

Blood



things that can go wrong

- **bleeding**
 - surgery
 - fluids
 - blood
 - plasma / substitutes
 - coagulants / anticoagulant antidotes
- **clotting in blood vessels**
 - anticoagulants
- **anaemia**



clotting

- blood vessel damage
- platelet clot
- fibrin clot
- fibrinolysis

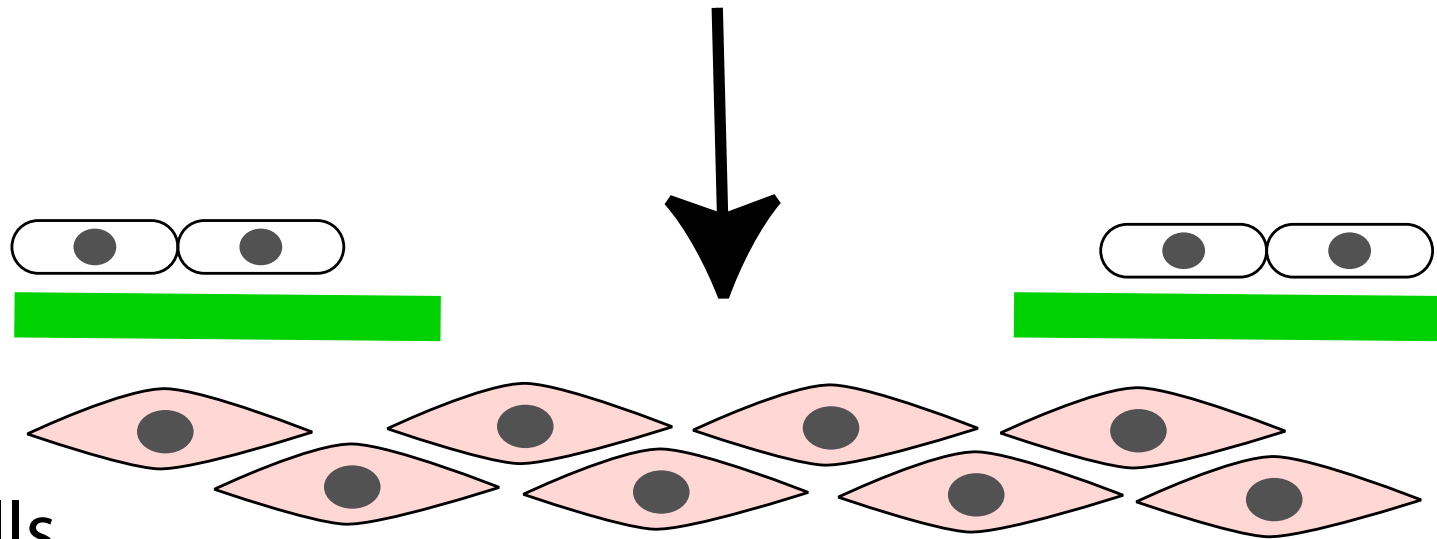


lumen

hole

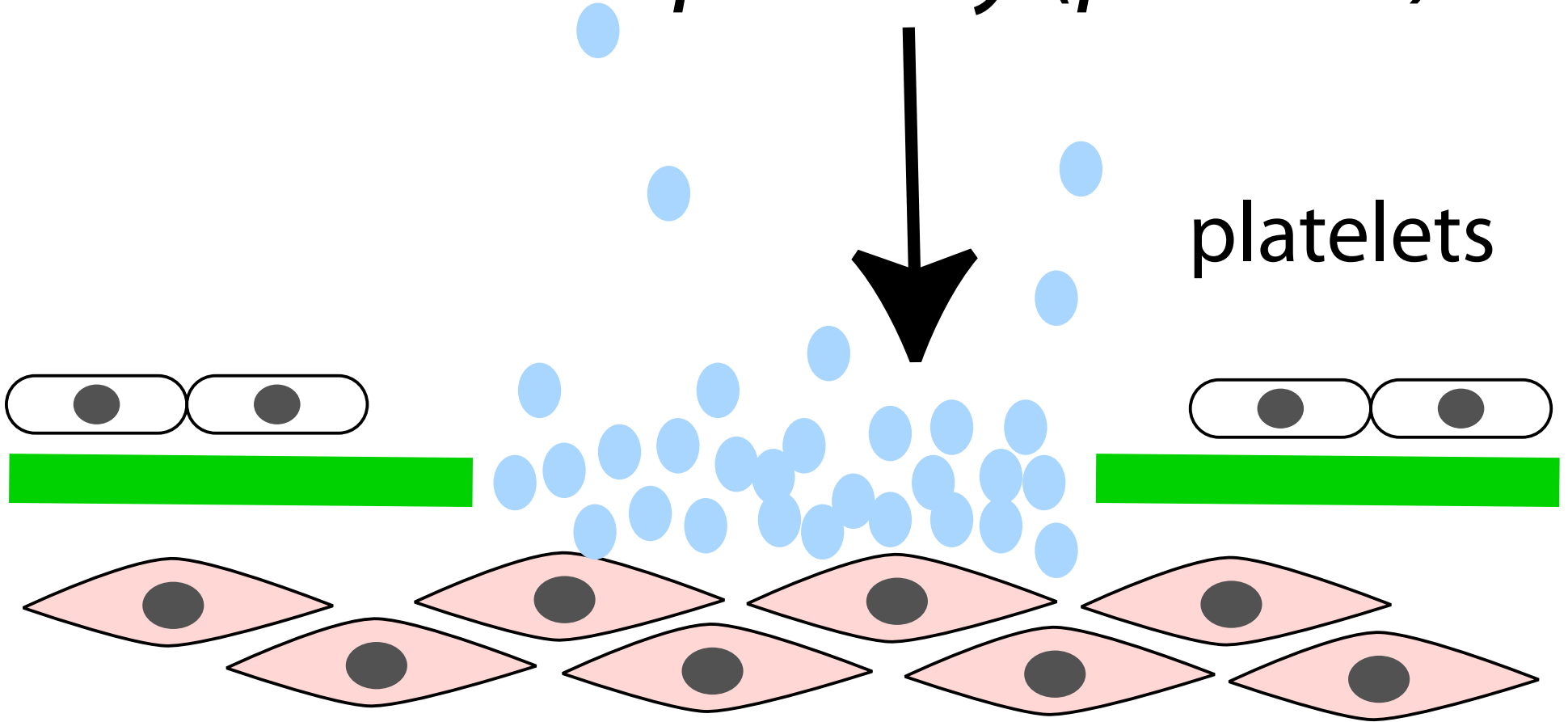
endothelial cells
collagen

smooth muscle cells

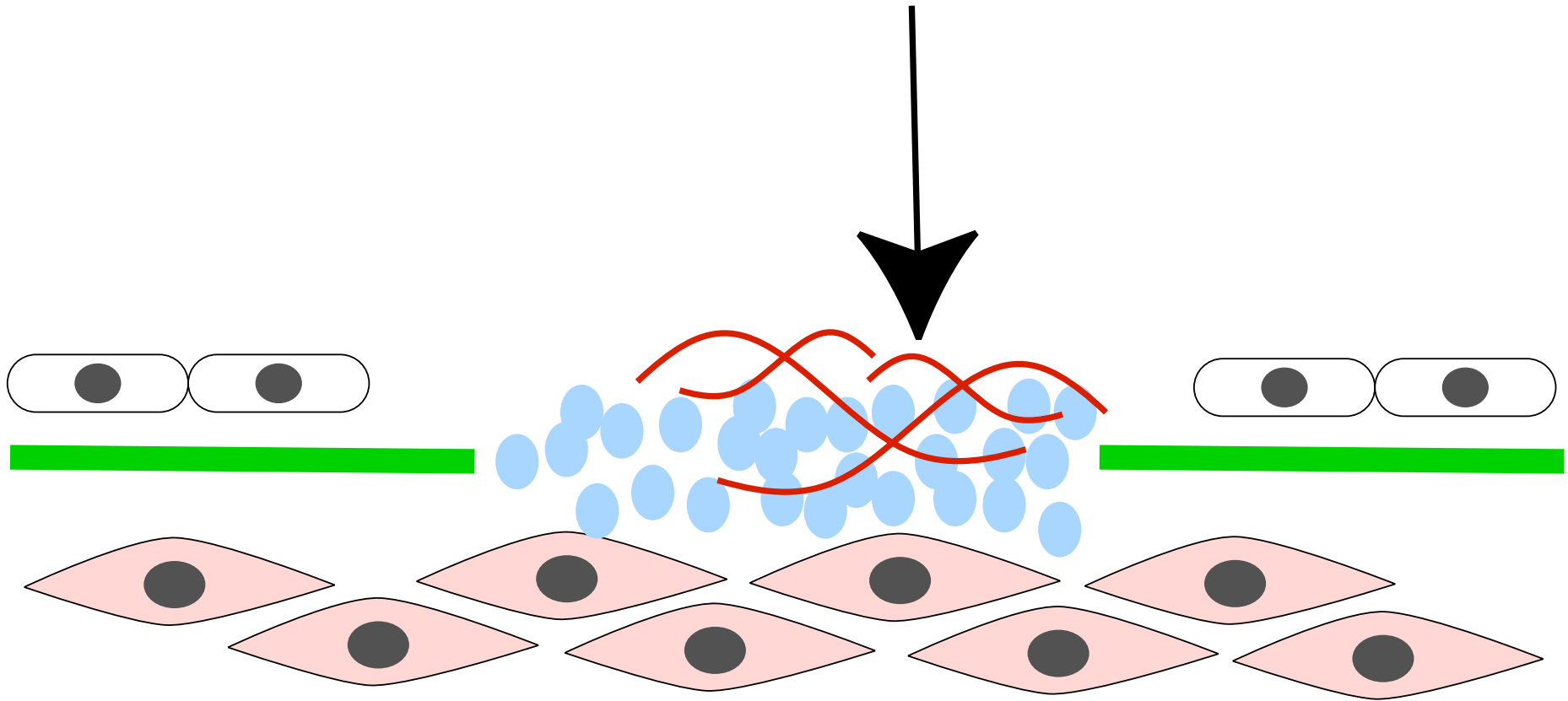


primary (platelet) clot

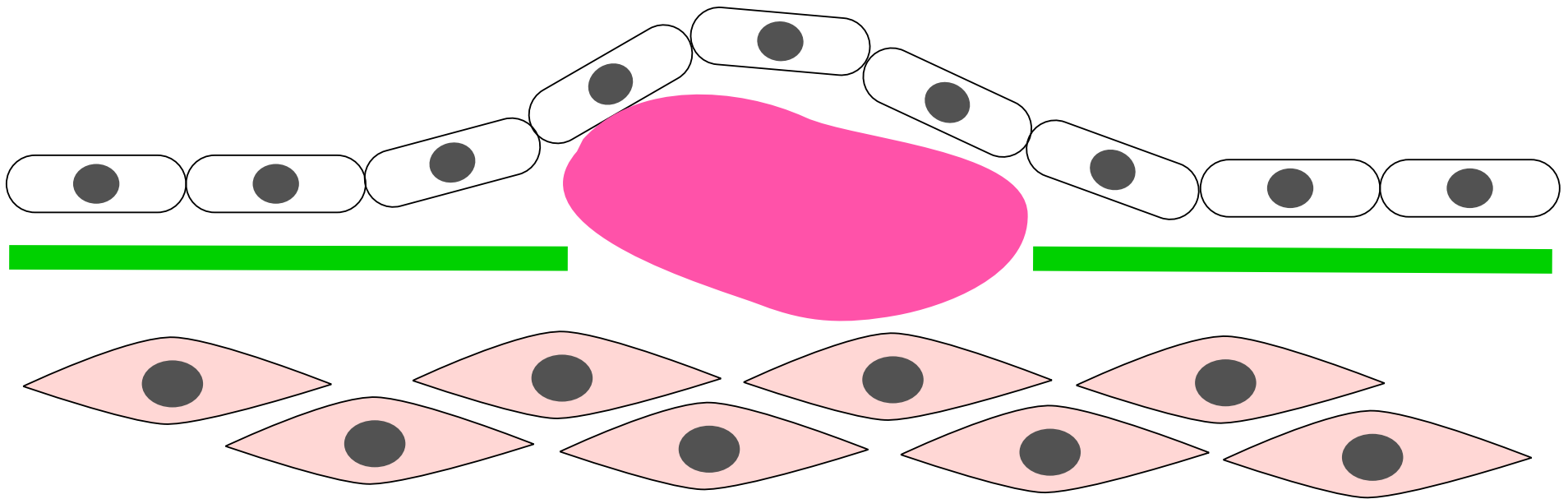
platelets

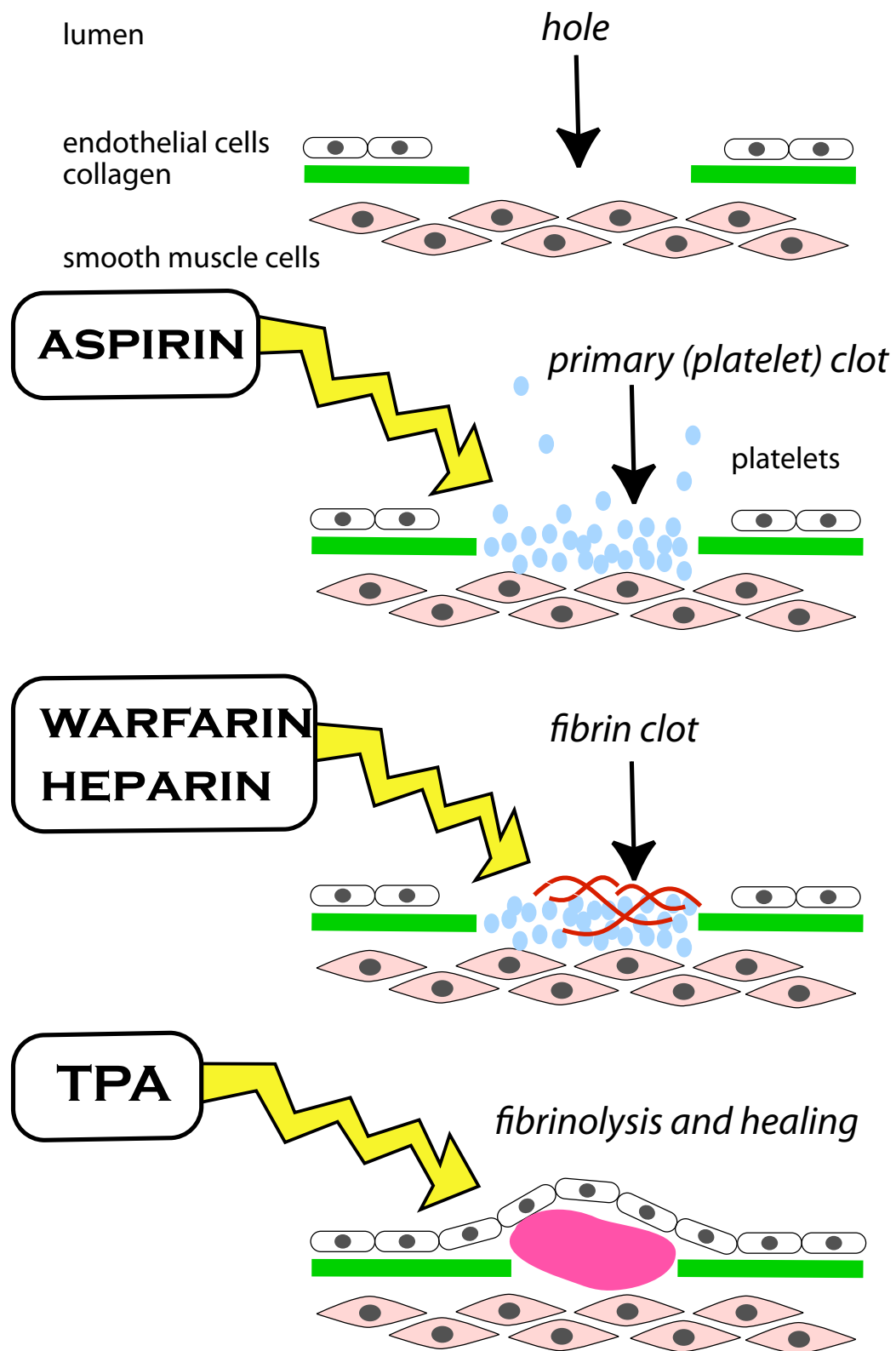


fibrin clot



fibrinolysis and healing





aims of treatment

- encourage clotting at site of injury
- prevent clotting in circulation



haemostasis

- good surgical technique
- pressure



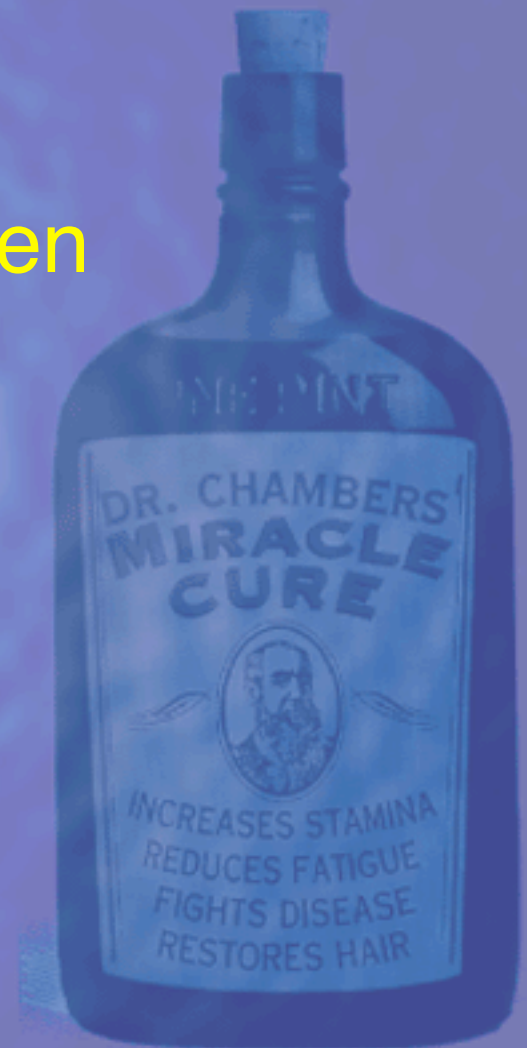
haemostasis

- **blood vessels**
 - topical vasoconstrictors
- **platelets**
 - artificial substrates
- **clotting factors**
 - fresh frozen plasma
 - fresh whole blood



parenteral haemostatics

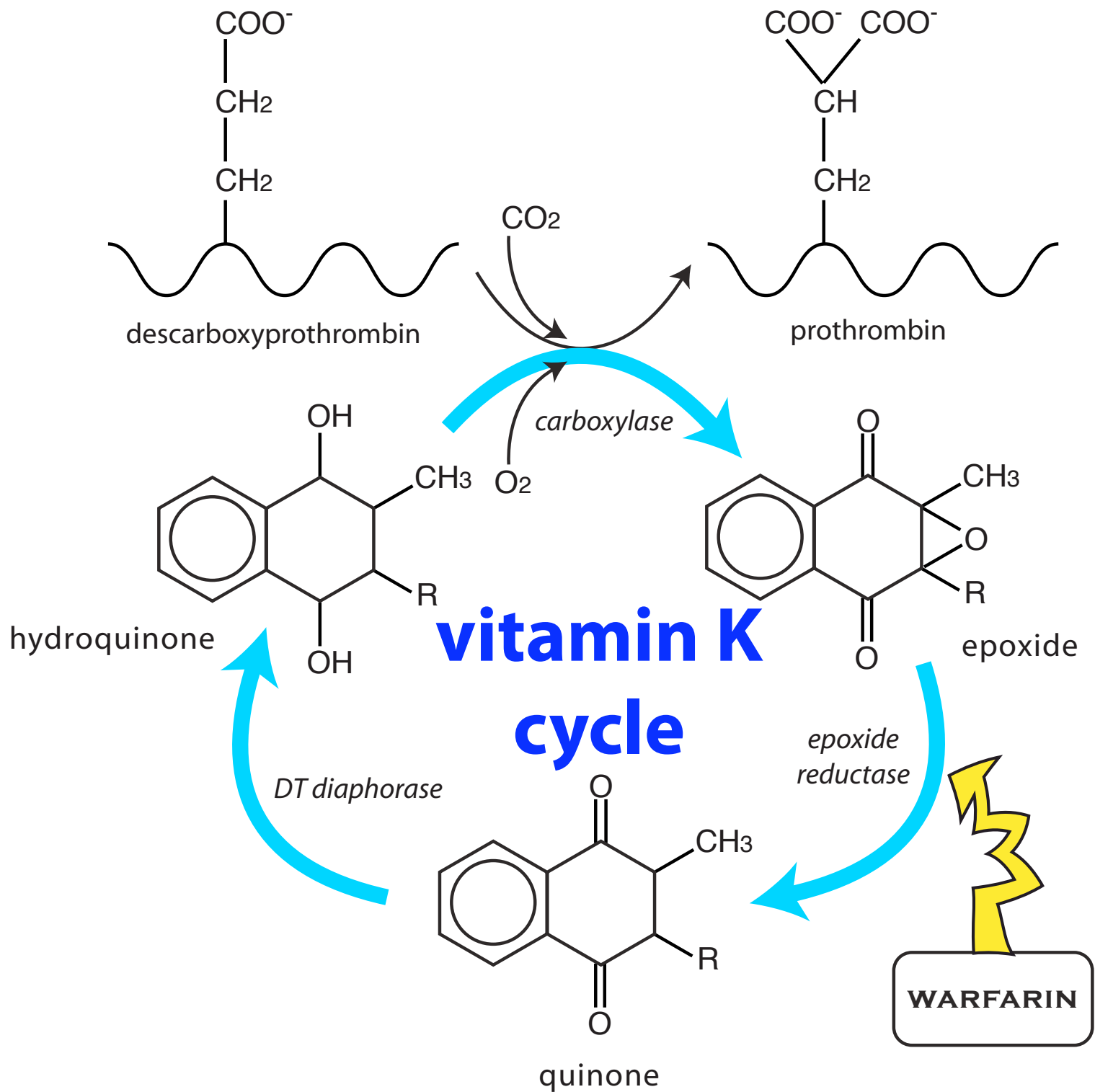
- **generally useless**
 - tranexamic acid for plasminogen overdose

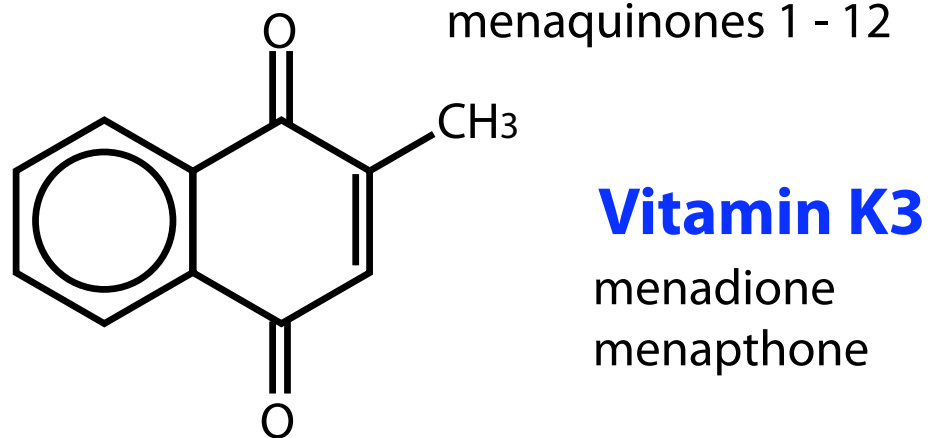
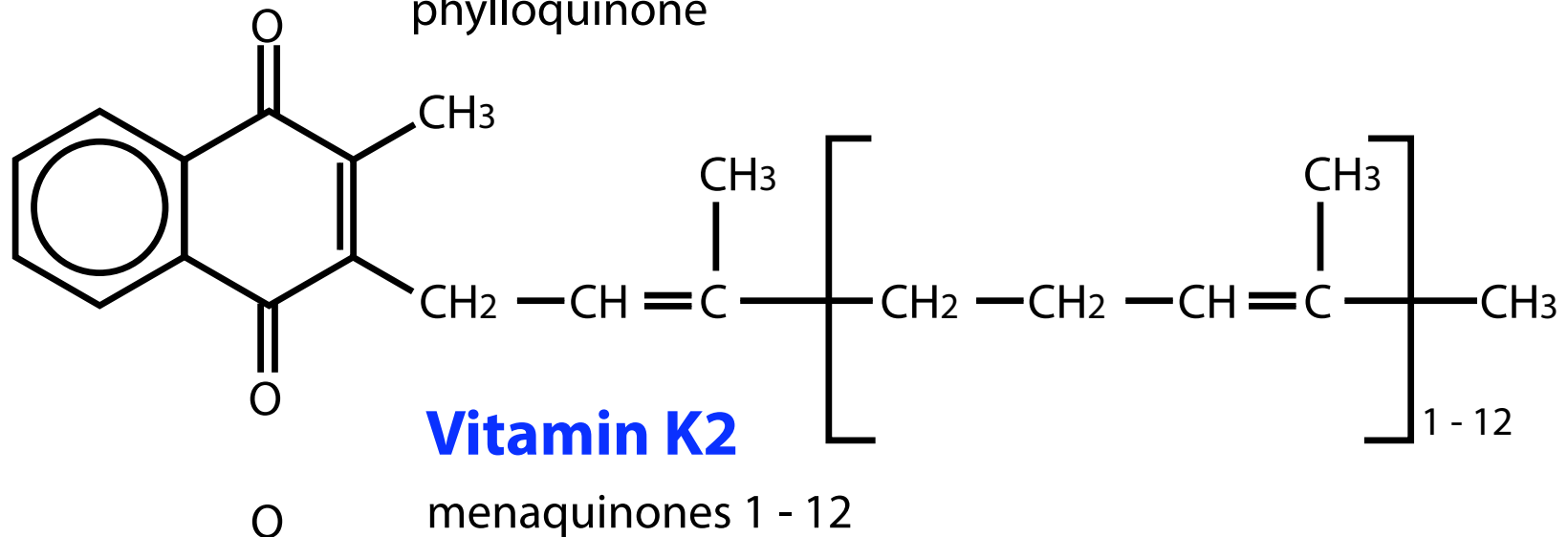
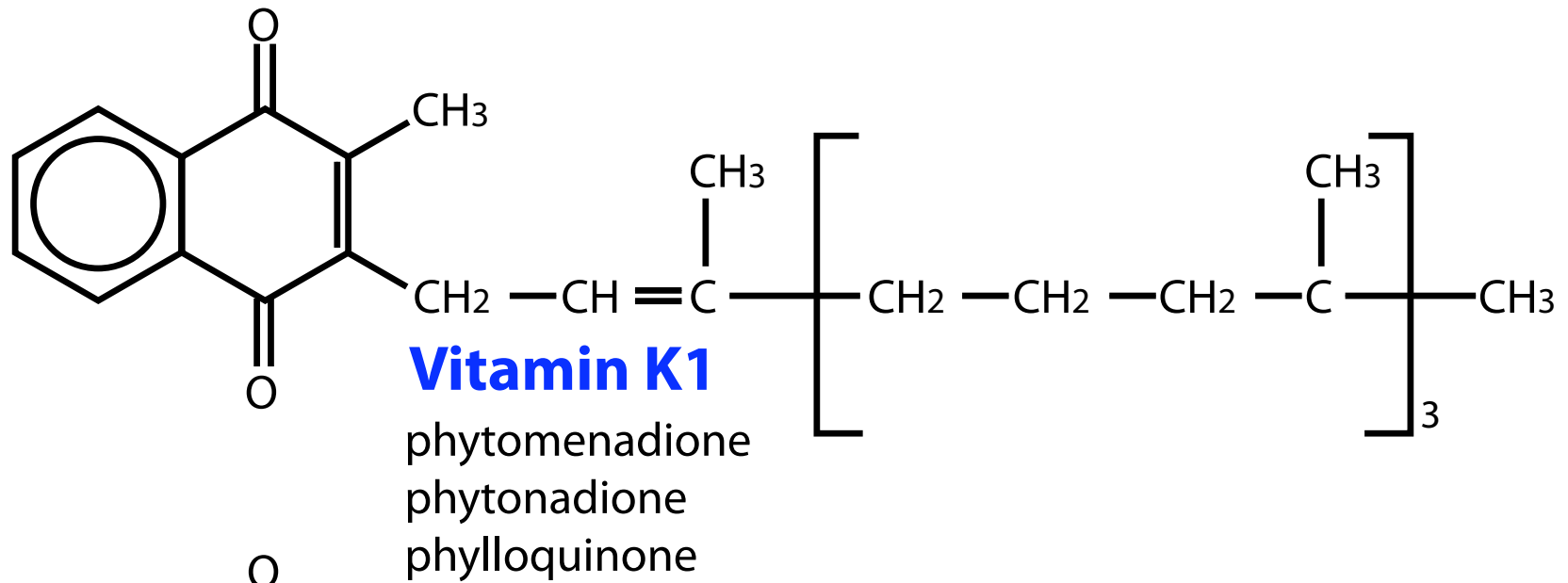


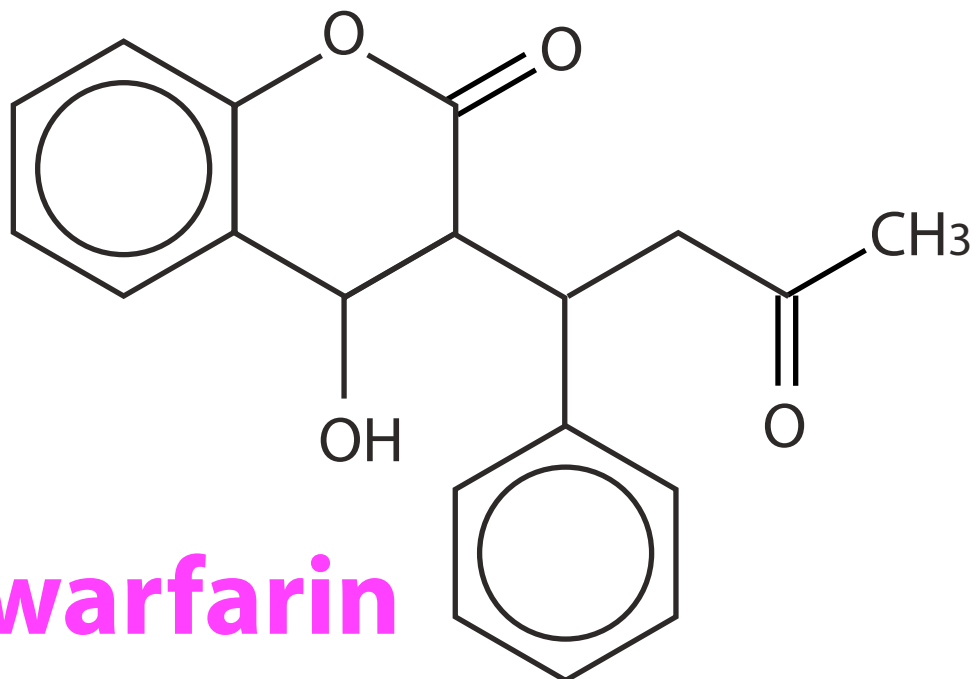
preventing clots

- **anti platelet drugs**
 - aspirin
- **parenteral anticoagulants**
 - heparin – antidote protamine
- **oral anticoagulants**
 - warfarin – antidote vit K1 – phytomenadione

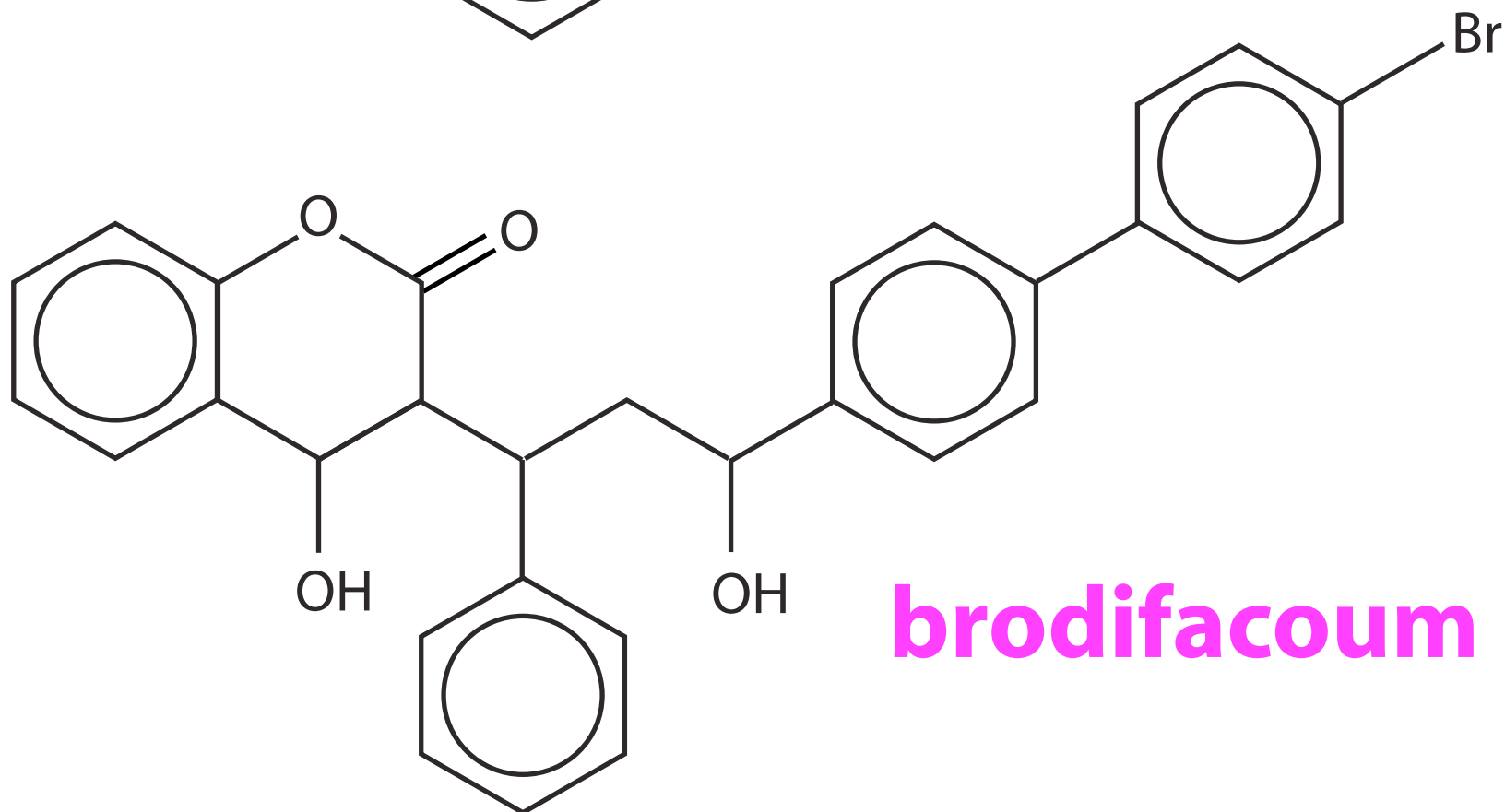








warfarin



brodifacoum

treating clots

- alteplase (rTPA)
- streptokinase
- urokinase
- must be given within minutes
- overdose fatal
- too expensive to use



in vitro anticoagulants

- **used for blood collection**
 - acid citrate dextrose
 - citrate phosphate dextrose
 - citrate
 - (EDTA)
- **chelate calcium**
 - also after administration



anaemia

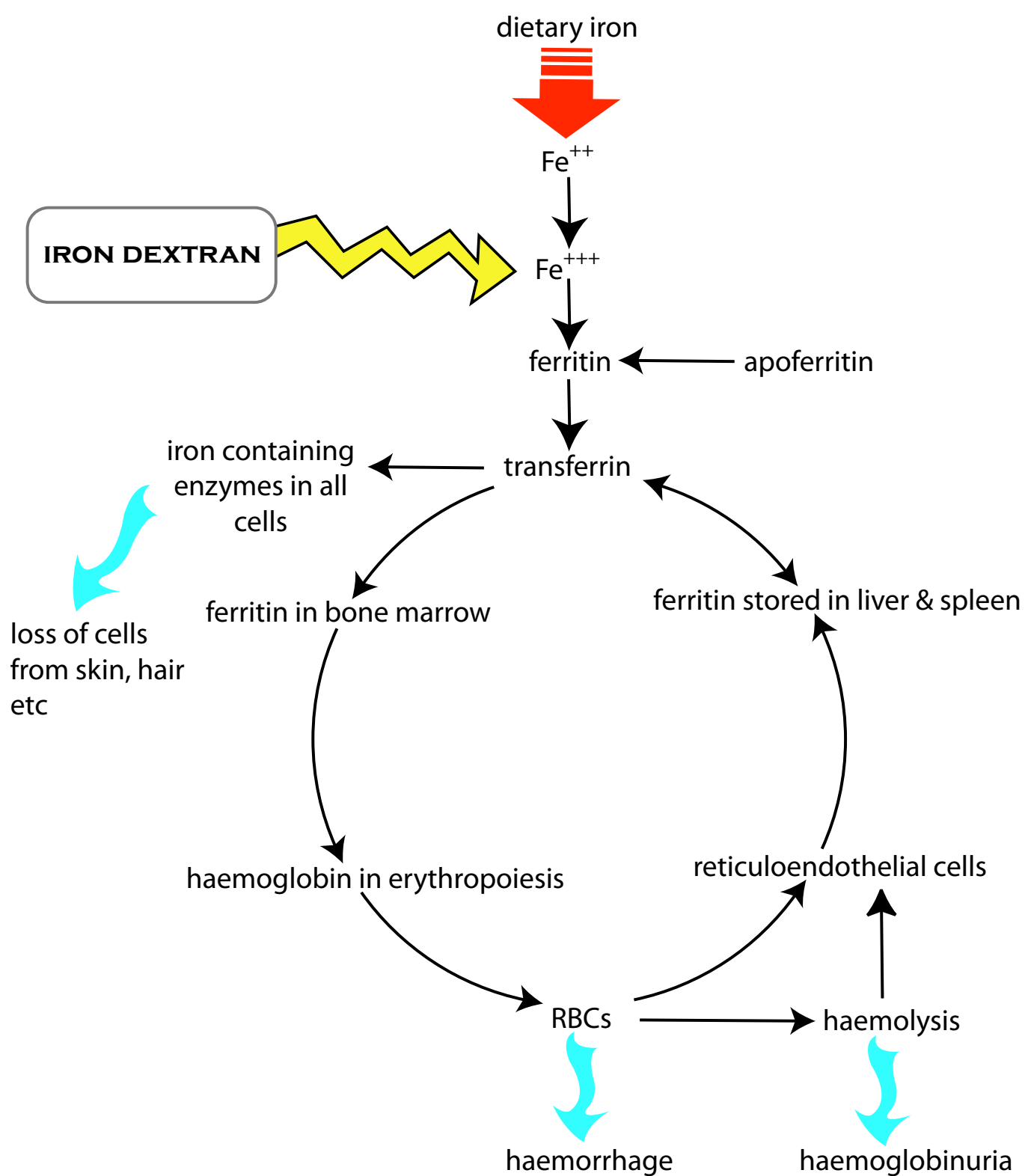
- iron
- vitamin B12 / cobalt
- folic acid



anaemia

- **iron**
 - piglets
 - (chronic bleeding)
 - overdose – give desferrioxamine
- **vitamin B12 / cobalt**
- **folic acid**





anaemia

- iron
- vitamin B12 / cobalt
 - gut disease / antibiotics in small animals
 - Co deficiency in ruminants
- folic acid
 - gut disease



anaemia

- **anabolic steroids**
 - nandrolone etc
 - do not use in food animals
 - abused by people
- **erythropoietin**
 - too expensive to use
 - counterproductive in horses
 - abused by people
- **lithium?**



1 yr old labrador

- being speyed
- ovarian artery ruptures
- massive bleeding



problems

- hypovolaemia



treatment

- surgical ligation
- iv fluids



30 mins later...

- artery finally ligated
- 3L fluids given
- PCV 12%



problems

- anaemia
- diluted clotting factors
- prolonged clotting times



treatment?

- wait and hope
- whole blood
 - ACD / PCD?
- fresh frozen plasma



monitoring

- CVP
- PCV
- clotting times



5 yr old collie

- farm dog
- sudden collapse



examination

- pale mucous membranes
- pulse 220 bpm
- harsh lung sounds
- petechial haemorrhages



dog's neck



problems

- clotting disorder



diagnosis

- **access to rat poison?**
 - brodifacoum
- **autoimmune haemolytic anaemia?**



treatment?

- whole blood?
- fresh frozen plasma?
- vitamin K?



blood

- in vivo anticoagulants – aspirin, heparin, warfarin
- catheters – heparin
- blood collection – ACD / CPD
- coumarin poisoning – fresh whole blood & vitamin K1
- anaemia – blood, iron, vit B12, anabolic steroids

