



Florida State University

Standard Operating Procedure

ORAL GAVAGE IN THE RAT

This technique should only be performed by experienced personnel. Inexperienced personnel must obtain training and be certified as proficient prior to using the technique for research.

Materials:

- Correctly sized metal or plastic feeding needle (see table below), preferably with ball tip
 - Appropriate sized syringe
 - Permanent marker or etching tool
 - Solution/compound to be administered (concentration to allow for small volume to be administered)
1. The procedure can be performed in either an awake or anesthetized animal. Awake is preferred as administration complications are usually immediately observable. Use only an approved feeding/gavage needle or vinyl tube.
 2. Weigh the rat to determine the appropriate dosing volume. The volume should be 10-20 ml/kg (never exceed the 20 ml/kg dose). If working with a group of rats an average volume based upon the group's median weight or average of the largest and smallest animals in the group may be used. Pregnant animals should only receive 25-30% of the maximum volume.
 3. Restrain the rat; there are several methods that can be used (hold the rat over the neck and the thoracic region and support the lower body, wrap the rat in a towel, hold the rat upright against your abdomen and immobilize its rear legs with your wrist and forearm, etc.). An assistant may be needed to restrain the animal. Do not restrain so tightly as to induce a panic response or cause respiratory distress.
 4. Measure the gavage needle externally from the tip of the nose to the last rib. This is the length needed to insert the tube into the stomach. Mark the needle at the point where it reaches the tip of the nose. If working with a large group of animals of the same size, the needle can be permanently etched (if stainless) to avoid having to re-mark but should be checked periodically. (Note – this is the maximum point of insertion to avoid risking perforation of the stomach).
 5. Draw up the calculated volume and attach the syringe to feeding needle.
 6. Lubricate the gavage needle tip lightly with water, KY or similar jelly.
 7. If not using a towel, restrain the rat over the shoulders and back so that the front legs are immobilized, keeping the front feet from pushing the gavage tube away. Hold the rat upright and extend the head upright —this extension of the head creates a straight line from the head through the neck and esophagus and to the rest of the body.
 8. Slide the needle into the mouth behind and to the right or left of the incisor teeth and over the tongue. If necessary, with the aid of the needle, gently insure the position of the rat's head upward and back to approximate a straight body line in order to

straighten the neck and esophagus. This helps to avoid entering the trachea instead of the esophagus.

9. Slowly advance the needle into the oral cavity and then into the esophagus. Do not rotate the needle except slightly during insertion. Avoid rotating needle once in the esophagus or during removal to avoid damage to the esophagus. Watch for the swallowing reflex as the rat should swallow as the needle is advanced. The needle should pass freely into the esophagus. **DO NOT FORCE. IF ANY RESISTANCE IS MET, REMOVE THE NEEDLE AND REINSERT.**
10. When the desired length of insertion is achieved, administer the solution slowly. If the rat coughs, chokes, struggles violently or appears to have trouble breathing, stop immediately and remove the needle.
11. Once the volume is administered, smoothly remove the feeding needle. Return the rat to its cage.
12. Observe the rat for no less than 15 minutes after the procedure for signs of pain or distress, such as gasping for breath, other unusual respiratory rate or pattern, bleeding or frothing at the mouth or poor mucus membrane color. If any of these signs are noticed contact the veterinarian right away for assistance. A rat that shows severe signs of respiratory distress or is suspected of having a perforation or intra-lung administration must be euthanized immediately.
13. Monitor animals again at least once between 12-24 hours after dosing. Look again for evidence of difficult breathing, lethargy, lack of food/water intake or other signs described above. Contact LAR veterinary staff if such signs are noted.

Note: Dosing may be repeated up to 3 times within a 24 hour period – if additional dosing is necessary this must be justified in the protocol.

Clinical signs associated with procedural complications (requires consultation with veterinarian or euthanasia):

- Respiratory distress
- Noisy breathing (wheezing, clicking or rattling)
- Pale or bluish ears, feet or tail
- Hunched posture
- Swelling of neck, thoracic inlet or under front legs
- Lethargy
- Blood, bloody froth or fluid at nose or mouth
- Eyes squinted
- Weight loss

Potential adverse effects to be considered: Perforation of the esophagus, trachea or stomach. Inflammation of the esophagus. Damage to the oral cavity. Damage to the cardia (gastroesophageal sphincter). Incorrect administration of fluid into lungs.

Demonstration videos:

Procedures With Care, Oral Gavage Rat: <http://www.procedureswithcare.org.uk/2010/oral-gavage-in-the-rat/>

Training In Basic Bi methodology for Laboratory Rats

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Feeding need size guide recommendations (based upon information from UBC SOP TECH#9 and South Pointe Surgical)

Weight	Gauge	Shaft Length (inches)	Ball Diameter (mm)	Shape
50-75 grams	20	1, 1.5	2.25	Straight, curved
75-120 grams	18	1, 1.5, 2	2.25	Straight, curved
100-200 grams	18	2, 3	2.25	Straight, curved
150-300 grams	16, 18	3	3	Straight, curved
200-350 grams	14, 16	3	4	Straight, curved

Note: Shaft length and ball diameter may vary with company product.

Various feeding needles sources: Braintree Scientific, Cadence Inc, Instech Labs, South Pointe Surgical, VWR, Kent Scientific and others.

Oral gavage is considered a potentially painful or stressful procedure. Literature Search Key Words:

Oral gavage rodents, oral dosing rodents, alternatives to oral gavage rodents

Alternative Methods:

Atcha, Z., Rourke, C., Neo, A.H.P., Goh, C.W.H., Lim, J.S.K., Aw, C-C., Browne, E.R. and Pemberton, D.J. [Alternative Method of Oral Dosing in Rats](#); JAALAS, 49(3):335-343; 2010
 Corbett, A., McGowin, A., Sieber, S., Flannery, T. and Sibbitt, B. [A method for reliable voluntary oral administration of a fixed dosage \(mg/kg\) of chronic daily medication to rats](#). Lab Animals. 46(4):318-324 (2012).

Ferguson, S.A. and Boctor, S.Y. [Use of Food Wafers for Multiple Daily Oral Treatments in Young Rats](#); JAALAS 48(3): 292–295; 2009

Huynh et.al. [Utilizing an Orally Dissolving Strip for Pharmacological and Toxicological Studies: A Simple and Humane Alternative to Oral Gavage for Animals](#). *J. Vis. Exp.* (109),
 Rourke, C. and Pemberton, D.J. Investigation of a Novel Refined Oral Dosing Method; Animal Technology and Welfare. 6(1):15-17

References:

AALAS Learning Library, Working With the Laboratory Rat, Lesson 13. Oral Gavage
 Jones, Andrews and McErlane. TECH 09 Oral Dosing (Gavage) in Adult Mice and Rats.
 UBC Animal Care Guidelines. Revised Feb 2015. Downloaded October 5, 2016
 Oregon State University Laboratory Animal Resources Center, Oral Gavage in Mice and Rats, September 2011

Turner, P.V., Vaughan, E., Sunohara-Neilson, J., Ovari, J. and Len, F. Oral Gavage in Rats: Animal Welfare Evaluation. JAALAS, 51(1):25-30 (2012).

University of Delaware Office of Laboratory Animal Welfare SOP #A-106, Oral Gavage – Mouse & Rat, revised January 2015

UCSF IACUC / LARC Standard Procedures, Oral Gavage in Mice and Rats, May 2011