# BASIC PRINCIPLES OF TOXICOLOGY 227.305

Kathy Parton



## Introduction to Toxicology

- Toxicology
- The study of harmful interactions between chemicals and biological systems.
- \* "The dose makes the poison"

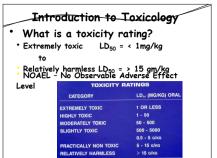
## Introduction to Toxicology

- What factors affect toxicity?
- What is a LD<sub>50</sub>?
- dose that is lethal to 50% of animals
- What is a dose-response relationship?
- the effect of the poison is proportional to dose of poison

#### Introduction to Toxicology

- The dose-response
- The quantity of the poison is related to a measurable effect in the animal

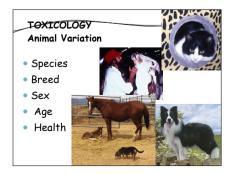




## Introduction to Toxicology

- How does the exposure alter the toxicity?
- acute vs chronic
- How does the route of exposure impact on toxicity?
- e.g. oral vs dermal





## PRINCIPLES OF TOXICOLOGY

- · Stabilise the animal
- · Limit Exposure
- Limit absorption
- Promote elimination
- · Identify the poison

## PRINCIPLES OF TOXICOLOG

#### Treatment

Successful treatment - the four principles:

- Prevent absorption of poison
- Treat the clinical signs
- "TREAT THE PATIENT NOT THE POISON
- Identify the poison
- Give antidotes when available

## LIMIT EXPOSURE

Oral Route of Exposure

Emetic? Up to 4 hours post ingestion

Activated Charcoal?

- Gastric lavage?
- Up to 2 hours post ingestion
- Dilution?

Dilution (caustic or corrosive)



бУ	
r	
٧"	
mal's wt poison	
poison 60 ount e frame	

## LIMIT EXPOSURE

Emetics

#### Contraindications:

- · Caustic or Corrosive?
- Petroleum?
- · CNS depression?
- CNS seizures?

## LIMIT EXPOSURE.

Emetics

In The Home:

- · Washing soda (Na Carbonate)
- · Hydrogen Peroxide (3%)
- · Dishwashing liquid in water
- Ipecac
- · Table salt ??



## LIMIT EXPOSURE

• Emetics-In the Veterinary Clinic:

Apomorphine



Xylazine



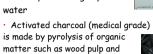
## LIMIT EXPOSURE

- Gastric Lavage:
- Intubate to prevent aspiration
- · Right lateral recumbency
- Body inclined 20 degrees (head down)
- · Warm water or saline flushes
- · If indicated give activated charcoal

## LIMIT ABSORPTION

Activated Charcoal

Black powder slightly soluble



exposure to steam or oxygen · Surface area is 1,000 M<sup>2</sup> per



## LIMIT ABSORPTION

Activated Charcoal

- Constipating effect
- · Binding to poison is reversible
- · Laxative (e.g. sorbitol) to aid elimination

Adsorbs materials from water and air Do not mix and allow to stand



## LIMIT ABSORPTION

Activated Charcoal (Carbosorb)

#### Exceptions to efficacy:

- · Acids and alkalies
- · Alcohol and ethanol
- Petroleum
- · Metals like iron, mercury



#### LIMIT ABSORPTION

Activated Charcoal (Carbosorb)

#### Contraindications:

- No bowel sounds
- · Corrosive ingestion
- · Abdominal trauma
- Hypotension, dehydration (with Sorbitol)

(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	

## LIMIT ABSORPTION

Activated Charcoal (Carbosorb)

#### Adverse effects:

- Black Stools
- Constipation
- Hypernatraemia
- · Diarrhoea (sorbitol)
- · Electrolyte imbalance (sorbitol)



## LIMIT ABSORPTION

Ion Exchange Resins

- · Cholestyramine (Questran)
- · Efficacy:
- · Antibiotics, phenobarbital
- Digoxin, thyroxine, pesticides
- E. coli enterotoxin, warfarin

## LIMIT ABSORPTION

Cholestyramine (Questran)

- •Contraindications:
- Dehydration
- · Constipation



## DECONTAMINATION

## **EYES**

- Copious amounts of physiologic saline
- OR warm water
- Flush for 15 minutes

## DECONTAMINATION



#### DERMAL

#### NON-OILY COMPOUNDS

- · Wash with copious amounts of water
- · Mild detergent as needed, rinse well

#### DECONTAMINATION

#### **DERMAL - OILY COMPOUNDS**

- · Cooking oil or liquid paraffin
- · Wash with mild detergent
- · Rinse with warm water



## DECONTAMINATION

## "ANTIDOTES"



- · Acetyl cysteine (Parvolex) (paracetamol)
- · Acetamide (1080)
- Ethanol (ethylene glycol)
- · 4- methylpyrazole (ethylen Konakion MM
- Vitamin K



## DECONTAMINATION CHELATORS

**Chelation therapy** is the administration of chelating agents to remove heavy metals from the body.

- British Anti-Lewisite (BAL) (lead, arsenic)
- Calcium EDTA (lead, zinc)
- d-Penicillamine (lead, zinc, copper, iron )
- Dimercaptosuccinic acid (DMSA) (arsenic, copper, lead)

Poison Information: New Zealand Poison Centre Urgent only 0800 764 766 Non-urgent 03 479 7248 (9-5) USA - National Animal Poison Control Center www.apcc.aspca.org **DECONTAMINATION** SUMMARY THOROUGHLY DECONTAMINATE • Emetics (apomorphine, xylazine) · Activated Charcoal and sorbitol · "Treat the Patient not the Poison." Case example of a "poisoned" dog: Owner thinks the dog has eaten a rodenticide. What questions do you need to ask? • If the dog ate 4 blocks of Talon, what do you need to know?





## Introduction to Toxicology

#### Issues to think about:

- Prevalence of poisonings in vet practice?
- What issues or questions arise in cases of poisoning?