ANIMAL POISON CONTROL CENTER | ASPCA

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# APCC Decontamination Guidelines

## Ocular exposures

Most ocular exposures to toxic compounds involve only the superficial layers of the cornea or conjunctiva. However, damage can range from mild irritation to severe damage.

Immediate irrigation should be performed. This can often be initiated by the pet owner, followed by more extensive irrigation by the veterinarian. Body-temperature tap water, lactated Ringer's solution, or normal saline may be used for irrigation. The eye should be rinsed with copious amounts of appropriate fluid for 20-30 minutes. A fluorescein stain should be performed to monitor for corneal damage and appropriate treatment instituted.

## Dermal exposures

Bathing is the standard method of decontamination for dermal exposures. Animals should be stabilized and assessed prior to initiating the bathing procedure. The stress of bathing may not be tolerated well by some debilitated animals.

Liquid hand dish detergents are superior to shampoos or hand soaps for removal of greasy substances. Insecticidal shampoos, or detergents designed for automatic dishwashers should never be used as these are too alkaline. Citrus based cleaners should be avoided. Solvents, such as mineral spirits, turpentine, gasoline, goo gone®, can damage skin and are therefore not indicated.

Repeated bathing may be required in some instances. Each bathing should be followed by a thorough rinsing to remove residual detergent. The animal should be dried well and kept warm following the procedure.

In the case of some sticky or viscous substances bathing alone may not be sufficient. Hand cleaners such as Goop® or Go Jo® may work well to remove some thick, petroleum based products. Also, vegetable oils can be used to initial remove the substance. Use of hand cleaners should be followed by thorough detergent bathing.

In some cases clipping or shaving the hair coat may be required to remove the offending substance.

## Oral exposures

One of the most important aspects of managing a toxicosis is to prevent further exposure by removing the toxic substance from the body, or, in other words, decontaminating the animal. A number of measures can be taken to reduce exposure whether by the oral, dermal, or ocular routes. However, there is no one correct approach to decontamination.

Circumstances of exposure vary from case to case, requiring *that* the process be adapted for the needs of the individual patient. Once a toxic substance is in the gut, several measures can be taken to remove the material, bind it to make it unavailable for absorption, or hasten passage through the gut.

Induction of emesis is one of the quickest, easiest and safest methods of removing undesirable materials from the stomach. However, as with any medical procedure, there are several considerations that the clinician must undertake before inducing emesis.

*Emesis is **contraindicated** if:*

1. the animal is exhibiting clinical signs of either nervous system excitation or depression. The stimulation of inducing emesis in an animal that is showing signs of excitation may, in some cases, initiate seizure activity, and subsequent aspiration of vomitus. On the other hand, animals exhibiting signs of CNS depression may have a compromised gag reflex and also risk aspiration of vomitus. To go along with this, ingestion of a rapidly acting stimulant is also a contraindication, because by the time the emetic takes effect and the animal begins to vomit, signs of CNS stimulation may be present.

2. a volatile hydrocarbon has been ingested. Volatile hydrocarbons are generally aromatic (ring structure) or short chain aliphatic (linear) molecules that readily evaporate at normal temperatures and pressures. Some examples are paint thinner, mineral spirits, and mineral seal oil. The thicker the substance, the less risk of aspiration (i.e., petroleum jelly is less of a hazard than mineral spirits).

3. a corrosive or caustic agent has been ingested. Corrosives (acids) and caustics (alkalis) can cause coagulative and liquefactive necrosis of mucosa and submucosa. In addition, cationic detergents are strong surfactants that disrupt cell membranes in the intracellular matrix of mucosal epithelial cells. These agents can result in severe oral burns, but the primary tissue of concern is the esophagus, which is thin walled and friable. Esophageal damage can result in scar tissue deposition upon healing, and stricture formation. If it has the potential to burn on the way down, it can burn on the way back up!!!

4. the species being treated cannot vomit (i.e., rabbits, rodents, horses, ruminants).

*Emesis is **not recommended** or is of **questionable benefit** if:*

1. the animal has already vomited.

2. the animal has a pre-existing medical condition that may make vomiting hazardous (e.g. severe cardiac disease, megaesphogus).

3. the exposure was via inhalation or intravenously.

4. the exposure occurred too long ago to be useful. This varies greatly with the agent. For most medications emesis is not useful after two hours; rodenticides up to four hours, and chocolate 6-8 hours. Other exceptions may include ingestion of extended release medications, or some plant materials which digest slowly.

## *Emetic agents*

1. **Hydrogen peroxide** (3%)

Hydrogen peroxide works by locally irritating the stomach resulting in emesis. Before use, hydrogen peroxide should be checked to be sure that it is still active by pouring a small amount into a sink or placing it on a small cut and observe for bubbling. Hydrogen peroxide can be administered by the DVM or at home by the animal owner using a small amount of a tasty substance such as milk or peanut butter to encourage consumption. If that fails, a syringe or turkey baster can be used. Recommended dosage is 1-2 ml/kg (0.5 -1 ml/lb) orally for dogs; the maximum dose is 45 ml (3 tablespoons). Emesis usually occurs by 15-20 minutes. The dosage can be repeated once if vomiting has not occurred. Gentle agitation (walking) often promotes the process.

Hydrogen peroxide should be used with extreme care in cats as severe hemorrhagic gastritis can result. It should never be repeated.

2. **Apomorphine hydrochloride**

Apomorphine is a commonly used emetic in the dog. It works through stimulating the dopamine receptors in the chemoreceptive trigger zone (CRTZ). It does not work well in cats due to vomiting in cats being mediated by alpha receptors. The most common route of administration is via instillation in the conjunctival sac. The tablet (6 mg), or portion of the tablet, is placed directly in the conjunctival sac. Alternatively, the apomorphine can be dissolved in water and instilled. Following emesis, the tablet is removed, and the sac rinsed. Apomorphine can also be administered intravenously (0.03 – 0.04 mg/kg), intramuscularly (0.04-0.08), or subcutaneously (0.08 mg/kg). CNS depression (or excitation in cats) is possible, and can be reversed with naloxone. However, naloxone will not stop the emesis.

3. **Xylazine hydrochloride**

Xylazine hydrochloride (Rompun®) is an alpha-2 adrenergic agonist sedative. It has been recommended as an emetic in cats (0.44 mg/kg IM). Sedation can be reversed with an alpha-2

adrenergic blocker such as yohimbine (0.25-0.5 mg/kg, SQ, IM) or atipamexole (0.05 mg/kg IM). Xylazine is not a reliable emetic in dogs.

4. **Syrup of Ipecac**

No longer routinely recommended. No longer available in the US.

5. Others (the above are safer and more reliable)

a. **Sodium chloride** (table salt). It has resulted in sodium ion toxicosis with severe hypernatremia.

b. **Liquid dishwashing soap**. Inconsistent emesis.

c. **Fingers or other objects in back of throat**. Risk of injury to human and animal.

**►Emetics rarely remove all material from the stomach, and may actually propel ingesta into the duodenum. Therefore, other measures to evacuate the stomach, or bind the material in the gut are required. Even after a successful emesis, close monitoring and treatment of the patient are usually required.**

### *Dilution*

Dilution with milk, water, or liquid from water-packed tuna fish is recommended in cases of ingestion of corrosive or irritant products, exposure to toad secretions, or taste reactions due to topically applied products (e.g. “foaming kitties” following flea spray application). Dilution with milk may also aid in relief of oral discomfort secondary to chewing on plants that contain insoluble calcium oxalates in their leaves (e.g. *Philodendron* spp.). For birds and reptiles, juicy fruits and vegetables can be fed to accomplish dilution.

### *Gastric Lavage*

Gastric lavage is the evacuation of stomach contents by gastric intubation and irrigation. It is generally not as effective as emesis. The same time restrictions for lavage as for emesis should be observed.

*Gastric lavage is **indicated** if*: emetics have failed, the animal is exhibiting clinical signs, other conditions prevent the safe use of emetics. It is generally restricted to large, life-threatening ingestions.

*Gastric lavage is **contraindicated** if*: the substance is caustic/corrosive, or a volatile hydrocarbon. Large, chunky material may not be adequately retrieved by gastric lavage.

Procedure:

1.) Perform procedure on an anesthetized or unconscious animal.

2.) Place a cuffed endotracheal tube to prevent aspiration of stomach contents.

3). Pass a large bore stomach tube. Keep the animal's head lower than their chest.

4.) Allow gravity to instill warm water into the stomach and allow it to mix with stomach contents. Use approximately 5-10 ml/kg of fluid per rinse.

5.) Allow fluid to drain from tube, and repeat procedure until water comes out clear. The approximate amount of fluid used for lavage should be retrieved.

6.) Administer activated charcoal prior to tube removal. Occlude end of tub while withdrawing.

7.) Save retrieved fluid for future toxicological testing.

Risks: The procedure may result in esophageal perforation or accidental tracheal intubation.

## *Enterogastric lavage*

Enterogastric lavage is an extension of gastric lavage, such that the intestines are also decontaminated.

Procedure: 1.) Perform standard gastric lavage. Leave lavage tube in place.

2.) Perform tepid water enema.

3.) Attach enema tube to faucet with an adapter and provide continuously running water at low pressure. Apply mild digital pressure around anus to keep water flowing into tube. Intestines will fill with water.

4). Atropine at 0.02 mg/kg IV may be required to relax smooth muscle of GI tract.

5.) Observe for fluid running out of gastric tube. Continue until fluid runs clear.

***Contraindications*** are similar as for gastric lavage.

## *Adsorbants*

***Activated charcoal (AC)***

Activated charcoal is produced by treating carbonaceous compounds with steam and acid creating a highly porous material, capable of trapping a wide range of organic substances.

Powdered and liquid AC products have surface binding areas of 900 – 1500 $m^2/g$. Tablet and capsule formulations have surface-binding areas of only 2-4 $m^2/g$, making them unsuitable for the treatment of poisoning.

Burnt toast, charcoal briquettes, or wood ashes are inert and **NOT** a substitute for activated charcoal. At home use of over-the-counter AC preparations are generally not recommended as the number of tablets that are needed to be administered may be excessive. In addition, aquarium charcoal is not recommended.

Not all toxic substances adsorb equally to AC. In general, small molecules, alcohols (ethanol, methanol, isopropanol, glycols such as ethylene glycol, and acetone), hydrocarbons (petroleum distillates, pine oils), metals, inorganic minerals, and corrosive agents do not adsorb well.

***Contraindications*** *to use of AC*: AC should not be used if:

1.) there is a significant danger of aspiration (as with volatile hydrocarbons).

2.) esophageal or gastrointestinal perforation is suspected.

3.) the animal is experiencing severe vomiting.

Dosage: 1-2 g/kg (1-2 tsp / 10 lb) of powdered AC mixed with 50 – 200 ml of water to make a slurry. Larger volumes are more likely to cause vomiting. Liquid preparations are also available. The recommended dose for ToxiBan® Suspension is 10-20 ml per kg (5-10 ml/pound). For delayed release substances, or those undergoing extensive enterohepatic recirculation, AC should be repeated every 6 – 12 hours at half the original dose. In these cases, AC can be administered for several days.

If clinical signs are apparent, administer with a stomach tube with the animal under sedation. Be sure a cuffed endotracheal tube is in place to prevent aspiration. Alternatively, administration with a syringe may be attempted, although this increases the risk of aspiration (especially if CNS signs already exist). Some dogs may readily ingest the charcoal product on their own (this seems to be the minority). Some AC products contain sorbitol, a non-absorbable sugar, making them more palatable. Some animals may ingest AC if mixed with a small amount of canned food.

Animals should be monitored for at least 4 hours after giving AC. Due to the presences of somatically active ingredients; AC can result in the shift of free water into the gut and result in severe hypernatremia. This may occur with single doses or multiple doses of AC and with or without added cathartics.

## *Cholestyramine*

Cholestyramine is an anion exchange resin available by prescription only. It is used as an adjunctive therapy for the lowering of serum cholesterol in patients with primary hypercholesterolemia who have not responded to diet or other measures alone. Cholestyramine is also indicated for use in the relief of pruritus associated with partial biliary obstruction. It has also been used to aid in the treatment of toxicoses in humans (amiodarone, digitoxin, iopanoic acid, kepone, chlordane, leflunomide, methotrexate, mycophenolic acid, piroxicam, tenoxicam, phenprocoumon, pfiesteria toxin, thyroid, Vitamin D, warfarin, blue-green algae, indomethacin).

Cholestyramine binds with bile acids in the intestine, preventing their reabsorption and producing an insoluble complex, which is excreted in the feces. Cholestyramine has been shown to decrease the toxicity of indomethacin in the dog. Animals are dosed ate 0.3 – 1 g/kg TID for several days (depends on toxin ingested). The powder should be given before feeding if possible or mixed with canned food. Cholestyramine is not absorbed out of the digestive tract, so it has no systemic effects other than possible constipation. If giving with activated charcoal alternate q 4 hours.

## *Cathartics*

Activated charcoal may bind substances in the gut, but it will not enhance passage through the gut. With time, AC may release its hold on the bound substance making it available for absorption. Usually AC is administered with a cathartic. Cathartics are agents that encourage the movement of materials through the digestive tract, causing evacuation of the bowels. If repeated doses of AC are administered, a cathartic should be added only to the first dose.

Cathartics are ***contraindicated*** if diarrhea or dehydration are already present, the ingested agent is also highly osmotically active (e.g. paintballs), or in the case of ileus or obstruction.

### *Osmotic cathartics*

Magnesium sulfate (Epsom salt) and sodium sulfate (Glauber's salt) are saline cathartics that act by increasing fluid retention in the gut. Epsom salts are available at most drugstores. The dosage of either salt is 250 mg/kg (0.25 tsp / 10 lb). The appropriate dose can be added to the charcoal slurry or as soon thereafter as possible. Use of magnesium sulfate for agents causing slowing of gut transit time, or in animals with renal insufficiency, may result in excessive absorption of magnesium. Hypermagnesemia may result in CNS and cardiovascular depression.

Sorbitol is a non-absorbable sugar that acts as an osmotic cathartic. Some AC formulations contain sorbitol. Sorbitol can also be purchased as a 70% solution at drugstores. Dosage of 70% sorbitol is 1-2 ml/kg (approximately 1-2 tsp / 10 lb). The sorbitol can be added directly to the AC solution.

### *Bulk cathartics*

Bulk cathartics act to "bulk-up" the ingesta, encouraging passage and offering protection to the gut following ingestion of physical objects.

Psyllium (Metamucil®) is a hydrophilic mucilloid-based laxative. Dosage for dogs is 3-10 gm (0.5 –2 tsp) and for cats is 3 gm (0.5 tsp) mixed with food every 12 – 24 hours.

Canned pumpkin (plain, without spices) can also be added to the diet.

### *Ion trapping*

The principle behind ion trapping is that charged molecules cannot cross biological membranes, and are thus trapped in a particular space. This is most often applied with reference to toxins excreted predominantly through the kidney, where they are "trapped" in the urine in their ionized form.

The following conditions apply for successful ion trapping:

1. the compound is excreted predominantly unchanged through the kidneys
2. the compound is a weak electrolyte with a suitable pKa
3. the toxicant is primarily distributed to the extracellular space and is not protein bound

Ion trapping is ***contraindicated*** when:

1. toxicant has a large volume of distribution
2. is strongly protein bound
3. is highly lipid soluble
4. is cleared primarily by tissue or hepatic metabolism

Attempts to alter urine pH requires monitoring of baseline urine and blood pH, serum sodium and potassium levels, and blood pressure.

**Acid diuresis** (useful for weak bases such as amphetamines)

Administer ammonium chloride (100 mg/kg every 12 hours PO).

*Must recognize that most patients already have a pre-existing metabolic acidosis*.

**Alkaline diuresis** (useful for weak acids such as phenobarbital)

Administer sodium bicarbonate (1-2 mEq/kg added to intravenous fluids over 6 hours).

*Complications* include volume overload, hypernatremia, decreased serum ionized calcium, decreased oxygen delivery to tissues, paradoxical CNS acidosis, hypokalemia.

*Contraindications* include: existing metabolic alkalosis, hypokalemia, hypocalcemia.

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