. V. Mkhitaryan, T. H. Tennahewa, H. Malissa, W. Jiang, T. A. Darwish, P. L. Burn, J. M. Lupton and C. Boehme (2024). Non-Bloch-Siegert-type power-induced shift of two-photon electron spin resonances in organic light-emitting diodes. Physical Review B 110(19): 195304.10.1103/PhysRevB.110.195304
4. Atwood, S. I., V. V. Mkhitaryan, S. Dhileepkumar, C. Nuibe, S. Hosseinzadeh, H. Malissa, J. M. Lupton and C. Boehme (2024). Three-photon electron spin resonances. Physical Review B 110(6): L060103.10.1103/PhysRevB.110.L060103
5. Bjånes, D. A., S. Kellis, R. Nickl, B. Baker, T. Aflalo, L. Bashford, S. Chivukula, M. S. Fifer, L. E. Osborn, B. Christie, B. A. Wester, P. A. Celnik, D. Kramer, K. Pejsa, N. E. Crone, W. S. Anderson, N. Pouratian, B. Lee, C. Y. Liu, F. Tenore, L. Rieth and R. A. Andersen (2024). Quantifying physical degradation alongside recording and stimulation performance of 980 intracortical microelectrodes chronically implanted in three humans for 956-2246 days. medRxiv.10.1101/2024.09.09.24313281
6. Borooman, S., S. Binder, M. Leber, J. Botero, F. Solzbacher, C. Reiche and L. Laurentius (2024). Optical Imaging of Microfluidic Integrated Smart Hydrogels for Research and Sensing Applications.10.26434/chemrxiv-2024-91317
7. Chen, R., J. Fan, C. Yu and W. Gao (2024). Digitized Phase-Change Material Heterostack for Transmissive Diffractive Optical Neural Network. Advanced Photonics Research 6.10.1002/adpr.202400201
8. Chowdhury, A. H. and H. P. Yoon (2024). Translucent Si Solar Cells Patterned with Pulsed Ultraviolet Laser Beam. Advanced Energy and Sustainability Research 5(11): 2400147.https://doi.org/10.1002/aesr.202400147
9. Estlack, Z., A. Pack, M. Golozar, A. L. Butterworth, R. A. Mathies and J. Kim (2025). Microfabricated Onsite Analyzer for Biomarkers (MOAB) for Automated Crew Health Monitoring. ACS Sens 10(6): 4209-4219.10.1021/acssensors.5c00371
10. Fan, J., B. Hillam, C. Guo, H. Fujinami, K. Shiba, H. Xie, R. Chen, K. Yanagi and W. Gao (2025). Optical modeling, solver, and design of macroscopic single-enantiomer carbon nanotube film and reconfigurable chiral photonic device. Carbon 235: 120016.https://doi.org/10.1016/j.carbon.2025.120016
11. Fan, J., R. Chen, M. Lou, H. Xie, N. Hong, B. Hillam, J. Doumani, Y. Tang and W. Gao (2025). A Programmable Wafer-scale Chiroptical Heterostructure of Twisted Aligned Carbon Nanotubes and Phase Change Materials. Nat Commun 16(1): 4478.10.1038/s41467-025-59600-w
12. Hamza, A., T. M. Hayward, A. Majumder, N. Brimhall, R. Menon and J. Ha (2024). High-resolution optical coherence tomography using a multi-level diffractive lens. Optics Express 32(16): 27748-27755.10.1364/OE.529870
13. Hasan, M. R., A. Nikeghbal, S. Tran, A. Deshpande, M. U. Karkhanis, E. Pourshaban, A. Banerjee, S. Noh, H. Kim and C. H. Mastrangelo (2024). Low-Cost Computational Mid-Infrared Spectrometry for Atmospheric Gas Sensing With Wavelength-Selective Microbolometer Arrays. IEEE Sensors Journal 24(24): 40240-40250.10.1109/JSEN.2024.3427689
14. Hayward, T. M., S. N. Qadri, F. Santiago, C. C. Cheung, M. Christophersen, N. Brimhall and R. Menon (2024). Imaging with an inverse-designed 50 mm-diameter f/1 MWIR flat lens with enhanced field of view and depth of focus. Opt Lett 49(18): 5015-5018.10.1364/OL.531096
15. Islam, A., N. D. Rock and M. A. Scarpulla (2024). Quantification of the strong, phonon-induced Urbach tails in β-Ga2O3 and their implications on electrical breakdown. Journal of Applied Physics 136(3): 035701.10.1063/5.0211588
16. Jia, W., M. A. Gomez, S. Blair, M. A. Scarpulla and B. Sensale-Rodriguez (2025). Low-Loss Parowax-Imprinted Diffractive Neural Network for Orbital Angular Momentum Terahertz Holographic Imaging. Advanced Photonics Research 6(6): 2400169.https://doi.org/10.1002/adpr.202400169
17. Jia, W., S. Blair and B. Sensale-Rodriguez (2025). Binary phase-only gallium oxide diffractive optical element for beam shaping. Sci Rep 15(1): 5125.10.1038/s41598-025-89663-0
18. Kumari, A., V. Dev, T. Hayward, R. Menon and V. Pal (2024). Generating optical vortex needle beams with a flat diffractive lens. Journal of Applied Physics 136: 113105.10.1063/5.0226316
19. Lin, D., A. Majumder, P. Lu and R. Menon (2025). Diffraction-free orbital angular momentum holography. Opt Express 33(3): 5791-5799.10.1364/oe.539970
20. Liu, S., S. K. Chong, D. Kim, A. Vashist, R. Kumar, S. H. Lee, K. L. Wang, Z. Mao, F. Liu and V. V. Deshpande (2025). Nanomechanical Characterization of an Antiferromagnetic Topological Insulator. Nano Letters 25(3): 973-980.10.1021/acs.nanolett.4c04086
21. Mahmud, K. R., F. S. Sium, S. Noh, A. Bulbul, C. H. Mastrangelo and H. Kim (2025). Multilayered On-Lens Inductor for Efficient Wireless Powering. 2025 IEEE 38th International Conference on Micro Electro Mechanical Systems (MEMS).10.1109/MEMS61431.2025.10917980

22. Majumder, A., J. Doughty, T. Smith and R. Menon (2025). Contrary to widespread belief, the Fresnel zone plate outperforms the metalens at high NA.10.48550/arXiv.2502.20481
23. Majumder, A., M. Meem, A. Ingold, P. Ricketts, T. Obray, N. Brimhall and R. Menon (2025). Color astrophotography with a 100 mm-diameter f/2 polymer flat lens. Applied Physics Letters 126(5): 051701.10.1063/5.0242208
24. Majumder, A., T. M. Hayward, R. Stewart and R. Menon (2025). Low-cost, high-volume, manufacturable 0.88 NA multi-wavelength diffractive lens array for optical document security. Appl Opt 64(7): B1-b5.10.1364/ao.541419
25. Matthew, D. M., H. Jesse, S. M. John, B. Arkka, K. Sriram, D. F. Clint, B. V. Joel and F. V. Lars (2024). Photoluminescence mapping of laser-damaged β-Ga2O3. Proc.SPIE.10.1117/12.3032501
26. McAlinden, N., C. F. Reiche, A. M. Clark, R. Scharf, Y. Cheng, R. Sharma, L. Rieth, M. D. Dawson, A. Angelucci, K. Mathieson and S. Blair (2024). In vivo optogenetics using a Utah Optrode Array with enhanced light output and spatial selectivity. Journal of Neural Engineering 21(4): 046051.10.1088/1741-2552/ad69c3
27. Mirmohammad, H., A. Regmi, J. Chang and O. Kingstedt (2024). Demonstration of an integrated-heating load frame for quantitatively assessing microscale tensile properties of copper and Zircaloy-2. Journal of Nuclear Materials 601: 155339.10.1016/j.jnucmat.2024.155339
28. Miyashita, T., S. Hati, S. R. Langlais, B. Pattison, T. Qiao, R. Sardar and M. L. Tang (2025). Chiral Gold Nanoprisms by Tuning the Wavelength and Handedness of Light. The Journal of Physical Chemistry C 129(6): 3352-3358.10.1021/acs.jpcc.4c08741
29. Mohammad, M. and W. Yunshan (2024). UV plasmonics for enhancing the sensitivity and selectivity of neurotransmitter sensor based on their native fluorescence. Proc.SPIE.10.1117/12.3028624
30. Morren, A., A. T. Ballance, F. K. Elliott and J. S. Shumaker-Parry (2024). Plasmon-Induced Vibrational Circular Dichroism Bands of Achiral Molecules on Gold Nanostructures with Tunable Extrinsic Chiroptical Responses. The Journal of Physical Chemistry C 128(36): 15091-15102.10.1021/acs.jpcc.4c04448
31. Nepal, S., J. Casalini, A. Jafek and B. Gale (2025). Application of Inertial Microfluidics for Isolation and Removal of Round Spermatids from a Spermatogenic Cell Sample to Assist In-Vitro Human Spermatogenesis. Micromachines (Basel) 16(5).10.3390/mi16050500
32. Nichols, D. M., J. G. Berg, T. Taniguchi, K. Watanabe, P. Dhagat, V. V. Deshpande, A. Jander and E. D. Minot (2024). Charge pumping in h-BN-encapsulated graphene driven by surface acoustic waves. Journal of Applied Physics 136(2): 024302.10.1063/5.0220123
33. Nikeghbal, A., R. Hasan, F. S. Sium, F. Momeni, A. Deshpande, S. Noh, H. Kim and C. H. Mastrangelo (2025). Ultra-High-Sensitivity Hydrogen Nanogap Microsensor for Environmental Applications Based on Chemically Actuated Palladium Cantilever Beams. 2025 IEEE 38th International Conference on Micro Electro Mechanical Systems (MEMS).10.1109/MEMS61431.2025.10918258
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Utah Nanofab Electron Microscopy and Surface Analysis Lab

Overview

FY2025 EMSAL Use Metrics:

- Research enabled at U of U: $186M*
- Student Users: 240
- Faculty: 107
- Private Companies: 80
- Other Academic Institutions: 10
- Peer reviewed publications: 71
- Peer reviewed publications with staff as co-authors: 11

*Note: This is the sum of all active research grants, not necessarily awarded in FY25, that utilized the combined Nanofab, cleanroom and EMSAL, in FY25.

The Nanofab Electron Microscopy and Surface Analysis Lab (EMSAL) provides access, training, and consultation on a wide variety of materials characterization and electron microscopy instruments. We have 4 SEMs, and that capability forms a core part of our services. Three of these are equipped with EDS and EBSD for elemental analysis and crystal orientation mapping, and one is a Focused Ion Beam (dbFIB). We also have the only analytical TEM/STEM on campus, the JEOL 2800. Materials Characterization and Surface Analysis form the next core of our capabilities with: Micro CT, XRD, XPS/AES/ISS/UPS, SAXS/WAXS, XRF, CL, LC MS, nanoindentation, magnetometer, potentiostat, AFM, Ellipsometry, 3D optical profilometry, optical microscopes, and a full suite of sample prep tools for these techniques (coaters, polishers, etc.).

Our 4 full-time staff have more than 50 combined years of experience in electron microscopy and materials characterization. The Nanofab EMSAL has $11.6M in state-of-the-are equipment available for use.

Services

Microscopy and materials characterization/analysis: elemental, chemical, crystal structure, mechanical/electrical/magnetic, optical. Training students to be independent users of all equipment in the lab. Staff provided analysis for industry clients.

- 2D materials
- Alloys/metals
- Additively manufactured materials
- Medical and dental devices
- Battery materials
- Biomaterials
- Catalysts
- Ceramics
- Composites
- Geologic materials
- Microelectronics

- Nanomaterials and nanoparticles
- Orthopedic implants
- Pharmaceuticals
- Polymers
- Semiconductor materials
- Sensors and devices
- Solar cell materials
- Thin films

FY26 Goals

- Secure funding for new XPS instrument
- Implement new rates to increase revenue
- Implement revised training protocols to maximize staff efficiency
- Implement 3rd party service on 2 instruments (nanoCT and XRD) to reduce expenses
- Continue presenting short talks of our capabilities to relevant departments (Chemistry, Physics, Geology and all departments in the John and Marcia Price College of Engineering) at faculty meetings. Continuing this from previous years, the goal is to continue to increase faculty awareness of our capabilities and increase utilization of the lab. We've found this to be a successful way of promoting the lab on campus.

Equipment:

Electron Microscopes

- STEM JEOL 2800. Ultrafast EDS, Liquid & gas in-situ TEM, electrochemistry.
- Focused Ion Beam FEI Helios Nanolab 650i. Hi-res, EDS, EBSD, EBL, Pt, W, C dep; XeF2, I2, H2O enhanced etch.
- SEM FEI Quanta 600 FE-ESEM. EDS, EBSD, Environmental SEM, Bruker PI-89 Picoindenter stage.
- SEM FEI Teneo FE-SEM. EDS, EBSD, Trinity imaging detectors.
- SEM JEOL IT200LV. Cleanroom inspection SEM.

Materials Characterization

- Nano CT Zeiss Xradia Versa 620. 4D, non-destructive imaging, in-situ (heating/cooling/tension/compression), Lab DCT (crystallographic imaging).
- XRD Bruker Discover D8 Hi-res. Thin film/powder/crystalline/polycrystalline samples, XRR, RSM, rocking curves, θ/2θ scans, 1100° heating stage, -180° to 400° C cooling/heating stage.
- Cathodoluminescence (CL) detector (Teneo SEM). Gatan Monarc Pro hyperspectral imaging.
- LC MS Agilent 6470B.
- SAXS/WAXS/GISAXS Anton Paar SAXSPoint 5.0. In-situ heating/cooling/mechanical loading/humidity.
- XRF EDAX Eagle III Microspot. Microprobe and elemental mapping.
- Magnetometer Microsense EZ-7 VSM.
- Potentiostat Gamry Reference 600+

Micro-Mechanical Testing

- MTSL Micro Test rig for SEM/NanoCT/optical microscope
- Nanoindenter Hysitron TI Premier. Heating stage.
- Picoindenter stage for SEM. Bruker PI-89.
- Deben 5kN compression/tensile stage for NanoCT

Surface Analysis

- XPS/AES/ISS/UPS Kratos AxisUltra DLD.
- AFM Bruker Icon-PT with KPFM, C-AFM, fluid cell, MFM.
- Ellipsometer Woollam V-VASE spectroscopic.

Optical Microscopes and Profilers

- 3D Optical Profiler Olympus OLS5000 LEXT.
- Keyence VHX-X1 Digital Microscope
- Optical Comparitor Vertex 220 microVu
- Optical Microscope Reichert Polyvar with BF, DF, DIC.

Sample Preparation

- Leica ACE600 Au/Pd or C coating for SEM
- Gatan PECS1 – Au/Pd coating or sample ion polishing
- Gatan PECS2 – sample ion polishing
- Fischione 1060 – dual gun ion polishing
- Gatan PIPS – sample thinning for TEM sample prep
- Allied Multiprep polishing system
- Buehler vibratory polisher
- Allied M-Prep3 Grinder/polisher
- Gatan ultrasonic disc cutter (TEM sample prep)
- Disc punch system (TEM sample prep)
- Dimpler sample grinder (TEM sample prep)
- Allied Techcut 4 precision low speed saw: sample sectioning

FY25 Annual Update

New Equipment

- XRD low temperature stage. Bruker MTC -180°C to +400°C
- Keyence VHX-X1 Digital Microscope
- MTSL MicroTestRig: Micro mechanical testing station for SEM, nanoCT and optical microscopes

Personnel

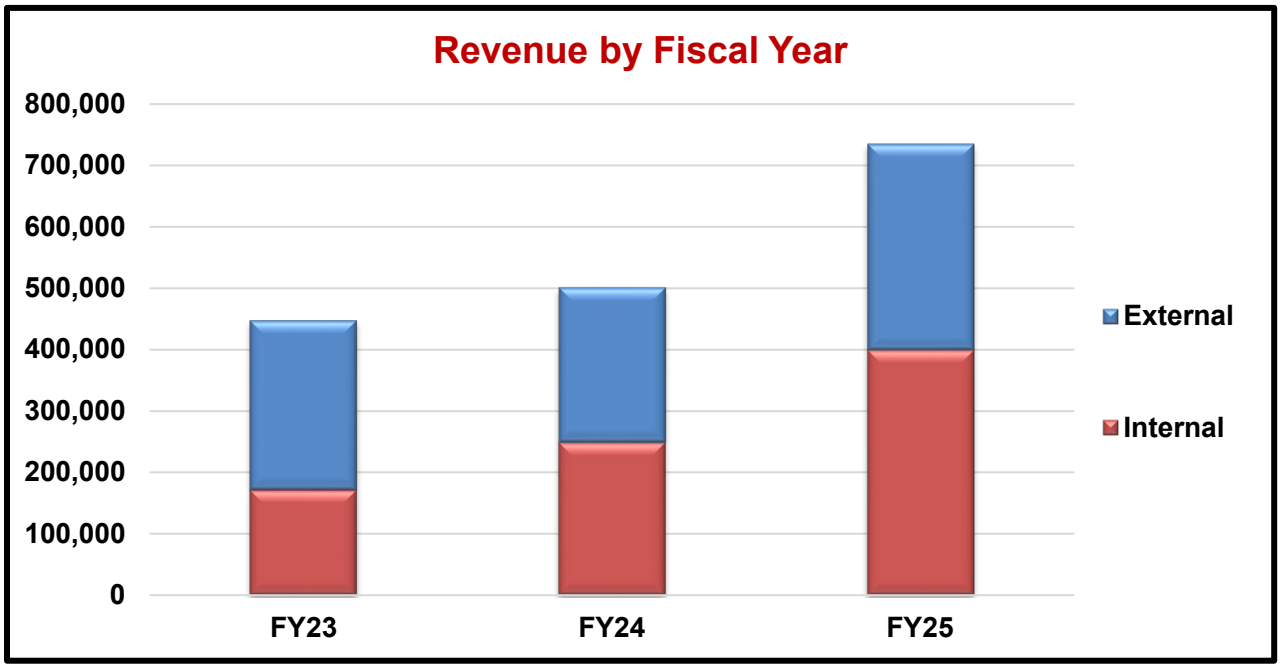
- Hanseup Kim, Ph.D., Director
- Brian Van Devener, Ph.D., Lab Manager
- Paulo Perez, Ph.D., Materials Scientist
- Randal Polson, Ph.D., Research Associate
- Bobby Duersch, Ph.D., Materials Characterization Specialist

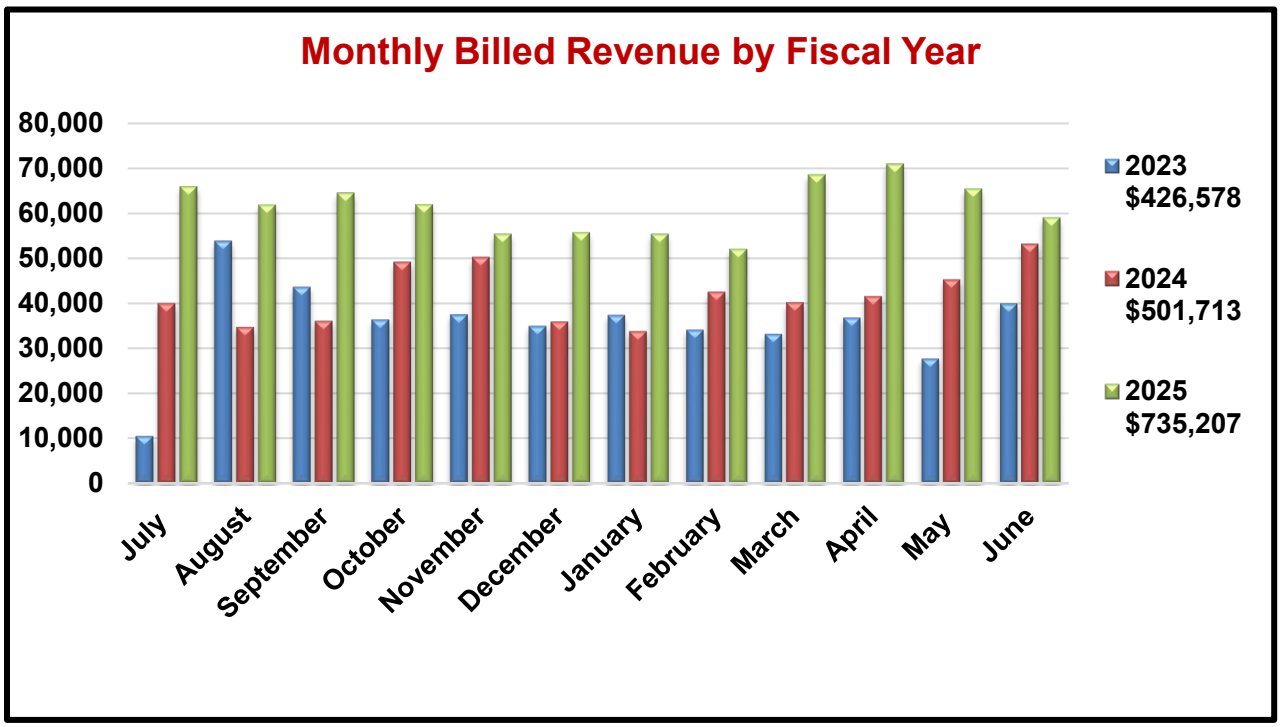
Revenue/Expenses

FY25 Expenses: **Total $875,580**

FY25 Revenue: **Total $735,207**

- FY25 Revenue billed from services: $735,304
- VP of Research: $0
- The John & Marcia Price College of Engineering: $0





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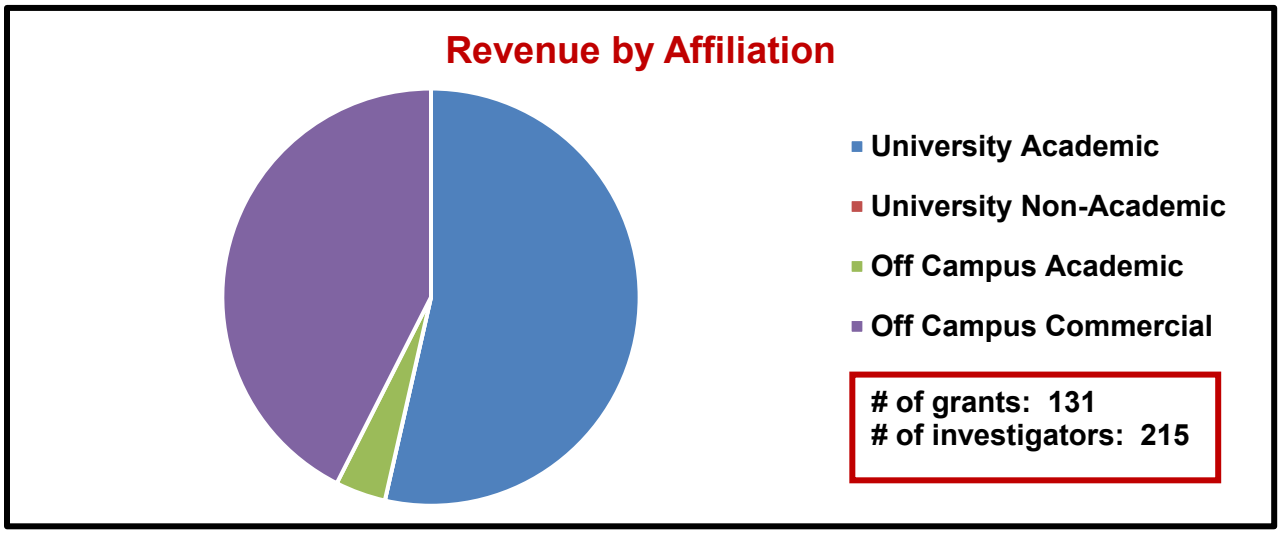
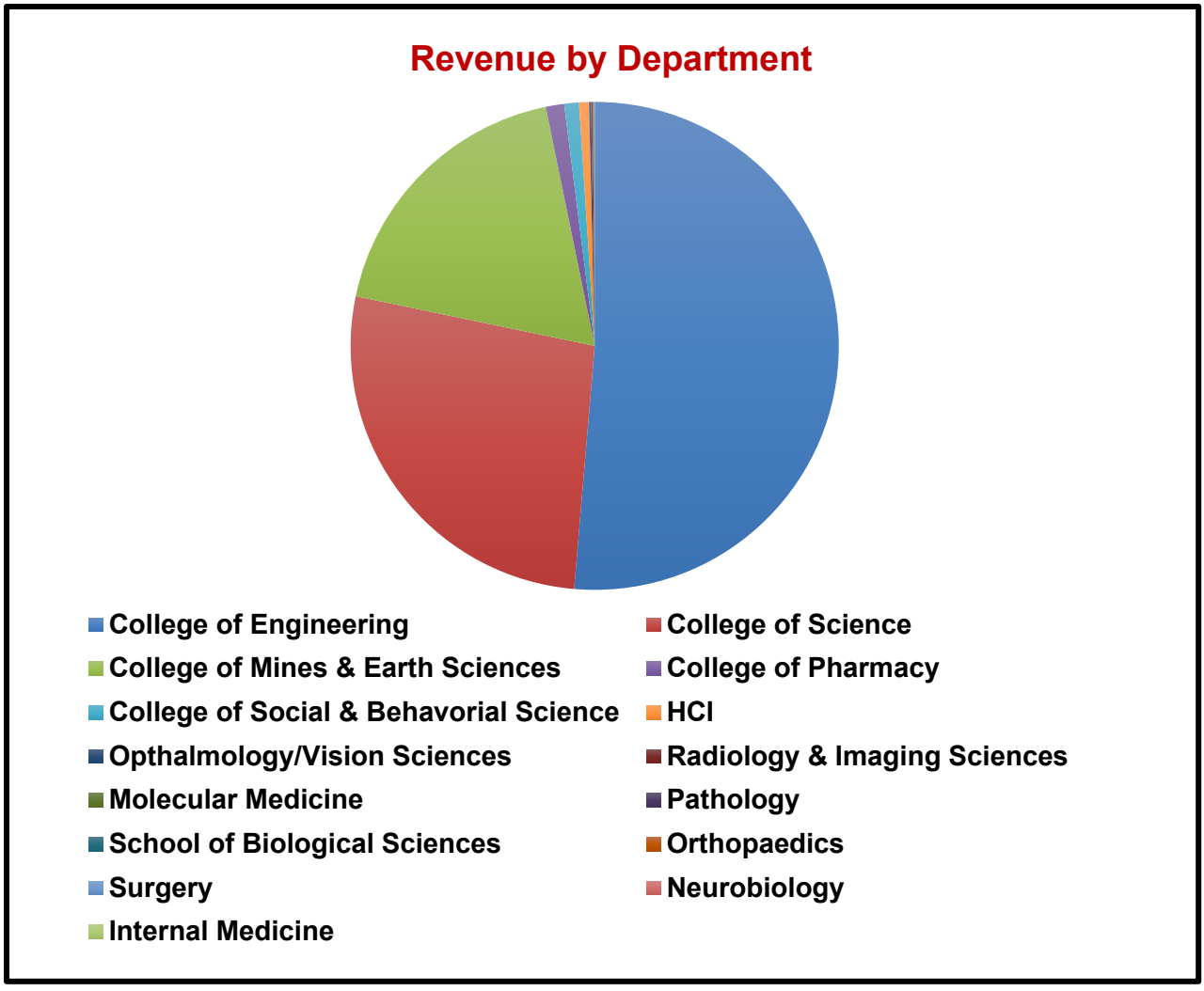
FY25 Scientific Impact
Research Support

Revenue Generated (see charts following):





Top Users

1	Forge Nano	Off Campus Commercial
2	Gentex Corporation	Off Campus Commercial
3	Kai Fu	Department, University of Utah Research Foundation
4	Luther McDonald	DOE
5	Rodrigo Noriega	NSF, Alfred P Sloan Foundation, Chemistry
6	Long Luo	Department, DOE, NSF
7	Luisa Whittaker-Brooks	Camile & Henry Dreyfus Foundation, Chemistry, DOE, NSF, Department, Alfred P Sloan Foundation
8	Ravi Chandran	DOE, Honeywell International Inc
9	Zak Fang	IperionX Technology LLC, Blacksand Technology LLC
10	Jacob Hochhalter	DARPA, Questek Innovations, NSF

Publications

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X-ray Crystallography

Overview

The X-ray Crystallography Core Facility provides services for atomic resolution structure determination by single crystal X-ray crystallography. This process may include high throughput crystallization of water soluble molecules, X-ray diffraction data collection on single crystals, and structure determination.

Uniqueness

The X-ray Crystallography Core facility provides single crystal X-ray diffraction not available anywhere else at the University of Utah. Our dual wavelength (Mo and Cu) X-ray diffractometer, Rigaku XtaLAB Synergy DW VHF, provides excellent data for single crystals of small organic or inorganic compounds as well as large biomacromolecules. These services are available to anyone. Crystalline samples can be delivered to or grown at the core facility. Data collection is performed by core facility personnel or by users trained to operate facility instrumentation.

Services

The X-ray Crystallography Core's primary mission is to provide students, faculty, labs, research organizations, and members of the state of Utah with single crystal X-ray Crystallography services, which include:

- High throughput crystallization
- Crystallization experiment evaluation
- Single crystal X-ray diffraction data collection
- Diffraction data processing and structure determination.
- Synchrotron access.

FY26 Goals

- Increase awareness of our services
- Increase core efficiency and reduce turnaround time.

Major Equipment

- Rigaku XtaLAB Synergy DW VHF X-ray diffractometer.
- Art Robbins Gryphon, Crystallization drop setter
- Dedicated crystallization rooms with stereo microscopes, (21°C, 13°C and 4°C).
- Access to synchrotron X-ray data collection.

Personnel

- Ryan VanderLinden, Ph.D., Dept. of Chemistry/Department of Biochemistry, Co-director
- Frank Whitby, Ph.D., Dept. of Biochemistry, Co-Director

Advisory Board Committee

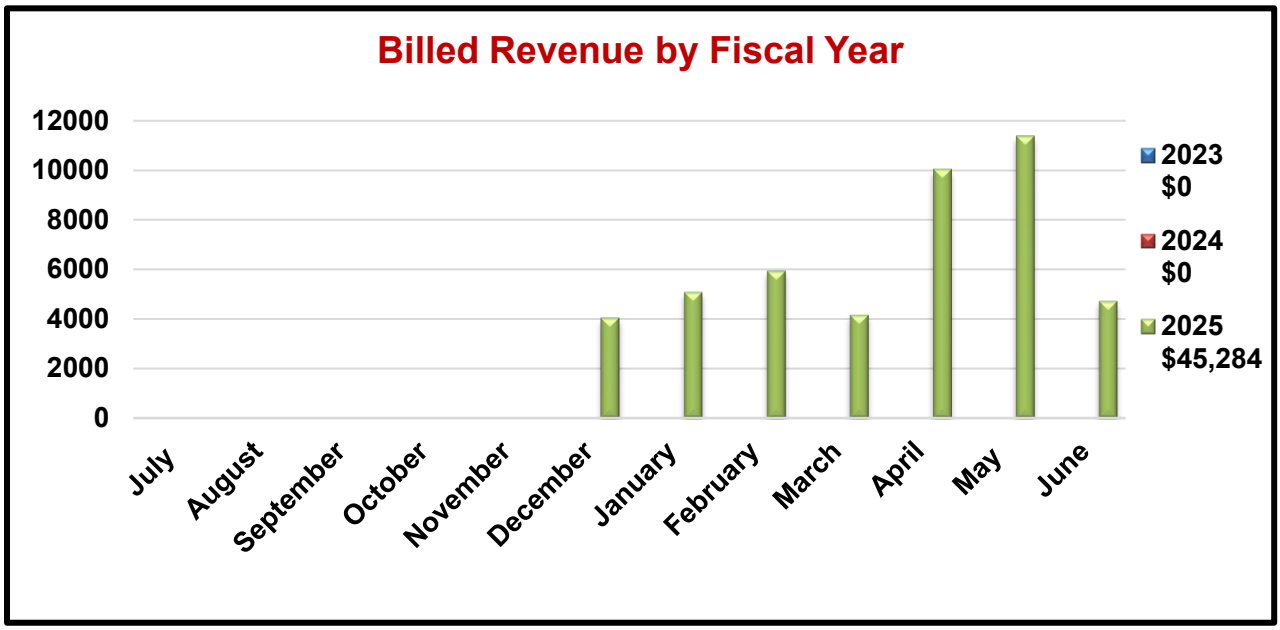
- Wesley I. Sundquist Ph.D., Department of Biochemistry
- Peter Armentrout, Ph.D., Department of Chemistry
- Julia Brasch, Ph.D., Department of Biochemistry
- Bethany Buck Ph.D., Department of Chemistry
- Chris Hill, D.Phil.,

Revenue/Expenses

FY25 Total Expenses: **$7,841**

FY25 Total Revenue: **$45,284**

- VP of Research Support: $0
- FY25 Revenue generated from services: $45,284

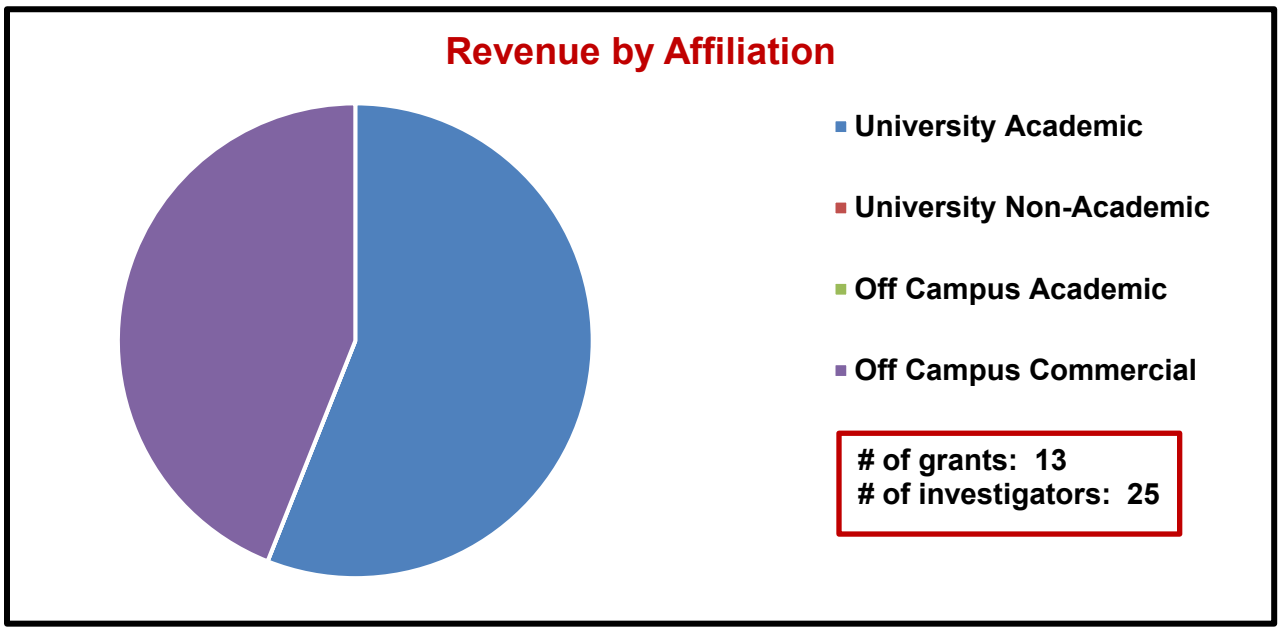


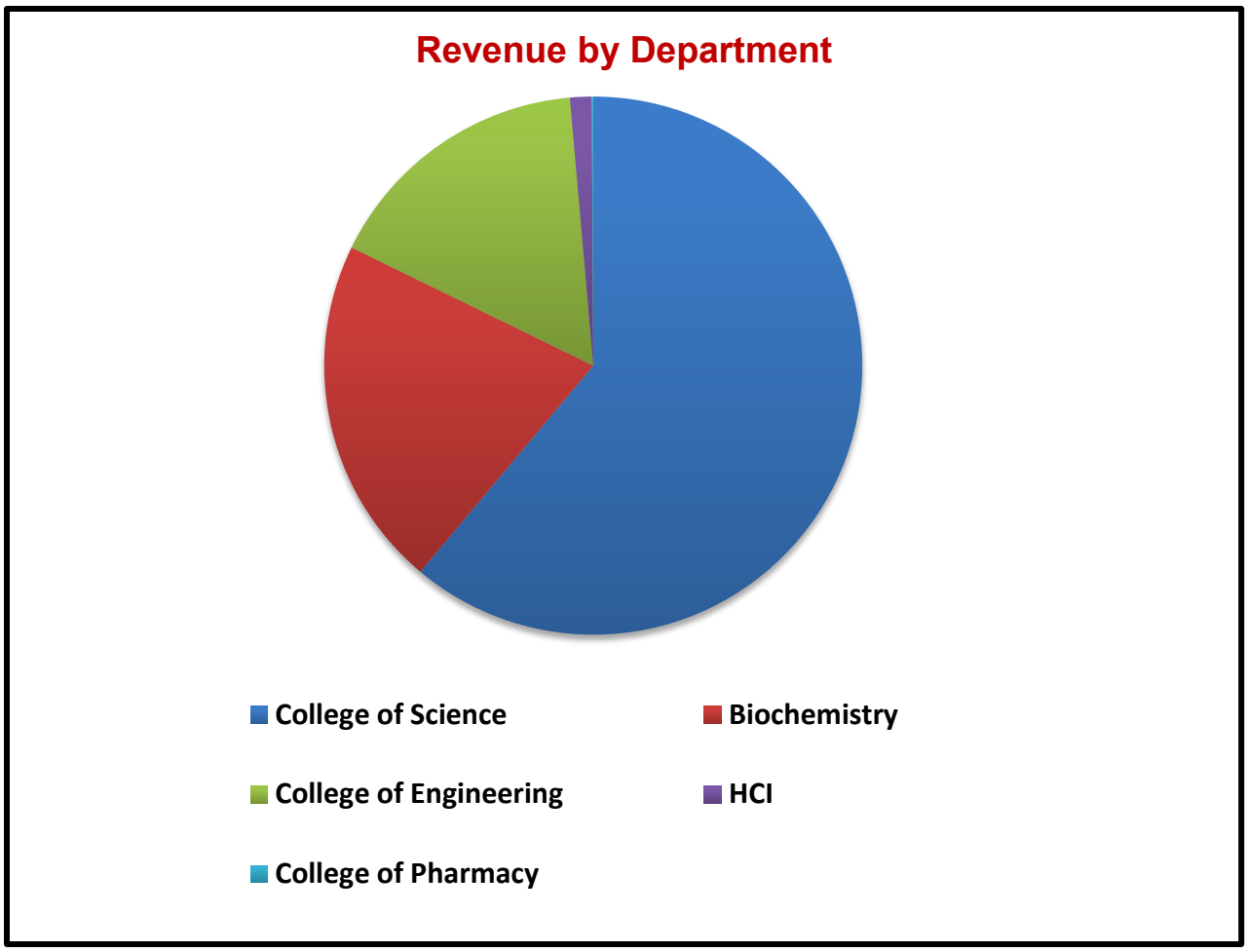
* Legend displays total annual revenue by year earned.

FY25 Scientific Impact

Research Support

Revenue Generated (see charts following):





Top Users

1	David Bearss	Department
2	NephroNovus	Off Campus Commercial
3	Lyterian Therapeutics	Off Campus Commercial
4	Thomas Richmond	Department
5	Christopher Hill	Good Ventures Foundation, NIH
6	Connor Bischak	Department
7	Luisa Whittaker-Brooks	NSF
8	Ling Zang	Gentex Corporation
9	Huiwen Ji	Department, NSF
10	Owen Pornillos	Washington University in St. Louis

Publications

1. Deolka, S., M. H. Samha, A. Garcia Roca, G. C. Haug, J. R. Howard, D. Dalmau, J. Sandres, S. Vasylevskyi, R. T. VanderLinden, R. S. Paton and M. S. Sigman (2025). Investigating Reactivity and Selectivity in a Palladium-Catalyzed Heteroleptic Ligand System for Electrophilic Arene Fluorination. J Am Chem Soc 147(15): 12878-12889.10.1021/jacs.5c01738