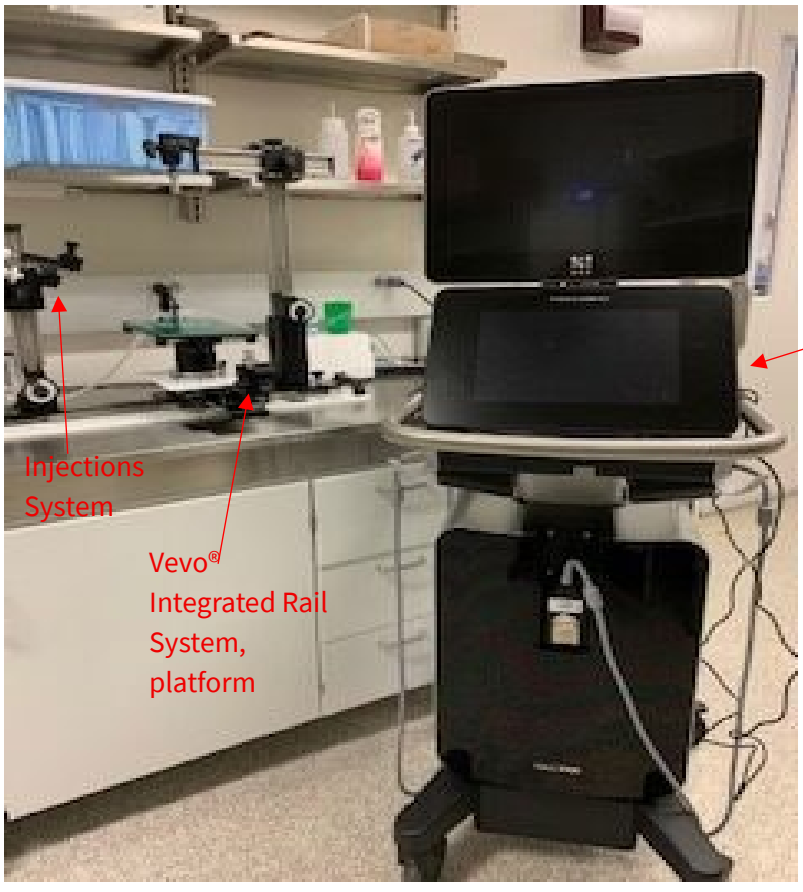
Vevo 3100 Ultrasound at DLAR Imaging Core

Vevo 3100 Imaging System along with the Vevo® Integrated Rail System and peripheral equipment for ultrasound imaging of rodents. The Vevo 3100 micro-ultrasound imaging system combines ultra high-frequency ultrasound imaging operating up to 70 MHz and imaging up to 300 frames per second.

The system is equipped with complete animal setup and handling to achieve noninvasive in vivo imaging under accurate physiological conditions (temperature-controlled heated stage, gas anesthesia, with EKG, temperature, and respiratory rate monitoring). The system has an injection setup mounted on dedicated rail-system extensions to enable Y-axis stage adjustment that can be used to assist in image-guided injections.

DLAR imaging core three transducers are available to work with Vevo 3100 micro-ultrasound system:

- **MX201 (axial resolution-100 µm; FOV- up to 23 mm width; scan depth- 36 mm and band width-10-22 MHz),** can be used for all contrast applications, Rabbit cardiovascular, Rat cardiology and abdominal (> 400g).
- **MX250 (axial resolution-75 µm; FOV- up to 23 mm width; scan depth- 30 mm and band width-15-30 MHz),** can be used for all contrast applications, Rat cardiology and abdominal (<400) and
- **MX550D (axial resolution- 40 µm; FOV- up to 14 mm width; scan depth- 15 mm and band width-25-55 MHz)** can be used for mouse abdominal, Mouse reproductive, Mouse vascular, Mouse & rat embryology, Small rat vascular, Tumor imaging (<14mm diameter).



The animal handling and physiological monitoring platforms

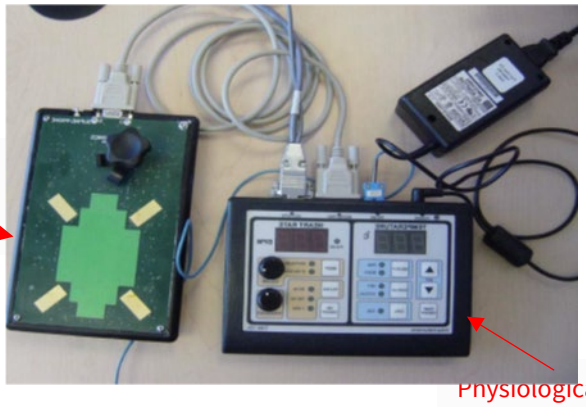
The animal handling and physiological monitoring system allows the mouse or rat to be secured quickly, supports manipulation of the animal during imaging, ensures comfort for the animal during the imaging session, and monitors the animal's ECG, temperature and heart rate. Physiological parameters collected will co-register with image data.

Vevo® Integrated Rail System

Allows for stable positioning of the transducer scan head, enabling precise image plane alignment and consistent imaging throughout the session.

Injection System

Mounted injection setup is also available for image-guided injections into internal organs such as liver. Injection system supports visualization and guidance of injection and extraction procedures in real-time.



Mouse animal handling and physiological monitoring platform and physiological Controller

Contrast applications

Mouse

- ✓ Abdominal imaging (liver, kidney, spleen, pancreas)
- ✓ Reproductive system imaging (ovary, uterus, testes)
- ✓ Vascular imaging (carotid arteries, aorta, peripheral vessels)
- ✓ Embryology (in utero embryo imaging, placental assessment)
- ✓ Tumor detection and longitudinal growth monitoring

Rat

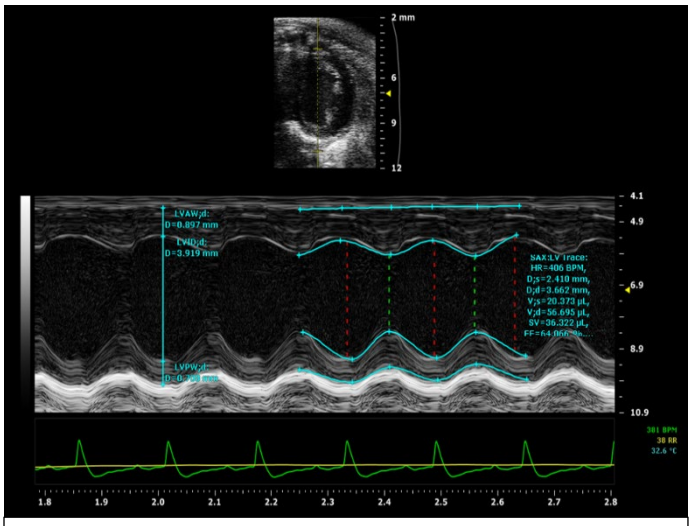
- ✓ Cardiovascular imaging (heart function, vascular studies)
- ✓ Abdominal organ imaging and disease models

Rabbit

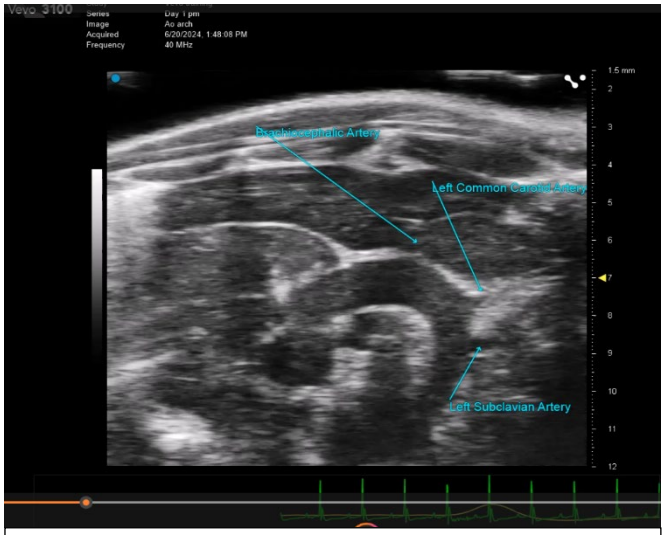
- ✓ Cardiovascular imaging, including structural and functional heart assessment

Key Research Applications

- **Cardiovascular Imaging – Aortic Arch and heart**
  - ✓ Assess cardiac function (e.g., ejection fraction, wall motion)
  - ✓ Transverse aortic constriction (TAC) models
  - ✓ Study atherosclerosis (e.g., plaque imaging in arteries)
  - ✓ AO- to view aortic insufficiency models, or assessment of aortic valve prolapse
- **Cancer research: Tumor detection and volume measurement**
  - ✓ Accurate tumor volume measurement using 2D and 3D imaging
  - ✓ Monitoring tumor vascularization (e.g., Doppler imaging of angiogenesis)
- **Reproductive and Developmental Biology**
  - ✓ Embryo imaging in utero (especially in transgenic models)
- **Drug efficacy/toxicity studies**
  - ✓ Non-invasive, longitudinal monitoring of cardiac, renal, and hepatic function
  - ✓ Detection of cardiotoxicity (e.g., changes in EF or wall motion)
  - ✓ Evaluation of therapeutic response in disease models
- **Kidney/liver disease models**
  - ✓ Structural assessment of kidney cortex and medulla
  - ✓ Renal blood flow measurement using Doppler imaging
  - ✓ Liver morphology and fibrosis-related structural changes
  - ✓ Portal and hepatic blood flow evaluation



M-Mode Imaging of SAX (Short-Axis View)



B-Mode Imaging of Aortic Arch

Parasternal Long Axis (PSLAX)

The FUJIFILM VisualSonics Inc. Vevo LAB software is available for image analysis. DLARIC provides access to this licensed software through a borrowable dongle.

Below is List of Analytical Measurements – Measurement | Mode | View

- √ Area (d/s)(mm2) | B-mode | PSLAX
- √ HR (bpm) | B-mode, M-mode | PSLAX, PSAX
- √ Volume (d/s)(µL) | B-mode, M-mode | PSLAX, PSAX

PSLAX– Parasternal Long Axis

PSAX –Parasternal Short Axis

- √ Stroke Volume (µL) | B-mode, M-mode | PSLAX, PSAX
- √ Ejection Fraction (%) | B-mode, M-mode | PSLAX, PSAX
- √ Fractional Shortening (%) | B-mode, M-mode | PSLAX, PSAX
- √ Cardiac Output (mL/min) | B-mode, M-mode | PSLAX, PSAX
- √ Left Ventricle Mass (mg) | M-mode |PSAX
- √ Left Ventricle Anterior Wall (d/s)(mm)| M-mode |PSAX
- √ Left Ventricle Posterior Wall (d/s)(mm)| M-mode |PSAX
- √ Transmitral flow | Pulse Wave Doppler |Apical 4 Chamber
- √ Mistral Valve Flow | Color Power Doppler | Apical 4 Chamber
- √ Transaortic Contriction | Pulse Wave Doppler | Aortic Arch
- √ Right Ventricle Wall | M-mode | Right Ventricle
- √ HR (bpm) | B-mode, M-mode | PSLAX, PSAX
- √ Volume (d/s)(µL) | B-mode, M-mode | PSLAX, PSAX
- √ Stroke Volume (µL) | B-mode, M-mode | PSLAX, PSAX
- √ Ejection Fraction (%) | B-mode, M-mode | PSLAX, PSAX
- √ Fractional Shortening (%) | B-mode, M-mode | PSLAX, PSAX
- √ Cardiac Output (mL/min) | B-mode, M-mode | PSLAX, PSAX
- √ Left Ventricle Mass (mg) | M-mode |PSAX
- √ Left Ventricle Anterior Wall (d/s)(mm)| M-mode |PSAX
- √ Left Ventricle Posterior Wall (d/s)(mm)| M-mode |PSAX

List of publications and preprints that have used the vevo 3100 imaging system at the DLARIC

Evans, W. S., Liu, Y., Canellas Da Silva, M. C., Li, H. Z., Prior, S. J., & Kuzmiak-Glancy, S. (2025). Moderate chronic aortic constriction induces modest, sex-specific effects on rat hearts and skeletal muscle. *Current research in physiology*, *8*, 100153. https://doi.org/10.1016/j.crphys.2025.100153