

ANAESTHESIA IN THE GREYHOUND

Because greyhounds have been bred selectively for speed over many years they have developed a number of physiological and anatomical adaptations that affect their response to anaesthetics.

1. More highly strung than most breeds causing increased susceptibility to Stress Induced Hyperthermia and possibly Malignant Hyperthermia.
2. Low fat to muscle ratio and high surface area to volume ratio making them susceptible to hypothermia during anaesthesia.
3. Reduced liver metabolism resulting in slow or poor recovery from some anaesthetic agents and making drug interactions more likely.
4. Unique clinical pathology, in particular a high PCV and a low Total Protein which affects plasma concentrations of certain drugs.
5. Possible predisposition to Malignant Hyperthermia when using certain anaesthetic agents.

Malignant Hyperthermia (MH) is a potentially life threatening syndrome seen in certain genetically predisposed individuals exposed to certain anaesthetic agents, depolarising muscle relaxants, stress and over exertion. It is due to a specific gene mutation in the sarcoplasmic reticulum (the Ryanodine Receptor RYR1) which leads to abnormally high calcium concentrations within the muscle cells which causes the clinical signs and laboratory changes. By and large MH is an infrequent complication of anaesthesia in dogs in general, and greyhounds appear no more susceptible than other breeds except under certain conditions.

THIOBARBITURATES IN GREYHOUNDS

Greyhounds respond to barbiturates differently to other breeds of dog as they have reduced activity of specific Cytochrome P450 enzymes, in the liver, essential in metabolising barbiturates. After intravenous injection of thiopentone termination of the anaesthetic effects relies on redistribution of the drug to muscles, fat and liver. With low levels of body fat and reduced liver enzyme activity there will be prolonged time for metabolism. Further, because thiopentone is highly protein bound there will be higher levels of the free drug to exert its anaesthetic effect. Also, drugs that are more strongly protein bound, such as nonsteroidal anti-inflammatory agents, can displace thiobarbiturates from their binding sites thus increasing the plasma concentration and increasing the anaesthetic effect.

Based on these adverse effects, their use in greyhounds is strongly discouraged.

PROPOFOL IN GREYHOUNDS

Propofol is one of the commonest induction agents used in greyhounds and is eliminated 10-20 times faster than thiopentone. However, greyhounds do respond to propofol differently to other breeds. Termination of anaesthesia is due primarily to rapid metabolism by the liver, in particular by Cytochrome P450 enzymes. These enzyme activities are three-fold lower in greyhounds than other breeds, thus, greyhounds take 2-3 times longer to recover and eliminate

propofol at half the rate, compared to other breeds. It is still regarded as a safe and reliable induction agents in greyhounds, especially for caesarian section.

ALFAXALONE IN GREYHOUNDS

Alfaxalone is a neuroactive steroid acting on the GABA receptors in the brain. It has a high margin of safety, rapid recovery, negligible respiratory depression even at 5 times the normal dose, good muscle relaxation and is non-irritant if accidentally injected outside the vein

DIAZEPAM-KETAMINE COMBINATIONS

This combination provides muscle relaxation and reduces the cardiogenic effects of ketamine, making it a suitable choice in both geriatric and cardiac patients. It should always be used in combination with a suitable premedication, eg acepromazine/butorphanol combination. It can cause prolonged apnoea before spontaneous respiration begins which can be a worry to first time users but overall is a very safe combination and is the author's preferred induction agent for routine surgery.

ANAESTHETIC MAINTENANCE

Anaesthesia can be maintained by either inhalant or injectable agents. Recovery from gaseous anaesthesia predominantly involves elimination via the lungs as opposed to metabolism in the liver. For this reason inhalant agents are the preferred option in greyhounds. The various inhalant agents are metabolised to different degrees by the liver with Halothane requiring the most (20%-40%), Sevoflurane less (2%-4%) and Isoflurane the least (0.2%).

Halothane may also potentiate Malignant Hyperthermia in greyhounds and its use is increasingly discouraged in this breed.

Intravenous maintenance can be used when gas maintenance is not feasible, as in bronchoscopy, airway examination and airway surgery. Any one of Propofol, Alfaxalone, or Ketamine-Diazepam can be used in this way but Alfaxalone gives the shortest recovery time.

CONCLUSIONS

- Sedative premedication is highly recommended.
- Painful procedures should include an analgesic in the premedication protocol, eg opioids.
- Thiobarbiturates should be avoided.
- Isoflurane should be used in preference to Halothane
- Avoid drugs such as H2 antagonists, macrolide antibiotics or azole antifungals prior to induction with drugs requiring liver metabolism eg propofol.
- Monitor temperature pre, during and post operation - checking for both hyper and hypothermia.