ANAESTHESIA FOR GERIATRIC PATIENTS WHY ARE THEY DIFFERENT?

Sheilah A Robertson

INTRODUCTION

Anesthesia for dogs and cats at either end of the age spectrum deserves special attention. The unique needs of dogs and cats at different life stages has led to the publication of several excellent resources:

- The AAFP-AAHA Feline Life Stages Guidelines:
  - available at: www.aahanet.org
- The AAFP Senior Care Guidelines:
  - available at: http://catvets.com
- The AAHA Senior Care Guidelines for Dogs and Cats:
  - Available at: www.aahanet.org

AAFP = American Association of Feline Practitioners
AAHA = American Animal Hospital Association

Cats tend to age more uniformly than dogs, and a cat is considered senior between 11 and 14 years of age and geriatric from 15 to 25+ years of age. Breeds of dogs (related to their size and weight) age at different rates. Dogs are considered "senior" when they have reached 75% of their expected life span. Examples of age-specific mortality related to size are shown in *Figure 1*. It is estimated that 30-40% of all patients seen by veterinarians are seniors or geriatrics and many of these may require anesthesia for a variety of reasons including dental procedures which are recommended on a frequent basis in this population.

Anesthetic mortality related to age

The Confidential Enquiry into Perioperative Small Animal Fatalities (CEPSAF) study provided valuable information on the risks associated with anesthesia in a variety of small animals and also pinpointed some specific risk factors in each species.[1-3] Older cats carry a higher anesthetic risk; cats over 12 years of age are twice as likely to die compared to cats aged 6 months to 5 years and this increased risk was independent from their health or ASA status.[a,3] In the CEPSAF study, dogs were grouped by age, but breed or size was not accounted for, therefore although dogs > 12 years had a higher mortality rate than young adults, the risk related to age in this study should be interpreted with caution.

Anesthesia for older pets

Although senior and geriatric patients may belong in a specific "life-stage" there is a wide variation in their health status. A sub-classification of the geriatric population has been suggested as follows: [4]

1. Healthy patients with age-related changes
2. Those with subclinical organ dysfunction
3. Those with an overt condition (often more than one)

Age and disease related changes in organ function and body composition impact on the pharmacokinetics (absorption, distribution, metabolism and elimination) of drugs therefore, dose and dosing intervals may require adjustment in this patient population. Organ dysfunction may or may not be measurable. In many cases significant decreases in renal and hepatic function can exist yet this will not be reflected by running routine hematology and chemistry tests.

Cardiac disease can also have a silent presence; a patient may have no detectable heart murmur or history of exercise intolerance, yet echocardiography may show evidence of decreased cardiac function; not enough to cause overt disease, but enough to cause concern with some of the agents used for anesthesia and sedation.

When we give a drug, we are looking for a pharmacodynamic effect and in geriatric patients this may be different due to changes in body composition (e.g. decreased lean body mass), drug receptors and neurotransmitters. Age and disease related changes in pharmacokinetics and pharmacodynamics can result in adverse effects unless the clinician individualizes each anesthetic and analgesic plan.

Senior and geriatric animals may respond poorly to changes in their environment and many have clinical signs suggestive of cognitive dysfunction.[5,6] Faced with a hospitalization, or extensive in-patient treatments, some of these pets seem to “give up” within moments of being in a strange environment. This might be something as mild as refusing to interact with caretakers but could also result in more serious issues such as refusal to eat, or drink water. Encourage caregivers to bring in and leave familiar toys or blankets which are often a comfort to any animal, but especially to older animals. Keeping the hospital stay as short as possible will be beneficial; when possible schedule these patients first thing in the morning so that they can be discharged on the same day.

The most important age-related changes in cardiac function are decreased ventricular compliance and cardiac reserve. This renders older animals less tolerant of acute changes in intravascular volume – both fluid loss and fluid overload. Older patients also have a decreased respiratory reserve. Vital capacity is reduced, the chest wall and lungs become less compliant and the anatomic dead space and work of breathing increase making them more susceptible to hypoxemia and hypercapnia. With a decrease in respiratory reserve, older animals may rapidly desaturate in the immediate post-induction period before they are intubated. For this reason, pre-oxygenation is recommended.[7]

As animals age, renal blood flow decreases as does glomerular filtration rate and the number of functional glomeruli. Older animals may have underlying renal pathology which is well compensated for until they are stressed or challenged in the perioperative period (e.g. fasting, fluid deprivation, and hypotension) therefore a decline in post-anesthetic renal function is a concern. These patients may already be receiving non-steroidal anti-inflammatory drugs (NSAIDs) for chronic pain or may be administered NSAIDs as part of a perioperative analgesic protocol for surgery. These drugs block prostaglandin production which is important for maintaining renal blood flow during periods of hypotension. If an NSAID is used in the peri-anesthetic period, preventing, recognizing and treating hypotension is essential to maintain normal fluid balance and renal perfusion.

Brain mass decreases with age because of neuronal loss, cerebral blood flow declines and the quantity of neurotransmitters is reduced. Specific age-related changes indicative of neurodegeneration similar to those seen in aged people have been identified in the brain, brainstem and spinal cord of cats.[8] Although the exact reasons are unclear, but probably linked to decreased brain mass, older humans have decreased anesthetic requirements which is well documented for the inhalant agents.[9] This phenomenon has also been confirmed for the commonly used agents isoflurane and sevoflurane in dogs.[10,11] Because of the documented decrease in anesthetic requirements in older patients the depth of anesthesia must be closely monitored (e.g. by assessing jaw tone, general muscle tone and eye position) to prevent anesthetic overdose. Hypothermia also decreased anesthetic requirements.

Aging can result in altered drug concentrations at their site of action and altered drug actions *per se.* Some of these changes are related to altered body composition, blood flow and organ perfusion and some are a result of altered metabolism and excretion and changes in the number and density of receptors in target organs. Advanced age can result in unpredictable drug effects therefore careful drug choice and administration combined with close monitoring is essential for a good outcome. It is prudent to choose drugs that are:

1. Reversible
2. Can be given “to effect” and
3. Have a short duration of action

As with all patients a complete history and physical examination are essential. Clinical findings will dictate what pre-anesthetic blood work should be run and what additional tests may be required (e.g. thoracic radiographs or echocardiography). In humans there are no agreed upon or mandated laboratory tests based solely upon age.[12] Abnormal laboratory tests were less predictive of outcome than ASA[a] classification or surgical risk.[13] A compete blood count and chemistry plus a urine analysis is generally warranted in this patient population both for evaluation of major body systems and as a baseline for comparison later.

One of the most common made mistakes when anaesthetizing older patients is to depend primarily on inhalant agents and avoid premedicant agents in the misunderstanding that inhalant agents are somehow “safer”. Sedation is recommended to decrease anxiety and fear which lead to increased catecholamine release, cardiac arrhythmias, peripheral vasoconstriction, increased cardiac work and decreased tissue perfusion. Acepromazine is not contraindicated in geriatric patients although dose requirements (on an mg/kg basis) may be markedly decreased. Acepromazine is an anti-emetic and anti-arrhythmic but one of its most important properties is its anesthetic sparing effect.[14] Two studies have examined the effects of acepromazine on systemic blood pressure and glomerular filtration rate (GFR) measured by scintigraphy in clinically normal dogs.[15,16] Acepromazine appears to protect renal function despite a decrease in blood pressure. Acepromazine combined with butorphanol provided excellent sedation for dogs undergoing nuclear scintigraphy procedures, and GFR was no different after sedation compared to measurements obtained from the same dogs without sedation, despite a decrease in systolic, diastolic and mean blood pressure.[15] In the same study, diazepam and ketamine resulted in significant increases in heart rate and blood pressure and resulted in a lower GFR compared to

the acepromazine + butorphanol combination. As previously stated, preserving renal blood flow and GFR is especially important in older patients who may have decreased renal reserve or are receiving NSAIDs for acute or chronic pain.

Benzodiazepines such as midazolam and diazepam produce more reliable sedation in older patients than in younger ones. For premedication, midazolam has an advantage over diazepam because it can be given intramuscularly. These drugs are also reversible with flumazenil should an adverse event or delay in recovery occur. Opioids produce sedation and provide analgesia and should be a part of all anesthetic protocols. In dogs opioids are significantly anesthetic sparing, but this effect is less in cats.

Ketamine causes an increase in heart rate and blood pressure which may be detrimental to some older patients. However, ketamine plays a role in preventing central sensitization and in the face of hypovolemia supports cardiovascular function and does not impair tissue oxygenation.[17,18] The pros and cons of ketamine in each individual must be considered before it is used. Propofol can be titrated slowly “to effect” without causing excitement and when used after premedication the dose required for induction is significantly reduced. When preceded by intravenous diazepam or midazolam, induction is smooth and again the dose can be reduced. It is important to avoid large doses of propofol and to administer it slowly to prevent profound hypotension. Propofol is rapidly metabolized even in patients with poor liver function and recovery is rapid and complete with no “hang over” effect. Alfaxalone is a suitable induction agent in dogs and cats, but as with propofol large doses given rapidly will cause cardiorespiratory depression. Etomidate has minimal cardiopulmonary depressant effects and can be a valuable induction agent in older dogs and cats, those with cardiac disease or in the face of fluid losses.[19]

For all but the shortest procedures inhalant agents are most commonly used for maintenance of anesthesia. All inhalant agents are potent cardiorespiratory depressant agents making the use of anesthetic sparing drugs and techniques important. Intra-operative infusions including opioids and low doses of ketamine reduce inhalant agent requirements and provide additional analgesia. Lidocaine infusions can be used in dogs[20] but are not recommended in cats because of documented decreases in cardiac output and perfusion.[21] The use of locoregional techniques (e.g. epidural placement of local anesthetics and / or opioids and specific nerve blocks) are extremely beneficial in older patients as they decrease anesthetic requirements and improve post-operative comfort.

Most anesthetic deaths occur in the first three hours of recovery, probably because this is a time when physiological support is withdrawn; for example, animals go from breathing 100% oxygen to room air at a time when their requirements for oxygen may increase if they are cold and shivering. This is especially detrimental in older patients with reduced cardiac and respiratory reserves. For these reasons, supplemental oxygen should be given until animals are normothermic. In addition, the close monitoring that occurred during anesthesia may not be continued into the recovery period.

Other tips for older pets

Older dogs may have problems with slippery floors. Using yoga mats outside their cage or kennel is very helpful as is placing a harness, so you can assist them to get up after a procedure. Whenever possible schedule them for early in the day so they can be an outpatient; getting back to a normal routine is important especially for pets with cognitive dysfunction. Older pets do not thermoregulate well, so extra efforts are needed to keep them warm; hypothermia is the number one cause of delayed recovery. Willingness to eat soon after anesthesia is also important and adding maropitant and / or ondansetron to the protocol will decrease the time to voluntary feeding and increase caloric intake in the first 24 hours after surgery.

Although our older patients may be “more delicate” and challenging to anaesthetize, with careful assessment and choice of anesthetic protocols a good outcome should be the rule and not the exception.

References

[a] American Society of Anesthesiologists physical status classification: www.asahq.org

1. Brodbelt D. Perioperative mortality in small animal anaesthesia. Vet J 2009;182:152-161.
2. Brodbelt DC, Pfeiffer DU, Young LE, et al. Results of the confidential enquiry into perioperative small animal fatalities regarding risk factors for anesthetic-related death in dogs. J Am Vet Med Assoc 2008;233:1096-1104.
3. Brodbelt DC, Pfeiffer DU, Young LE, et al. Risk factors for anaesthetic-related death in cats: results from the confidential enquiry into perioperative small animal fatalities (CEPSAF). Br J Anaesth 2007;99:617-623.
4. Kukanich B. Geriatric veterinary pharmacology. Vet Clin North Am Small Anim Pract 2012;42:631-642, v.
5. Landsberg GM, Denenberg S, Araujo JA. Cognitive dysfunction in cats: a syndrome we used to dismiss as 'old age'. J Feline Med Surg 2010;12:837-848.
6. Chapagain D, Range F, Huber L, et al. Cognitive Aging in Dogs. Gerontology 2018;64:165-171.
7. McNally EM, Robertson SA, Pablo LS. Comparison of time to desaturation between preoxygenated and nonpreoxygenated dogs following sedation with acepromazine maleate and morphine and induction of anesthesia with propofol. Am J Vet Res 2009;70:1333-1338.
8. Gunn-Moore DA, McVee J, Bradshaw JM, et al. Ageing changes in cat brains demonstrated by beta-amyloid and AT8-immunoreactive phosphorylated tau deposits. J Feline Med Surg 2006;8:234-242.
9. Nickalls RW, Mapleson WW. Age-related iso-MAC charts for isoflurane, sevoflurane and desflurane in man. Br J Anaesth 2003;91:170-174.
10. Magnusson KR, Scanga C, Wagner AE, et al. Changes in anesthetic sensitivity and glutamate receptors in the aging canine brain. J Gerontol A Biol Sci Med Sci 2000;55:B448-454.
11. Yamashita K, Iwasaki Y, Umar MA, et al. Effect of age on minimum alveolar concentration (MAC) of sevoflurane in dogs. J Vet Med Sci 2009;71:1509-1512.
12. John AD, Sieber FE. Age associated issues: geriatrics. Anesthesiol Clin North America 2004;22:45-58.

13. Dzankic S, Pastor D, Gonzalez C, et al. The prevalence and predictive value of abnormal preoperative laboratory tests in elderly surgical patients. Anesth Analg 2001;93:301-308, 302nd contents page.
14. Heard DJ, Webb AI, Daniels RT. Effect of acepromazine on the anesthetic requirement of halothane in the dog. Am J Vet Res 1986;47:2113-2115.
15. Newell SM, Ko JC, Ginn PE, et al. Effects of three sedative protocols on glomerular filtration rate in clinically normal dogs. Am J Vet Res 1997;58:446-450.
16. Bostrom I, Nyman G, Kampa N, et al. Effects of acepromazine on renal function in anesthetized dogs. Am J Vet Res 2003;64:590-598.
17. Pozzi A, Muir WW, Traverso F. Prevention of central sensitization and pain by N-methyl-D-aspartate receptor antagonists. J Am Vet Med Assoc 2006;228:53-60.
18. Haskins SC, Patz JD. Ketamine in hypovolemic dogs. Crit Care Med 1990;18:625-629.
19. Pascoe PJ, Ilkiw JE, Haskins SC, et al. Cardiopulmonary effects of etomidate in hypovolemic dogs. Am J Vet Res 1992;53:2178-2182.
20. Valverde A, Doherty TJ, Hernandez J, et al. Effect of lidocaine on the minimum alveolar concentration of isoflurane in dogs. Vet Anaesth Analg 2004;31:264-271.
21. Pypendop BH, Ilkiw JE. Assessment of the hemodynamic effects of lidocaine administered IV in isoflurane-anesthetized cats. Am J Vet Res 2005;66:661-668.

Figure 1.

Age-specific mortality [%] related to size

		AGE - YEARS			
SIZE	BREED	4-7	7-10	10-15	≥ 15
SMALL	Chihuahua Yorkie	20 ± 5	29 ± 5	47 ± 12	9 ± 5
MEDIUM	Labrador Doberman	26 ± 3	33 ± 3	38 ± 4	3 ± 1
LARGE 1	Mastiff St. Bernard	39 ± 16	38 ± 2	23 ± 13	0
LARGE 2	Great Dane Wolfhound	53 ± 9	37 ± 3	10 ± 6	0

Old Dogs New Tricks Anesthesia for Older Pets

Lap of Love Veterinary Hospice & In-Home Euthanasia

Sheilah Robertson
Senior Medical Director
Lap of Love Veterinary Hospice

TALKING POINTS

Lap of Love Veterinary Hospice & In-Home Euthanasia

AgingCare.com

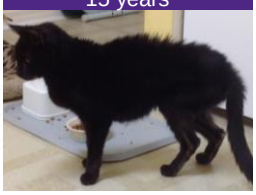
Should Your Parent Risk an Anesthesia Disaster or Forego Surgery?

?

Kermit

3 months

15 years



PET AGE	CAT	< 9.5kg	9.5-23kg	23-54kg	> 54kg	DOG
3	28	28	29	31	39	
4	32	33	34	38	49	
5	36	38	39	45	59	
6	40	42	44	52	69	
7	44	46	49	59	79	
8	48	50	54	66	89	
9	52	54	59	73	99	
10	56	58	64	80		
11	60	62	69	87		
12	64	66	74	94		
13	68	70	79			
14	72	74	84			
15	76	78	89			
16	80	82	94			
17	84	86				
18	88	90				
19	92	94				
20	96					

HUMAN EQUIVALENT AGE

ADULT

SENIOR

GERIATRIC

What percentage of your patients?

30% 40%

Medical specialists [human]

Pediatricians 1:800

PEDIATRICS

Geriatricians 1:5000

AGS Geriatrics Healthcare Professionals

Leading Change. Improving Care for Older Adults.

The Veterinary Journal 2017

ELSEVIER

Perioperative mortality in cats and dogs undergoing spay or castration at a high-volume clinic

J.K. Levy[a,*], K.M. Bard[b], S.J. Tucker[a], P.D. Diskant[a], P.A. Dingman[a]

0.03%

Humane Society Tampa Bay 100 Years

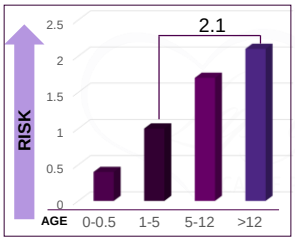
ASSOCIATION OF SHELTER VETERINARIANS™

Anesthesia Related Mortality

	%	%
Overall	0.17	0.24
Healthy ASA I-II	0.054	0.112
Sick ASA III-V	1.3	1.4

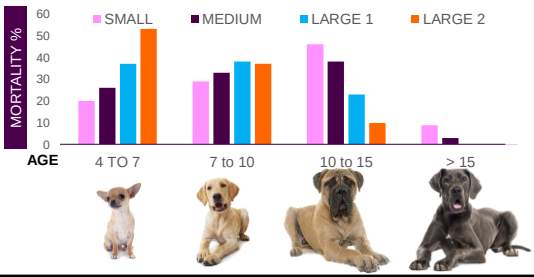
ASA status:
American Society of Anesthesiologists

Risk related to age

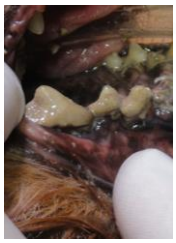


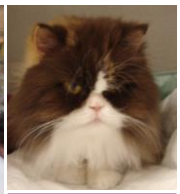
Brodbelt *et al* Br J Anaesth 2007

Age-specific mortality related to size



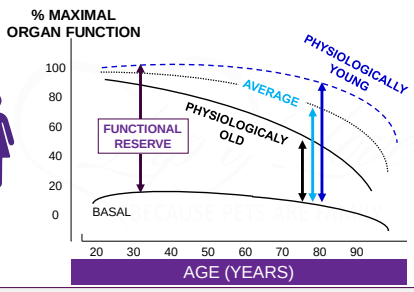
DENTAL HEALTH
He/she is old and it's "just their teeth"





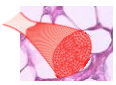
Muffie DOB: 1-3-2002

THIS NEEDS TAKEN CARE OF!



3 categories of older pets

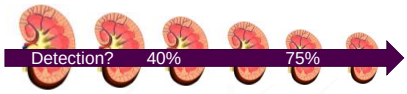
1. Old but healthy – age related changes
2. Old with subclinical organ dysfunction
3. Old with overt disease often multiple comorbidities



↓ Skeletal Muscle	↓ Heat production
↑ Adipose Tissue	↑ Drug effects

↓ Alveolar surface area	↓ Lung volumes
↑ Stiffness	↓ Gas exchange
	↑ Work of breathing

Renal mass and function

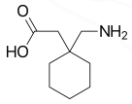


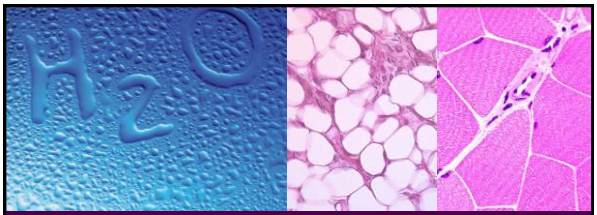
Well compensated until challenged:

Drug dosing
Empiric recommendations based on serum creatinine

	Serum Creatinine mg/dl			
Drug	Standard dose	2.3 - 4.0	4.9 - 5.5	8.5
Gabapentin	10 mg/kg q 8h	6 mg/kg q 12h	6mg/kg q 24h	3-4 mg/kg q 24h

Trepanier VCNA 2013

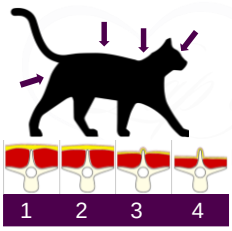




Body composition

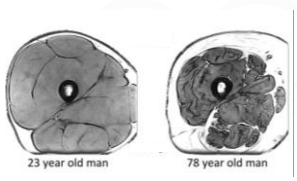
Timely Topics in Nutrition

The importance of assessing body composition of dogs and cats



Body Condition Score

Sarcopenia

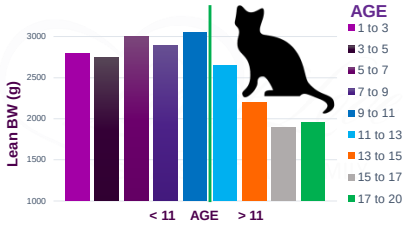


Piper

Multiple causes

- Exercise history
- Nutrition – protein intake
- Chronic inflammation
- Infiltration of adipose tissue into muscle
- Loss of neuromuscular junctions

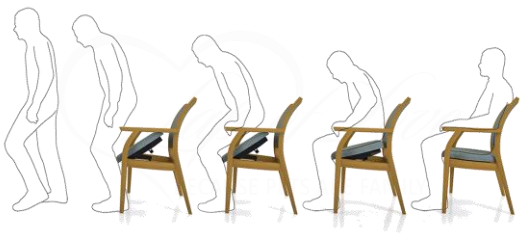
Lean body weight

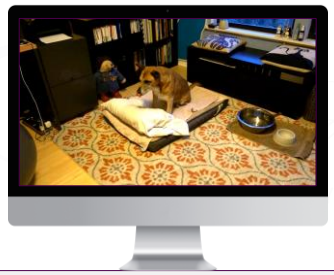


Muscle Loss

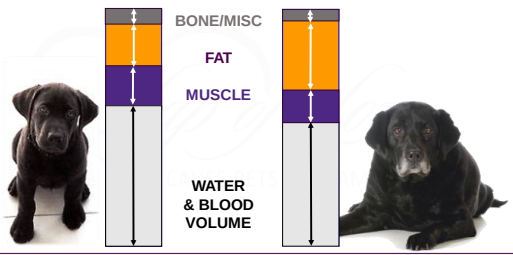
SLOW TWITCH
MARATHONER

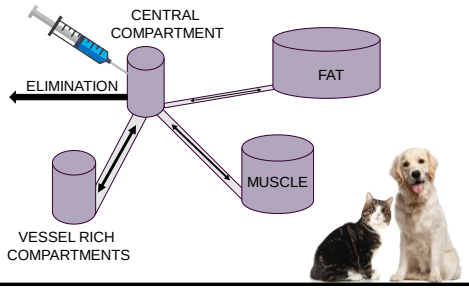
FAST TWITCH
SPRINTER

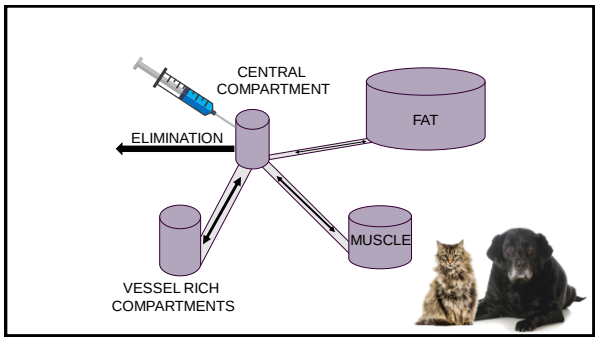


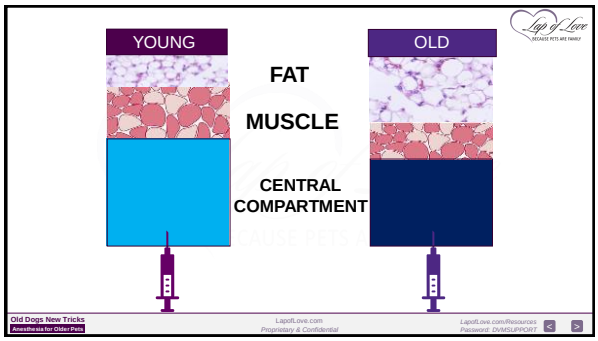


Body composition

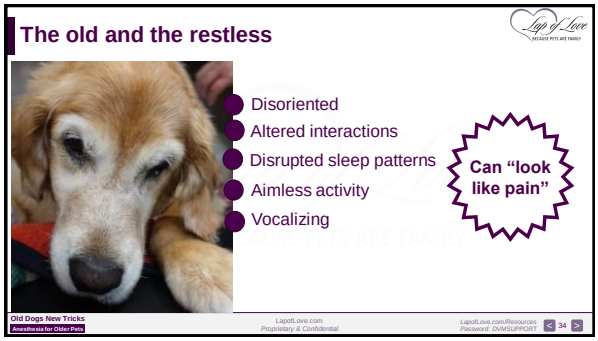


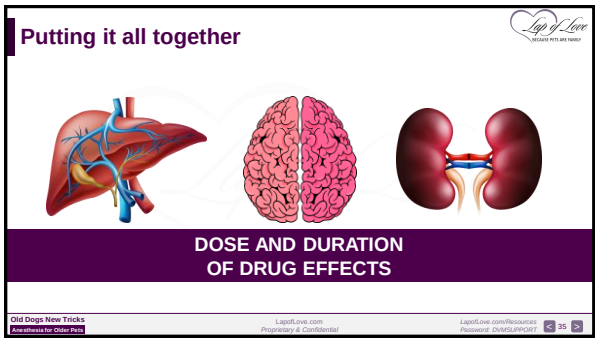



CENTRAL
COMPARTMENT
FAT
ELIMINATION
MUSCLE
VESSEL RICH
COMPARTMENTS


YOUNG
OLD
FAT
MUSCLE
CENTRAL
COMPARTMENT
Old Dogs New Tricks
Anesthesia for Older Pets
LapofLove.com
Proprietary & Confidential
LapofLove.com/Resources
Password: DVMSUPPORT

Cognitive Dysfunction
Old Dogs New Tricks
Anesthesia for Older Pets
LapofLove.com
Proprietary & Confidential
LapofLove.com/Resources
Password: DVMSUPPORT
33


The old and the restless
Disoriented
Altered interactions
Disrupted sleep patterns
Aimless activity
Vocalizing
Can “look like pain”
Old Dogs New Tricks
Anesthesia for Older Pets
LapofLove.com
Proprietary & Confidential
LapofLove.com/Resources
Password: DVMSUPPORT
34


Putting it all together
DOSE AND DURATION
OF DRUG EFFECTS
Old Dogs New Tricks
Anesthesia for Older Pets
LapofLove.com
Proprietary & Confidential
LapofLove.com/Resources
Password: DVMSUPPORT
35

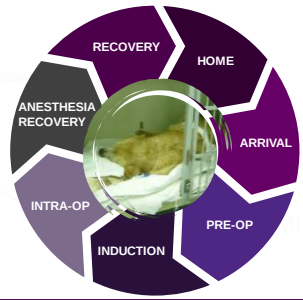
Old Dogs New Tricks
Anesthesia for Older Pets
LapofLove.com
Proprietary & Confidential
LapofLove.com/Resources
Password: DVMSUPPORT

4

- HYPOTHERMIA
- HYPOXEMIA
- HYPOVOLEMIA
- HYPOTENSION

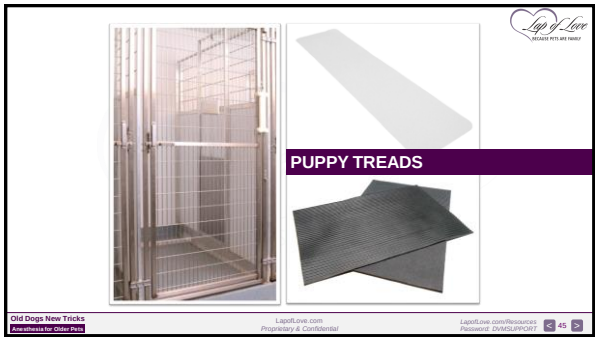
Common anesthesia problems

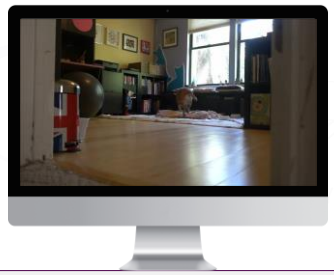
HUMANS	DOGS & CATS
Delayed recovery Delirium in recovery	Delayed recovery Delirium in recovery



The clinic environment

The "scary floor"





Acute on chronic pain

How will this little guy feel tomorrow?

Planning

Pre-admission

Preoperative assessment

Procedure
- Is minimally invasive surgery an option?
- Can you use a locoregional technique?

History

Physical examination

Blood work

Preoperative assessment

History

Physical examination

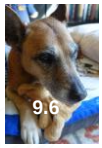
Blood work

Preoperative Blood Work

Pregeneral anaesthetic blood screening of dogs and cats attending a UK practice

Davies & Kawaguchi Vet Rec 2014

Mean Age (years)



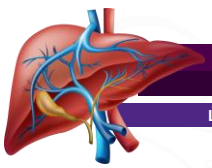
- Based on history and PE the results were only unexpected in 1% of cases
- Some cases postponed
- Anesthesia protocol changed in **4%** of dogs and **9%** of cats

Screening apparently healthy senior and geriatric dogs [n=100]

32%	Increased Serum Creatinine
32%	Proteinuria
29%	Hypophosphatemia
27%	Increased ALP
25%	Increased ALT
23%	Leukopenia

Willems *et al* 2017 JVIM

What about elevated liver enzymes?



ALT, AST, ALP
GGT

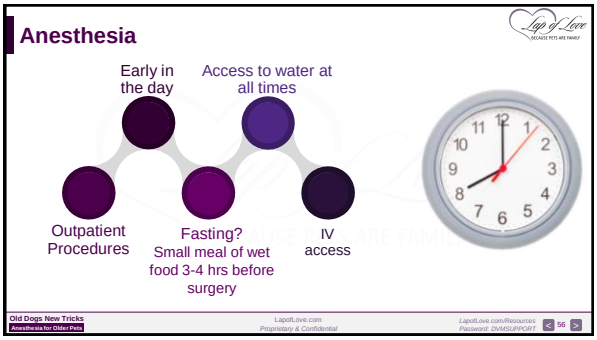
Liver function indicators:

Serum bilirubin

Albumin

Bile acids

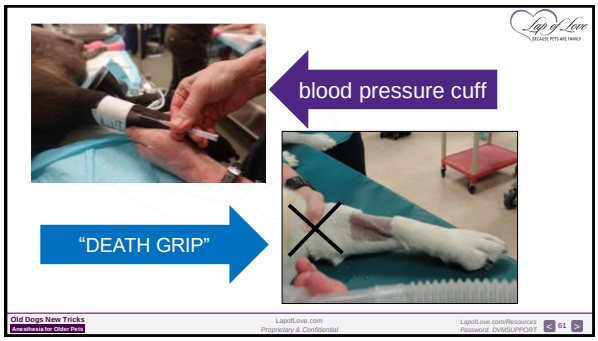
Anesthesia

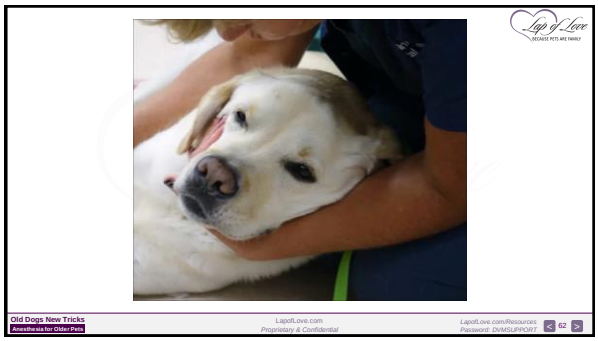


"Don't blow it"

Clipper care
Hypoallergenic tape

Veins: Fragile, lumen size





Preoperative fluids?

Blood volumes

4.7-6.6%
Of Body Weight
47 - 66 mls/kg

7.9-9.0%
Of Body Weight
79 - 90 mls/kg

2013 AAHA/AAFP Fluid Therapy Guidelines for Dog and Cats

In the absence of evidence-based anesthesia fluid rates for animals it is suggested to start at:

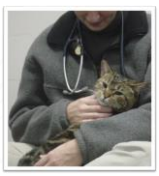
3 ml/kg/hour

5 ml/kg/hour

www.aahanet.org

Anesthesia drugs

- Reversible
- Short acting
- Titratable (IV)
- Lower doses



Premedication – IM or IV

Opioid alone or in combination with a sedative

Acepromazine	Dexmedetomidine	Midazolam
0.01-0.02 mg/kg	1-2 microg/kg	

CALMING POINTS

ACUPRESSURE

SHANTI

SCHEDULED FOR DENTAL CLEANING

Nausea and vomiting

Nausea and Vomiting

Hydromorphone Morphine	EMETIC?
Buprenorphine Butorphanol Fentanyl Methadone	NON-EMETIC?
Dexmedetomidine	EMETIC?

Acepromazine

Effects of acepromazine on the incidence of vomiting associated with opioid administration in dogs

Valverde *et al* 2004

Drug therapy

$5HT_3$ receptor antagonist	NK-1 receptor antagonist

Maropitant

IMPROVED

- Quality of recovery
- Decreased time to feeding
- Increased consumption

Ramsey *et al* 2014

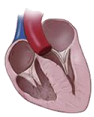
Preoxygenation

3 minutes

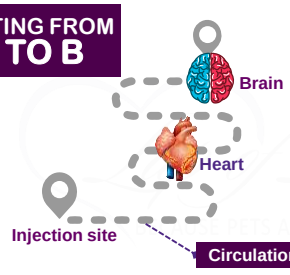
Induction

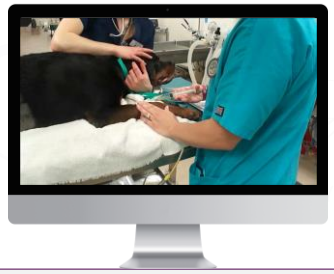
- Fentanyl + midazolam
- Alfaxalone + midazolam
- Propofol + midazolam
- Ketamine* + midazolam

*cats?

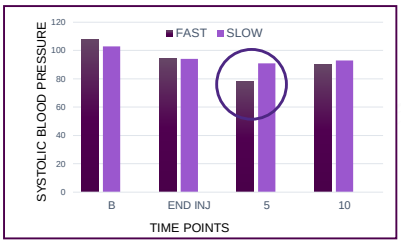


GETTING FROM A TO B

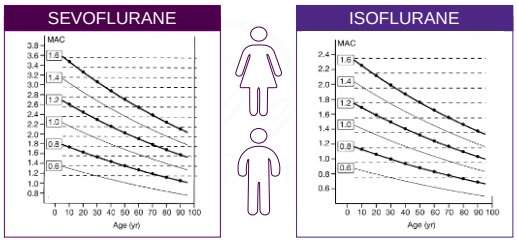




Propofol
Over 30 seconds or 2 minutes



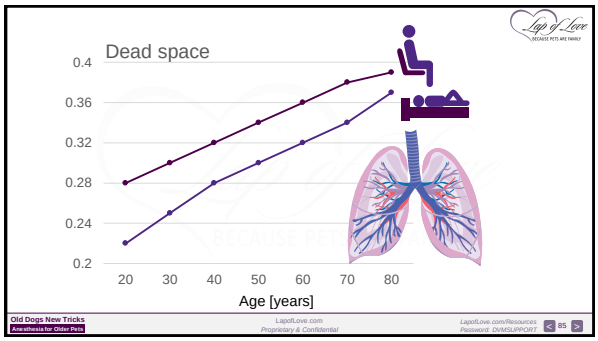
Inhalant agents



Reduced requirements

2 years	8 - 10 years
MAC = 2.25	MAC = 1.86

Inhalant agents + CRIs



Positioning

Reverse Trendelenburg

THINK LOCALLY
ACT GLOBALLY

WSAVA Global Veterinary Community

http://wsava.org

Practical 'How To' videos on using local anesthetics

Epidural
Morphine + local anesthetic

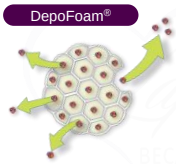
Long acting local anesthetics

Approved uses in humans:

- Orthopedic - infiltration
- Soft tissue – infiltration
- Oral surgery - infiltration
- Femoral nerve block
- Brachial plexus block
- TAP block (abdominal)

Bupivacaine liposome formulations

DepoFoam®



72 Hours

Decreased tear production and corneal drying

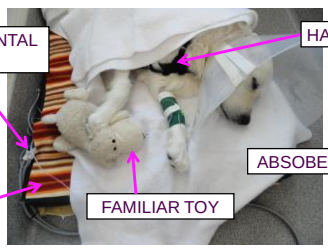
Recovery

AGS Geriatrics Healthcare Professionals

Best practices Guideline
American Geriatrics Society

Recovery

Recovery



SUPPLEMENTAL HEAT

HARNESS

ABSOBENT FLEECE

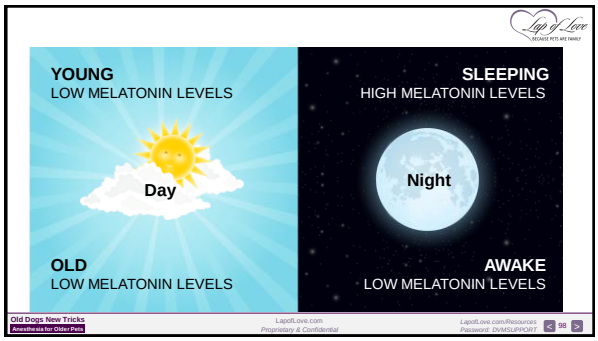
FAMILIAR TOY

RAISED BED

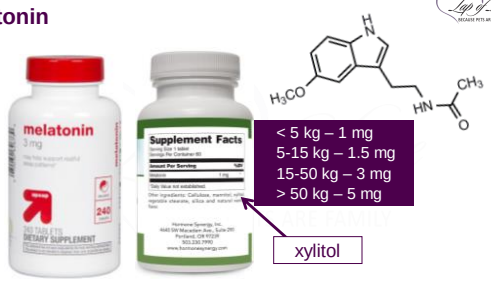
Bladder care

RECOVERY CHECKLIST

- ☐ Express bladder



Melatonin



Delayed recovery?

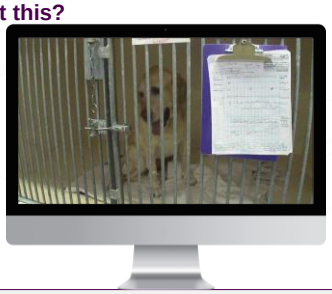
ºC	ºF	MEAN ± SD TIME TO RIGHTING (min)
35.0-35.4	**95.0-95.8**	24 ± 22
35.5-35.9	**95.9-96.7**	18 ± 15
36-36.4	**96.8-97.6**	15 ± 18
36.5-36.9	**97.7-98.5**	11 ± 4
37.0-37.4	**98.6-99.4**	10 ± 3
37.5-37.9	**99.5-100.3**	9 ± 5
> 38.0	**> 100.4**	7 ± 4

Hypothermia

Delayed recovery?

Delayed recovery?

What about this?



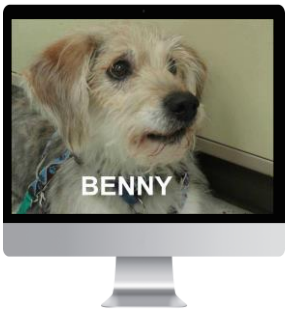
- Cognitive dysfunction?
- Dysphoria?
- Emergence delirium?
- Pain?

- Separation anxiety?
- Due to confinement?
- A full bladder?

Dysphoria

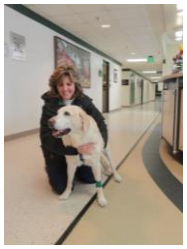
- Associated with opioid use
- Agitated, “hyper-responsive”
- Vocalizing
- Panting
- “Unaware”
- Non-responsive to human interaction

Butorphanol or Naloxone
Dilute 1:10 with saline

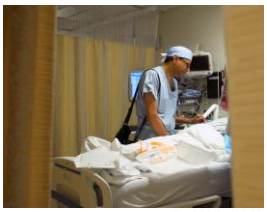


Going home

- Melatonin?
- Maropitant
- Oral medications
  - NSAIDs
  - Grapiprant
- Tramadol?



Cold therapy

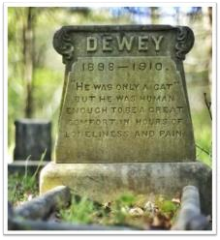


Being Mortal
Medicine and what matters in the end

> Our ultimate goal, after all, is a good life to the very end

Atul Gawande

Lap of Love
BECAUSE PETS ARE FAMILY

LapofLove.com/Resources
Password: DVMSUPPORT
DrRobertson@LapofLove.com

QUESTIONS AND COMMENTS