

## Advanced cardiovascular monitoring for dogs under anesthesia

### Purpose

To test whether using advanced cardiac monitoring techniques provides a more accurate measurement of cardiac output and helps clinicians better determine when anesthetized dogs need more cardiovascular support to maintain a healthy cardiac output.

### Background

When dogs are anesthetized for surgeries and other procedures, veterinarians typically measure the patient's blood pressure to determine if the patient's heart is pumping blood at a healthy rate. If the patient's blood pressure falls too low, this lets us know that additional fluids or medications may be needed. However, control of blood pressure is affected by various factors. Another important way to know if blood is reaching tissues and organs and providing appropriate oxygen to the organs is by measuring cardiac output. Blood pressure doesn't always accurately correlate with cardiac output. So, direct measurement of cardiac output gives a more accurate picture of the blood flow in the body during anesthesia.

In this study, we will be monitoring cardiac output using advanced techniques that have been validated in humans, and have shown to enhance patient care and improve outcome in anesthetized human patients. We also hope that using a more accurate measurement of cardiac output may help clinicians make better determinations about when anesthetized dogs may need more cardiovascular support to maintain a healthy cardiac output.

This study is funded by the Veterinary Memorial Fund.

### Eligibility

- Dogs weighing  $\geq 10$  kg / 22lbs.
- Dogs who will be monitored using invasive arterial blood pressure monitoring and will need mechanical ventilation during a procedure
- Dogs who suffer from spontaneous hypotension at any point during general anesthesia for the procedure

### Exclusion Criteria

- Dogs with cardiopulmonary abnormalities

### Study Design

While your dog is anesthetized as part of a routine hospital procedure, such as an orthopedic surgery, we will use advanced non-invasive cardiac output monitoring in addition to the standard anesthetic monitoring such as ECG, blood pressure, temperature, oxygenation and ventilation recordings. We will closely monitor all these variables as well as cardiac output measurements from the start to the end of anesthesia.

If the anesthetized patient develops low blood pressure, a common complication in dogs under anesthesia, we will instantly use standard interventions to raise the blood pressure back to a normal level. We will also use a passive leg raise maneuver that is common in human medicine to test the patient's response to these interventions. We will be recording the cardiac output measurements throughout. After collection of the data from enrolled dogs, we will be correlating cardiac output values with blood pressure measurements to better understand how we can improve or best maintain the patient's circulatory function under anesthesia.

### Compensation

There is no compensation for participating in this study and no additional cost for participating dogs. We hope that the results of the study will largely benefit quality of patient care and anesthetic management in future canine patients who are undergoing anesthesia.

### Contact

Dr. Vaidehi V. Paranjape, Anesthesia  
[vparanjape@vt.edu](mailto:vparanjape@vt.edu)

Mindy Quigley, Clinical Trials Coordinator  
Office Phone: (540) 231-1363 | Email: [mindyq@vt.edu](mailto:mindyq@vt.edu)

If your query is urgent, please call the Small Animal Hospital on (540) 231-4621.