Ultrasound for Small Animal Imaging

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ABSTRACT

To obtain anatomical images that allow for measurement of structural changes in physiology, using Vevo 770,or Vevo 2100 Visual Sonics Integrated Rail System, which includes rat/mouse handling platform.

EXTERNAL LINK

https://www.visualsonics.com

PROTOCOL STATUS

Working

MATERIALS TEXT

1. Vevo 770,or Vevo 2100 Visual Sonics Integrated Rail System, includes rat/mouse handling platform.
2. Indus Instruments, Temperature and heart rate monitoring system
3. Vevo Compact Anesthesia System; Includes 2-liter induction chamber and acitvated charcoal filters for exhaust absorption.
4. Charcoal filters VaporGuard ™ (VetEquip inhalation Anesthesia systems) #931401.
5. Physiological Controller; monitors animal's physiolocal parameters such as ECG, heart rate and respiration via electrode pads.
6. Sigma gel (electrode conducting gel), Parker Laboratoies Inc.
7. Warming plate, connected to the controller, which is computer operated. ECG, Heart rate, temperature and respiration are monitored throughout the course of experiment and visually displayed on screen.
8. Rectal probe for body temperature.
9. T-SprayII™, Disinfectant cleaner for Ultrasound scanheads (virucide, bactericide, fungicide).
10. Muko, Lubricating jelly for rectal probe.
11. Thermasonic gel warmer.
12. Aquasol ultrasound gel (water soluble), Parker Laboratoies Inc.
13. Vevo 770 and Vevo 2100 scanheads (transducers).
14. Visualsonics High Resolution Imaging system, includes LCD monitor with remote keypad.
15. Imaging system calculates parameters measured and reports in CSV file. All images are retained and archived for later viewing and subsequent analysis. Each report incudes:Study name, Aquired by, Date,Time of Echo, User name, ID# of animal, Color, Strain, Source, Body weight, Type, Date of birth, Heart rate, Body Temperature, Sex.
16. Weigh scale for body weight recordings.

Additional material:
A. Isoflurane/Oxygen (1.0-2.0 % mixture) inc. Vaporizer, induction chamber, nose cone/mask.
B. Tear Gel, lubricating eye gel, (Novartis –opthalmic liquid gel).
C. Cottontip applicator (Puritan 6").
D. Gauze pads (2x2), and (4x4) for cleaning of skin.
E. Electric animal shaver, shave area of examination.
F. Depilatory cream, for finer removal of hair.
G. DDW, for skin rinse and also for filling of mechanical transducers.
H. 3M™- Transpore tape, for securing to warm plate for ECG monitoring.
I. Virkon disinfectant for counter cleanup. T-SprayII™for Scanhead cleaning.

SAFETY WARNINGS

1. Personal Protective equipment- ie. Gloves, lab coat.

2. Exposure to anaesthetic gases (Isoflurane). Use a Fumehood and filters to scavenge any excess gases.
3. Check exhaust system before beginning, weigh charcoal filters and check expiration date.
4. Animal bites or scratches – use proper handling techniques.

BEFORE STARTING

Need institutional ethics in order to undertake this procedure.

1 A. Specific details (eg. weight, DOB, sex, strain) of animal used for experiments are recorded on each report.
B. Animal Anesthesia: Place the animal in the induction chamber and set oxygen level to 1-1.5L/minute and the Isoflurane to 1% followed with increamental increases of 0.5 % to 3.0 % to induce total anesthesia for knockdown. (As indicated by pedal response)
C. Re-direct the Isoflurane (anesthesia) through the hose to the mask and reset the Isoflurane level for maintenance to 1.5-2.0 % for obese animals, 1.0-1.5% for lean. Animal is immobilized during the course of the experiment with light anesthesia. Level of anesthesia is determined via pedal response.
D. The animal is moved to the animal handling platform with the snout in the anaesthesia mask.
E. Carefully place a small amount of corneal lubricant to each eye with the sterile cotton tip applicator.
Place a drop of gel onto each ECG connector on the handling platform and contact pads with the dermatological 3M tape.
F. The ECG threshold control is used to adjust the display of ECG and heart rate, respiration on screen.
G. Shave the area of interest then apply depilatory cream to remove the hair from the animal.
H. Remove the cream after 1 minute. Ensure all the cream is removed with a water wash and pat dry.
I. Use the gel warmer to heat the gel to 37°C, so the animal's temperature will not drop when the gel is placed on the skin.
J. Place warmed ultrasound gel on the area of interest.
K. Clean and disinfect the rectal probe and cover with lubricating gel. Advance temp probe slowly 3-5mm into the rectum and secure with the 3M tape.
L. Attach the Scanhead to the rail system and mount above the animal. (Vevo™ Integrated Rail System II Operator Manual, 4099A Katz).
M. The animal handling platform and the Scanhead are moved to attain the correct position needed for viewing area of interest.
N. Observe the Vevo monitor as you use the controls to bring the area of interest into view. (Vevo™ 770 High Resolution Imaging system Operator manual, 4099A Katz).
O. An imaging session takes 10-30 minutes, depending on required views, for a complete procedure.
P. Physiological parameters are recorded with the images during the course of the experiment, so the animal is closely monitored throughout.
Q. Remove the Ultrasound gel from the animal. Clean the shaved area with a warm damp gauze then pat area dry.
R. Carefully remove the temperature probe and tape that is securing the animal to the platform.
S. Turn off the anaesthetic and remove the nose from the mask.
T. Weigh the animal on scale and record.
U . Place the animal in an incubation chamber with O2 until complete recovery is obtained as indicated by righting reflex and ability to eat, drink and walk. (takes approx. 1-3 min).
V. Clean Scanheads and ECG platform with the T-Spray disinfectant.
W. Clean box, fume-hood surface, counter and weigh scales with Virkon solution and rinse with water after 10 minutes.
X. Place animal into home cage after complete recovery.

2