

**Modules art. 23.2.b function:**  
*designing procedures and projects;*

**Task specific**

**Module 21: Advanced anaesthesia for surgical or prolonged procedures**

This module is linked, but not exclusively, to the “surgery” module (22). “Surgical procedures” include all procedures not defined as “Minor procedures” in the Preamble to Module 20. Prolonged is defined as any duration greater than 15 minutes, which may require additional or continuous dosing (including anaesthesia for imaging).

This module also discusses the alleviation of pain during painful procedures such as surgery, through the use of anaesthetic and analgesic drugs. Anaesthesia is also used for producing muscle relaxation, suppressing reflexes, and producing loss of consciousness for purposes other than prevention of pain perception. For example, anaesthesia is required for MRI, CT scans and other minimally invasive imaging modalities.

Because of the wide variability of laboratory animal species and strains, as well as anaesthetic agents, an appropriate anaesthetic regimen should be developed in consultation with a veterinarian.

If not used for restraint alone, the need to use an anaesthetic to perform a procedure implies that the procedure would be painful for an awake animal. In addition there may be some residual pain after the animal recovers from the anaesthetic and analgesics should be used. Some drugs described here appear in both the anaesthesia and surgery modules.

**Learning Outcomes**

Trainees should be able to:

- 21.1. Relate why and when anaesthesia might be used, including additional factors relevant for long term anaesthesia.
- 21.2. Relate the need for and list the factors to be considered in pre-anaesthetic evaluation of animals, including acclimatisation.
- 21.3. Discuss the use of pre-anaesthetic agents and analgesics as part of a balanced anaesthetic regime.
- 21.4. Indicate that a range of drugs are commonly used for premedication and the induction and maintenance of anaesthesia in relevant laboratory species, and identify where to get advice on the different drug available and their use.
- 21.5. Describe how an animal’s concurrent pathology may require specific anaesthetic regimen, monitoring or nursing care.

- 21.6. Indicate types of agents used for the induction and maintenance of general anaesthesia, their advantages and disadvantages and when each might be used.
- 21.7. Describe how anaesthetic agents interact to produce the three components of the anaesthetic triad to different degrees, and how balanced anaesthesia might be best achieved by using combinations.
- 21.8. Demonstrate a sufficient understanding of anaesthetic agents having a low analgesic effect, potentially requesting the use of an additional analgesia.
- 21.9. List the factors to be considered when monitoring anaesthesia both for anaesthetic depth and physiological stability. Indicate how to determine that an animal is sufficiently deeply anaesthetised to enable painful procedures to be undertaken, and what action should be taken if an adverse event occurs.
- 21.10. List methods which can be used to assist monitoring of anaesthesia (e.g. ECG, BP, Urine output, Oxygen saturation, CO<sub>2</sub>) and how these can be monitored.
- 21.11. Monitor anaesthetic depth and the animals' vital signs, using both clinical signs, and electronic apparatus if appropriate.
- 21.12. Describe and demonstrate the correct set-up, operation and maintenance of anaesthetic and monitoring equipment appropriate to the species concerned.
- 21.13. Demonstrate competence in maintaining and interpreting records of pre- and postanaesthetic induction and whilst an animal is anaesthetised, as well as in managing the animal care adequately.
- 21.14. Indicate the problems that may occur during anaesthesia, and understand how to avoid these, or manage them if they occur.
- 21.15. Demonstrate an understanding of mechanical ventilation.
- 21.16. Describe methods to optimise post anaesthetic recovery to ensure a smooth and rapid recovery from anaesthesia, as in Basic Module but with additional methods required, including analgesia and fluid replacement, for animals having undergone lengthy anaesthesia of surgical procedure.
- 21.17. Consider the consequences of anaesthesia and the surgical procedures on recovery.
- 21.18. Appreciate how the choice of anaesthetic agent will determine the rate of recovery and describe how duration and quality of anaesthesia governs the rate of recovery.
- 21.19. Describe the problems that can arise (in the post-operative period), and indicate how to avoid these, or manage them if they occur.
- 21.20. Discuss how to integrate a program of pain management into an overall scheme of perioperative care.
- 21.21. Indicate some of the problems associated with pain recognition and pain management in animals.

- 21.22. Demonstrate a sufficiently detailed understanding of analgesics to be able to administer safely, including routes of administration and potential adverse effects.
- 21.23. Demonstrate an understanding of safe / good working practices with regard to use, storage and disposal of anaesthetic and analgesic agents.