

# Thyroid & Pancreas



# 7 yr old Dobermann

- lethargic
- poor exercise tolerance
- obese



# clinical examination

- thickened skin
- bilateral symmetrical alopecia



# diagnosis

- hypothyroidism
- confirmed by blood T4 level



# treatment

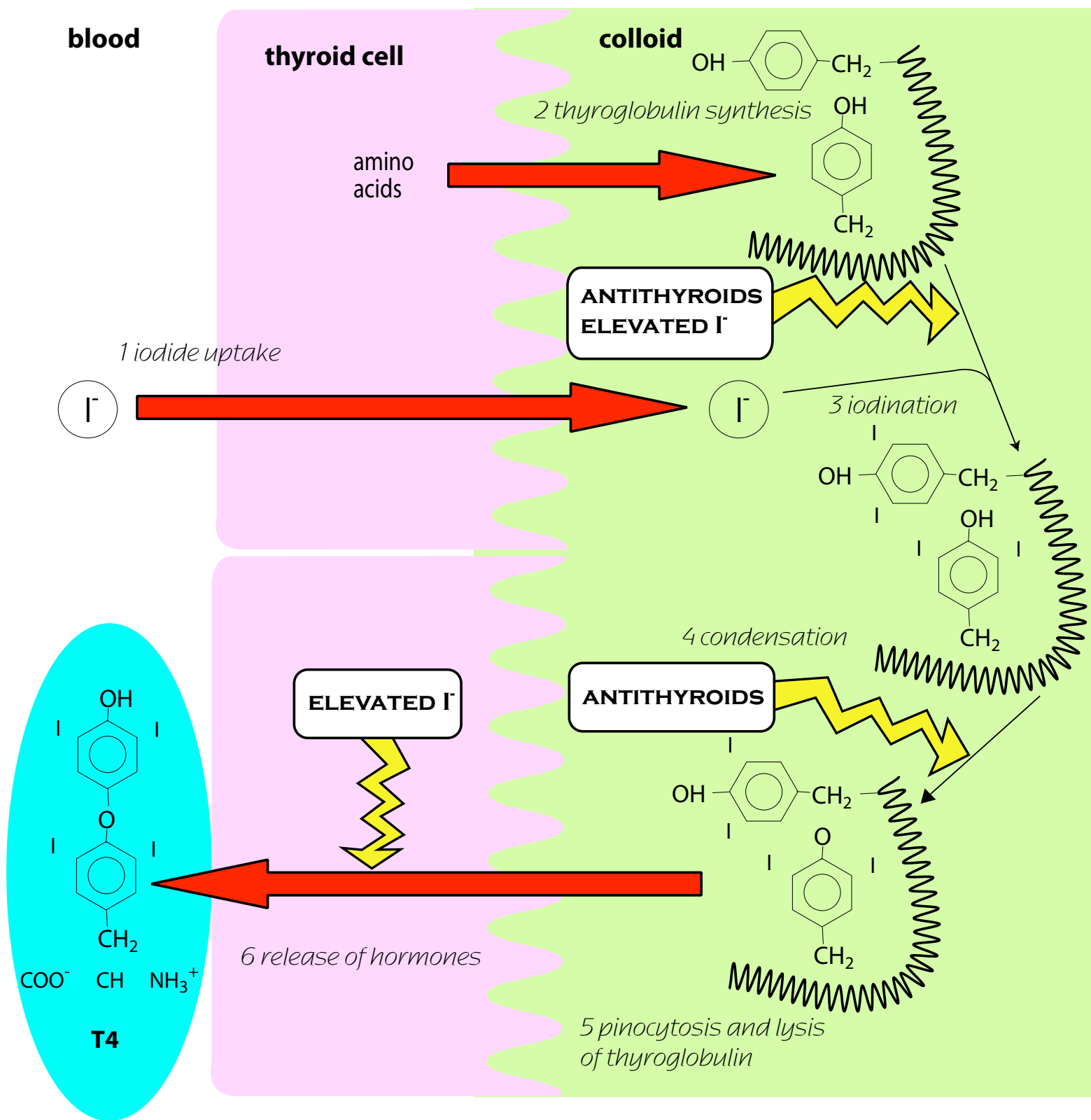
- **thyroxin**
  - levothyroxin (INN)
  - T4



# beware overdose

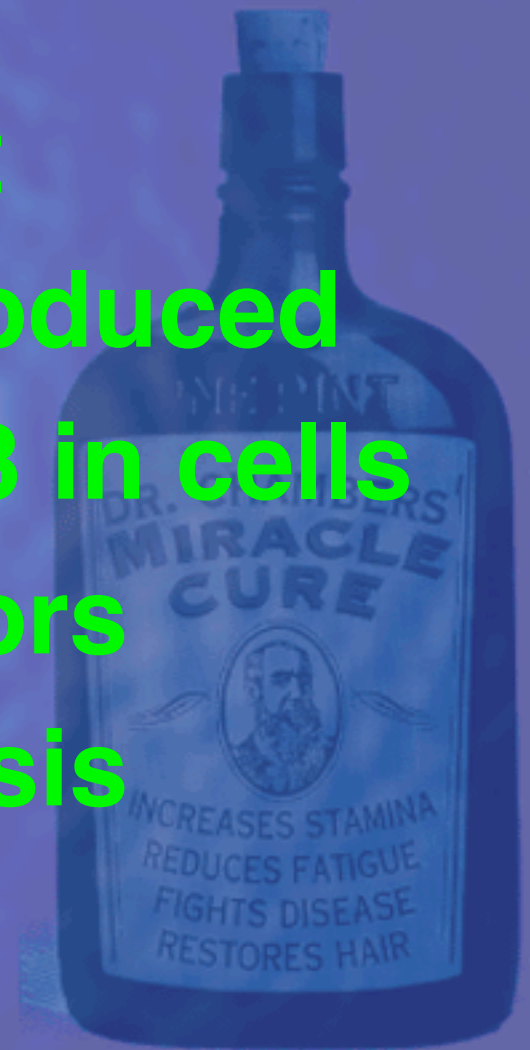
- polyuria
- polydipsia
- nervousness
- panting
- tachycardia
- voracious appetite





# thyroid hormones

- dietary iodine important
- 4x as much T4 as T3 produced
- most T4 converted to T3 in cells
- binds to nuclear receptors
- increases protein synthesis





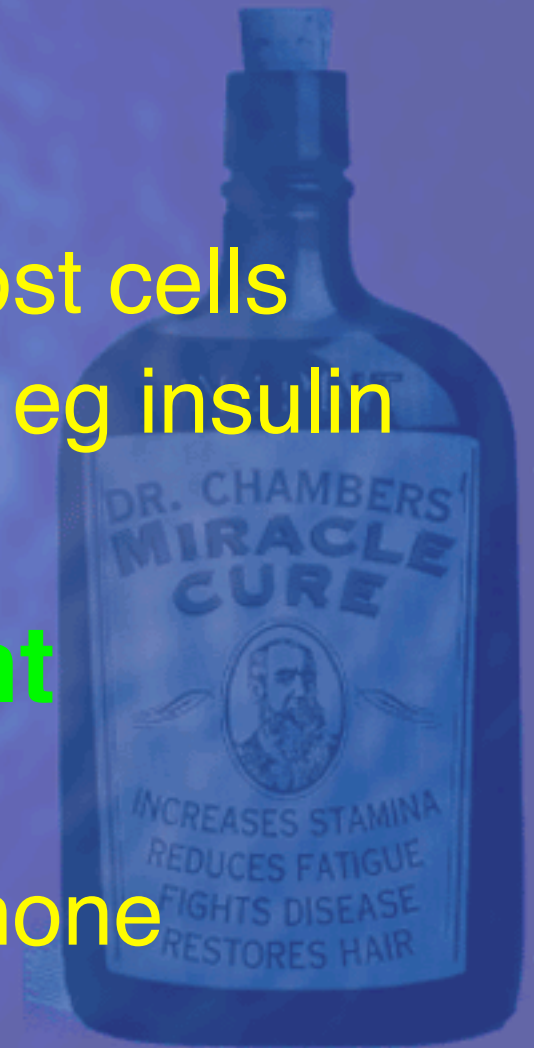
# actions

- **metabolism**

- increased metabolism in most cells
- modulates other hormones, eg insulin
- upregulates  $\beta$  receptors

- **growth and development**

- direct effect on cells
- potentiates GH & parathormone



# hypothyroidism

- **dogs**
  - primary
- **cats**
  - rare
  - iatrogenic
  - secondary



# drugs

- **thyroxin**
  - T4
  - levothyroxin (INN)
  - Eltroxin
- **tri-iodothyronine**
  - T3
  - liothyronine (INN)
  - Tertroxin



# thyroxin

- cheap
- converted to T3
- use low dose and work up
- monitor progress



# kinetics

- highly protein bound
- half life 12 hr in dogs
- cleared faster with enzyme inducers



# lithyronine

- short half life - 6 hr
- rapid effect
- only used when T4 does not work
  - (suppression test in cats)



# progress on T4

- **week 1**
  - more active and alert
- **week 2**
  - neurological signs improved
- **week 4**
  - hair starting to regrow
- **variable**
  - weight loss



# therapeutic monitoring

- if no response in 2 months
- blood sample before dosing & after 6 hours





# hypothyroidism

- **brassica poisoning**
  - cattle and sheep
  - vinylthioxazolidine
  - produces goitre in longer term



# 9 yr old cat

- losing weight despite eating more
- restless
- looks rough



# examination

- heart rate 240
- small kidneys
- nodules in neck



# diagnosis

- hyperthyroidism



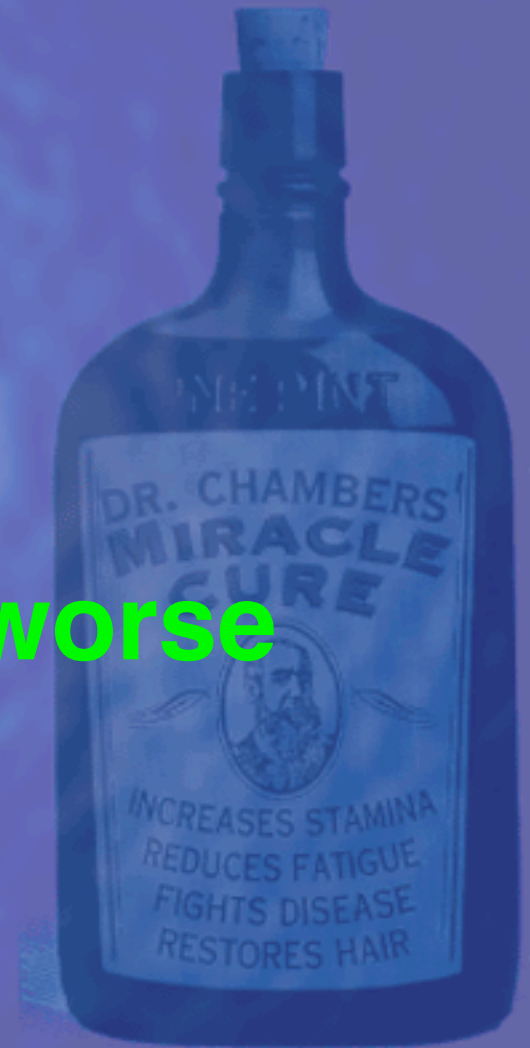
# treatment

- surgery
- antithyroid drugs
- radioactive iodine



# surgery

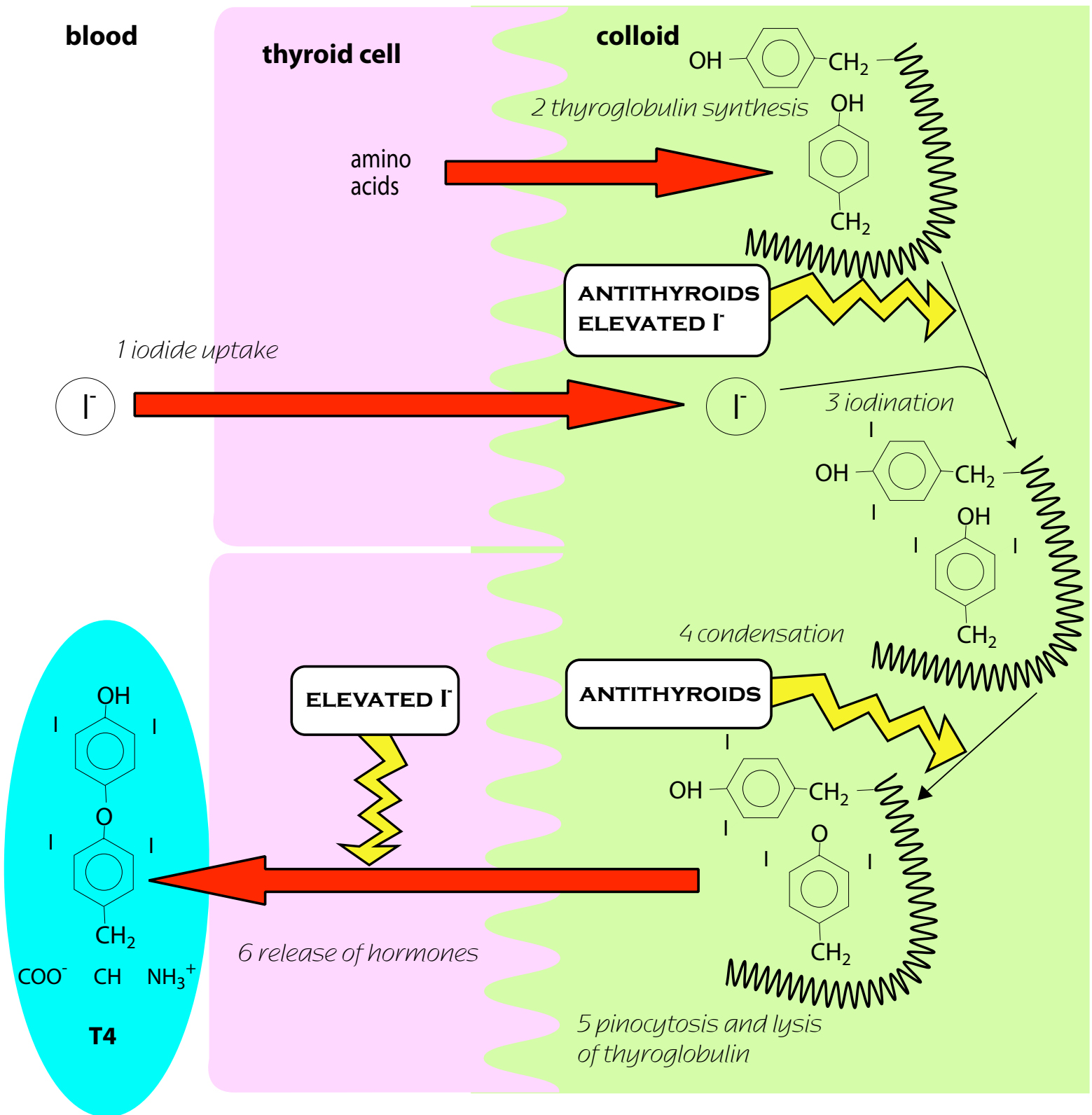
- $\beta$  blockers
- iodine premed
- calcium post op
- may make renal failure worse
- commonest in practice



# antithyroid drugs

- carbimazole
- (methimazole)
- (propylthiouracil)





**blood**

**thyroid cell**

**colloid**

2 thyroglobulin synthesis

amino acids

**ANTITHYROIDS ELEVATED I<sup>-</sup>**

1 iodide uptake



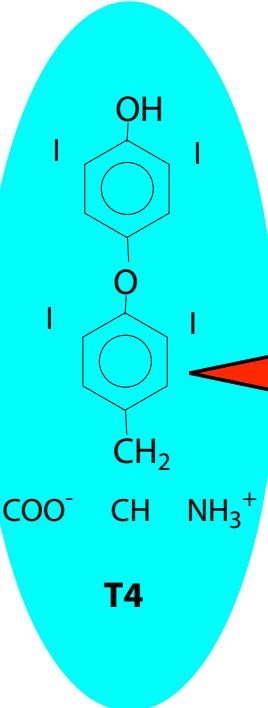
3 iodination

4 condensation

**ANTITHYROIDS**

**ELEVATED I<sup>-</sup>**

6 release of hormones



5 pinocytosis and lysis of thyroglobulin



# side effects

- vomiting
- anorexia
- lethargy
- leucopaenia
- thrombocytopaenia & bleeding



# radioactive iodine

- $^{131}\text{I}$
- $\beta$  0.6Mev
- $\gamma$  0.08Mev
- half life 8 days



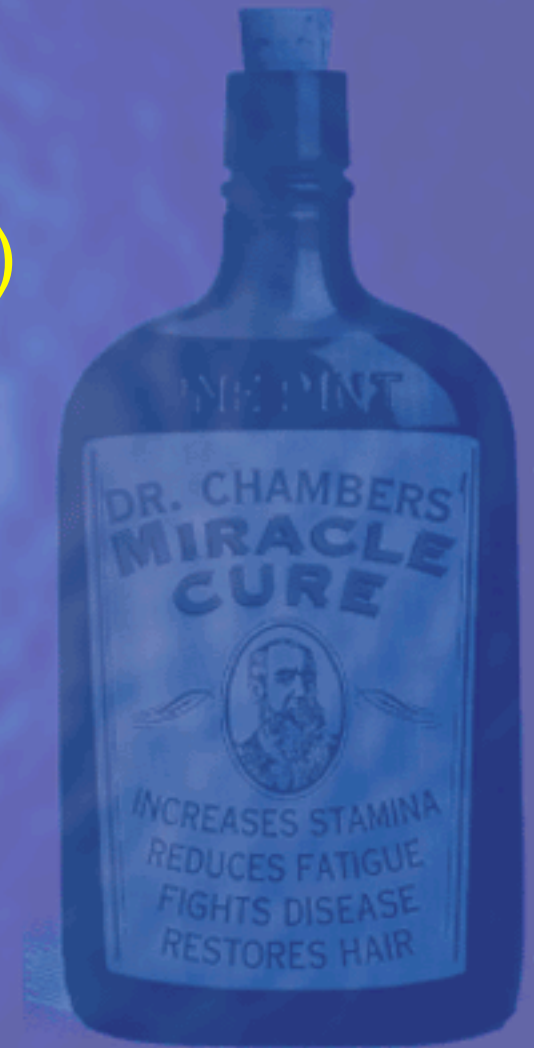
# radioactive iodine

- **advantages**

- single iv injection (also sc or po)
- relatively safe and specific
- 85 - 90% cure

- **disadvantages**

- isolation for 3 weeks
- potential danger to people
- lots of red tape



# thyroid

- **dogs - hyothyroid**
  - give thyroxin
- **cats - hyperthyroid**
  - surgery
  - carbimazole
  - radioactive iodine



# diabetes mellitus

- **type 1**
  - insulin dependent
  - dogs & cats
- **type 2**
  - non insulin dependent
  - horses



# diabetes

- **low insulin**
- **high blood glucose**
  - osmotic diuresis
  - polyuria / polydipsia
- **ketone production**



# treatment

- **type 1**
  - insulin
- **type 2**
  - oral hyoglycaemics ± insulin
- **both**
  - diet



# insulin

- polypeptide 6kDa
- species differences
  - human recombinant
  - Caninsulin is from pigs
- rapidly broken down





# insulin

- **very fast action**
  - lyspro / aspart
- **fast action**
  - soluble
- **medium action**
  - isophane
  - amorphous insulin zinc suspension
- **slow action**
  - crystalline insulin zinc suspension
  - glargine



# fast acting

- **soluble**
  - acetate buffered solution
  - can be given iv
  - onset immediate
  - lasts up to 2 hr



# medium acting

- **isophane**
  - complexed with protamine
- **amorphous insulin zinc**
  - small crystals with zinc chloride
  - given sc
  - onset 1 - 2 hr
  - lasts 12 - 24 hr



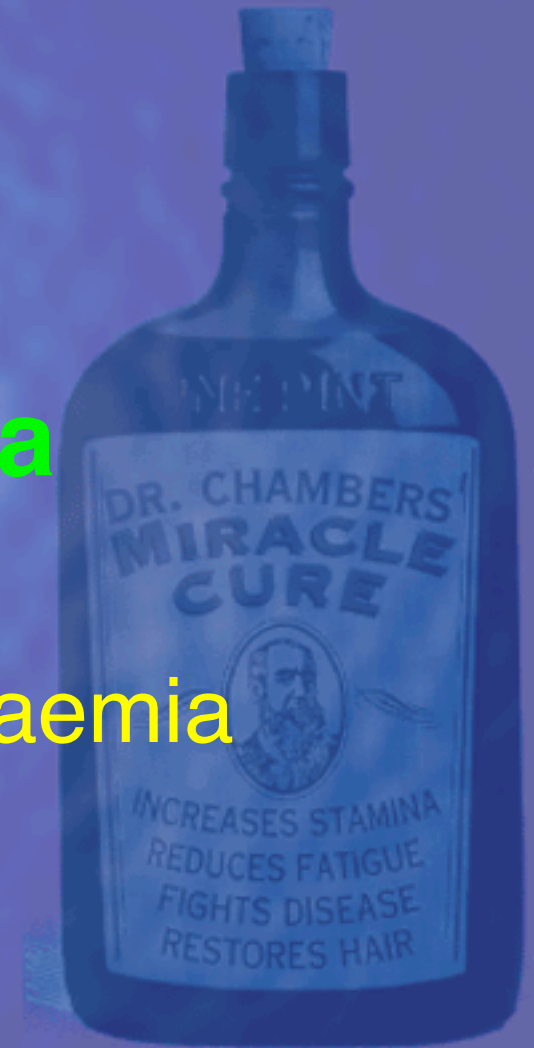
# long acting

- **crystalline insulin zinc**
- **insulin glargine**
  - given sc
  - onset 2 - 8 hr
  - duration 24 hr
  - used in cats



# side effects

- hypoglycaemia
  - give glucose iv
- rebound hyperglycaemia
  - Somogyi effect
  - reflex response to hypoglycaemia



# oral hypoglycaemics

- type 2 diabetes
- cats
- many new human drugs
  - glipizide
  - (tolbutamide)
  - (metformin)



# diabetic coma

- soluble insulin iv
- intensive care
  - acidosis
  - dehydration
  - heart
  - lungs



# diabetes in dogs

- sort out diet
- insulin
- measure blood glucose
- hospitalise until stable
- monitor urine glucose





# diabetes in cats

- sort out diet
- oral hypoglycaemics
- insulin
- measure blood glucose etc



# diabetes

- **dogs - type 1**
  - give insulin
- **cats type 2 / 1**
  - insulin
  - oral hypoglycaemics

