

## ULTRASOUND

The ultrasound machine is one of the most widely used imaging tools in medicine, second only to radiographs (x-rays). It allows us to look at the insides of organs, such as the heart, liver or urinary bladder, without an incision. It is safe and economical, and has greatly reduced the need for contrast radiography. Unlike with x-rays, no ionizing radiation is produced by the ultrasound machine. Another name for ultrasound is a sonogram. An echocardiogram, in which the sound waves are reflected off the heart, is another type of ultrasound study. The ultrasound machine is commonly used to diagnose pregnancy in both people and animals.

An ultrasound machine transmits sound waves, at a much higher frequency than we can hear with our ears. The sound waves reflect back in greater or lesser amount depending on the density of the material they hit. The reflected sound waves that bounce back are picked up by a receiver. A computer analyzes the time delay and amplitude of the returning echo and forms an image on a screen. The depth of a structure producing an echo is determined by the amount of “round trip” time of the transmitted pulse of sound and the returning echo. Fluid and tissues reflect sound the best. Air or gas and bones prevent the transmission of the sound wave.

Pulses of sound and the images produced are updated approximately 30 times a second, so an ultrasound allows us to see an image of the heart contracting or a baby moving, just like viewing a movie that consists of thousands of individual images. A single image can be selected, stored and printed as a photograph, or the entire movie can be recorded on videotape or computer.

With the ultrasound machine we can measure the ability of the heart to contract, gauge the thickness of the bladder or intestinal walls, detect bladder stones, gallstones or fluid pockets, such as in the uterus with pregnancy or a cyst in a kidney. Guided by the ultrasound image, a doctor can direct a needle into a specific organ, a tumor or a nodule and obtain a tissue or fluid sample for analysis. This allows us to obtain small tissue samples from the liver, spleen or other organs without the need for invasive surgery. Because needle biopsy samples are small they are not always diagnostic, but they are a safer alternative for some pets than more major biopsy procedures in which a larger sample can be obtained.

Most pets will need to be shaved for the ultrasound procedure – since air doesn’t transmit ultrasound waves, the air trapped in the fur deflects the wave and makes the ultrasound ineffective. Gel is applied between the pet and the transducer, which transmits the sound waves and detects them bouncing back again, to further block out air between it and the patient. For pets that mind the clippers, sedation may be needed.

Depending on the pet and the procedure needed, performing the ultrasound exam itself may require sedation or anesthesia. Some pets find being restrained in one position for 15 minutes or more to be stressful or frightening. Small incisions will need to be made to obtain biopsy samples guided by the ultrasound machine, so anesthesia is almost always required for these. Procedures rarely requiring a sedative include scanning for pregnancy, echocardiograms and routine abdominal ultrasound.

The ultrasound scan itself is very safe. Biopsies carry some risk of bleeding, perforation or the spread of an existing infection. Your veterinarian can discuss the risks for your particular pet before the procedure.

The cost of an ultrasound scan varies tremendously depending on how long it will take and what procedures are being done. The ultrasound machine itself may cost anywhere from a few thousand to \$100,000. The price of the scan will cover not only the doctor's time but the cost of this expensive equipment.