In the laboratory of Dr. James W. Simpkins, our current research aims to investigate the interaction between vascular dysfunction and the age-related progression of Alzheimer’s disease in a triple transgenic mouse model. Cerebral amyloid angiopathy is characterized by the accumulation of the amyloid β peptide around brain blood vessels. Previous research has demonstrated that treatment of amyloid β in cultured endothelial cells causes the release of inflammatory molecules and cell death. Therefore, we hypothesize that the accumulation of amyloid β around cerebral microvessels causes vascular degeneration, resulting in the hypoperfusion of cerebral tissue. To assess our hypothesis, high-resolution tomographic images of polyurethane corrosion casts made from the entire brain vasculature were acquired on the SkyScan 1272 desktop MicroCT (Bruker). MicroCT data sets were reconstructed into three-dimensional models using CTvox software for visual inspection. To determine the disease-related alterations of vessels in respect to vessel hierarchy, CTan software was used to calculate measurements of vessel density, length, total volume, and various morphological descriptors in effort to characterize the pathology of the cerebrovasculature that parallels the age-related progression of Alzheimer’s disease.

(A) Three-dimensional reconstructed vascular cast from a 24-month triple transgenic mouse model of Alzheimer’s disease. Overview of the whole brain vascular network imaged at a pixel size of 2μm and a rotation step size of 0.1 °. A magnified 1mm cube of the primary somatosensory cortex (B, C) digitally isolated from a whole brain scan of the entire vascular network clearly depicting penetrating pial vessels projecting dense capillary branching into the cortical layers.

https://goo.gl/forms/8MzvGPCw7jLKUzXW2

https://goo.gl/forms/4CLrBVbanZpDNYCj2
What type of microscope should I use?

Types of Microscope Available in the Facility:

1. **Brightfield microscope**
   A typical microscope that uses transmitted light to observe targets. With the proper condenser, it can also be used for Darkfield Illumination

   **Microscopes in the Facility:**
   * Zeiss Fluorescent (also Darkfield)
   * Zeiss Tissue Culture Scope
   * Olympus Slide Scanner
   * Zeiss Tissue Culture
   * Olympus MVX
   * Nikon Sweptfield

2. **Fluorescence microscope**
   A biological microscope that observes fluorescence emitted by samples by using special light sources.

   **Microscopes in the Facility:**
   * Zeiss Fluorescent
   * Nikon Sweptfield
   * Nikon Live Cell
   * Zeiss Tissue Culture
   * Olympus MVX
   * Olympus Slide Scanner

3. **Confocal Laser microscope**
   This microscope uses lasers for clear observation of thick samples with different focal distances.

   **Microscopes in the Facility:**
   * Zeiss 510 Violet Confocal
   * Zeiss 710 Confocal with Airyscan (Environmental Control)
   * Nikon Sweptfield Confocal (Environmental Control)

4. **Total internal reflection fluorescence microscope**
   A fluorescence microscope that uses an evanescent wave to only illuminate near the surface of a specimen. The region that is viewed is generally very thin compared to conventional microscopes.

   **Microscope in the Facility:**
   * Nikon Sweptfield with TIRF (Environmental Control)

5. **Multiphoton excitation microscope**
   The use of multiple excitation lasers reduces damage to cells and allows high-resolution observation of deep areas.

   **Microscope in the Facility:**
   * Two Photon NLOM
The Imaging Facility now has 3 Workstations!

- For more information on any of the Imaging software we provide, please contact Mandy Ammer (MIF) or Sarah McLaughlin (AMIF).
- Each workstation can be reserved through CORES at $5 / hr.

**Workstation 1**
- NIS Elements—full version
- Zen Lite—Blue and Black
- Microsoft Office
- Adobe Photoshop
- ImageJ
- AutoQuantX2—Media Cybernetics
- OlyVia

**Workstation 2**
- IMARIS—full version
- Fiji / Image J
- Rhinoceros 5
- LSM Browser (Zeiss)
- AutoQuant X3

**Workstation 3**
- Living Image 4.0
- Vevo LAB
- DataViewer
- CTan
- CTvol
- CTvox

Workstation 3 is **NEW**! This system is loaded with software from the AMIF. This system has similar specs to the computer used with the microCT, so it is a powerful workstation that is capable of analyzing large files. Please sign up on CORES to reserve this for your analysis.
Please let us know when you publish a manuscript with data from the MIF or AMIF so that we may acknowledge your achievement in our newsletter!

**Recent Publications**


Please Remember to Acknowledge Us!

**AMIF:** “Small animal imaging and image analysis were performed in the West Virginia University Animal Models & Imaging Facility, which has been supported by the Mary Babb Randolph Cancer Center and NIH grants P20 RR016440, P30 GM103488 and S10 RR026378.”

**MIF:** “Imaging experiments and image analysis were performed in the West Virginia University Microscope Imaging Facility, which has been supported by the Mary Babb Randolph Cancer Center and NIH grants P20 RR016440, P30 GM103488 and P20 GM103434.”
The purpose of this newsletter is to inform researchers about the AMIF and MIF. We want all investigators, graduate students and staff to be knowledgeable about the equipment and resources that are available. The staff are always glad to discuss upcoming studies with investigators to best utilize the core resources available. To learn more about our facilities, please check out our websites (to the left) or contact us to speak directly with AMIF or MIF staff.