

## *Anesthesia of the rabbit*

### *Part I: pre-anesthetic preparations*

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Warning: this file contains pictures that may be distressing for people.

Rabbits are often considered as difficult in relation to anesthesia. This probably relates to the fact that the dosages needed to induce anesthesia and those producing toxic effects are close, and to the variety of observed secondary effects related to stress, including death. Indeed, rabbits are "preyed-on" animals, which are easily distressed in a new environment (new persons, new odors, new noises, restrain, etc.). Sometimes, they may attempt to escape during the examination. This will affect various hormonal pathways and physiological processes, notably a rise of catecholamine and a slowdown of the digestive system activities. The rise of catecholamine can have dramatic effects on the cardiac and respiratory activities, which lead to secondary adverse complications such as altered response to the surgical anesthetic drugs. Pain also induces hormonal, and physiological responses, it is thus necessary to give analgesic medication, when potentially painful procedures need to be done (e.g. [blood sampling](#)).

Anesthesia in rabbits can be considered as a safe procedure, when:

- the biology, physiology and anatomy of the rabbit are known,
- a minimum of safety measures are taken, including a complete check-up of the rabbit,
- the correct anesthetics agents, and dosages are used,
- there is no malfunctioning equipment,
- respiratory and cardiac monitors have no upper-limits set lower than use commonly observed in rabbits and other small animals.

Since rabbits are unable to vomit, there is not mandatory to withhold the food and water before a planed surgery. In fact, rabbits, whose accessibility to food is removed over a longer period of time, show an increased tendency of becoming hypoglycemic during surgery or became post-surgical disturbances of the gastro-intestinal tract due to dysbiosis. Growth of pathogenic bacteria leads to the development of enterotoxaemia. The rate of recovery is furthermore slowed down in rabbits whose food was taken



away hours before surgery. It is nevertheless advised to remove food up to an hour before anesthetic preparations are started. Indeed, some rabbits tend to accumulate food and water in the oral cavity and the oropharynx; withdrawing food one hour prior to surgery will assure that the oral cavity does not contain food rests and that the stomach is not overloaded. Food and water should be available immediately after the rabbit recovers from the anesthesia.

### Pre-anesthetic preparations

It is important to verify the general condition of the rabbit. A complete examination, including accurate weight, a CBC, a blood biochemistry panel, X-rays, ultrasound or MRI, urinalysis, will help determine the health condition of the rabbit. Particular attention should be paid to respiratory and digestive troubles. It is best to refrain from anesthesia, if a rabbit presents any of the aforementioned problems. If the rabbit is found healthy, no major problems should be encountered.

Body temperature	38.5 – 39.6 °C
Body surface area	2.5 kg = 1270 cm <sup>2</sup> 4.8 kg = 3040 cm <sup>2</sup>
Heart rate	130 – 325 beats/min
Blood volume	57 – 65 ml/kg
Blood pressure	90 – 130 /60 – 90 mm Hg
Respiratory rate	32 – 60 min
<u>Tidal Volume</u>	4 – 6 ml/kg
<u>Oxygen use</u>	0.47 – 0.85 ml/h.

The state of hydration is another important point. Indeed, a frequently observed problem is dehydration prior to surgery, due to a decreased intake of food and water. This is particularly the case when dental or gastrointestinal problems are involved. In this case, the surgery must be postponed in order to allow rehydration of the rabbit by means of administration of fluids. Various ways can be used:

- IV (intravenous) administration, directly in the marginal ear vein, lateral saphenous vein, or the cephalic vein, after placement of a catheter. Long-term catheterization of the jugular vein is not recommended; in rare cases, swelling of the head has been reported.



- SC (subcutaneous) administration, is slow and not very effective in case of severe dehydration.
- IP (intraperitoneal) administration, is slow and not very effective in case of severe dehydration.
- Intraosseus administration, is useful when a prolonged administration of fluids is foreseen.



VEIN (Veterinary Exotic Information Network) System, Copyright © 2002 Shinkichi Tsuruno and Akira Yamanouchi

Left: Placement of a catheter in the ear of a rabbit,  
Right: Placement of a catheter in the leg of a rabbit, to provide fluids and intravenous medication during and after the surgery.

A light sedative or pre-anesthetic agent can be used to avoid stress in the rabbit, prior to anesthesia. They are furthermore indicated when:

- The concentration of volatile anesthetic, used to maintain anesthesia, must remain low. Preemptive analgesia by means of opioid agents, 30 to 45 min prior to surgery is indicated for this purpose (e.g. fentanyl/fluanisone (EU), fentanyl/droperidol (USA), or more commonly acepromazine/butorphanol).
- A rabbit is suffering from upper or lower respiratory trouble, or when the irritable isoflurane gas is used for surgical anesthesia. The pre-anesthetic drug will help reduce the production of saliva or bronchial secretions. The use of atropine is not indicated for rabbits. Indeed, around 30 to 50% of all rabbits possess an endogenous atropinase enzyme. Glycopyrolate is the anti-cholinergic drug of choice in rabbits.
- Immediate reduction of post-surgical pain is needed. Opioid analgesic drugs like butorphanol or buprenorphine can be given during the pre-anesthetic preparations.
- A rabbit is stressed and anxious. The use of benzodiazepines (e.g. diazepam) provides good tranquilization and muscle relaxation. The can be particularly helpful, if intubation of the rabbit is needed during the surgical anesthesia stage.



(Rabbits regularly anesthetized with the ketamine/xylazine mixture has been linked to increased rates of heart disease and an increased death rate.)

The various pre-anesthetic agents that can be used in rabbits are listed in a table. [Click here](#)

After the complete examination of the rabbit, it should be possible to have a good idea of the health status of the rabbit, and to assign him in one of the various ASA (American Society of Anesthesiologists) categories.

Category	Risks	Meaning
ASA I	Excellent anesthetic risk	Healthy patient
ASA II	Good anesthetic risk	Mild systemic disease
ASA III	Fair anesthetic risk	Moderate to severe systemic disease
ASA IV	Poor anesthetic risk	Life-threatening systemic disease
ASA V	Guarded anesthetic risk	Moribund, life expectation around 24 h.
ASA VI	Emergency	

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### Further information

1. Cantwell S.L. Ferret, Rabbit and Rodent Anesthesia. In: Analgesia and Anesthesia. Vet. Clin. N. Amer. Ex. Anim. Pract. 2001. pp: 169-192.
2. Flecknell P. BSAVA Manual of Rabbit Medicine and Surgery, Gloucester, UK: British Small Animal Veterinary Association 2000.
3. Harcourt-BrownOxford F. Textbook of Rabbit Medicine, UK: Butterworth-Heinemann 2001
4. Hillyer E.V. and Quesenberry K.E. Ferrets, Rabbits, and Rodents: Clinical Medicine and Surgery, New York: WB Saunders Co. 1997
5. Laber-Laird K. Handbook of Rabbit and Rodent Medicine, Pergamon Veterinary Handbook Series, Butterworth Heinemann 1996.
6. Murray M.J. Rabbit Anesthesia for Veterinary Technicians. Tufts Animal Expo Conference Proceedings, 2001.
7. Paddleford R.R. Manual of Small Animal Anesthesia. 2<sup>nd</sup> ed. Saunders, Philadelphia, 1999

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