Optimisation of ^{131}I Dose for Radionuclide Therapy in Feline Hyperthyroidism

There was a response to ^{131}I in 85.7% of cases (36/42)
Hypothyroidism 2.4% (1/42)
Persistent Hyperthyroidism 11.9% (5/42)

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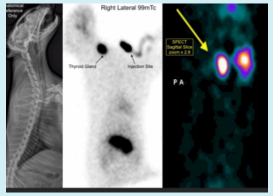
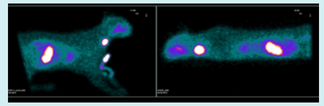
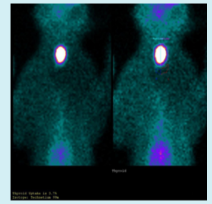






Introduction

Feline hyperthyroidism is the **most common endocrine disorder** in older cats. Radionuclide therapy using Iodine-131 (^{131}I) is the gold-standard treatment due to its high efficacy. Individualised dose optimisation may reduce treatment failure and improve long-term outcomes.

Aim

Correlate 99mTc-Pertechnetate scintigraphic findings and quantitative results with ^{131}I therapy (RAI) dose and treatment outcomes with the **purpose of optimising the weighted therapy dose determination algorithm.**

Methods

- Pre-treatment: T4, thyroid scintigraphy uptake, body weight. Anti-thyroid medications ceased for 2 weeks.
- ^{99m}Tc-pertechnetate planar and SPECT scintigraphy quantified thyroid uptake and morphology.
- Dose adjusted using morphology-based weighting factor.
  - Unilateral disease (3.28 x Y) + 148MBq
  - Bilateral symmetrical (2.7 x Y) + 151MBq
  - Bilateral asymmetrical (3.88 x Y) + 144MBq
- Subcutaneous administration into neck; monitored in feline isolation ward 7-10 days.

Fig. 1 Oneway Analysis of % uptake By Treatment Success

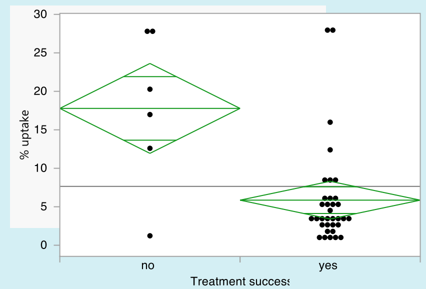
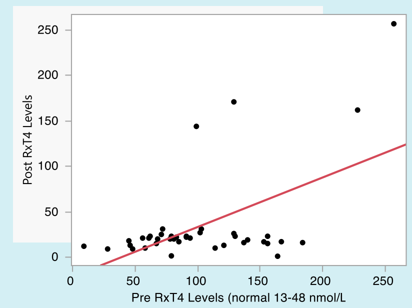


Fig. 2 Bivariate Fit of Post RxT4 Levels By Pre RxT4 Levels (normal 10-60 nmol/L)



Results

Retrospective review of 41 cats showed a 90.2% success rate within six months post-treatment. Cats with treatment success were statistically associated with lower ^{131}I doses (mean = 161.9 MBq) than treatment failure (mean = 183.5 MBq) (P=0.0428) which reflects **a higher failure rate among more severe hyperthyroidism.** Indeed, the mean percentage uptake for treatment success was statistically lower (5.84% versus 17.8%) than treatment failure (P=0.0005).

Conclusion

This study highlights the value of morphology-based dose adjustments in delivering precision therapy in feline hyperthyroidism. The poorer performance for higher degrees of hyperthyroidism indicate that the previously validated ^{131}I dose determination algorithm needs **additional refinement.**

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