Fluids


ONE PINT
DR. CHAMBERS'
MIRACLE
CURE
INCREASES STAMINA
REDUCES FATIGUE
FIGHTS DISEASE
RESTORES HAIR

water in the body

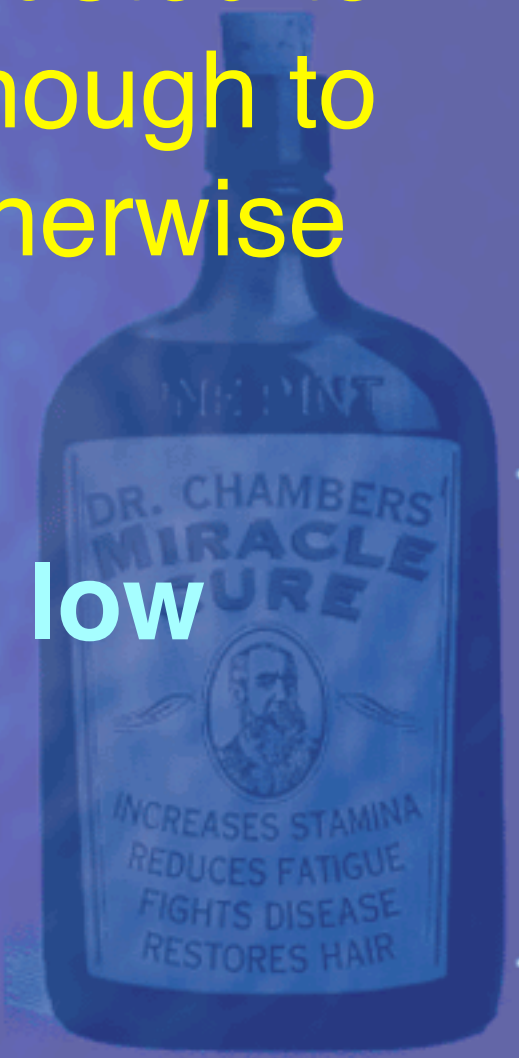
- **total body water**
  - 65% body weight (adults)
  - 80% body weight (neonates)
- **intracellular fluid 45% bw**
- **extracellular fluid 20% bw**
  - blood volume 9% bw
  - plasma volume 5% bw
- **In very fat animals these figures will be lower**

fluid loss

- urine 20 ml/kg/day
- expired air 20 ml/kg/day
- haemorrhage (not necessarily external)
- vomiting 4 ml/kg/vomit?
- diarrhoea 0 - huge amounts
- not drinking
- anaesthesia (breathing dry gas)
- laparotomy / thoracotomy (evaporation)

fluid compartments are adjusted to keep blood volume high enough to provide flow to tissues - otherwise **shock** occurs

main indication for fluids is **low blood volume**



shock

- a generalised failure of perfusion of tissues

shock treatment

1. place large bore catheter
   - sedate if necessary
     - benzodiazepine ± opioid
   - cut down if necessary
     - local anaesthetic

lat saphenous cut down

shock treatment

1. place large bore catheter
   - sedate if necessary
     - benzodiazepine ± opioid
   - cut down if necessary
     - local anaesthetic
2. check heart

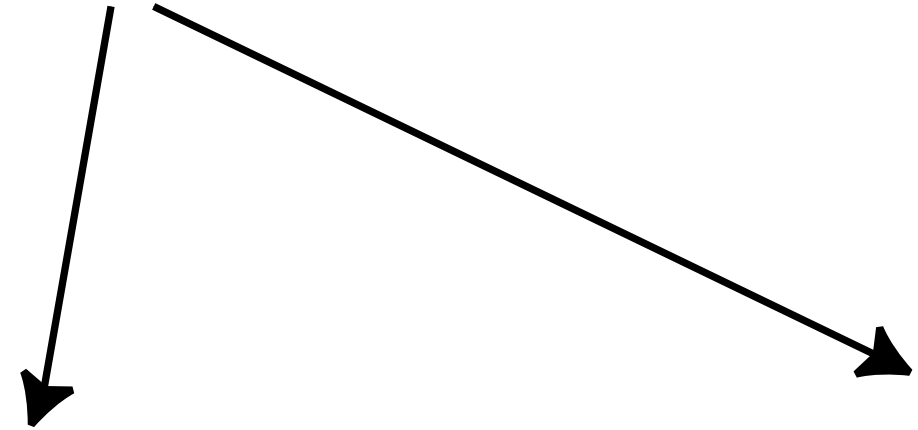
peripheral shock

3. give lots of fluids iv
   - any type of iv fluid (not dextrose)
4. consider oxygen
5. diagnose cause

cardiogenic shock

- give oxygen
- sedate if necessary
  - benzodiazepine
- check for cardiac tamponade
  - drain
- treat for acute heart failure

5 diagnose cause



hypovolaemic shock

6 give more iv fluids
- colloids

7 stop any bleeding
- pressure
- surgery

8 consider vasoconstrictors

9 keep warm

septic shock

take blood for culture

consider
- high dose steroids
- iv antibiotics

give more iv fluids
- colloids

keep warm

fluids available

- **oral fluids**
  - water
  - electrolyte solutions
- **blood**
- **colloids**
- **crystalloids**

administration

- **dose**
  - as much as required
    - deficits
    - maintenance
- **rate**
  - as fast as needed
    - 90 - 10 ml/kg/h
- **route**
  - iv, po
  - ip, sc
  - intraosseus

$$Q = \frac{\pi p r^4}{8 \rho l}$$

monitoring effects

- central venous pressure
- pulmonary oedema
- ions

longer term priorities

- correct acidosis
- electrolytes
- calculate and give maintenance requirements
- treat the original problem!!

iv fluids

- blood
- colloids
- crystalloids
- electrolyte additives
- parenteral nutrition solutions

for oxygen carriage

- **whole blood**
  - fresh
  - ACD / CPD
- **packed cells**
- **(perfluorocarbons)**
- **(haemoglobin solutions)**

for clotting factors

- fresh whole blood
- fresh frozen plasma
- (freeze dried clotting factors)

for volume expansion

- colloids
- crystalloids
- hypertonic saline
- (blood)

colloids

- **plasma**
  - diy
- **gelatins**
  - Haemaccel
  - Gelofusin
- **starches**
  - hetastarch
  - pentastarch
  - dextrans

hypertonic saline

- NaCl 7% solution

for water & ions

- crystalloids
- strong electrolyte solutions

crystalloids

- **normal saline - NaCl 0.9%**
- **Hartmann's solution**
  - compound Na lactate, lactated Ringer's
- **NaCl 0.18% & dextrose 4%**
- **dextrose 5%**
- **Ringer's solution**

Hartmann's

- Na^+ 129mM
- Cl^- 109mM
- K^+ 5mM
- Ca^{++} 2mM
- lactate 29mM
- water qs

concentrated ions

- potassium chloride
- bicarbonate
- calcium (boro) gluconate
- magnesium hypophosphite
- magnesium sulphate

for parenteral nutrition

- lipid emulsions
- amino acid solutions
- propylene glycol
- propionate
- glycerol

What would you do?

- dog left in car on a hot day
- now collapsed
- temperature 42˚C
- heart rate 148
- panting

problems

- hyperthermia
- dehydration

treatment

- hose down with cold water
- 5% dextrose iv
- 0.18% saline & 4% dextrose iv

What would you do?

- bitch spayed that morning
- now collapsed
- pale mucous membranes
- heart rate 160, v weak pulse
- panting

haematology

- PCV 17%

problems

- blood loss
- hypovolaemia

dog needs…

- plasma expander
- red cells
- clotting factors

fluids

- in emergency any iv fluid is useful for plasma expansion
- hypertonic saline is a first aid measure only
- colloids stay in blood vessels, crystalloids redistribute to other compartments
- beware overdose of K^+, Mg^{++} and bicarb