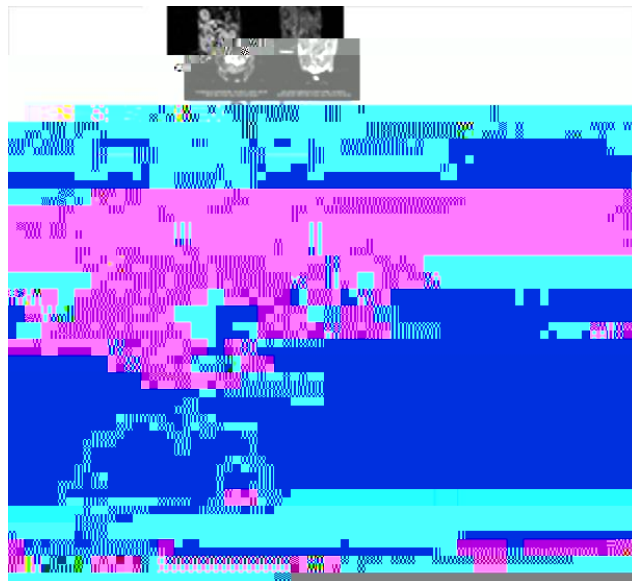




- Location:** University
- Responsibility:** Principal Investigators (PI), Research Staff, Veterinary Staff
- Purpose:** The purpose of this Standard Operating Procedure (SOP) is to describe basic cardiac and reproductive ultrasound processes for rodents.

1. **Introduction and Definitions:** refers to sound waves with a frequency too high for humans to hear. In general, ultrasound used clinically is in the range 1-18 MHz; however, rodent machines operate at a much higher frequency to get far better resolution (typically 40-70MHz). Ultrasound images (sonograms) are made by sending a pulse of ultrasound into tissue using an ultrasound transducer. The sound waves hit a boundary between tissues (e.g. between fluid and soft tissue, soft tissue and bone) and are reflected back to the probe and relayed on to the machine, or travel further until they reach another boundary and get reflected. The machine calculates the distance from the probe to the tissue or organ (boundaries) using the speed of sound in tissue (5,005 ft/s or 1,540 m/s) and the time of the each echo's return (usually on the order of millionths of a second). The machine displays the distances and intensities of the echoes on the screen, forming a two dimensional image. Many different types of images can be formed using ultrasound. The most well-known type is a B-mode image, which displays the acoustic impedance of a two-dimensional cross-section of tissue. Other types of images can display blood flow, motion of tissue over time, the location of blood, the presence of specific molecules, the stiffness of tissue, or the anatomy of a three-dimensional region. Compared to other prominent methods of medical imaging, ultrasonography has several advantages that include: 1) the ability to observe structures without the use of radiation; 2) the acquisition of images in real-time (rather than after an acquisition or processing delay); 3) portable imaging instruments; and 4) lower costs versus other common imaging techniques.



## **2. Materials:**

**Mouse heart rate**  
**Mouse resting**

325-780bpm **MEAN=470bpm**

**CONCERN = +/- 10%**

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