Guide to Small Animal

**Reproductive Imaging**
using the Vevo 770™

**Course Objectives:**

After completion of this module, the participant will be able to accomplish the following:

- Recognize reproductive female and male reproductive organs in mice,
- Position micro-ultrasound RMV scanhead to acquire the necessary views, and
- Discuss the physiological functions and relevance to *In vivo* imaging.
I. OVARIES

**Location:** The ovaries of the mouse lie close to the inferior pole of the kidneys and adhere to the posterior wall of the abdomen. To visualize the ovaries, go transverse on the kidney, and move toward the feet (caudally), on the lateral edge of the kidney.

The ovary sits in a fat pad, which appears bright in the image. The ovaries are small bilateral spherical organs with smooth surfaces. During sexual maturity, the ovaries assume a nodular aspect with cystic areas. This is due to the presence of follicles. The ovary is an endocrine gland and has the fundamental function of producing oocytes that, once expelled, pass into the uterus through the oviducts and are fertilized.

**Scanhead position:** Ovaries may be imaged in a sagittal plane by rotating the scanhead 90 degrees. Remember there may be a bowel loop, giving off a shadow that may affect the visualization.

*Figure 1: B-Mode image of the left ovary using the Vevo 770 and the RMV 704 with a center frequency of 40MHz.*
II. UTERUS:

Location: The uterus is formed by a tubular median part (body of the uterus) and two lateral formations (lateral horns). The caudal part of the uterus body is called the neck. The uterus runs upwards along the right and left sides of the abdomen of the mouse to the level of the ovaries, which are at the lower border of the kidneys.

Scanhead position: When the mouse is not pregnant, it is difficult to locate the uterus and follow it in its entirety, because it shares space in the abdominal cavity with the intestines and is mostly obscured by them.

However, when the uterus is gravid (pregnant), you are able to follow each separate horn and identify the embryos. Begin to do this by locating the bladder of the mouse which is slightly to the right of midline. On either side of the bladder a uterine horn is visible. The horns form a "Y" pattern around the bladder and extend up to the right and left side of the mouse up to the ovaries.

When several embryos are present, it can be difficult to follow the horn. With practice, you will be able to accomplish imaging of each embryo along the horn.

III. MAMMARY GLANDS

Location: In the mouse there are 5 areas of mammary tissues:

1) Cervical
2) Thoracic (x2)
3) Abdominal
4) Inguinal

The mammary glands are glandular tissue and are formed by a system of lobules and excretory ducts. When the tissue is completely developed, it is extended through nearly all the subcutaneous region. The most frequent lesions of the mammary glands are tumors. Benign or malignant tumors that originate from the duct epithelia are Adenomas and Adenocarcinomas. Their appearance can be cystic or hemorrhagic, with diameters from a few millimeters to centimeters. The least frequent tumors are those with a connective tissue origin, called Fibromas or Fibrosarcomas, which are more invasive and often ulcerate at the skin surface.
VI. PROSTATE GLAND

Location: The prostate gland in the male mouse consists of both a ventral and a dorsal portion. A large portion of the gland sits behind the bladder.

Scanhead position: To visualize the prostate gland, position the scanhead with the notch toward the mouse’s head and angle the scanhead toward the mouse’s head.

Once the bladder has been located, (which appears black) a hypoechoic (gray) gland behind the bladder will be visible - this is the prostate gland. As an alternate method, the gland may be visualized in transverse by rotating the scanhead 90 degrees, and keeping the angle going up towards the head of the mouse.

Figure 4: B Mode image of the bladder and the prostate using the Vevo 770 and the RMV 707B at a center frequency of 30MHz
V. VESICULAR GLANDS

**Location:** The Vesicular glands are located in the pelvis of the male mouse and are much more obvious than the prostate. Often, these glands are mistaken for the prostate. The glands are large and lobulated and are located slightly above the prostate. There are two bilateral structures that communicate with the urethra and are formed from numerous small secretion filled cavities.

![B-Mode image of the bladder and vesicular glands using the Vevo 770 with the 707B RMV with a center frequency of 30MHz.](image)

**Figure 6:** B-Mode image of the bladder and vesicular glands using the Vevo 770 with the 707B RMV with a center frequency of **30MHz**.
VI. TESTICLES:

**Location:** The testicles are located in the pelvic cavity of the mouse. If the mouse is in heat, the testicles will be more obvious. Alternately, you will have to identify the testicles by scanning the pelvis of the mouse. The organs have a smooth texture and are hypoechoic (gray). The two organs are of oval shape with a diameter of a few millimeters, and are situated at the side of the bladder. Both organs should be identified to confirm that the testicles are in fact the organs being imaged. The testes consist of numerous tubules and their main function is the production of mature sexual cells or spermatozoa, as well as the sexual hormones or androgens. At the top of the testicle, the epididymal head and the epididymis, run laterally along the length of the testicle to the distal portion of the testes. It carries the spermatozoa produced from the testes into the urethra.

![B-Mode image of the testicle using the Vevo 770 with the RMV 704 with a center frequency of 40MHz.](image)

**Figure 7:** *B-Mode image of the testicle using the Vevo 770 with the RMV 704 with a center frequency of 40MHz.*

Within the testicle there are linear structures that appear darker than the tissue of the testicles, known as the seminiferous tubules.
**Figure 8:** B-Mode image of the seminiferous tubules in a testicle using the Vevo 770 and the RMV 708 with a center frequency of 55MHz.
VII. EPIDIDYMIS

**Location:** The epididymis sits on top of the testicle and runs laterally along the length of the testicle. It consists of a head and a tail.

*Figure 9: B Mode image of the epididymis using the Vevo 770 and the RMV 704 with a center frequency of 40MHz.*
Figure 10: B Mode image of the epididymis using the Vevo 770 and the RMV 704 with a center frequency of 40MHz.

For more information or assistance with any imaging procedures, please contact VisualSonics at: support@visualsonics.com