1. Diuretics
2. diuretics
   - act on the kidney to increase urine flow
   - most block reabsorption of ions from tubules
   - water kept in tubules by osmotic pressure
3.
4. diuretics & CHF
   - reduce pulmonary oedema
   - reduce preload
5.
6.
7. groups of drugs
   - loop diuretics
   - thiazides
   - osmotic diuretics
   - potassium sparing diuretics
   - carbonic anhydrase inhibitors
   - (mercurials)
8. common drugs
   - frusemide
   - (hydrochlorthiazide)
   - (mannitol)
9.
10. loop of Henle
11. frusemide
    - potent
      - up to 20% of filtered Na+ excreted
    - cheap
    - very widely used

12 frusemide indications
- reduce oedema
- reduce cardiac preload
- (acute renal failure)

13 minor indications
- hyperkalaemia
- hypercalcaemia
- uraemia
- epistaxis
- hypertension

14 abuse
- speeding up / slowing racehorses

15 pharmacokinetics
- iv
  - onset minutes
  - peak 30 mins
  - duration 2 hours
- po
  - onset 30 – 60 mins
  - peak 2 hours
  - duration 4 – 6 hours

16 pharmacokinetics
- metabolism
  - negligible
- elimination
  - secreted into PCT by anion pump
  - passes out in urine
    - horses which eat their bedding may take it in again

17 side effects

- hypovolaemia
  - reduced glomerular filtration
  - reduced excretion of other drugs
  - collapse
  - direct vasodilatation?
- hypokalaemia
- metabolic alkalosis
- hypocalcaemia / hypomagnesaemia
- tolerance

18 side effects
- hypovolaemia
- hypokalaemia
  - digoxin!!!
- metabolic alkalosis
- hypocalcaemia / hypomagnesaemia
- tolerance

19

20 side effects
- hypovolaemia
- hypokalaemia
- metabolic alkalosis
- hypocalcaemia / hypomagnesaemia
- tolerance

21 interactions
- increased PCT toxicity
  - aminoglycosides
  - out of date tetracyclines
  - some obsolete cephalosporins
- potentiates digoxin
- ACE inhibitors?

22 common drugs
- frusemide
- (hydrochlorthiazide)
- (mannitol)

23

24 early DCT

25 thiazides
- many drugs available
  - hydrochlorthiazide
  - bendrofluazide, etc
- moderately potent
- cheap

26 thiazide side effects
- hypokalaemia
  - digoxin!!
- metabolic alkalosis
- increased plasma uric acid
- hyperglycaemia

27 kinetics
- always given po
- onset 1 – 2 hours
- peak effect 4 – 6 h
- duration 8 – 12 h

28 indications
- mild / moderate heart failure
- (diabetes insipidus)

29 osmotic diuretics
- mannitol
- glycerol

- glucose

30

31 mannitol
- indications
  - glaucoma
  - cerebral oedema
  - acute renal failure
- contraindications
  - heart disease
- caution
  - must be given iv

32 K+ sparing diuretics
- amiloride
- triamterene
- spironalactone

33 late DCT

34 K+ sparing diuretics
- weak diuretics
- expensive
- caution with ACE inhibitors
- rarely used in animals

35 CA inhibitors
- acetazolamide
- (dorzolamide - eye drops only)

36

37 CA inhibitors
- weak diuretics
- rarely used as diuretics
  - used for glaucoma

- cause mild metabolic acidosis

38 diuretics

- frusemide most important
- main indication – oedema
- very potent – beware overdose
- hypokalaemia potentiates digoxin
- do not use in horses about to race
- mannitol – beware accidental perivascular injection