Utilization of Radiopharmaceutical Therapies in Animals with Naturally Occurring Disease

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INTRODUCTION

Historically, lab animal models have been utilized for novel drug and device evaluation in the field of radiopharmaceutical therapies. Lab animal medicine is a separate specialty from veterinary medicine. Disease models found in pets (naturally occurring disease) is a modality with increasing use in the field of radiopharmaceutical therapies (RPT), augmenting successful translation to human medicine.

OBJECTIVES

- Demonstrate advantages of veterinary patients for evaluation of radiopharmaceutical therapies.

CONCLUSIONS

- Veterinary patients suffer from many similar diseases that afflict humans, such as cancer and osteoarthritis.
- Naturally occurring disease in pets creates an opportunity for radiopharmaceutical drug and device utilization for translation to human patients.
- Radiopharmaceuticals can be evaluated safely and effectively in naturally occurring models of disease.
- Future steps involve specific pet assessment to qualify which pets may perform better/worse with a RPT treatment.
- Proper regulations are followed and owner consent is always obtained.

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YTTRIUM-90 HYDROGEL

Background: Yttrium-90 hydrogel is injected intra-tumoral as a liquid and turns to a gel with body temperature. It is classified as a device, delivering beta-emitter radiation to a maximum of 11mm from delivery location with minimal damage to non-treated tissue.

Methods: Six cases of intra-tumoral Y-90 hydrogel for the treatment of cancer in pets are reviewed. Each veterinary patient underwent pre-treatment workup, treatment, and lifelong follow up.

Application in pets: See Table 1.

RESULTS

- Y-90 hydrogel treatment for cancer was used safely in both pet dogs and cats with cancer. Table 1. Figures 1 and 2.

Figure 1. Kash (left) positioned for left hindleg treatment of a cutaneous mast cell tumor.

Figure 2. Max (right) positioned under general anesthesia for treatment of recurrent soft tissue sarcoma along the back.

Table 1: Individual dog and cat patients treated with Y-90 hydrogel

Pet Name	Species, Breed	Disease	Treatment Date	Status
Max	Feline, Domestic Longhair	Soft tissue sarcoma on back, surgically resected 3 times. Y-90 applied post-surgery.	March 2022	No recurrence, enjoying life.
Jazper	Canine, German Shepherd	Soft tissue sarcoma on elbow. Treated twice, four months apart.	June 2024 & Oct 2024	No recurrence, enjoying life.
Francis	Canine, Yorkshire Terrier Mix	Soft tissue sarcoma surgically resected with dirty margins.	Dec 2021	No recurrence, enjoying life.
Jean-luc	Canine, Pomeranian Mix	Myxosarcoma	Jan 2026	Recovering.
Kash	Canine, Pitbull	Mast cell tumors	Jan 2026	Six-month recheck appointment scheduled for July, 2026.
Remington	Canine, German Shepherd	Soft tissue sarcoma on paw, metastatic disease present.	May 2024	Euthanized 8 months post-treatment due to unrelated health condition.

RADIOSYNOVIORTHESIS-TIN117M

Background: Tin 117m radiosynoviorthesis (RSO) delivers low-energy conversion electrons (gamma radiation) and is indicated for elbow osteoarthritis (OA). The device provides up to twelve months of pain relief following a single intra-articular injection.

Methods: Ten case studies of bilateral elbow tin117m RSO were reviewed. The degree of OA varied between individual elbows and patients. See Figure 3.

RESULTS

- Tin117m RSO was used safely in pet dogs. Some dogs experienced (minor) acute pain from the procedure which resolved within 72-hours. Long-term response rates varied from slight improvement to significant improvement for greater than twelve months.

Figure 3. Riley (top), a ten-year old, male/neutered, Labrador Retriever is positioned for right elbow radiosynoviorthesis with tin117m. Middle: fluoroscopic pre-treatment image. Right: intra-articular injection of tin117m.

FUTURE DIRECTION

- Future work will include detailed analysis of pre-treatment findings to correlate which individuals may have a significant response.

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