Oral Gavage - Rodent

IACUC Approved: 11/14/2022

A. Introduction:

Oral gavage is used when a specific volume of an agent needs to be administered directly into the lower esophagus or stomach. Whenever possible, alternatives such as purchasing custom-made chow containing the experimental agent, providing a palatable mixture (e.g. flavored gelatin or nut butter) that is voluntarily consumed or dosing with a water bottle should be considered. Some materials can be introduced only into the animal's mouth and voluntarily swallowed.

Oral gavage may only be performed by trained personnel. Please contact OLAC for assistance with training.

B. Materials:

i. Gavage needle of the correct size for the animal

It is important that the gavage needle be both the correct length and diameter. The choice of whether to use a rigid or flexible gavage needle or to use a straight or curved gavage needle is according to operator preference and the needs of the study. Gavage needles are available in disposable plastic or reusable stainless steel. Flexible plastic gavage needles (mice or rats) or red rubber feeding tubes (for rats) have less chance of damaging the esophagus than stainless steel gavage needles, but animals may bite through them and they require some practice to use effectively. Gavage needles should have a ball or pear-shaped smooth rounded tip to prevent injury to the esophagus and other tissues. Care should be taken if using disposable flexible catheters for oral gavage as they may not have a smooth rounded tip. See Figure 1 below.

Recommended Mouse Gavage Needle Sizes

Weight (g)	Gauge	Length (inches)	Ball Diameter	Shape
to 14	24	1"	1 ¼ mm	Straight, Curved
15-20	22	1-1 ½"	1 ¼ mm	Straight, Curved
20-25	20	1-2"	2 ¼ mm	Straight, Curved
25-30	18	1-2"	2 ¼ mm	Straight, Curved
30-35	18	1-3"	2 ¼ mm	Straight, Curved

Recommended Rat Gavage Needle Sizes

Weight (g)	Gauge	Length (inches)	Ball Diameter	Shape
50-75	20	1-1 ½"	2 ¼ mm	Straight, Curved
75-100	18	1-1 ½"	2 ¼ mm	Curved
100-200	18	2-3"	2 ¼ mm	Curved
200-300	16	3-4"	3 mm	Curved

Note: For neonates smaller tubes may need to be used. Consult with OLAC and SDSU veterinarians for recommendations if needed.

Figure 1
Assorted sizes and types of gavage needles. Note that the end of the gavage needle is blunted with a round or tear-drop shaped tip to prevent esophageal trauma during insertion

ii. Pre-filled syringes, with the fluid or agent
iii. Permanent Marker
iv. Scale
v. Personal protective equipment (PPE), gloves, eye protection, mask, other PPE as indicated by EH&S for specific animals and agents used.

C. PROCEDURE:

1. After donning indicated PPE, weigh the animal and determine the appropriate dosing volume and gavage needle size. Gavage volumes should not exceed 1% of body weight (example, a 20 gram mouse may have 0.2ml administered). Giving the least volume indicated is recommended as higher volumes can result in rapid shunting of the compounds to the duodenum and/or increase the chances of aspiration pneumonia associated with passive reflux of the material into the esophagus. The maximum volume should be reduced for pregnant animals.

2. To confirm the appropriate length of gavage needle, measure the distance between the corner of the mouth (Fig. 2.a) or the tip of the nose (Fig. 2.b) to the last rib or xyphoid process. The needle should be no longer than this to reach to stomach. Using a permanent marker, mark the needle or tubing at the correct length and do not insert past this point to avoid perforation of the stomach.

Figure 2.a

Figure 2.b

3. Restrain the animal. Use a single-handed restraint technique to hold the rat or mouse. Firm manual restraint with immobilization of the head, without affecting the airway, is necessary.

4. Extend the head and neck. Keep the nose, head and spine aligned so that the esophagus is straight. DO NOT allow the rodent to tip back as you perform the gavage.

5. Use a free hand to guide the ball-tipped gavage needle into the animal's mouth. Position the needle toward the center and run the ball along the roof of the mouth, then up and over the base of the tongue and gently down into the esophagus. Never force the gavage needle down the esophagus; allow the animal to swallow as you carefully guide it down.

6. Advance gently without resistance. If there is **ANY** resistance or the animal struggles, the gavage needle should be withdrawn and another attempt made. If there is difficulty advancing the needle, the ball may be too large. Don't hurry this procedure; if you accidentally place the needle in the trachea or lungs, you may drown the animal. If you use too much force or lose control of either the needle or the animal, you may tear the esophagus.

7. Administer the compound slowly. If fluid appears in the mouth around the gavage needle it is likely in the trachea; immediately withdraw the needle and gently rotate the animal so the head is facing down so fluid can drain out. Observe animal closely. A second dosing attempt after fluid has entered the trachea is not recommended. Once successful administration is complete, pull finger away from syringe plunger before withdrawing the gavage needle. Always pull the needle straight out and never aspirate the needle.

8. Observe the animal for normal respiration and coloration prior to returning to home cage. If there is difficulty breathing (gasping for air, blue mucus membranes) there is possibility the trachea was entered, and the animal should be immediately euthanized.

9. Observe the animal again after 24 hours. If the animal has abdominal distension or lethargy the stomach may have been perforated and euthanasia is indicated.

Other considerations:

a. Dosing can be repeated up to three times in a 24 hour period.

b. General anesthesia is advised against, since it may interfere with gastric emptying. However, light anesthesia may be required in some animals,
c. Adverse effects may include administering in to the trachea, reflux, aspiration, as well as pharyngeal, esophageal, gastric irritation, injury or rupture, and even death.
d. Oral gavage technique described here is similarly performed in the rat, mouse, guinea pig and rabbit.
e. Contact OLAC Manager to arrange training if needed.