

Frequently Asked Questions

Preclinical Ultrasound for Small Animal Research M-Mode and Doppler – PuSAR MD

1. What is PuSAR MD For?

PuSAR MD is a specialized cardiovascular and hemodynamic monitoring system that measures blood flow metrics and vascular health, such as:

- **Biofluid Dynamics:** Assesses blood movement through vessels.
- **Blood Profiles:** Measures blood flow volumes and speeds.
- **Vascular Insights:** Quantifies vessel size and stiffness.
- **Organ Perfusion:** Measures blood flow to major organs simply.

This allows researchers to find early signs of vascular and organ disease, study the mechanisms in-depth and to test new treatments.

2. What type of imaging can be performed?

PuSAR MD uses the Doppler effect – the change in frequency of a sound wave in relation to an observer who is moving relative to the wave source. How the sound waves change pitch when they bounce off moving blood provides real-time details on how fast, in which direction, volumes and important timing metrics.

3. Will this procedure expose my experimental animals to any radiation, tissue damage, and are there any side effects during the scan?

No, PuSAR MD is completely noninvasive by utilizing ultrasound-based technology, meaning it relies on high-frequency sound waves rather than ionizing radiation (like X-rays) or strong magnetic fields. This non-invasive approach eliminates animal exposure to radiation, making safe, repetitive, and longitudinal imaging highly practical for monitoring physiological changes over time.

4. Do I need to shave the animal, or use chemical depilatory creams, such as Nair/Veet, to prevent signal artifact usually seen in ultrasound?

No, the small probes allow us to simply part the hair and add acoustic coupling like water to the skin. This eliminates the need to shave or use harsh chemical depilatories, thereby keeping the animal's skin completely irritation-free.

5. What components make up the PuSAR MD system?

- **Integrated Transceiver and Digitizer** – modifies acoustic wave properties, converts raw analog signals, and transforms the data into informational spectrograms.
- **Handheld probes** – the unique, pencil-sized probe allows for precise angling, such as in between ribs, to properly align with vessels to deliver highly accurate, uncorrected data.
- **Automated analysis interface** – optimized algorithms for multiple use cases, such as vessel elasticity, perfusion changes, and cardiac metrics, to allow for quick, accurate analysis of full data sets rather than the usual 4 -5 manual technical analysis usually performed in ultrasound datasets.

6. What if I already have an ultrasound system?

PuSAR MD is engineered specifically for hemodynamic data acquisition - each component within the system was purposely designed to achieve the most precise blood flow patterns with researcher ease as a top priority, of highlight:

Advanced Electronics – building on over 30 years of engineered technology, the PuSAR MD contains specialized Doppler processing, signal conditioning,

and spectral display modules each designed to optimize preclinical cardiovascular and vascular blood flow analysis.

- **Less Chance of Artifacts:** eliminates standard ultrasound aliasing and signal wrapping by significantly expanding the velocity ceiling to accurately quantify blood flow up to 770 cm/sec, compared to the typical 200–250 cm/sec limit. This high-velocity processing ensures clean, artifact-free spectral waveforms for enhanced preclinical cardiovascular data.
- **Multi-Channel Waveform Integration:** Houses distinct inputs and outputs for simultaneous multi-site vascular and real-time channel tracking.

Probe Design - Unlike standard ultrasound systems that rely on bulky transducers and angle corrections, PulSAR MD features a pencil-sized probe that allows for optimal insonation angles, allowing for easier acquisition and more accurate, uncorrected velocity assessments.

- **Dual Probe Acquisition:** allowing researchers to acquire simultaneous measurements of multiple sites for accurate transmit times.
- **Noninvasive and Surgical Options:** Handheld probes are completely noninvasive, but if wanting longer term imaging, silicone cuff probes that wrap around the vessel directly can be utilized.

7. Can the system accommodate different animal models other than mice and rats?

Yes, the PulSAR MD accommodates a wide variety of animal models—including guinea pigs, naked mole rats, zebrafish, giant danio, pigs, cats, and dogs. Because hemodynamic principles are conserved across most species, the research remains highly translatable between species and human applications.

8. How are the animal's body temperature and heart rate monitored during recording?

The PulSAR MD is specifically designed to handle broader datasets by integrating both hemodynamic and animal vital signals. The Rodent Surgical Monitoring system, a heated platform that monitors ECG, respiration, core body temperature, oxygen saturation and pressures (ventricular and blood pressure) can easily integrate into the PulSAR MD to give more comprehensive datasets.

If you have any questions on which method best meets your research needs, feel free to contact us to discuss your model. We have many resources available, from scientist webinars to journal citations, to help point you in the right direction.

To learn more visit our website (www.scintica.com) or feel free to reach out to us via email at info@scintica.com or by phone at 832-548-0895 and we would be glad to assist you.