

# **General oral radioiodine administration**

## **Standard Operating Procedure/Safe Working Procedure**

### **1. INTRODUCTION**

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Cats and dogs with hyperthyroidism can be treated with radioiodine ( $^{131}\text{I}$ ) administered orally by trained and licensed personnel. If you currently use injectable radioactive iodine, choose an oral capsule dose closest to the predicted injectable dose using whatever method of dose selection and calculation you routinely perform. The time frame for withdrawal of anti-thyroid medication remains the same. Treatment outcomes are likely similar with the same percentage of persistence, return to euthyroidism or development of subclinical or clinical hypothyroidism as you currently expect. Generally, there are a good range of capsule doses available, and decay calculations as supplied by the manufacturer can be used to delay treatment until the desired dose is achieved.

There are no pharmacokinetic studies in cats investigating any difference in bioavailability between injectable and oral dosing and no evidence to suggest an oral dose should be higher. In humans, the absorption fraction of oral radioiodine is excellent and although delayed by food, is virtually complete within 3 hours. Resolution rates for hyperthyroidism are equivalent by either method.

The beta and gamma rays released by the decay of  $^{131}\text{I}$  pose a radiation hazard to people working near animals treated with  $^{131}\text{I}$ . Steps must be taken after the treatment procedure to minimise the risk of contamination of humans and the environment.

There should be no difference from your current protocols regarding where treatment is performed, where cats are housed, how suitability for release and discharge is determined, and the discharge and handling instructions provided. You may initially wish to reassess/confirm that the standard protocols and time frames used to currently assess cats for release, perform equivalently after transition to oral dosage.

There is a small chance that cats may vomit after treatment and clients should be warned that this may negatively impact treatment success. Even if vomited soon after administration, radioactive iodine may be absorbed from a broken capsule relatively quickly and immediate retreatment is not usually recommended. You can check for residual radioactivity using a contamination metre and generally assess response at least four weeks later before determining the need for retreatment. This risk may necessitate a little more focus on the potential existence of concurrent gastrointestinal disease that may increase the risk of vomiting. Pre-emptive maropitant may be given to reduce the risk of vomiting (see Procedure below).

### **2. TRAINING/LICENCING**

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Training and licencing should remain the same although your local RA and RPAs should be informed to amend the required legal documentation.

### **3. PERSONAL PROTECTIVE EQUIPMENT**

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This will be dictated by your RA/RPA but will likely include;

- Enclosed footwear that is sturdy and non-slip
- Protective shoe covers
- Safety glasses or face shield
- Nitrile gloves or double layer of latex or equivalent thinner gloves.
- Long trousers
- Disposable gown (full length, long-sleeved)
- Mask
- Personal whole body dosimeter ( $\pm$  finger dosimeters)

#### **4. PROCEDURE**

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##### **Equipment**

- Appropriate sedation
- Radioiodine capsules
- Radiation contamination meter
- Absorbent plastic-backed (incontinence) pads
- Spill kit
- Alcohol & Cotton balls
- Long-handled atraumatic forceps ( $\pm$  pill popper)
- $\pm$  Lead pot and spill shield
- Crash equipment for managing sedation-related emergencies as permitted by your RA/RPA

The exact sedation preference will vary by institution although it must be emphasised that the cat maintains the swallowing reflex to assist orogastric transit of the radioiodine capsule and limit aspiration risk. Examples of different sedation protocols used for oral administration include

- intravenous 50:50 v/v solution of ketamine 100 mg/ml and diazepam 5 mg/ml to effect with a maximum dose of 25 mg for ketamine and 1.25 mg for diazepam
- intravenous alfaxalone and butorphanol (e.g. 0.5 mg/kg alfaxalone, 0.3 mg/kg butorphanol).
- intramuscular combination of midazolam 0.2 mg/kg, butorphanol 0.2 mg/kg and alfaxalone 2 mg/kg, or a combination of medetomidine 5  $\mu$ g/kg and butorphanol 0.2 mg/kg for fractious cats when intravenous administration is challenging or other combinations contra-indicated
- oral gabapentin, typically 100mg/cat the evening prior to and the morning of treatment, 1-2 hours prior to radioiodine administration

Pill-poppers (e.g. the ones with a soft rubber flange) can be used for administration of radioiodine capsules but would still have to be loaded using forceps to handle the capsule.

##### **Preparation**

Ordering, delivery storage and recording protocols should change little apart from potentially the supplier, order and treatment dates. Transport through the hospital should be similar. Radioiodine

treatment capsules should be stored in their original shielded containers until administration and containers disposed of in accordance with manufacturer guidelines and local rules. If ordering a range of capsule sizes you will need a protocol to ensure the correct dose is given to the correct cat.

Fasting and treatment with maropitant should be given careful consideration. A 12 hour fast is recommended. To ensure compliance with this, cat should be admitted at least the day before treatment and fasted overnight. Maropitant (1mg/kg SC) can be given the evening prior to the radioiodine treatment to minimise the risk of vomiting the capsule. If admitting on the day of treatment, fasting is still required but the maropitant could be administered 2 hours prior to the planned treatment time.

### **Procedure**

The radioiodine dose will be transported and stored as dictated by your local regulations. The following indicates specific steps that may be required for administering oral capsules.

- The cat is placed on an examination table covered with absorbent pads to contain a possible radiation spill. These should be placed absorbent-side up and fixed with tape. Depending on temperament, cats may be comfortable sitting within a lined bottom half of a leak-proof plastic transport box, also lined with an absorbent pad.
- The assisting person should gently restrain the cat and facilitate opening the mouth for capsule administration, while the treating person administers the radioiodine.
- The administrator checks the cat's swallowing reflex prior to opening the transport container.
- The vial containing the capsule can remain secured in the lead base of the transport container and the top of the vial is removed. The capsule is then removed from the vial using long handled forceps. An alternative is to hold the neck of the vial with the forceps, decant the capsule from the container into a lead pot and pick up the capsule with the lead forceps before administration.
- The capsule is administered orally using long-handled forceps (or pill-popper) to place the capsule over the base of the tongue.
- 5-10 mLs of water are then syringed into the cat's mouth to encourage swallowing of the capsule.
- Depending on the sensitivity of the radiation contamination meter, it can be swept externally over the cat from mouth to stomach to ensure the capsule is in the cat's stomach (based on marked activity in this area). If the capsule does not appear to have moved down to the stomach, repeat the water swallow and reassess.
- Cats should be monitored continuously until recovery from sedation and then offered a meal of their usual diet at 50% of their daily energy requirements. Cats should be observed for the first 6 hours following treatment for vomiting; any vomit in this time frame should be handled as a potential radioactive spill.

### **Hospitalisation**

Apart from the monitoring for potential vomiting in the initial hours after capsule administration, and the potential for this to require management as a spill, there should be no differences from your current protocols. This includes ongoing hospital management and monitoring, handling waste, discharge from hospital, handling patient medical care and emergencies during the isolation period or during the restricted handling period after discharge, handling deceased patients etc.