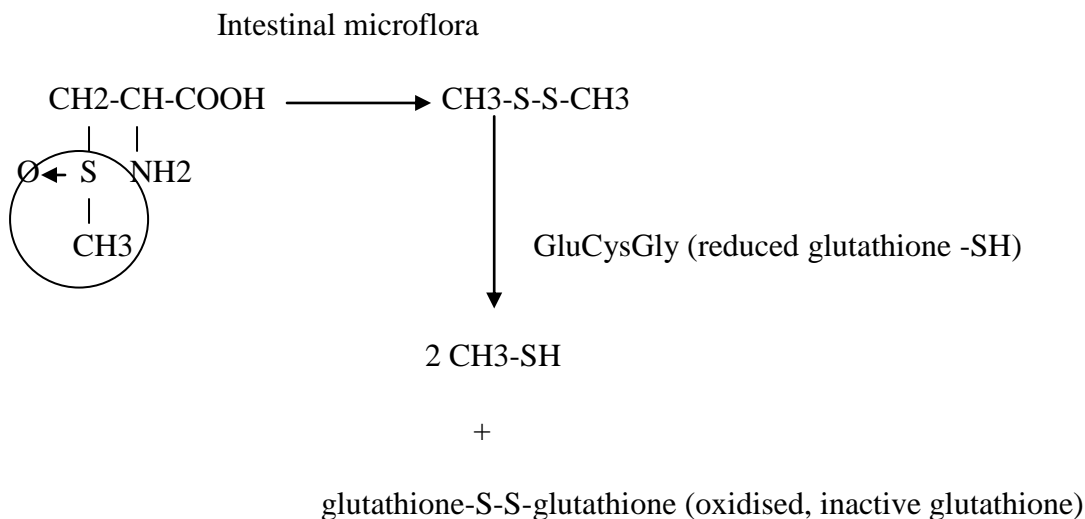


Practice No. 10

Rape toxicosis, botulism, zootoxins

Rape toxicosis

- Occurs especially in roe deer (wild ruminants)
- Caused by hybrid 00 (no erucic acid, no glucosinolates), most often grown
- Problem in winter – winter varieties are grown (no other source of food)
- Rape contains a lot of proteins and sugars, no pulp/fiber and this is the source of GIT problems: diarrhoea, tympania, foaming fermentation, which may, in young, old, pregnant or ill animals, lead to death
- Long-lasting intake causes chronic intoxication due to toxic amino acid S-methylcysteinsulfoxide (S-MCSO)
- S-MCSO is changed by bacterial microflora to dimethyldisulfide, which interacts with sulfhydryl (-SH) groups of body proteins, especially of glutathione
- Decreased levels of reduced glutathione results in oxidative stress, which is dangerous especially for erythrocytes, the result is haemolytic anaemia
- Released hemoglobin and iron are cummulated and iron deposits in liver, kidney and spleen in form of haemosiderin
- Haemosiderosis decreases function of liver and kidneys – failure of those organs
- Cumulation of ammonia (hepatopathic encephalopathy) and urea (uraemia) lead to brain damage and neurological signs (apathy, loss of reflexes, blindness, death)
- Treatment can be symptomatic, but it is not common – prevention is better
DO NOT GROW RAPE ON BIG AREAS CLOSE TO FORESTS !!!



Botulism

- Botulotoxin - one of the most potent poisons in the world (LD in ng/kg)
- Produced by Clostridium botulinum
- Birds and mammals mainly sensitive to it, but can be toxic also to fish
- The most sensitive species is horse

- Types A-G(H)
 - Types A, B, E, F, G, H toxic for humans
 - Types B, C, D for cattle
 - Type B, C (A) for horses
 - Type C for birds and carnivores
- Poisoning are less common in humans, toxin is destroyed by boiling for 10 minutes
- Usually affects animals bred at home (due to incorrect storage of their food, esp. meat, meat cans and other preserved food) and herbivores (bacteria on hay contaminated with soil or cadavers) and water birds (anaerobic sediment in eutrophicated ponds, invertebrates, maggots from cadavers)
- Botulism is a typically alimentary intoxication, but wound form and toxoinfectious (infant) form may appear as well
- In case of alimentary poisoning, toxin is swallowed with contaminated food
- In stomach it is released from bacterial cells by hydrochloric acid and is absorbed right into the blood (doesn't damage gastric mucosa)
- Its final destination is peripheral nervous system
- Botulotoxin inhibits acetylcholine release from nerve endings and causes blockage of neurotransmission, which leads to paralysis of muscles

Clinical signs:

- Among first signs of intoxication belong apathy and fatigue
- Later loss of stability and paralysis. In birds we can easily distinguish paralysis of muscles of neck – so called Soft/Limber neck, later paralysis of wings
- Pupil is mydriatic and the loss of palpebral reflex comes up lately. The eye stays open and cornea dries up
- Typical sign is paralysis of mimic muscles, animal cannot swallow spits, breathes with opened mouth, tongue hanging out.
- Death comes due to collapse of respiration muscles
- Symptoms generally begin 18 to 36 hours after eating a contaminated food, but they can occur as early as 6 hours (acute high dose poisonings) or as late as 10 days (wound or toxoinfectious form)

Pathology:

- Any specific finding

Treatment:

- In most of the animals mainly symptomatic
- Gastrolavage or emetics only if there are still no signs of paralysis – otherwise risk of respiratory pneumonia
- Activated charcoal
- Physostigmin – inhibits Acetylcholine esterase = acetylcholine stays longer on synapsis
- Antitoxin
- Keep animal in calm, cover with cloth, food is given parenterally
- Recovery may take several weeks

Zootoxins

Snake toxins:

- More than 80 % of snakes have glands with venom
- These glands derived from salivary glands
- Two types of venomous teeth – with a ductus inside the tooth or with a groove on its surface
- Native toxin is a fluid of white to orange colour
- While staying on air, quickly loses its strength – proteolytic enzymes contained in poison
- For medicinal purposes we keep it exsiccated
- Active parts of poison are proteins and enzymes
- Effects on many body systems – neurotoxins, haemotoxins, cardiotoxins are most common
- In middle Europe the most common is viper

Common viper:

- Its venom consists of haemorrhagins – directly affect endothelium of vessels (mainly caused enzymes) – increased permeability, loss of fluids, oedemas
- Then of circulatory toxins – vasodilating effect, cause rapid decrease in blood pressure and circulatory collapse
- Venom releases histamine and bradykinine from tissues – also vasodilatation, paralysis of smooth muscles of veins
- Coagulative agents (phospholipase A, glycoproteins)
- Neurotoxins – destroy lipids in CNS and cause lack of ATP in mitochondria (not typical for common viper, mainly exotic snakes)

Clinical signs:

- Pain of affected place, oedema, petechias, necrosis or gangrene
- Complex signs: epistaxis, cough due to bronchospasmus (histamine, bradykinine), decreased blood pressure, colic, paralysis, coma
- Anaphylactic shock (type of allergic reaction) can appear in sensitive animals or people

Treatment:

- Immobilization of affected leg, No ligature, No incision!
- Application of antiserum, corticoids, central analeptics, blood transfusion, adrenalin in anaphylactic shock
- !!! Beware of allergic reactions due to antiserum application, sometimes can cause anaphylactic shock worse than primary bite !!!
- Careful monitoring of all the vital functions during whole hospitalization

Honey bees, wasps, hornets:

- Only females have the poison, which forms 30 % of their body weight
- Three parts of venom:
 - F1 mellitin

- F2 enzymatic fraction (lipase, phospholipase, lyase)
- F0 protein fraction (less toxic)
 - also histamine, acetylcholine, serotonin, apamine - cytotoxic effect
- Mellitin is a protein mixture, no aminoacids with sulphur. It is a haemolytic agent, damages blood and lymphatic veins, causes decrease of blood pressure and respiration collapse
- These toxins are potent allergens and often cause anaphylactic shock
- Clinical signs and treatment similar to those in snakes

Scorpions:

- Mainly neurotoxic peptides
- Enzymes: phospholipase A, hyaluronidase
- Aminoacids
- Histamine, serotonin
- Blockage of neuromuscular platelet - Na⁺, Ca²⁺ or K⁺ channels
- Intoxication in 5-30 minutes
- Clinical signs similar to those in snakes
- Treatment: antiseptics, analgesics, atropine, calcium, steroids

Spiders:

- Again neurotoxins (mainly peptides and aminoacids)
- Clinical signs and treatment similar to those described above (snakes, scorpions)