THE UNIVERSITY OF MELBOURNE

Melbourne Veterinary School

Cells to Systems Case Study: Fridge Cat Week 7

VETS30015 / VETS90121

Dr Laura Dooley

Presenting Clinical Signs: Bella

- Increased appetite
- Weight loss
- Occasional vomiting

Differential Diagnoses: Systematic Approach

Body systems:

- Digestive
- Nervous
- Urinary
- Endocrine

Differential Diagnoses: Systematic Approach

Vascular: cerebral vascular accident causing behavioural change/cognitive dysfunction

Infectious: GI parasites, bacterial/viral cases of maldigestion

Neoplastic: intestinal neoplasia (eg lymphoma), nervous system, renal,

Drugs: *not consistent with history*

Inflammatory/Idiopathic: inflammatory bowel disease, chronic renal disease, hepatic disease

Congenital: *not consistent with history*

Autoimmune/Anatomical: GI obstruction, autoimmune disease of kidneys/liver

Trauma/Toxins: toxins affecting the GI system, renal toxins

Endocrine: diabetes mellitus, hyperthyroidism, hyperadrenocorticism

Further information?

- When did the presenting signs start?
- Any dietary changes?
- Other animas at home? What is feeding routine?
- How much is she drinking? (inside/outside)
- Is she urinating normally? (frequency/volume)
- Is she defecating normally? (frequency/consistency, outside?)
- How frequent is the vomiting? (also size, consistency, timing)
- Does she receive regular worming treatments?
- Are there any other behavioural changes? (pacing, vocalising)

History & Physical Exam findings

- Vaccination and worming not up to date
- Diet canned and dry Whiskas
- Occasionally allowed outside
- Occasionally vomiting largely undigested food soon after eating
- Vomiting frequency has increased
- Increased volume of faeces, but not diarrhoea
- Behavioural changes: pacing, vocalising
- Unkempt coat

- Underweight
- Significantly elevated heart rate
- Heart murmur
- Elevated systolic blood pressure
- Mass palpable in ventral neck region
- Unkempt appearance

Differential Diagnoses

Vascular: ~~cerebral vascular accident causing behavioural change/cognitive dysfunction~~, **cardiac disease**

Infectious: GI parasites,~~ bacterial/viral cases of maldigestion~~

Neoplastic: intestinal neoplasia (eg lymphoma), ~~nervous system~~, renal, **thyroid**

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Further tests?

- Blood tests: glucose (diabetes), hepatic & renal parameters
- Blood test: thyroid hormone (hyperthyroidism)
- Urinalysis: USG (renal), glucose (diabetes)
- Faecal exam: egg count (parasites)
- Abdominal ultrasound (GI disease, hepatic/renal disease)
- Imaging of neck mass – ultrasound, scintigraphy (thyroid neoplasia)
- Echocardiogram (cardiac disease)

Test results – significant findings

- Haematology:
  - results all normal – no evidence of anaemia or inflammation
- Biochemistry:
  - Blood glucose normal (not diabetes mellitus)
  - Urea/creatinine normal (no evidence of renal impairment)
  - Mild elevation of ALT (leakage of liver cells)
  - Significant elevation of T4 (thyroxine)
- Urinalysis:
  - No evidence of impairment of renal function/renal disease

Differential Diagnoses

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Effects of increased levels of thyroid hormones

- Consumption of stored body fuels: glycogen, fats and proteins = *weight loss, increased appetite*
- Increased heart rate and force of contraction – can lead to heart disease = *heart murmur*
- Increased blood pressure
- Increased rate and depth of respiration
- Increased gastrointestinal motility and secretion = *weight loss, increased appetite*
- Excitatory effects on the central nervous system = *pacing, vocalising, unkempt coat*
- Increased muscle activity
- Increased secretion and utilisation of other hormones

Regulation of thyroid hormone production

- Thyroglobulin stored in thyroid follicles is the precursor to thyroid hormones
- Iodine is required for the synthesis of T4 and T3 from thyroglobulin
- T4 and T3(small amount) released into circulation
- fT4 is de-iodinated to T3 in the tissues

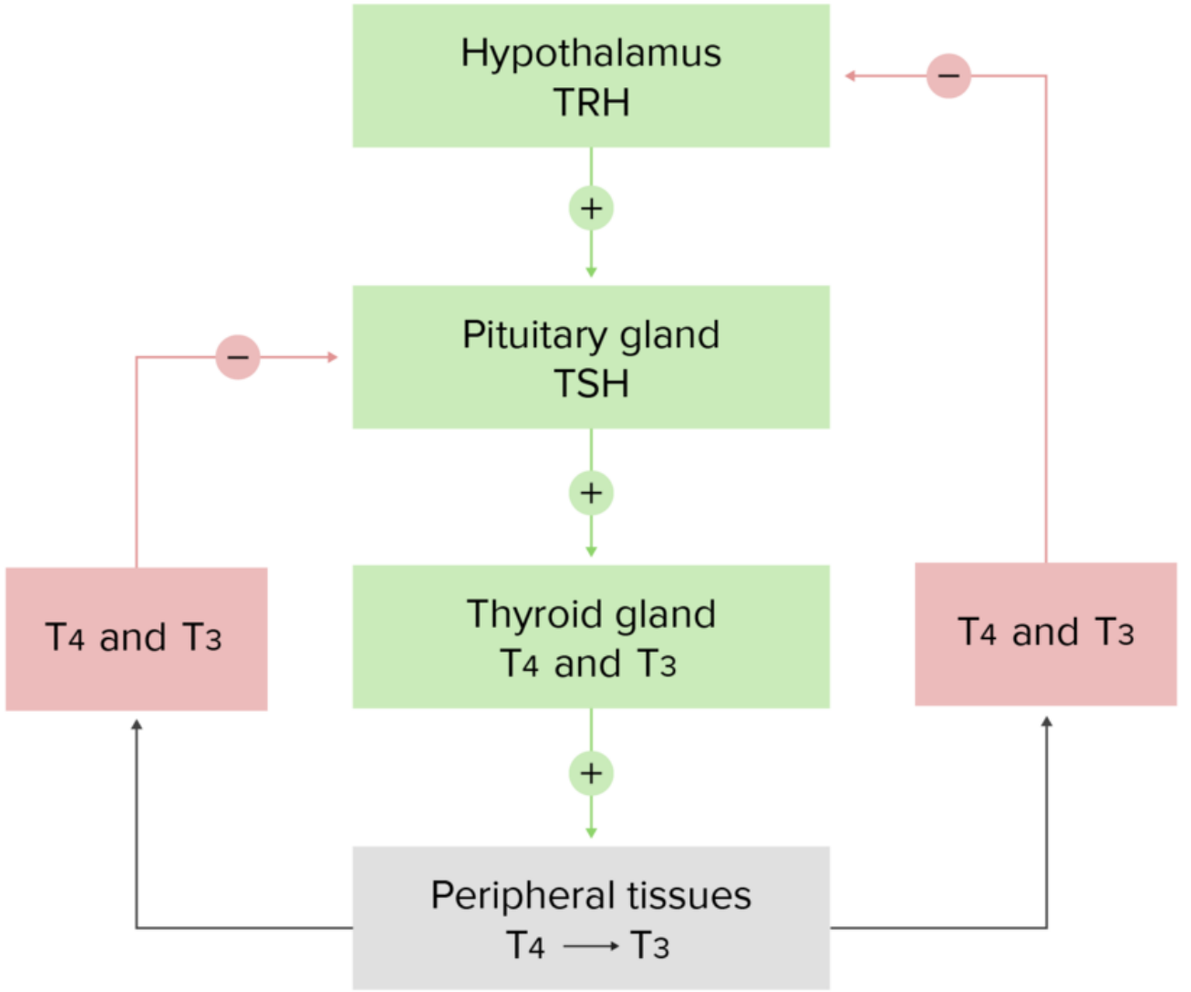


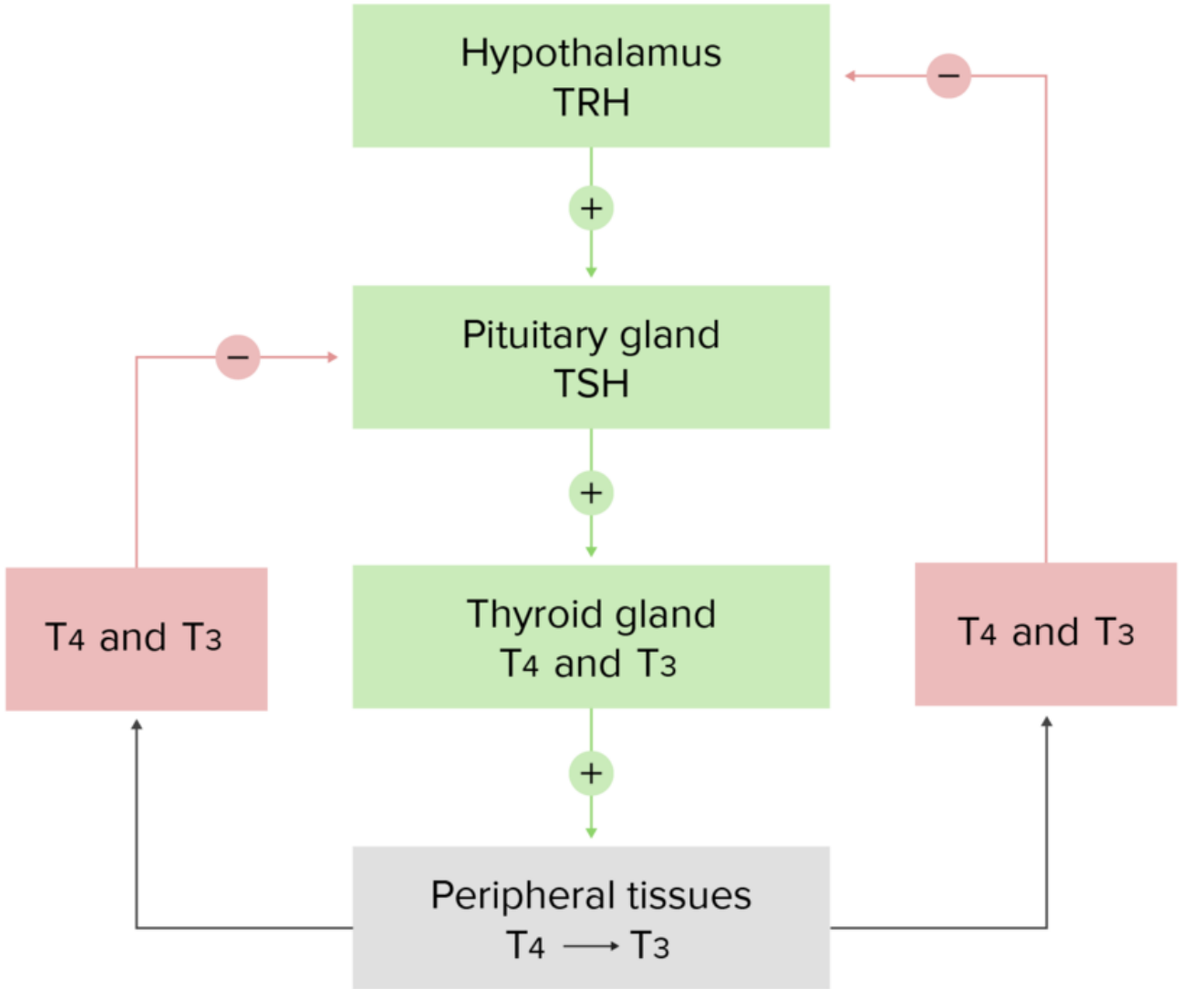
Image from Lecturio.com

TSH = thyroid stimulating hormone, produced by anterior pituitary gland
TRH = thyrotropin releasing hormone

Hyperthyroidism in cats

- Approximately 98% of cases: Thyroid nodular hyperplasia/adenoma (benign)
- Autonomous secretion of T4 and T3 → not controlled by TSH
- Low TSH levels, normal thyroid follicular tissue atrophies

- Remainder are thyroid adenocarcinomas (malignant)



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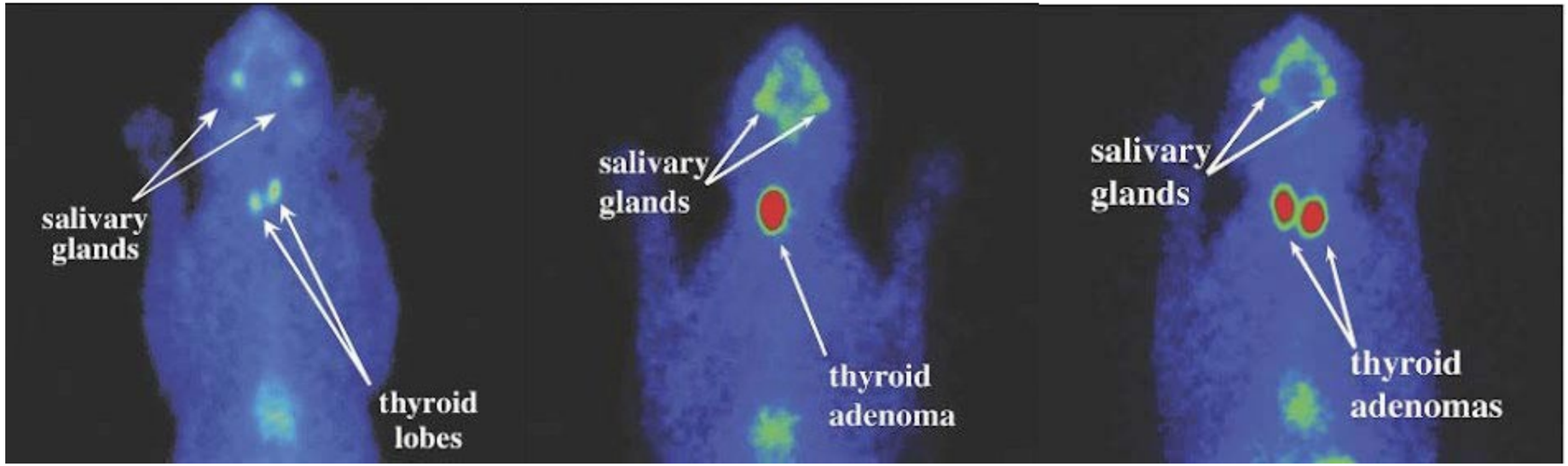
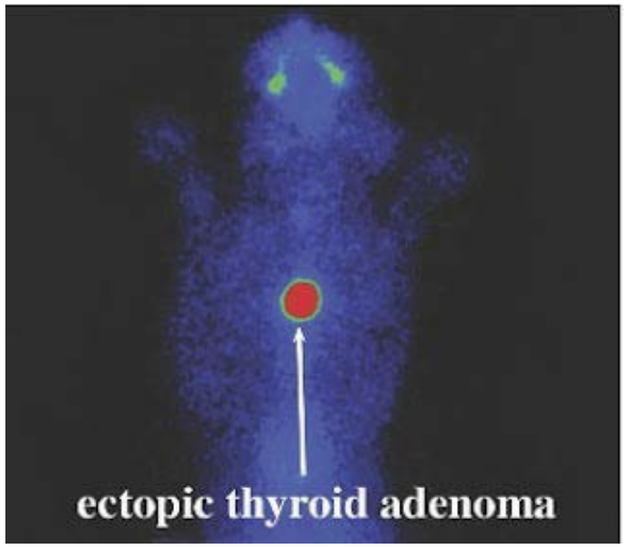
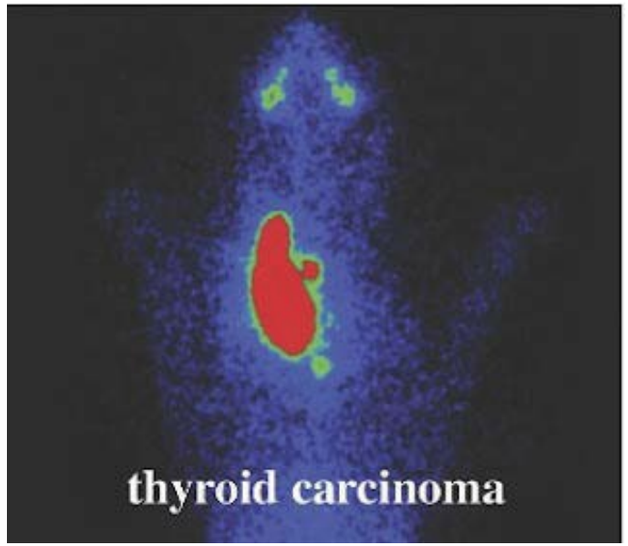
Thyroid scintigraphy:
nuclear scans using Technetium^{99} radioisotope







http://animalendocrine.blogspot.com.au/2010/07/is-thyroid-scanning-useful-in-cats-with.html

Goitre in lambs

- Inadequate iodine intake or ingestion of ‘goitrogens’
- Very low production of thyroid hormones
- Increased TSH levels → hypertrophy of thyroid gland

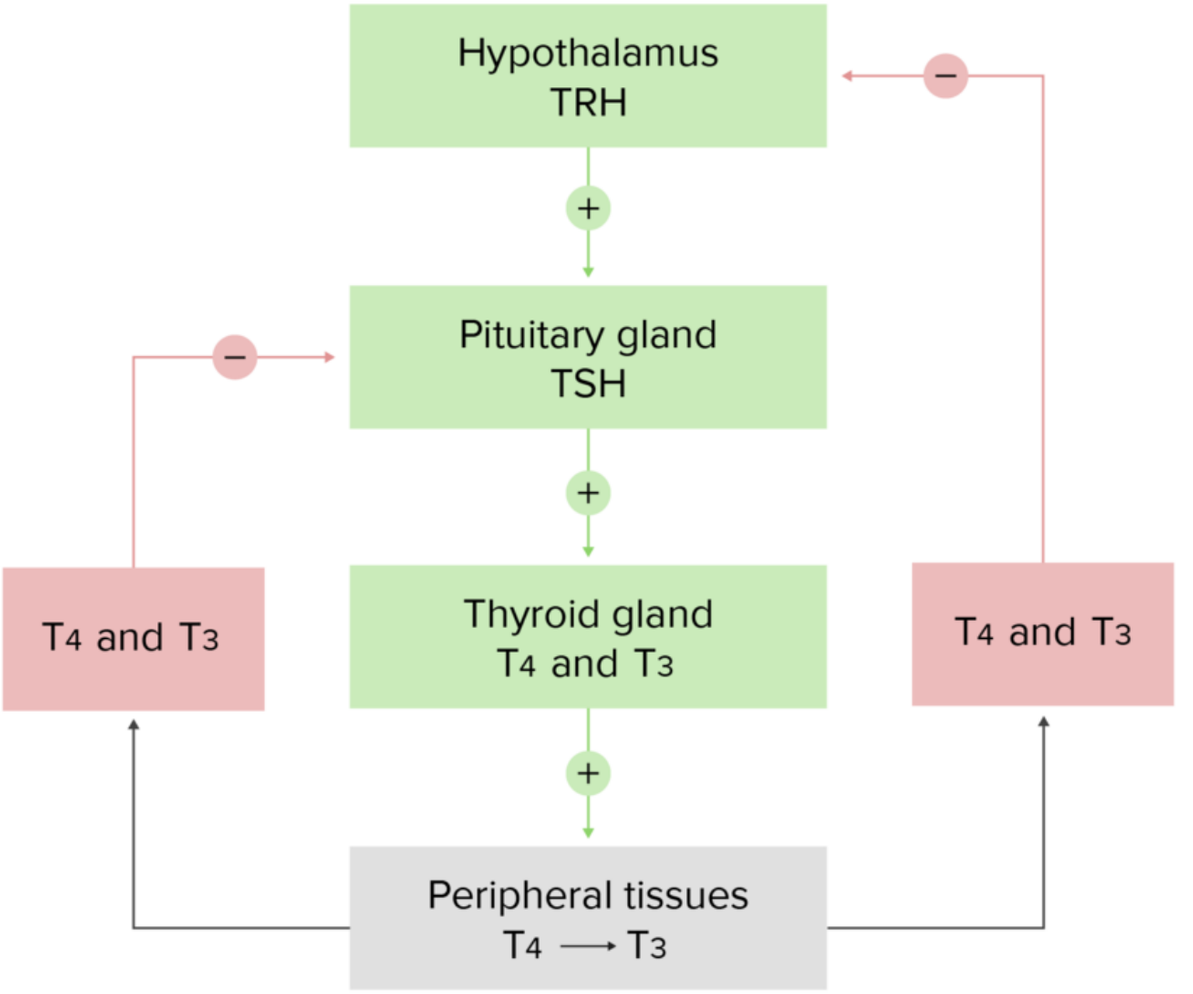
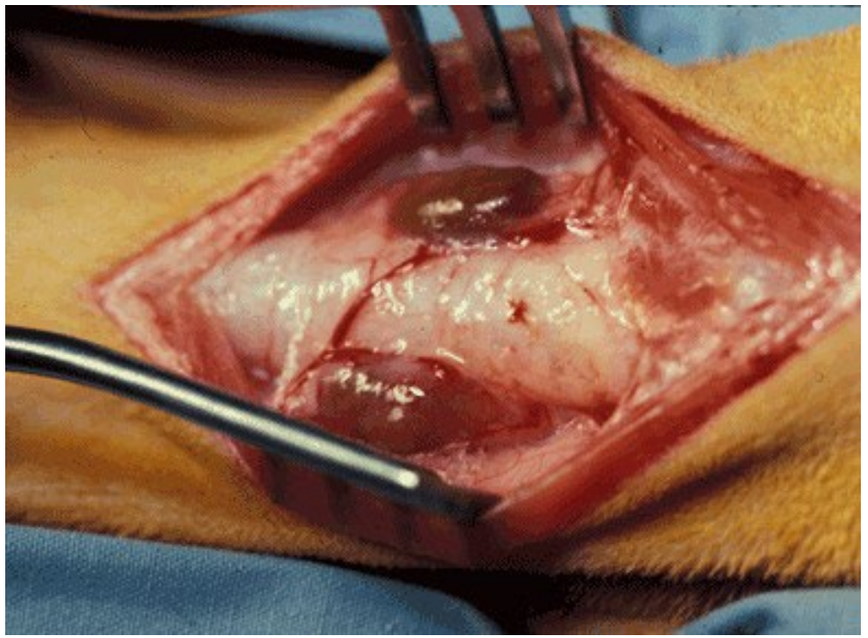
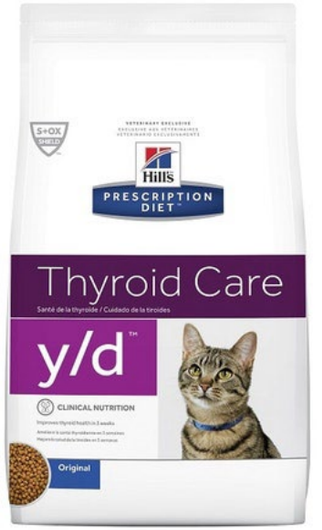


Image from Lecturio.com

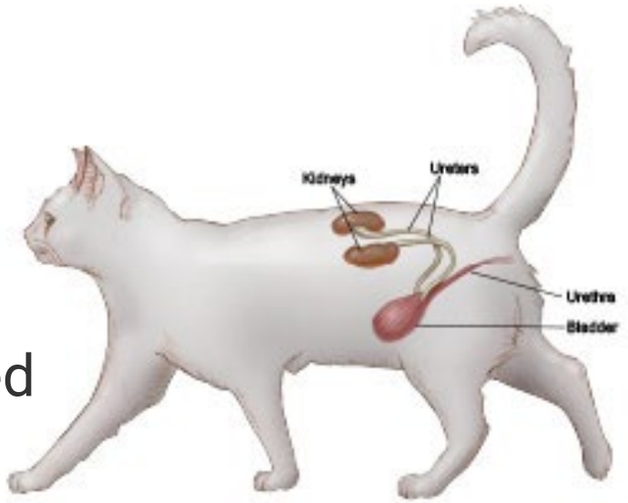
Treatment options for hyperthyroidism



- **Surgery: thyroidectomy.** Drawback – risk of damage/removal of parathyroid, thyroid issue located elsewhere
- **Medical: carbimazole/methimazole** – block synthesis of thyroid hormones. Drawback – lifelong administration and monitoring, owner (and cat) compliance an issue
- **Radioactive iodine** – irradiates hyperplastic thyroid cells. Drawback – cost, permanent (care with renal function)
- **Low iodine diet: Hills y/d**. Drawback – palatability, multi-cat households



Effect on renal function



- Increased thyroid hormone = increased renal blood flow = increased GFR
- Cats treated for hyperthyroidism with underlying renal failure may experience a deterioration in renal function
- Trial treatment with medication enables monitoring for this ‘unmasking’ of renal disease before permanent treatments like radioactive iodine or surgery.
- Monitor: blood urea/creatinine, USG and urine protein

Hypothyroidism

- Some cats develop a temporary hypothyroidism following radioactive iodine treatment
- Rarely, radioactive iodine can cause permanent hypothyroidism
- Classically causes weight gain and lethargy