SOP RSC 5.1 Veterinary Diagnostic and Therapeutic Nuclear Medicine

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Procedures and Facilities

Nuclear medicine involves the use of unsealed radioactive materials (i.e. liquid, aerosol, or gaseous materials) for either diagnostic or therapeutic purposes. It introduces a further dimension of hazard in terms of ensuring adequate containment of the radioactive material during preparation, administration, and in the subsequent care of the animal.

Diagnostic or therapeutic nuclear medicine veterinary procedures must only be performed:

(a) in an area that is specially designed for the purpose; and
(b) subject to a specific authorisation from the relevant regulatory authority.

Diagnostic veterinary nuclear medicine must only be undertaken by personnel who:

(a) are specifically trained in:
  (i) radiation physics,
  (ii) radiation biology, and
  (iii) radiation hazards and protection;
(b) have practical experience in:
  (i) nuclear medicine instrumentation,
  (ii) imaging procedures,
  (iii) quality control of the radiopharmaceuticals,
  (iv) the handling of unsealed radioactive materials, and
  (v) hot laboratory procedures & clinical practice; and
(c) are appropriately authorised by the relevant regulatory authority.

Therapeutic veterinary nuclear medicine must only be undertaken by personnel who:

(a) meet the requirements specified in the above clause for diagnostic nuclear medicine; and
(b) have additional training in:
  (i) the biological pathways and distribution of radioactive materials,
  (ii) radiation dosimetry,
  (iii) experience in spillage mediation procedures, and
  (iv) handling radioactive waste at levels encountered in therapy.

Detailed written procedures must be developed for:

(a) decontamination; and
(b) the disposal of radioactive waste.

Dedicated facilities must be used for:

(a) storage, safe handling, manipulation, and dispensing of unsealed radioactive sources;
(b) administration of unsealed radioactive materials to animals;
(c) subsequent housing of the animals;
(d) measurements of the radioactive materials in the animals and any subsequent investigations; or
(e) housing the animals before discharge once the studies are completed.

Appropriate radiation warning signs and instructions must be displayed on the kennel, box, stall or other enclosure in which the animal will be housed.

Written protocols for each type of nuclear medicine procedure must be developed before the procedures are implemented.

Suitable arrangements must be made for the discharge or disposal of animals.

A record of the receipt, use, and disposal of all radioactive materials must be maintained.

Specific Nuclear Medicine Procedures

Technetium-99m

The following requirements must be implemented when using technetium-99m for nuclear medicine procedures:

(a) an isolated, shielded and secure accommodation must be used for:
    (i) administering the radioactive material, and
    (ii) hospitalising the animal after the administration;
(b) all personnel involved must be made aware that they are handling a radioactive animal;
(c) the procedures and precautions must be:
    (i) carefully planned, and
    (ii) explained to all personnel involved with handling a radioactive animal;
(d) suitable animal restraints must be provided to minimise handling of the radioactive animal during imaging or other procedures;
(e) persons under the age of 18 years and pregnant women must not hold animals during nuclear medicine procedures and a notice advising of this requirement should be displayed prominently in the area;
(f) a separate shielded and secure location must be used for the imaging procedure;
(g) in order that they can be hosed down to remove any radioactive contamination, the walls and fixtures in rooms used for nuclear medicine procedures must be:
    (i) waterproof and ‘non-slip’, or
    (ii) painted with waterproof paint;
(h) the floors must be sealed;
(i) the flooring material must:
    (i) be readily cleanable,

(ii) cover the whole imaging area, and

(iii) be sealed or coved up at the edges;

(j) drainage must be provided to the normal establishment waste;

(k) procedures to minimise the contamination from urination must be considered;

(l) decontamination equipment must be available for easy and rapid decontamination of the area;

(m) bedding material must be absorbent;

(n) contaminated bedding and other material from the area must be disposed of after 24 hours;

(o) entry to the area must be prohibited between the time of injection and the time of removal of the animal for the imaging procedure;

(p) a syringe shield must be used for the injection of the radioactive technetium;

(q) provision must be made for appropriate shielding of the operator at the imaging console;

(r) the animal must be sedated as appropriate for the period of the imaging procedure; and

(s) radiography or other clinical investigations required must be delayed until the day after the administration of the technetium.

Treatment of feline hyperthyroidism with iodine-131

Iodine is readily volatile and, if proper precautions are not taken, it is readily vaporised and can be inhaled and accumulate in the body. Also, vapours may build up in poorly ventilated areas, thereby presenting a potential inhalation hazard to anybody in the vicinity.

The following requirements must be implemented for the treatment of feline hyperthyroidism with iodine-131:

(a) an isolated, shielded, well-ventilated and secure area must be provided for:

(i) administering the radioactive material, and

(ii) hospitalising the cat for at least 5 days after the administration;

(b) the radioactive material must be kept in a shielded container until just before administration;

(c) if the radioiodine is injected either intravenously or subcutaneously:

(i) disposable gloves must be worn during the procedure, and

(ii) disposable gloves, the syringe barrel and any other item or material that might have become contaminated during the procedure must be stored as radioactive waste following the procedure;

(d) a well-ventilated and shielded area must be available for storage of radioactive waste;

(e) all material removed from cages must be:

(i) handled with disposable gloves, and

(ii) stored as radioactive waste in accordance with detailed safety protocols;

(f) a written protocol for the handling of radioactive material must include details of:

(i) routine radiation monitoring of the area after administration, and

(ii) clean up procedures and radiation monitoring after a spillage;

(g) at the time of release, the treating veterinary surgeon must provide the owner of the cat with plain-language, written instructions for the handling of the cat for the following two weeks that include:

(i) instructions to avoid long periods (more than a few minutes) in close proximity to the cat, particularly during the first week,

(ii) information that it is safe to pick up the cat for short periods but that it should not sit on any person's lap for extended periods or sleep next to any person on a bed,

(iii) instructions that if the cat:

- urinates inside a dwelling, the urine should be cleaned up thoroughly with paper towels which are then placed in a rubbish bag, and
- vomits inside a dwelling, the vomit should be cleaned up thoroughly with paper towels which are then placed in a rubbish bag;

(iv) instructions that the cat should only be handled in well-ventilated areas during this period,

(v) instructions to wear rubber gloves when cleaning up urine and to wash hands thoroughly afterwards, and

(vi) instructions that if the urine has soaked into garments or carpets, they should be cleaned thoroughly;

(h) after administration:

(i) the cat must, where practicable, be:

- handled with disposable gloves, and
- held at arm's length; and

(ii) the treatment area and disposable gloves be monitored with an appropriate radiation survey meter;

(i) an extraction fan must be installed unless there is good natural ventilation;

(j) where the radioiodine is in capsule form:

(i) the cat must be:

- lightly tranquillised , and
- placed in a deep tray, such as a baby bath, lined with absorbent paper for administration of the radioactive material;

(ii) where possible, long handled forceps must be used to insert the capsule well down the throat followed by about 20 ml of water introduced into the mouth by a syringe, and

(iii) consideration must be given to the risk of subsequent vomiting by the animal;

(k) if a cat dies before treatment is completed, it must be:

(i) sealed in a plastic bag,

(ii) stored as radioactive waste until it can be cremated or released for burial, and

(iii) cremated or released to the owner for burial after an appropriate decay time has been applied.

REVISION & APPROVAL HISTORY

Date	Revision No.	Author and Approval
Dec 2014	Version 1	William Bartolo, Bartolo Safety Management Service
May 2016	Version 2	William Bartolo, Bartolo Safety Management Service
Dec 2016	Version 3	Radiation Safety Committee, Charles Sturt University
Jan 2017	Version 4	William Bartolo, Bartolo Safety Management Service and Radiation Safety Committee, Charles Sturt University
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