






HAZARD MANAGEMENT – SAFE OPERATING PROCEDURE (SOP)

Only to be completed where required as a control measure under a Risk Assessment

NAME OF THE TASK/ACTIVITY	VEVO 3100 ULTRASOUND PRECLINICAL IMAGING	DATE: 24/02/2020
LOCATION	ADELAIDE MICROSCOPY, AHMS LEVEL 6	Insert photo (Optional)
RISK ASSESSMENT (RA) NAME	Vevo 3100 Ultrasound Preclinical Imaging (FUJIFILM/VISUALSONICS)	
Residual risk rating on the RA	<input checked="" type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> Very High	
Hazards identified on the RA	Contact with animals Contact with electricity or potential for electric shock	
PERSONAL PROTECTIVE EQUIPMENT		
	Eye protection: <input checked="" type="checkbox"/> Safety glasses <input type="checkbox"/> Eye shields <input type="checkbox"/> Safety goggles <input type="checkbox"/> Other:	
	Face protection: <input type="checkbox"/> Dust goggles <input type="checkbox"/> Face shield <input type="checkbox"/> Visor <input checked="" type="checkbox"/> Face mask <input type="checkbox"/> Dust mask <input type="checkbox"/> Other:	
	Hand protection: <input type="checkbox"/> Rubber <input type="checkbox"/> Cut resistant <input type="checkbox"/> Leather <input type="checkbox"/> Vinyl <input type="checkbox"/> Neoprene <input checked="" type="checkbox"/> Nitrile <input type="checkbox"/> Barrier creams <input type="checkbox"/> Other:	
	<input checked="" type="checkbox"/> Enclosed footwear: <input type="checkbox"/> Footwear that is resistant to spills of hazardous substances <input type="checkbox"/> Boots with steel caps <input type="checkbox"/> Other:	
	Protective clothing: <input type="checkbox"/> Lab coat <input checked="" type="checkbox"/> Gown <input type="checkbox"/> Long sleeves <input type="checkbox"/> Long pants <input type="checkbox"/> High visibility <input type="checkbox"/> Helmet <input type="checkbox"/> Sun protection <input type="checkbox"/> Other:	
DESCRIBE, IN SEQUENCE, STEPS TO COMPLETE THE ACTIVITY SAFELY		
Pre-operational checks		
YOU MUST NOT USE THIS MACHINE UNTIL YOU HAVE HAD APPROPRIATE TRAINING BY TRAINED ADELAIDE MICROSCOPY STAFF. Unauthorised use may result in damage to the instrument.		
Operational checks/steps to complete the activity from start to finish (including transport and waste disposal where relevant)		
General		
The Vevo 3100 Ultrasound Preclinical Imager (FUJIFILM/VISUALSONICS) is an animal ultrasound, which is used to see internal body structures such as tendons, muscles, joints, blood vessels, and internal organs. Its aim is often to find a source of a disease or to exclude any pathology.		
All new users must have undergone training in the operation of the machine from a member of Adelaide Microscopy staff. Users should operate the instrument in accordance with the manufacturer supplied operating instructions to avoid damage to the instrument. Users must read and acknowledge the safe operating procedures and PC2 certification requirements appropriate to the Vevo 3100 Ultrasound.		
Equipment peripheral to the system (in particular the anaesthetic machine and the biological safety cabinet) must be operated in accordance with the safe operating procedures relevant to this equipment.		
Handling of biological material may present some safety problems and the safe operating procedure for handling animals and biological material must be followed. The safe handling of general laboratory items is detailed in the Adelaide Microscopy laboratory general safety procedures. Low stocks of consumable items (gloves, paper towel, etc.) should be reported to a member of AM staff.		
Hazards		
Contact with electricity or potential for electric shock Contact with animals		
Risk Control Measures		
<u>Personal Protective Equipment:</u>		
The Vevo 3100 Ultrasound is located in a PC2 facility so PPE including Gown, Enclosed Footwear and Safety Glasses must be worn at all times. An induction into the PC2 facility by Adelaide Microscopy staff is required before access into the facility is granted.		

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Engineering Controls:

The user operable parts on the Vevo 3100 Ultrasound are all accessible from the front of the instrument, and include the sample loading tray, and the computer (switch, mouse and keyboard). There is no risk involved in the operation of these parts. However, misuse of these parts can result in damage to the instrument. Users of the instrument should not remove any fixture or panel from the scanner or access the rear of the instrument.

There are no operator adjustable parts on the Vevo 3100 Ultrasound and all instrument control is via a computer interface. This interface does not pose any safety problems but must be operated in accordance with the manufacturer supplied operating instructions to avoid damage to the instrument.

Procedural Controls:

Adelaide Microscopy has a designated Radiation Officer who holds a Radiation license from the EPA.

All new users must have a practical demonstration of the operation of the machine from a member of Adelaide Microscopy staff. Users should operate the instrument in accordance with the manufacturer supplied operating instructions to avoid damage to the instrument.

The user operable parts are all accessible from the operator's console; users of the instrument should not attempt to remove any fixture or panel from the instrument.

The Vevo 3100 Ultrasound is located in a PC2 facility and all users must undergo a PC2 induction prior to access.

Handling of biological material may present some safety problems and the safe operating procedure for handling animals and biological material must be followed.

The safe handling of general laboratory items is detailed in the Adelaide Microscopy laboratory general safety procedures.

Low stocks of consumable items (gloves, paper towel etc.) should be reported to a member of AM staff.

General Procedures:

Anaesthesia:

1. Animals will be anaesthetized with isoflurane (in an anaesthetic chamber) and placed in the machine where isoflurane anaesthesia is maintained via nose cone. For studies that require imaging of the face, mice will be injected with anaesthetic prior to placement into the machine.
2. Following the imaging session, animals are returned to their home cage and observed until they are able to move about the cage. Animals that display clinical signs of illness which place them at risk for anaesthetic death, will not be imaged.
3. Active anaesthetic scavenging will be employed to minimize personnel exposure to anaesthetic gases.

Biocontainment Procedure:

The PC2 lab is a common use area where there is potential for animals to become infected with pathogenic agents. The following procedures will be followed to prevent the dissemination of infectious agents.

1. Only Biosafety Level 2 pathogens or lower will be permitted in this facility.
2. All animals will be handled using Animal Handling Procedures.
3. Work surfaces and equipment (counter tops, imaging chamber, nose cones, anaesthetic equipment) inside and outside the machine will be disinfected before **and** after each imaging session using F10 solution followed by 70% ethanol/ 30% water solution which is provided.
4. Biohazardous waste will be placed in a biohazard container located within the room.
5. Any spills will be handled as potentially biohazardous.
6. All personnel involved with the animals will be gloved, and wear laboratory coats which will be laundered or replaced on a weekly basis.

Vevo 3100 Ultrasound Procedure:

1. Each person using the ultrasound imaging system must be specifically trained and authorized to use the equipment by an AM staff member.
2. Users must wear a lab coat and rubber gloves while working with animals.
3. Animals must be transported to and from animal rooms in suitable covered cages.

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4. Animals will be returned to their home cage or a separate enclosed container and observed continuously during recovery from anaesthesia.
5. All surfaces and equipment (counter tops, the biosafety cabinet, imaging chamber, nose cones, dividers and anaesthetic equipment) must be disinfected before AND after each imaging session using F10 solution followed by 70%ethanol – 30% water solution.
6. Dispose of contaminated biohazardous materials in the biohazard container located within the room.
7. Wash hands after handling animals.
8. Personnel may not eat, drink or store food intended for human consumption in this area.

Materials

- Personal protective equipment, i.e. gloves and lab coat
- Isoflurane/oxygen or air (1.0-2.0% mixture), vaporizer, induction chamber, nose cone/mask
- Tear gel, lubricating eye gel (Novartis, ophthalmic liquid gel)
- Cottontip applicator (Puritan 6")
- Gauze pads (2x2 and 4x4), for cleaning of skin
- Clippers, for shaving area of examination
- Depilatory cream, for fine hair removal
- ddH2O, for washing of skin and filling of mechanical probes
- 3MTM Transpore tape, for securing animal to warming plate for echo analysis and ECG pads
- Sigma gel (electrode conducting gel)
- T-SprayITM, disinfectant cleaner for ultrasound (viricide, bactericide, fungicide)
- Muko lubricating jelly for rectal probe
- Aquasol ultrasound gel (water soluble)

Equipment

- Vevo 3100 (Fujifilm/Visualsonics) integrated rail system, includes rat and mouse handling platforms
- Operator manual
- Indus Instruments, temperature and heart rate monitoring system
- Vevo Compact Anaesthesia system, includes 2 litre induction chamber and activated charcoal filters for absorption and monitoring badge for inhalants
- Charcoal filters
- Physiological controller, connects to the platform which monitors the animals' ECG via ECG electrode pads, heart rate and respiration
- Warming plate, which connects to the controller, computer operated and includes ECG electrodes, heart rate measurements and respiration detection throughout the course of the experiment and visually displayed upon screen with echo image
- Heating lamp
- Rectal probe for body temperature, monitoring throughout the course of the experiment and visually displayed
- Thermasonic gel warmer
- Scanheads for the Vevo 3100 (Real time microvisualizaton)
- Visualsonics High Resolution Imaging system, includes 15" LCD monitor with remote keypad
- Fumehood
- Weigh scale

DETAILED STEP-BY-STEP PROCEDURES

System preparation

- Start Vevo 3100 system
- Turn on vital signs monitoring system
- Preheat handling platform and heating lamp
- Remove bubbles and preheat ultrasound gel
- Turn on fume hood
- Set anesthesia machine up, verify tubing connection, weigh/replace carbon filters, open medical gas cylinders, fill anesthesia machine with anesthetic agent (if required)
- Record animal details, i.e. weight, d.o.b, sex, strain

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- Anaesthetize animal according to SOP Anesthesia Machine

Animal preparation

- Place a small amount of corneal lubricant to each eye with a sterile cotton tip applicator
- Place a drop of gel onto each ECG connector on the handling platform and contact animal pads with dermatological 3M tape
- Adjust display of ECG, heart rate and respiration on screen using the ECG threshold control
- Shave the area of interest (rat)
- Apply the depilatory cream onto the area of interest to remove hair from the animal (rat or mouse)
- Remove the cream after 2-3 mins
- Ensure all cream is removed with a water wash with dampened gauze (depilatory cream is a skin irritant)
- Clean and disinfect the rectal probe and cover with lubricating gel, slowly insert into the rectum and secure with 3M tape
- Heat thermasonic gel to 37°C using the gel warmer
- Place gel on area of interest

Ultrasound biomicroscopy

- Attach the scanhead to the rail system and mount above the animal
- Move handling platform and scanhead to attain the correct position needed for viewing the area of interest
- Observe the Vevo monitor as you use the controls to bring the area of interest into view
- If exposing rat to varying oxygen concentrations adjust mixer to desired concentration (21-8%)
- Confirm % is correct using oxygen monitoring software, it may need to be adjusted slightly to compensated for the anesthetic
- Only expose the rat acutely to limit any stress, animals can be kept at low oxygen concentrations for 2min or less (8%), medium oxygen concentrations for up to 15min (11%, 15%) and higher oxygen concentrations for up to 30min (17%, 21%).
- Measure the oxygen saturation of the placenta, fetus and dam using the Vevo software
- Return the animal to room (21%) oxygen
- Imaging session time will vary depending on the number of views collected, approximately 20-60 minutes for complete procedure
- Closely monitor animal physiological parameters throughout the course of the experiment, adjust anesthetic parameters accordingly

Recovery

- Remove all thermasonic gel from the animal
- Clean shaved area with a warmed damp gauze and pat area dry with dry gauze
- Carefully remove the temperature probe and tape securing the animal to the platform
- Turn off anaesthesia and remove animal nose from the nose cone/mask
- Weigh animal and record
- Place the animal in induction chamber with 100% oxygen until complete recovery (approximately 1-3 mins)
- Return animal to home caging and monitor until complete recovery

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On completion of work – steps to make safe (including clean up, any waste disposal & service/maintenance requirements)

Clean-up

- Clean scanheads and ECG platform with T-Spray disinfectant
- Clean induction chamber, fumehood surface, counter and weigh scales with F10 solution followed by 70% Ethanol/ 30% water solution which is provided.
- Biohazardous waste will be placed in a biohazard container located within the room.
- Any spills will be handled as potentially biohazardous.

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Emergency and Spill Procedures, Transport or storage requirements (where relevant), First aid/Medical

Any spills will be handled as potentially biohazardous and neutralised with 1% hypochlorite solution. Followed through with F10 and 70% ethanol. A spill response kit is located in the corridor within close vicinity of the PC2 labs.

Emergency shower and eye wash are located in the foyer of both PC2 labs.

A First aid kit is located in the corridor within close vicinity of the PC2 lab and First aid officers contact details are on the front.

Prepared by

People involved in the drafting of this SOP	Agatha Labrinidis Aoife McFadden		
Person authorising the SOP	Name:	Angus Netting	Signature
	Position:	Director, Adelaide Microscopy	

This SOP must be reviewed after any incident/injury associated with this activity or when a Risk assessment is reviewed.

File your completed SOP as instructed by the Supervisor/Person in control of the area/activity and retain the SOP in accordance with the State Records of SA, General disposal [Schedule](#) No. 30 issued under the State Records Act 1997. (Contact the University's [Records Management Office](#) for further assistance/information if required.)

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