NEI P30 Vision Cores

UAB The University of Alabama at Birmingham

UAB MEDICINE | HEERSINK School of Medicine

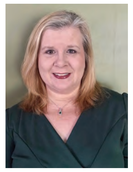
Overview

The P30 Cores are funded by a P30 Core grant EY03039 from the National Eye Institute (NEI). This P30 has been funded since 1979 to facilitate scientific collaboration and productivity for the P30 participants.

The NEI requires that all NEI funded core facilities establish core use priorities for investigators. The priority order is as follows:
1) Investigators with NEI R01-funding are given priority.
2) Investigators with NIH new/early-stage investigator status.
3) Investigators who are Co-I on an NEI R01-funded active grant.
4) Investigators actively seeking new or continued NEI R01 support.
5) Investigators with vision-related NIH funding and VSRC pilot grant awardees.
6) Investigators with vision-related funding.

Administrative Core

Director, P30 PI
Dr. Paul Gamlin
pgamlin@uab.edu



Program Manager
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Administrative Associate
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Locations: EFH 601 and Volker Hall 390

Research Programming & Computational Analysis (RPCA) Core

Core Director
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Associate Director
Rafael Grytz
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Lab Manager
Chester Calvert
chesterc@uab.edu

Database Analyst
Liyan Gao
gaoly@uab.edu

Locations: Calvert - Volker Hall G044
Gao - Callahan Eye Hospital, CEH 609

RPCA Core Services and Resources

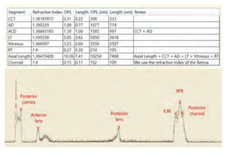
Chester Calvert
Custom hardware/software interfaces and research programming
Electronics support

Liyan Gao
Custom database and query development

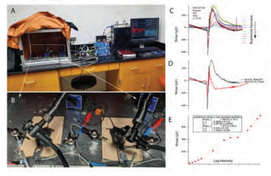
Research Programming and Hardware/Software Interface Services
- Custom hardware/software interfaces and data acquisition
- Electronics Support
- Custom programming for data filtering, analysis, and quantification
- Custom database and query development and programming

Research Programming Hardware and Software Shared Resources
- LabView boards for testing
- Graphics workstations (iMac Pro and Dell PC [768GB RAM, 56 CPUs, 4x Nvidia GPUs])
- Servers/Programming for P30 web content and equipment calendars
- Database: SQL, FileMaker, RedCap
- Amira Image Analysis Software Floating License
- Various Programming Languages
- Interfaces to CHEAHA HPC cluster

RPCA Projects - Examples



Custom program developed in the RPCA core to extract axial eye dimensions of tree shrew eyes from the raw data of the LenStar LS900 clinical biometer. The custom code fundamentally changed Dr. Grytz's in vivo animal work, as it improved accuracy and reduced analysis time from 5 minutes to 5 seconds per measurement.



(A-B) Custom small animal ERG that can test two animals at once to improve throughput, which was developed by the RPCA and Machine Shop cores for the Visual Phenotyping Core. The device is based on LED light sources, LABView data acquisition and control, and custom ERG data processing that were developed and programmed by the RPCA core to produce flash intensity series (C), steps and light adapting tests (D) and dual scotopic-photopic curve fitting (E).

Machine Shop Core

Core Director
Lawrence Sincich
sincich@uab.edu

Associate Director
Julie Quinet
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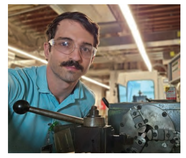


Machinist
Steven Pahos
spahos@uab.edu

Location: Volker Hall B002B

Machine Shop Services and Materials

SERVICES
- Precision design and fabrication of parts and instruments.
- Repair or replacement of broken parts.

METALS
- Aluminum alloys
- Titanium alloys
- Stainless Steel alloys
- Brass
- Copper

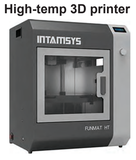
Researcher IV
Nikisha McFall
jforten@uab.edu

PLASTICS
- Acrylics
- Polycarbonate
- ABS (low temp plastic)
- PEEK (high tensile strength)
- Nylon
- Others for 3D printing

Machine Shop equipment

Clausing lathe

High-temp 3D printer



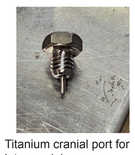
Bridgeport Milling Machine

Tormach 770M Milling Machine

Roland Picza 3D scanner

Machine Shop Projects - Examples

Custom acrylic ice-bath for preparing retinal slices for physiology.



Titanium cranial port for intracranial pressure monitoring in macaques.

Titanium sub-dermal cranial implant and PEEK cortical window for macaque 2-photon imaging.

Titanium headframe for fluorescence imaging in mouse cortex.

Aluminum "goggles" for holding lenses for tree shrew studies.

PEEK fiducial holders for cranial implants compatible with MRI imaging.

Visual Phenotyping Core

Core Director
Paul Gamlin
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Associate Director
Timothy Kraft
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Lab Manager
James Fortenberry
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Researcher IV
Nikisha McFall
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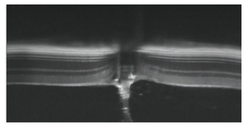
Locations: Volker Hall 346, 347, 375 and VH basement

Small eye imaging in VH375
A comprehensive in vivo ocular analysis suite that includes a Bioptigen 840 nm SD-OCT with rodent aiming system and probes for mouse, rat, and species with a larger eye size. A Micron IV digital microscope for fundoscopy including fluorescence detection. It includes a slit lamp and focal ERG attachments.

Bioptigen OCT for mice and rats

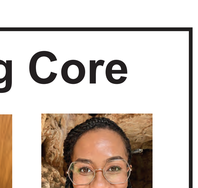


OCT resolution of 1.8 µm

Small eye physiology in VH347
An Ocuscience ERG instrument, suitable for small rodents with a dedicated isoflurane vaporizing anesthesia machine. A custom-designed LED-based ERG system for rodents capable of measuring ERG from two eyes or animals simultaneously.

A Phenosys qOMR visual behavioral system for measuring visual acuity and contrast sensitivity in zebra fish, mice, and rats is available.

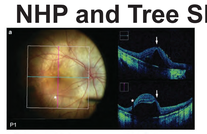
Phenosys qOMR - Automatic head tracking provides objective measures



Mouse ERG setup using LED light source. Data acquisition with LabVIEW

Large Eye Imaging in Volker Hall Basement
Heidelberg - Spectralis OCT2
Heidelberg - FlexArm Spectralis OCT/OCTA
Zeiss intraoperative OCT surgical microscope
Heidelberg - Anterion OCT
Nidek ARK-700A autorefractor
Lenstar LS-900 optical biometer

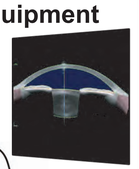
NHP and Tree Shrew Phenotyping equipment



Zeiss Lumera 700 OCT surgical microscope

Heidelberg Engineering SPECTRALIS Flex Module

Heidelberg Engineering Anterion



Molecular & Cellular Analysis Core

Core Director
Oliver Gramlich
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Associate Director
Yuchen Wang
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Lab Manager
José Luis Roig-Lopez
joseluis@uab.edu

Locations: Volker Hall 352 and 370

Equipment Available:

- **Boekel Scientific Slide Moat™ Slide Hybridizer (2)**
- **NanoDrop Spectrophotometer**
- **BioRad Criterion Gel & Blot System**
- **Beckman Optima MAX-TL Ultracentrifuge with 3 rotors**
- **ProteinSimple WES automated Western analysis**
- **Eppendorf 5810 refrigerated centrifuge**
- **Orbital Shaker with refrigeration**
- **LI-COR Odyssey Fluorescent Imager**
- **Perkin Elmer 1420-041 with Advanced Kinetics Fluorescence Plate Reader**
- **Leica CM3050 S Cryostat**
- **Zeiss Axioplan 2 Microscope**
- **Nikon AX-R Confocal Microscope with 5 laser lines**

Nikon AX-R scanning confocal microscope

The Nikon AX-R scanning confocal microscope includes a dual scanning system with a high speed resonant scanner for gentle live-cell or high content (HC) imaging and Galvo scanners for the highest possible SNR. Additionally, the AXR has an industry-leading field of view (25 mm). This microscope utilizes (405/488/561/640/730 nm) solid-state lasers.

Nikon AX-R image of Human RPE cells demonstrating lipofuscin, melano-lipofuscin and melanin autofluorescent granules (488). Image captured with 60x oil obj. using resonant scanning. Provided by Jeff Messinger (Curcio lab).

Max projection Nikon images (40x obj., Z-stack) of age-matched wild type and a2d-4 knockout mouse retinas. Antigens labeled are rod transducin (Gat1, 488), cone arrestin (ARR3, 546), and peanut agglutinin lectin (647, stains cone sheaths). Provided by Gillian Huskin (Wang lab).

Specific details of core services and resources can be obtained by contacting either the Core Directors or lab managers at the e-mail addresses listed above.