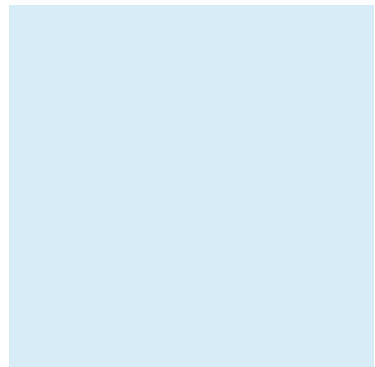
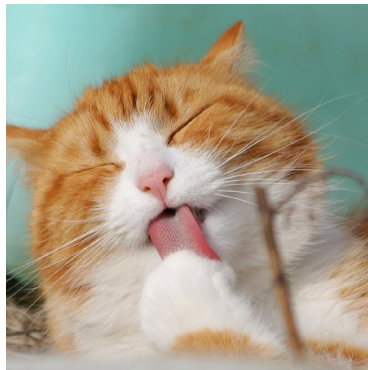
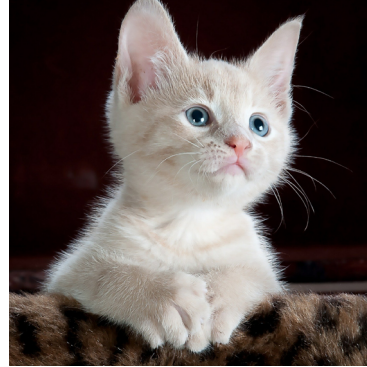
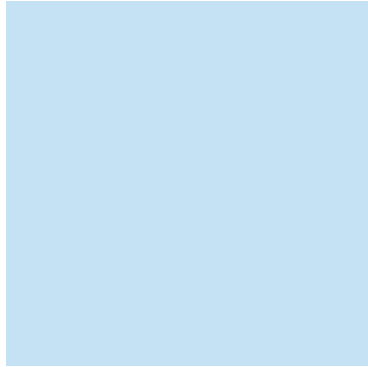




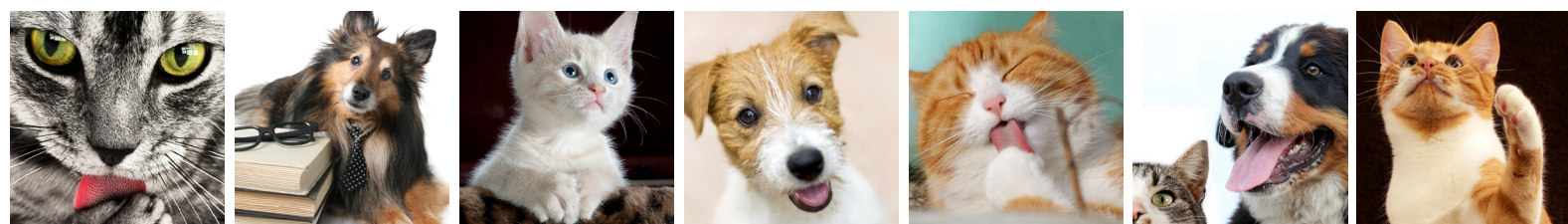
APBC
ASSOCIATION OF PET
BEHAVIOUR COUNSELLORS



THE APBC 2021
Virtual Veterinary
Conference



WITH THANKS TO OUR SPONSORS AND CHARITY PARTNER



Contents

	Page
Conference Schedule	4
Welcome	5
Patrons	6
Join The APBC	7
ABTC	8
Guest Speakers	
Dr Amber Batson	
PART ONE – The Problem of Puberty: when pets become aliens	9
PART TWO – Troublesome Teens: What other factors affect teenage behaviour	36
Sponsor – Forte Healthcare	62
Gwen Covey-Crump	
Not ‘Just Getting Old’ And ‘Slowing Down’, Pain Where You Least Expect It	63
Sponsor – TVM	97
Caroline Clark	
Behavioural Awareness for the Veterinary Team	98
Sponsor – Feliway	122

CONFERENCE SCHEDULE

CONFERENCE P1 – Begins at 9:30am

WELCOME FROM DR ANNE MCBRIDE, CHAIR OF THE APBC

Dr Amber Batson: The Problem of Puberty: when pets become aliens and 30 minutes Q&A

SPONSOR: FELIWAY

Dr Amber Batson: Troublesome Teens: what other factors affect teenage behaviour and 30 minutes Q&A

CONFERENCE P2 – Begins at 1:40pm

Gwen Covey-Crump BVetMed, CertVA, DipECVAA, MRCVS, CertVetAc(IVAS): Not 'just getting old' and 'slowing down', pain where you least expect it and 30 minutes Q&A

Caroline Clark: Behavioural Awareness for the Veterinary Team and 30 minute Q&A

CONFERENCE CLOSE



Welcome

To The APBC Virtual Veterinary Conference

As Chair of the APBC, I wish you a very warm welcome to the APBC Veterinary Conference 2021.

Thank you so much for joining us. I know you will find the presentations interesting, informative and entertaining.

In these challenging times those of us in practice as behaviourists and trainers have had to adapt to the situation, and that has involved using technology in new and innovative ways.

The APBC also has been adapting, and the events committee have done a marvellous job of enabling us to be able to present our virtual conference today.

I would like to thank our speakers for making their brilliant presentations remotely. This is not as easy as it sounds, it is quite different to talk to a camera with no live audience! Of course, we still have the opportunity for live interaction with the speakers. Each is available after each session for the live Q&A.

I also would like to thank our sponsors. Their support is greatly appreciated. All provide services and resources relevant to the field of behaviour counselling and/or training.

Finally, I wish to take this opportunity to introduce our patrons; Dr James Greenwood MRCVS, and Cat Henstridge MRCVS - Cat the Vet as many of you will know her.

We thank them for their patronage and support and look forward to continuing our fruitful relationship with them both.

We are proud to present this on-line APBC conference entitled Growing Pains: Addressing Adolescence in Companion Animals.

Welcome again – enjoy the day, relaxed, safe and comfortable in your own home.



Anne McBride
APBC Chair person



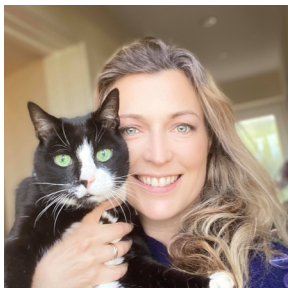
Our Patrons



Dr James Greenwood
BVSc MRCVS

“ I am absolutely delighted to act as patron for the Association of Pet Behaviour Counsellors. Understanding pet behaviour is incredibly complex. When our pets start to show challenges in their behaviour – having a trusted body like the APBC to call upon to provide exceptionally skilled clinical animal behaviourists is incredibly reassuring for myself as a referring veterinarian.

Knowing that those pets showing behavioural complexities will be addressed in the most appropriate manner to achieve the desired results, without compromising their welfare, stands absolutely in line with my own principles. I could not be more honoured to act as patron.”



Cat Henstridge
BVSc ESVPS Cert GP
(SAM) MRCVS

“ I have a keen interest in behaviour and how it impacts on pets and their humans. However, the world of animal behaviour professionals is an unregulated one and without the proper training, knowledge and understanding it is extremely easy to do more harm than good. I only recommend APBC registered behaviourists to my clients and I'm extremely pleased and proud to now be working with the association as a patron.”



APBC

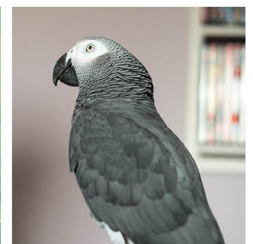
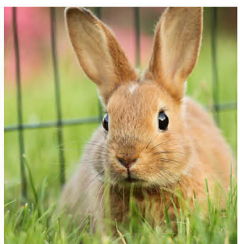
ASSOCIATION OF PET
BEHAVIOUR COUNSELLORS

AN INVITATION TO JOIN THE APBC

Established for over 30 years
we work closely within the
veterinary profession and
the animal industry

BENEFITS INCLUDE:

- Big discounts on CPD Events
- 24/7 Wellbeing Helpline
- Promotion of members
- Access to Journals
Anthrozoos, Applied Animal Behaviour Science,
Journal of Veterinary Behavior
- Supportive groups for moral support and exchange of up-to-date information



THE APBC ARE A CAB AND ABT ASSESSOR ORGANISATION

Visit www.apbc.org.uk for further information

ABTC

ANIMAL BEHAVIOUR & TRAINING COUNCIL

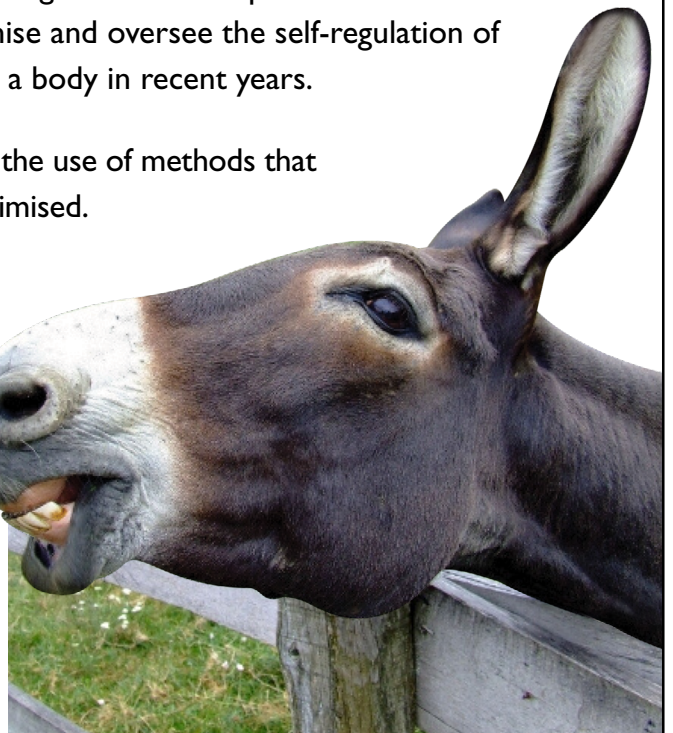
The Animal Behaviour & Training Council is the regulatory body that represents animal trainers and behaviourists to both the public and legislative bodies as these are currently unregulated professions.

The Council sets and maintains the standards of knowledge and practical skills needed to be a trainer or behaviourist, and it maintains the national registers of appropriately qualified animal trainers and animal behaviourists. It promotes the welfare of animals in their interactions with humans, lobbying for humane methods in training and behaviour modification, and for the education of the animal owning public.

The acknowledged wealth of expertise and qualifications of practitioners within member organisations of the ABTC make it the most appropriate organisation to represent the sector. The Council has been established to set standards, organise and oversee the self-regulation of the sector in accordance with a number of calls for such a body in recent years.

By promoting responsible and well qualified practitioners, the use of methods that are designed to train animals through aversion will be minimised.

The humane treatment of animals undergoing training or behaviour therapy will be at the forefront of education and training of practitioners.



The Association of Pet Behaviour Counsellors is proud to be one of the founding members of the Council, alongside other training and behaviour organisations, welfare organisations and veterinary organisations.



APBC

ASSOCIATION OF PET
BEHAVIOUR COUNSELLORS

www.abtc.org.uk

Presenter

Dr Amber Batson MRCVS



PART ONE – The Problem of Puberty: when pets become aliens

We now recognise that adolescence is a time of life when a variety of brain and body changes influence behaviour.

Recent research in dogs (Asher et al 2020) has shown that dogs have a passing phase of carer – specific, conflict – like behaviour during adolescence, (both reduced trainability and reduced responsiveness to commands) an effect that was more pronounced in dogs with behaviour that indicated a less secure attachment (to the carer) and bitches with behaviour indicative of insecure attachments in the pre-adolescent phase, became reproductively capable earlier.

In human adolescents we recognise a significant portion of the population of those in this life stage have mental illness or behavioural problems. It is a complicated and challenging time for the adolescents themselves and their parents, caregivers or companions.

Adolescence is a developmental transition from dependence on caregivers to independence from caregivers which contains, but is not defined by, puberty.

Puberty (the period of sexual maturation) in the dog is considered to occur between 6 and 9 months of age in males and 6–16 months in females; however, behavioral and social maturity may be reached between 12 and 24 months of age and is suspected to differ depending on the breed as stated by Harvey 2021, however further research on the more precise timings of adolescence and puberty within different dog breeds, or dog sizes needs clarity. In a recent thesis, the timing of cat puberty and sexual maturity was influenced by the amount of resources available to them. Of course it is important to note in cats that they are seasonal breeders, unlike the dog and this will influence the onset of puberty.

Both male and females are born with limited gonadal hormones. Prepuberty, the brain starts to produce GnRH from the hypothalamus and then FSH and LH (both males and females) from the pituitary gland as part of the Hypothalamic-Pituitary-Gonadal axis. Rising levels of FSH/LH influence the gonads (ovaries and testicles) to start their own activity resulting in rising levels of testosterone in the male and the development of follicles producing oestrogens in females.

Rising testosterone levels are not equated to immediate reproductive maturity in the male, and it may take 3-6 months before the testicles are producing mature spermatozoa with full fertilisation capacity.

Female dogs will have a rise in LH that promotes final follicle development and then rupture of the follicle to release the oocyte (egg) in to the uterus. The remaining follicular tissue, under LH influence starts to produce progesterone. The dog is fairly unique in not producing prostaglandins in the post ovulatory, non pregnant state, so that every female dog who ovulates will go through a physiological “phantom pregnancy” even if they do show that overtly in behavioural signs. This is important to note when we consider behavioural change in the entire female dog and has relevance to neutering timing – see later.

The adolescent brain is not simply a brain on “sex hormones” As stated by Risk and Romeo 2019 “It appears that certain developmental changes in the adolescent brain are programmed to occur, with or without, the influence of pubertal hormones.”

It is important to notice that some behaviours such as mounting and pelvic thrusting are NOT reliably indicative of the onset of puberty. In fact mounting and thrusting has been seen in free ranging dogs as early as 6 weeks of age – in females and males. It is often a form of pseudosexual play. This is present in most species including dogs, horses, rabbits, and perhaps less commonly reported, in cats too. Mounting and thrusting can also be a displacement activity that occurs at time of anxiety, stress or conflict. Owners may commonly consider neutering their pets because of the onset of mounting behaviours, believing that they are now sexually mature and this is not necessarily true.

The brain changes significantly in two regions from childhood through adolescence and into adulthood, with the striatum, a central region impacting on the emotional responses of an individual developing early on in life, and well ahead of the prefrontal cortex (PFC) , an area of the fore brain that has executive functions to input and regulate striatal responses. During adolescence, the striatum is still developing quickly, and is doing so in advance of the now developing PFC meaning that the adolescent will have strong emotions and motivations but normally lacks the higher input to voluntarily control these. The “moody” “emotional” teenager is an effect driven by brain chemical and pathway changes rather than a conscious, volunteered behaviour.

These brain changes support the transition from dependent on caregiver to independent of caregiver. Increasing drive to explore, develop independence including risk taking. It is possible that these changes may drive even aggressive responses in some adolescents, and human psychology considers this “near normative” and transient in human adolescents.

We must be mindful of our approach to these behavioural changes in pet adolescents. It is a common recommendation to neuter, particularly dog teenagers, as these “unruly” behaviours begin and this may not always give us the response we desire.

Multiple studies in dogs have highlighted that neutering males during adolescence can result in ongoing undesired behaviours or even the development of new undesired behaviours including aggression. One study in female dogs (Kim et al 2006) found GSDs neutered around the time of puberty / early adolescence, became more reactive. A number of studies have shown that neutering males and females may result in increased fear based problems, increased aggression and may contribute to early cognitive decline.

There are of course medical benefits alongside the obvious positive of population control – a particular benefit in cats where owners are not often controlling or observing the actions of their pets. However, we also recognize a number of medical negatives from gonad removal, outside the scope of this presentation, suggesting we need to individualize our approach to recommending neutering given we are now starting to appreciate different pros and cons depending on the breed and or size of the dog, as well as the timing of the neutering in that individual’s life time.

Focussing on the behavioural aspect of neutering we recognize two main reasons why the procedure of removing gonads may impact on the adolescent pet’s behaviour:

1/ Learning that occurs as the result of the procedure

Many pets (dogs, cats, rabbits) are brought into a clinic for the operation and this puts them, alone, away from their human caregiver / companion (attachment figure) in a potentially threatening environment – one full of pheromones and other stimuli conferring fear and / or stress.

The process of restraint and injections used in the preparation of the patient for the anaesthetic, has the potential to result in single trial learning (through classical conditioning associative learning) where by after the procedure the animal might view a previously neutral stimulus such as approach by an unfamiliar person, as fear or even pain inducing and therefore result in unconscious, reflexes that result in undesired (by humans) behaviours such as flight attempts or even growling / biting – fight attempts. This alone may explain why some dogs who were not aggressive prior to neutering become fear aggressive towards unfamiliar post operatively and in the long term.

2/ Hormonal / physiological changes that occur as the result of the operation (including anaesthesia)
Testosterone is recognized as a confidence giving, potentially stress reducing hormone so its sudden loss may trigger increased fear responses.

Oestrogens and progesterone play a role in resource sharing, social interactions and their loss (particularly on the developing brain) may result in increased fear and resource protectiveness.

Removal of the ovaries in the dioestrus (progesterone, perhaps prolactin dominant) phase has been linked to the sustained release of prolactin and ongoing “phantom pregnancy” behavioural responses which may explain resource guarding or social aggression post op. Even in bitches with out behavioural signs of phantom pregnancy, initiation of these symptoms following ovariectomy in the dioestrus period, has been reported (Root el 2018).

Newer research also highlights the impact of anaesthetics and some other medicines eg NSAIDs, antibiotics on the intestinal microbiota, which will be discussed in relation to behaviour in more detail in part 2.

Some male dogs may find the presence of testosterone driving certain behaviours such as exploration, increased social interactions, desire for sex, a source of stress and frustration if these behaviours are thwarted. Sometimes we have to try to assess whether undesired behaviours by an adolescent dog eg irritability, are the result of fear or frustration. If they are the result of frustration alone, castration may help. If fear is a component, or there are existing issues with people / handling etc then castration has the potential to worsen the behaviour. The use of anti-testosterone medicines before castration may be a possibility, although detailed research on the behavioural outcome of these medicines, and the reliability of them as predictors of post castration behaviour is limited.

The neutering process should be an individualized decision commencing with informed owner consent. This requires a detailed discussion with the owner about medical AND behavioural pros and cons depending on the individual dog, their temperament, any existing behavioural concerns and their breed, size and age that may influence medical outcomes.

We can plan in advance to reduce negative consequences of neutering if we consider the use of anti-anxiety medicines given at home on the day of the procedure, fear reducing handling techniques, use of adequate pain relief, plans for post operative wound management (ideally avoiding plastic, rigid Elizabethan collars), potential for use of pre/probiotics, and post operative environment management.

Ideas to avoid the most restrictive confinement which can increase stress should be considered. Along with static / low movement enrichment, which should not solely focus on food enrichment. Controlling movements in the restricted adolescent can be challenging and the author finds a combination of static enrichment alongside the use of “station training” where the animal has items to lick/ find treats/ sniff in immediate sight on leaving the confined area, useful in achieving a calmer animal. Alternatives or additions to station training include target training or reward training the animal to walk “loosely” although the author finds having visual stimuli, closer to the ground for the pet to focus on is often more beneficial in promoting calm movements when walking outside the pen for toileting or exercising.

If we proceed with neutering but end up with undesired behaviours post operatively then we can consider options such as post op melatonin (with research showing an increase in serotonin, decrease in cortisol and an increase in testosterone in male dogs given melatonin post castration) – effects on females not currently known. The use of standard behaviour modification such as counter conditioning, supportive gut health with the use of pre/pro or post biotics, anti-anxiety medications and even enrichment – to be explored in more detail in part 2.

APBC VET CONFERENCE

THE PROBLEM OF PUBERTY: when pets become aliens

Dr Amber Batson MRCVS 2021



A dog lescence – a survival guide!

“This (adolescence) is a very important time in a dog’s life.

This is when dogs are often rehomed because they are no longer a cute little puppy and suddenly their owners find they are more challenging and they can no longer control or train them.”

Dr Asher, Newcastle University. July 2020.



Intellectual Property Dr A Batson 2021

Problematic puberty / the troublesome teens

“Of late there has been a rise in the prevalence of mental illness and maladaptive behaviours among adolescents. WHO estimate shows that up to 20% adolescent have one or more mental or behavioural problems. Studies conducted in different parts of the world show that prevalence of behavioural and emotional problems in adolescents ranges from 16.5% to 40.8%”

From Pathak, R., Sharma, R.C., Parvan, U.C., Gupta, B.P., Ojha, R.K. and Goel, N.K., **2011**. Behavioural and emotional problems in school going adolescents. *The Australasian medical journal*, 4(1), p.15.



Intellectual Property Dr A Batson 2021

A dog lescence – a survival guide!

“We found a passing phase of carer – specific, conflict – like behaviour during adolescence, (both reduced trainability and reduced responsiveness to commands) an effect that was more pronounced in dogs with behaviour that indicated a less secure attachment (to the carer).

Bitches with behaviour indicative of insecure attachments in the pre-adolescent phase, became reproductively capable earlier.”

Asher, England et al 2020

Intellectual Property Dr A Batson 2021

What is adolescence?

Adolescence is defined as “the transition from juvenile to adult and may be comprised of phases; early, middle and late, all of which encompass physical and psychological change”

Adolescence typically occurs during the teenage years in humans and includes puberty – the time when juveniles become capable of sexual reproduction. However, in humans it is now discussed that puberty may precede adolescence.

Puberty is a discrete physiological event driven by the maturation of the hypothalamic-pituitary-gonadal axis resulting in the ability to sire and care for offspring.

Adolescence is a developmental transition from dependence on caregivers to independence from caregivers.

Ref Romeo 2017 The metamorphosis of adolescent hormonal stress reactivity: a focus on animal models

Intellectual Property Dr A Batson 2021



When is adolescence?

“The mammalian brain undergoes considerable neurological reorganization during adolescence. Neurological adolescent development may begin before puberty and can end a considerable time after it [e.g., in humans adolescence begins at around age 10 years and ends in our mid-20s].

Puberty (the period of sexual maturation) in the dog is considered to occur between 6 and 9 months of age in males and 6–16 months in females; however, behavioral and social maturity may be reached between 12 and 24 months of age and is suspected to differ depending on the breed.

There is also evidence to show that different behavioral traits exhibit different developmental and lifespan trajectories. In terms of memory, dogs aged under 24 months have been shown to have the shortest memory span compared with older dogs, implying that memory is still undergoing a developmental change in this period.....

The majority of dogs aged between 6 months to 1 year (27–52 weeks) could be presumed to be undergoing puberty (although it is acknowledged that data on the exact timing of puberty and breed-related differences are sparse). Thus, those aged between 6 months to 1 year (27–52 weeks) could be classified as “Juvenile,” capturing the period of change associated with the onset of puberty. The limited data available on the timing of behavioral maturation in dogs suggest that adolescent development may continue until dogs are ~2 years of age, as they still exhibit behavioral changes between the age of 1 and 2 years” Harvey 2021

Intellectual Property Dr A Batson 2021



Cats....

Recent research has suggested puberty onset may be affected by resource availability where resource low, free ranging cats reached sexual maturity much sooner (by 4 months) than resource high, owned cats (around 6-8 months) E.Bohrer Thesis 2016



Age matters....

Age of relinquishment to shelter (USA)

0-4 mnths 11.2%
 5-24 mnths 54.9%
 3-8 yrs 27.1%
 >8 years 6.9%

Scarlett, 1999

The majority of dogs in rescue centres / shelters are under 2 years old.

Patronek et al 1995, Bollen and Horowitz 2008, Protopopova et al 2014, Barnard et al 2015

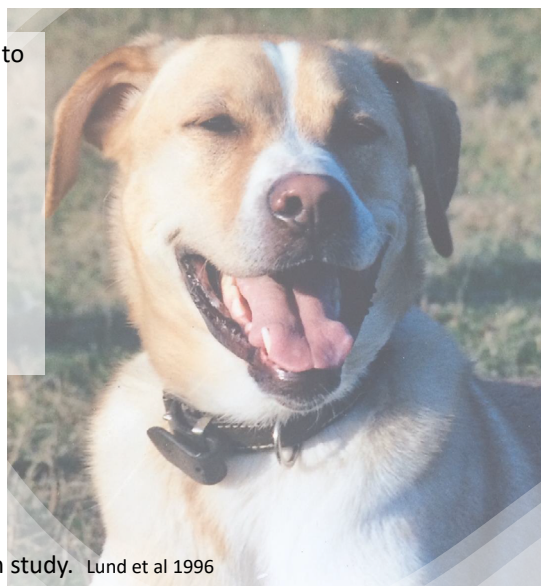
80% behaviour problems were reported in the first 3 years of life in a Danish study. Lund et al 1996

The median age of dogs with behaviour problems was 12 months of age (following a median age at neutering of 9 months, approx. 85% dogs had been neutered) in a large international study. Dinwoodie et al 2019.

Age of dogs when surrendered to Dog's Trust, UK

65% <3 years old

Diesel et al 2010



Intellectual Property Dr A Batson 2021

Age matters....

"This study has reported Undesired Behaviour (UB) as a substantial risk factor of death for dogs under the age of three 473 years of age.

In most cases in this study, veterinarians did not record offers of advice on how to solve the UB, or where to find a behavioural professional for further help. 2

Furthermore, in most cases, there was no record of the owners having actively pursued resolution of the UB."

From Boyd et al 2018. UK study

Then a very recent study:

"This study found that amongst dogs that died under three years of age, those aged between one and two years had the highest odds of dying due to a cause ascribed to a UB." From Yu et al 2021 Australian study

Intellectual Property Dr A Batson 2021

Undesirable behaviour	No.	Percent	95% CI*
Aggression	256	54.0	49.4-58.6
Road Traffic Accident (RTA)	185	39.0	34.6-43.6
Inter-pet conflict	31	6.5	4.5-9.2
Dog Attack	28	5.9	4.0-8.4
Anxious/Nervous	25	5.3	3.4-7.7
Restraint required for veterinary examination	24	5.1	3.3-7.4
Hyper-excitability	9	1.9	0.9-3.6
Limited training	9	1.9	0.8-3.4
Destructive	7	1.5	0.6-3.0
Excessive Vocalisation	5	1.1	0.3-2.4
Hyper-sexuality	4	0.8	0.2-2.1
Inappropriate elimination	4	0.8	0.2-2.0
Owner can't cope	1	0.2	0.0-1.2
Other or undiagnosed behaviours	20	4.2	2.6-6.4

Table from Boyd et al 2018

Reproductive physiology changes at puberty



Male dogs

Low levels of testosterone are produced by the testes from birth.

Puberty marks the onset of a rise in testosterone by the testes into the blood, that results in the production of spermatozoa and the start of being able to fertilise female eggs.

Studies in free ranging, medium sized dogs have shown that testosterone levels and correspondingly, spermatozoa, are low before 24 weeks of age (approx. 5 months old) and no sperm were present in the testes. However, testosterone levels were increasing from approximately 20 weeks.

The pituitary gland starts producing LH (lutensising hormone) from around 13 -20 weeks of age, and this peaks at around 36 weeks (or later in large/ giant breeds).

It takes a further 3-6 months for testicular tissue to be producing maximal androgen amounts and fertile sperm. At this time LH levels lower slightly then remain stable.

Beagles have been shown to have a significant plasma T rise with first ejaculate produced at 235 days of age (approx. 7 months) and Collies at 365 days.

Reproductive physiology changes at puberty



Female dogs

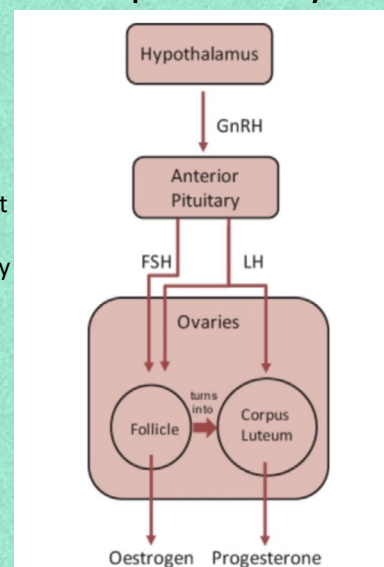
Female dogs are born in a state of ANOESTRUS

As they approach puberty the hypothalamus starts to send out pulses of GnRH (Gonadotrophin Releasing Hormone) which switches on the front part of the pituitary gland to start releasing FSH (Follicle Stimulating Hormone) and LH (Luteinising Hormone). These are released into the blood where they are detected by the 2 ovaries.

FSH stimulates the development of a number of follicles (which contain the eggs or oocytes) and LH stimulates the maturation of the follicle and then egg release, followed by the luteinisation process – the ruptured follicle region becoming a different tissue type called the CORPUS LUTEUM (CL).

When the follicles are developing, these release oestrogens.

When the follicles have ruptured and CLs have formed, the CLs produce progesterone.



Intellectual Property Dr A Batson 2021

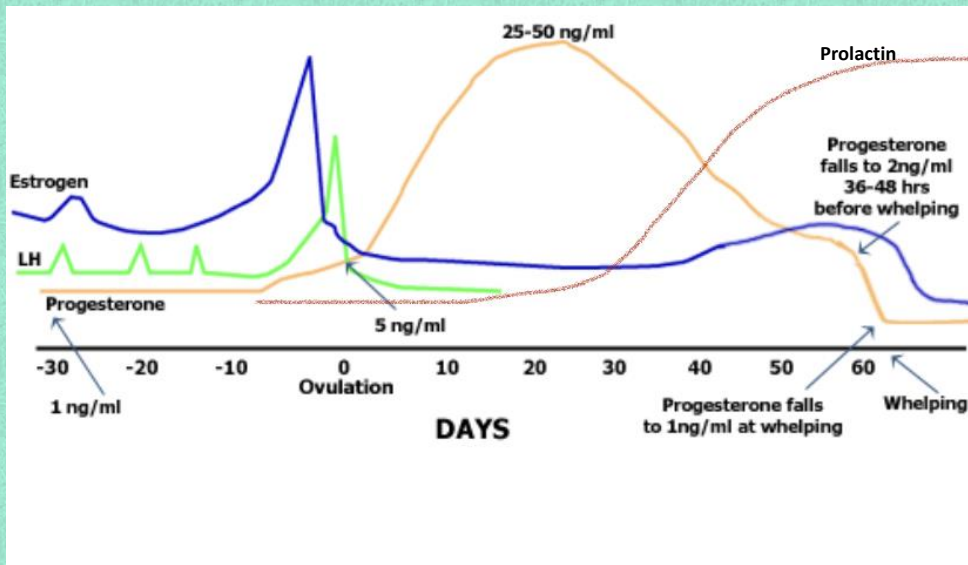


Image from wacvet.ca/services modified to include prolactin

Intellectual Property Dr A Batson 2021

All cycling female dogs produce prolactin. Unlike other species, if they are not pregnant they do not produce prostaglandin. After ovulation, every female dog will go through a physiological pseudocycsis – a phantom pregnancy.

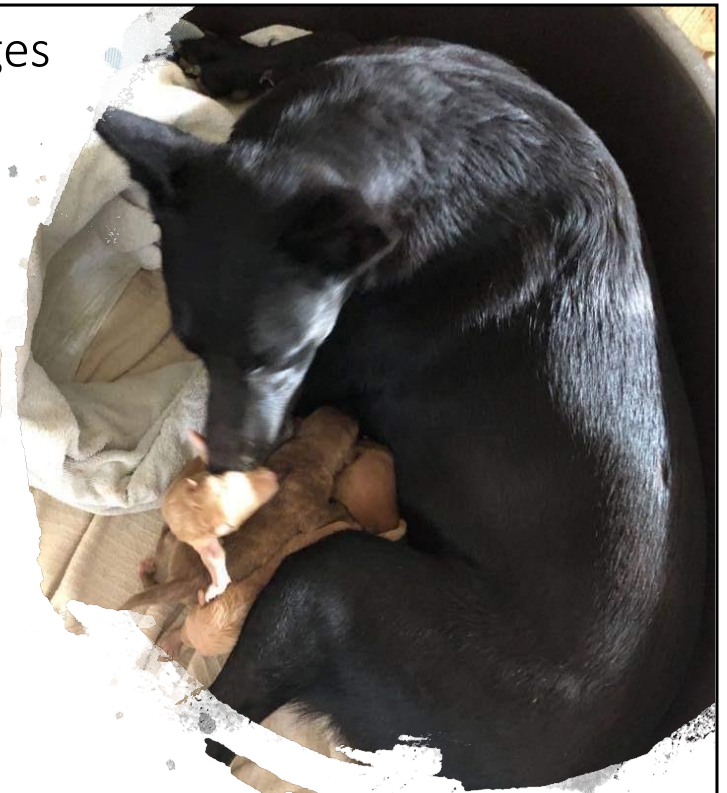
Reproductive physiology changes at puberty

Female dogs

Following the natural resolution of pseudocycsis (the result of a lack of oxytocin from puppies sucking on the breast causing the pituitary gland to stop releasing prolactin) which typically occurs around day 70-80 or the weaning of the puppies from a successful pregnancy causing the same reduction in prolactin, the female dog will reenter a period of anoestrus.

The next pulsing of GnRH will begin in 2- 4 months time in most female dogs, meaning that they on average have an ovulatory cycle twice per year.

The cycles are not related to the season of the year.



Intellectual Property Dr A Batson 2021

So the adolescent brain is simply a brain on sex hormones?



Definitely not!

Many of the changes that occur in the brain around the time of adolescence occur even if we remove the sex hormones from the individual (neutering) BEFORE puberty begins.

“It appears that certain developmental changes in the adolescent brain are programmed to occur, with or without, the influence of pubertal hormones.

Nevertheless, when pubertal hormones are around, there is a potential for hormonal modulation of the developmental trajectory of the adolescent brain.

Our overall perspective is that the transition from childhood to adulthood that occurs during puberty and adolescence involves complex interactions between the developing brain, hormones and experience.”

From Risk and Romeo 2019 Coming of Age



SoMounting and thrusting

NOT NECESSARILY INDICATIVE OF PUBERTY

*Play

Mounting (rearing up on hind legs and placing front legs over some part of another individual) and occasionally mounting then thrusting (moving the pelvis backwards and forwards) has been described as a normal part of play patterns seen in the dog. Often referred to as pseudosexual play.

This has been reported as early as 6 weeks of age.

Ref: Ward et al 2008 Partner preferences and asymmetries in social play

Pal 2010 Play behaviour during early ontogeny in free ranging dogs

*Displacement activity

Displacement activities are defined as those behaviours that are normal for that species but done out of appropriate context, undertaken at times of emotional or physical conflict or as the result of frustration.

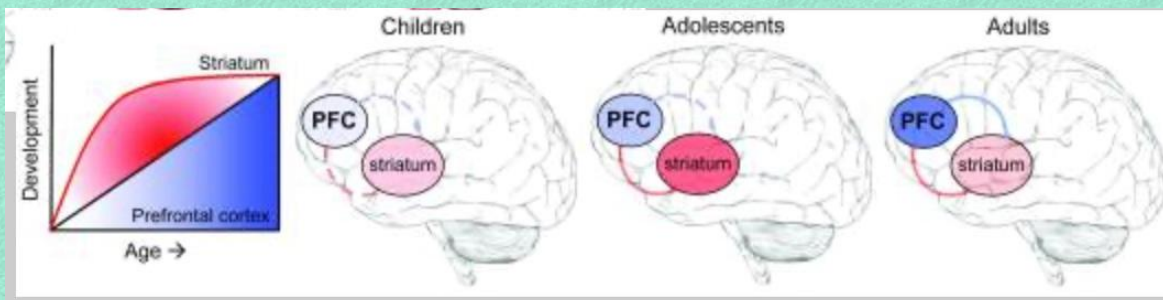
Play has been described as a moderately common displacement activity in the dog. Mounting and thrusting therefore can indicate a negative emotional state for that dog rather than related directly to sexual activity.

Sommerville et al 2017 Why do dogs play?



Intellectual Property Dr A Batson 2021

The brain during adolescence



From Casey & Jones 2010 Neurobiology of the adolescent brain

PFC – prefrontal cortex. Works to create self control, focus, planning, higher level problem solving, emotional control among others.

Striatum. One of the main components of the basal ganglia. It is predominantly involved in movement and mediating rewarding experiences. It receives and sends signals to a variety of other brain areas including the emotional centres in the limbic system and is therefore involved in multiple elements of cognition and behaviour.

Intellectual Property Dr A Batson 2021



What changes occur in the brain during adolescence?

*Natal dispersal Dogs

Pal 1998 figures showed 39% adolescents dispersed from their natal group of which 73% were males. Average distance to new 'range' was 1.7km

Moving from a natal home range to a new 'territory' markedly increases risks (new social interactions, food acquisition, shelter acquisition, mate acquisition, potential disease). The 'priming' of the adolescent brain to cope with risk taking is a likely similar physiological mechanism to that studied in people.

However, >60% of adolescents did NOT disperse from their natal group. Many of this category remained with the natal group for life. A small amount dispersed as adults.

This means the brain must have the capacity to adapt to different environments – remain in a familiar environment vs undertake the risk and potential danger of a new, unfamiliar environment.

*Natal Dispersal Cats

Females rarely disperse, instead living in a matriarchal community. Male dispersal, however, seems to be more frequent. This is particularly frequent in the second or third year of life. When young males disperse and move through unknown territory, they are more susceptible to environmental dangers, e.g. road accidents. Although they reach sexual maturity by the end of their first year, they are often not integrated spatially and socially into a local cat society until their second or third year; only then do they become truly reproductively active. See Turner 2014

Intellectual Property Dr A Batson 2021

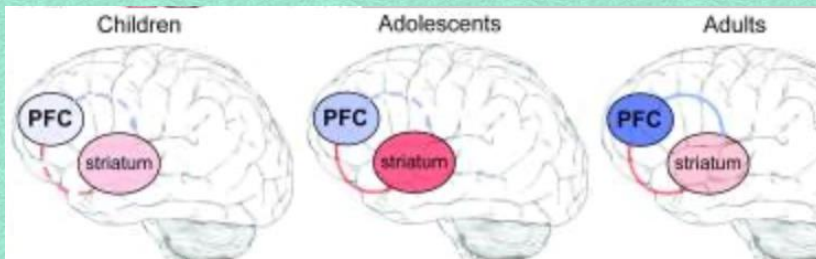


Risk taking in the adolescent

The Changes in Dopamine Systems

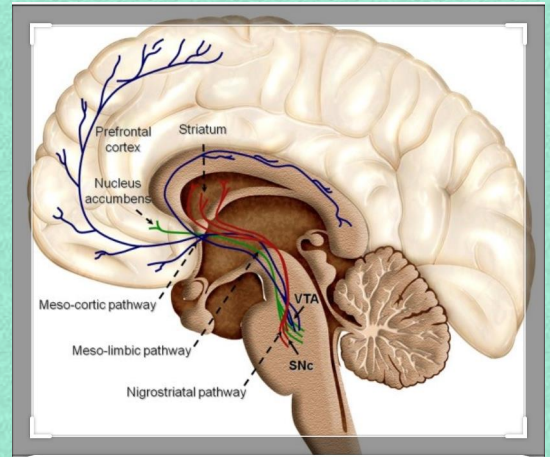
There is a mesocortical peak in dopamine activity during adolescence. This results in an apparent balance shift between mesocortical and mesolimbic dopamine pathways in the brain. However the mesolimbic system appears to become hypersensitive to dopamine.

This activation pattern in the prefrontal cortex is consistent with certain characteristic adolescent behaviours, including heightened incentive-seeking, increased risk-taking, and poor decision making.



From Casey & Jones 2010 Neurobiology of the adolescent brain

Intellectual Property Dr A Batson 2021



Behavioural expression of increased risk taking

Is adolescent aggression a normal behaviour in the ethogram?

'Life long persistent tendency toward aggression, is thought to have its origins in neurodevelopment (eg related to attachment theory among other aspects of neurodevelopment in the neonate and juvenile), it begins in childhood and persists from there.

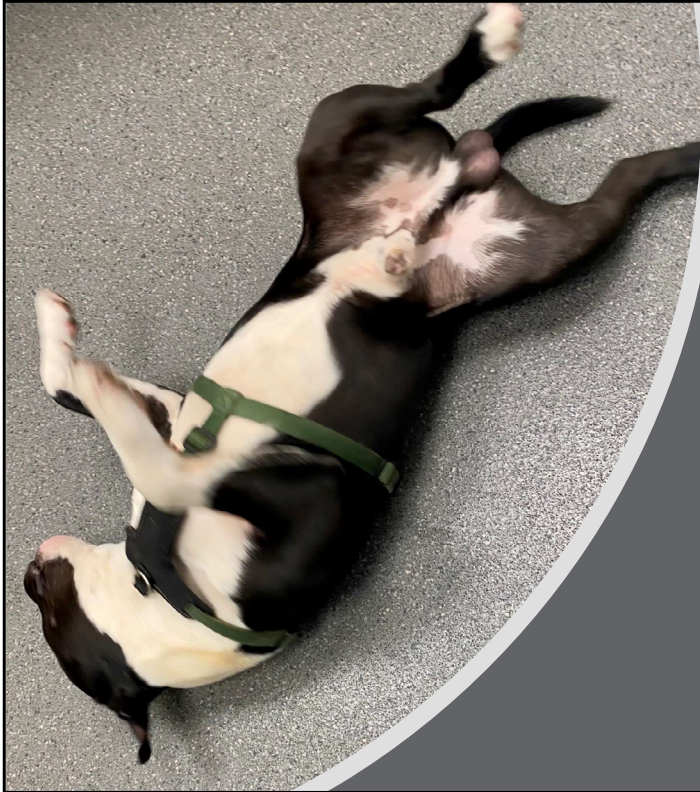
In contrast, adolescent tendency toward aggression, has its origins in social influence (the observable behaviours of those around the individual, as well as attachments during this period); it begins in adolescence but desists in young adulthood.

Research has shown that adolescent aggressive tendencies are common, transient and near normative."

In part two: Troublesome teens we'll explore why stress and frustration in environment and training, impact on the adolescent dog / cat in different ways than in other life stages

Ref. Moffitt, T. E. (2003). Life-course-persistent and adolescence-limited antisocial behavior: a 10-year research review and a research agenda.

Intellectual Property Dr A Batson 2021



So we should neuter our pets to reduce undesired behaviours, right?

Intellectual Property Dr A Batson 2021

Neutering

Neutering remains the most common recommendation given to owners by vets and trainers when an un-neutered dog presents with any behavioural problem.

In many countries including the UK, much of Europe and USA, neutering remains the main method of population control and a strongly recommended procedure to prevent disease.

Recent studies have started to challenge whether neutering is really as beneficial for the individual as we would have owner's believe.

Neutering can INCREASE fear problems including fear aggression (Appleby, 2010)

Neutering has been linked with improvements in mounting, urine spraying and roaming – all behaviours directly linked to sexual reproduction, but little or no effect on fear or aggression related behaviours (Neilson et al 1997)

Castration of male dogs may even increase the likelihood of aggression developing in some individuals (7-12 months of age when castrated 26% more likely to show aggression towards strangers) Farhoody, Serpell et al 2018



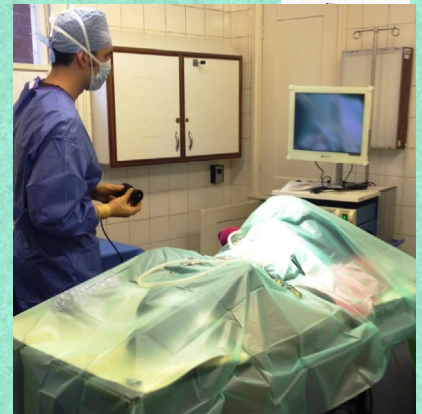
Intellectual Property Dr A Batson 2021

Neutering

Spaying/neutering dogs is commonly used for population control and perhaps as a perceived way to reduce behavioural problems.

“However, spaying and neutering is associated with an increased risk of several long-term health problems including obesity, urinary incontinence, bladder stones, hypothyroidism, diabetes mellitus, hip dysplasia, cruciate ligament rupture, behavioral changes (including owner-directed aggression and fear), cognition problems, as well as several forms of cancer (including leukemia, prostate cancer, bone cancer, skin cancer, splenic cancer, and bladder cancer).”

Kutzler 2020



PROS

VS

CONS



Neutering pre, peri or post puberty

Losing body parts is a big deal!

“Gonads are not merely gamete-producing or ancillary sex/reproductive organs but rather they are necessary endocrine glands for normal metabolic, behavioral, musculoskeletal, and anti-neoplastic health” From Kutzler 2020

If we remove body parts we definitely wont get disease in those body parts.

However, removing the gonads has quite a wide range of pros and cons on both disease and behaviour.

It is a hugely emotive and conflicting topic which is only really now being fully appreciated and certainly from a medical perspective, beyond the scope of this presentation.



Useful references

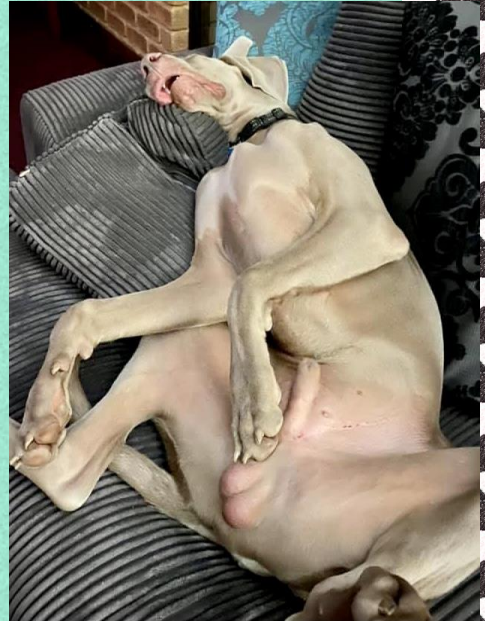
Hart BL, Hart LA, Thigpen AP, Willits NH. Assisting decision-making on age of neutering for 35 breeds of dogs: associated joint disorders, cancers and urinary incontinence. *Front Vet Sci.* (2020) 7:388. doi: 10.3389/fvets.2020.00388

Hart, L.A. and Hart, B.L., 2021. An Ancient Practice but a New Paradigm: Personal Choice for the Age to Spay or Neuter a Dog. *Frontiers in Veterinary Science*, 8, p.244.

Kutzler M A 2020 Gonad – sparing surgery surgical sterilization in dogs *Frontiers in Veterinary Science* 7 p342

Kutzler, M.A., 2020. Possible Relationship between Long-Term Adverse Health Effects of Gonad-Removing Surgical Sterilization and Luteinizing Hormone in Dogs. *Animals*, 10(4), p.599.

Urfer SR and Kaeberlein M 2019 Desexing dogs: a review of the current literature *Animals* 9(12) p1086



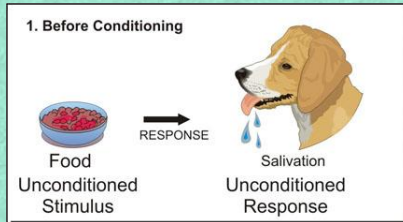
Neutering and behaviour

Fear and / or stress created by the neutering procedure

- Being left in an unfamiliar place
- Pain and fear of handling prior to procedure
- Waking up disorientated after anaesthesia in an unknown place, often in some discomfort or pain
- Repeat trips to the surgery for post op checks and removal of stitches

Intellectual Property Dr A Batson 2021

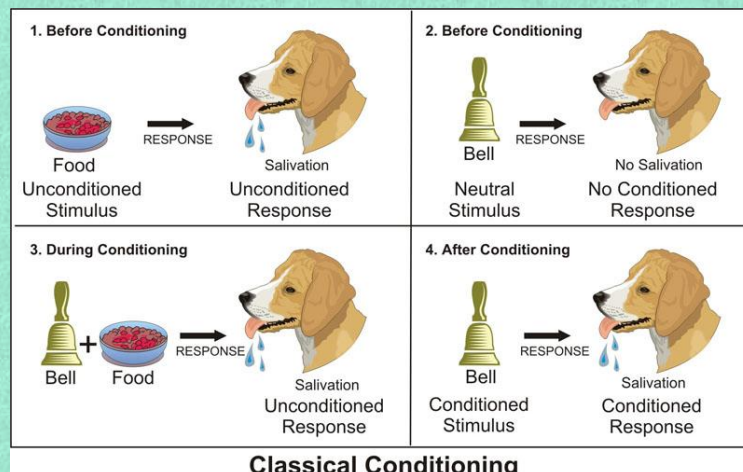
How the neutering experience may affect learning: Classical conditioning



Pavlov was a physiologist studying digestion in the early 1900's.

Noticed 'psychic secretion'

Classical conditioning



Classical conditioning and fear / pain



Fear conditioning can occur from a one off, life threatening experience.

Fear conditioning is an implicit – no need for conscious recall – type of memory.

When the stimulus that predicted the fear is encountered, the fear and its reflex outcome: flight / freeze or fight, is automatically, unconsciously triggered in the body.

These memories are believed to be stored in the amygdala itself – compared to explicit/ voluntary memories that are stored in multiple places across the forebrain.

This means that fear conditioned memories are rapidly accessed and acted upon and mostly, out of our conscious control.

CS veterinary nurse in proximity
NS (CS) vet nurse trying to touch DOG

Ucs fear of being restrained /
pain (fear of) from being touched

Ucr growl / bite

CR growl / bite

Implicit fear / pain conditioning
Unconscious recall



Intellectual Property Dr A Batson 2021

Neutering and behaviour

***Fear and / or stress created by the neutering procedure**

***Hormonal changes as a result of the neutering process**

- Removal of testosterone – the ‘confidence’ giving hormone
- Removal of oestrogens / progesterone – female hormones related to nesting behaviours, food acquisition , resource sharing

(Post anaesthetic changes to gut microflora may also influence behaviour within days to weeks of such procedures. See Xu et al 2020 for further discussion. NSAIDs and antibiotics used as part of the procedure may also play a role in gut bug changes. See part 2 for more about those gut bugs and behaviour).

Intellectual Property Dr A Batson 2021

Neutering males and behaviour



ONCE ITS DONE – THERE'S NO GOING BACK!

Castration of male dogs may even increase the likelihood of aggression developing in some individuals (7-12 months of age when castrated 26% more likely to show aggression towards strangers) Farhoody, Serpell et al 2018

Testosterone reduces activation of the HPA axis – reducing cortisol production. Testosterone has also been shown to have specific fear reducing properties (Van Honk et al 2005)

Although intact males have been shown to have higher cortisol levels than castrated males Sandri 2015 and entire males have higher urinary cortisol levels Xue et al 2017

“The results of the questionnaires indicate a trend that neutered males react emotionally more unstable in stressful situations and the case studies show a tendency for aggressive behaviour and fear to be more frequent in castrated dogs” Kaufmann et al 2017

In an owner questionnaire based study, Roulaux and colleagues 2019, found that whilst 58% of owners gave “correcting undesirable behaviours” as the reason for choosing to castrate their male dog, 50% of those owners reported the undesirable behaviour to be aggression.

However, the majority of these owners reported no change to their dog’s aggressive behaviour post castration and a number of owners who had not reported aggression in their dogs PRE castration, did find their dogs developing aggressive behaviours after castration.

Intellectual Property Dr A Batson 2021

Neutering males and behaviour

“The current data indicate that some forms of aggression, a category of response intimately connected to fear, is significantly and positively associated with lower AAC (age at castration) and PLGH (percentage lifetime exposure to gonadal hormones). This aligns with previous evidence that shyness (as opposed to boldness) is higher in castrated dogs. It is possible that, during the transition through puberty, sex hormones play a role in proofing dogs against fearfulness in later life.

So the current findings present the paradox that castration may reduce the numbers of unwanted dogs but may also increase the likelihood of problem behaviours that reduce the appeal of the castrated dogs and make them more vulnerable to being surrendered.”

From McGreevy et al 2018

Intellectual Property Dr A Batson 2021



Neutering males and behaviour

Sexual frustration – its role in behaviour problems

We have already outlined that younger dogs, particularly the adolescents, appear more easily affected by frustration.

We identified that thwarting a goal is a source of frustration. Rising levels of testosterone drive the tendency to roam and search out a suitable mate.

The inability to carry out this behaviour of roaming, locating and having sex can be a considerable stressor to some intact male dogs.

The presence of likely frustration driven behaviours: development of frustration based aggression including redirected aggression, increased amounts of displacement activities or the development of repetitive behaviour problems such as stereotypies or compulsive disorders, might need to be considered in relation to rising testosterone levels in the peripubertal male dog.

Careful evaluation of an individual male dog with these tendencies in relation to fear versus frustration may need to be taken before considering whether lowering / removing gonadal hormones may be helpful in resolving the behavioural issue.



Intellectual Property Dr A Batson 2021

Medications for reproductive hormone related behaviours

Anti-Testosterone medications

Tardak injection (delmadinone)

Suppresses testosterone for 3-6 weeks – cannot be removed

Suprelorin subcutaneous implant (deslorelin)

Suppresses testosterone for approx 12 months – cannot be removed

PROS

Short acting if negative SE seen.

Limited effect on long term fertility

Not linked with adrenal gland suppression

CONS

Has been linked to rare cases of adrenal gland suppression and development of Addison's

Cost

Longer acting if negative SE seen.

Larger needle size = more pain on injection

Cost

More likely to have long term effects on fertility

Hard to predict duration of effect (?4 months to 12 months)

Intellectual Property Dr A Batson 2021

Neutering females and behaviour

ONCE ITS DONE – THERE'S NO GOING BACK!

Ovariohysterectomy of bitches has been shown to increase reactivity in German Shepherds who had the procedure done between 5 – 10 months of age (Kim et al 2006)

Ovary removal in female Vizlas has been shown to increase the tendency of fear issues such as thunderstorm phobias (Zink et al 2014)

Ovariohysterectomy of female spaniels has been linked to increased aggression towards the owner as well as increased aggression towards unfamiliar adults. They were also more likely to physically bite compared to intact females. (Reisner et al 2005)

Owners of spayed Labrador Retriever dogs described more frequent or more intense fear reaction in their animals in response to loud noises, unfamiliar objects approaching on or near the sidewalk, or if they were approached by unknown dogs barking, growling or jumping. In contrast to popular belief, gonadectomy did not inevitably result in a behaviourally more stable dog (Balogh et al 2018)

Phantom pregnancies initiated or maintained by ovariectomy in dioestrus, may be one cause of the increase in reactivity and/or aggression in bitches after being spayed (Root et al 2018)

DHEA (dehydroepiandrosterone which has nerve cell protective effects) declines steadily during adult life in ovariectomised females, whereas intact females showed no decline until old age. Mongillo et al 2014
Increasing studies are suggesting cognitive decline is more prevalent in females who have been gonadectomised.

Intellectual Property Dr A Batson 2021

Neutering females and behaviour

“ As in the associated study on neutered male dogs, we found that female dogs with less exposure to their natural gonadal hormones (decreased PLGH percentage lifetime exposure to gonadal hormones) showed greater incidence of several fear/anxiety, aggressive, and excitable behaviours than entire female dogs in contexts such as being barked or growled at by an unfamiliar dog, when the doorbell rings or an unfamiliar person visits the home, and when approached by an unfamiliar male dog.

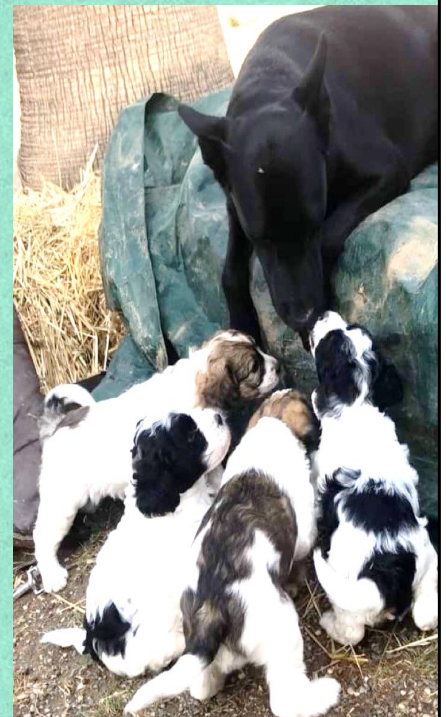
Responsible pet ownership does not end with having one's pet gonadectomised.

Rearing dogs and managing them in ways that meet their behavioural needs and enrich the bonds they share with their owners must be given priority as a form of preventative care.

The challenges that owners face and the role of unwanted behaviours in jeopardising the human-dog bond should not be underestimated by simple, broad-scale policies.”

From Starling, M., Fawcett, A., Wilson, B., Serpell, J. and McGreevy, P., 2019. Behavioural risks in female dogs with minimal lifetime exposure to gonadal hormones. *PLoS one*, 14(12)

Intellectual Property Dr A Batson 2021



Neutering cats

A recent study of free ranging cats found that significantly less aggression between cats post neutering (at least in the males) and stable social relationships within the group over time post neutering. A reduction in urine spraying was noted post neuter. The main “negative” behavioural change was reduced activity. Cafazzo et al 2019

Studies of free-ranging cats suggest that entire cats have larger home ranges than those that are neutered (Hervías et al 2014, Kitts-Morgan et al 2015) but more recent work has not linked this directly to less RTAs or other mortality associated with trauma (McDonald et al 2017)

Medically (for a review see Vendramini et al 2020)

Reduced risks of mammary tumours (which typically are more malignant in cats than in dogs) 86% reduction of MC in cats spayed <1 yo

Reduced risks of certain infectious diseases particularly in neutered males eg FeLV, FIV, respiratory infections

Increased risks of obesity (which is likely to also impact on OA symptom severity / development)

Increased risks of Diabetes Mellitus

Increased risk of certain (most?) urolithiases

Increased risks of vaccine associated adverse effects



Intellectual Property Dr A Batson 2021

Considering neutering



Intellectual Property Dr A Batson 2021

INFORMED OWNER CONSENT:

Aware medical PROS & CONS

Aware more behavioural CONS than PROS

Aware various options eg castration vs vasectomy

Aware of adolescent “fear” period: avoid 7-12 months of age?

Ensure dog not in fearful period by considering behaviours and activities at time of surgery

Female dogs to be in anoestrus

Consider antianxiety medication given at home before trip to surgery on the day (gabapentin, propranolol etc)

Adequate pain relief for several days

Pre/probiotics before and after procedure?

Post operative wound management plan (e.g to avoid Elizabethan Collars, see Shenoda et al 2020)

Post operative sleep and enrichment plans

Considerations for the confinement / restriction care plan



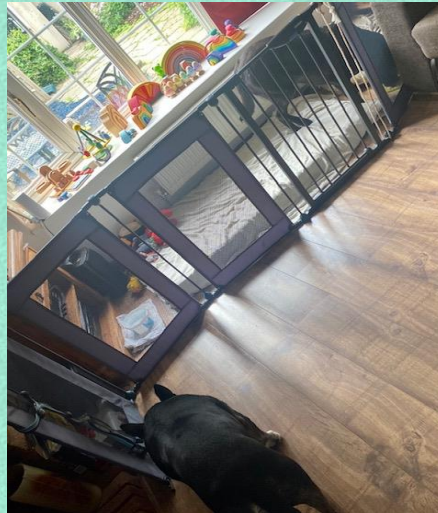
*How much does the individual really need “crate” confinement – see Gwen Covey-Crump’s webinar

(not so much: laparoscopic spays vs traditional, the calm individual, castration < OHE)

*Pen vs crate vs small room rest

Creating barriers

move furniture or use tailored products



A crate’s really not that great....

Intellectual Property Dr A Batson 2021

Considerations for the confinement / restriction care plan

*How much does the individual really need “crate” confinement – Gwen Covey-Crump’s webinar

(not so much: laparoscopic spays vs traditional, the calm individual, castration < OHE)

*Pen vs crate vs small room rest

*Wound management

- “can” the collar ?! (See Shenoda et al 2020)

Consider: Scented dressings. Body suits. Inflatable or soft collars
- wound discomfort will be influenced by surgical technique, ?suture material, pain relief and stress levels

“The consequences of prolonged exposure to stressors include sensitization to pain, longer post-surgical recovery, and in some cases, sepsis, or delays in healing”

for a detailed review see

Hernández-Avalos, I., Flores-Gasca, E., Mota-Rojas, D., Casas-Alvarado, A., Miranda-Cortés, A.E. and Domínguez-Oliva, A., 2021. Neurobiology of anesthetic-surgical stress and induced behavioral changes in dogs and cats: A review. *Veterinary world*, 14(2), p.393.



Intellectual Property Dr A Batson 2021

Considerations for the confinement / restriction care plan

*How much does the individual really need “crate” confinement – Gwen Covey-Crump’s webinar

(not so much: laparoscopic spays vs traditional, the calm individual, castration < OHE)

*Pen vs crate vs small room rest

*Wound management

*Static enrichment

Food vs non food enrichment

Food: small amounts, low calorie. Snuffle mats, lickimats, “toys” stuffed with some food, chews, puzzle toys commercial vs homemade, muffin tins etc TEENS ARE EASY TO FRUSTRATE (part 2) Often best to do food search activities after a recent meal portion.

Non food: human scents, dog scents, other animals, plants incl herbs, spices, hydrolats (care with Essential oils) BUILD A “NOSE LIBRARY”

Intellectual Property Dr A Batson 2021



Intellectual Property Dr A Batson 2021



Toy swap for teens

Who says confinement has to equal social isolation?!

Intellectual Property Dr A Batson 2021

BRING THE OUTDOORS – INDOORS THE “WALK IN A BOX” ACTIVITY



Intellectual Property Dr A Batson 2021

Considerations for the confinement / restriction care plan

*How much does the individual really need “crate” confinement – Gwen Covey-Crump’s webinar

(not so much: laparoscopic spays vs traditional, the calm individual, castration < OHE)

*Pen vs crate vs small room rest

*Wound management

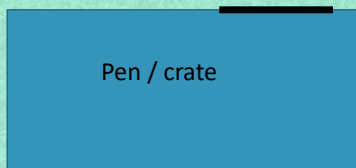
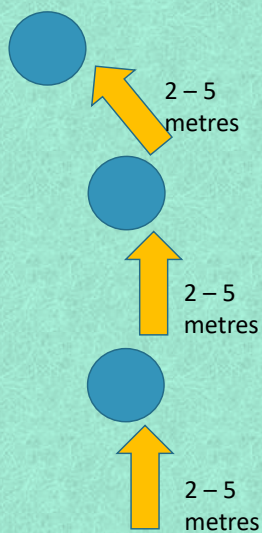
*Static enrichment

*Slow, controlled movements Keep the nose down!

- station training



Intellectual Property Dr A Batson 2021



Intellectual Property Dr A Batson 2021

Considerations for the confinement / restriction care plan

*How much does the individual really need “crate” confinement – Gwen Covey-Crump’s webinar

(not so much: laparoscopic spays vs traditional, the calm individual, castration < OHE)

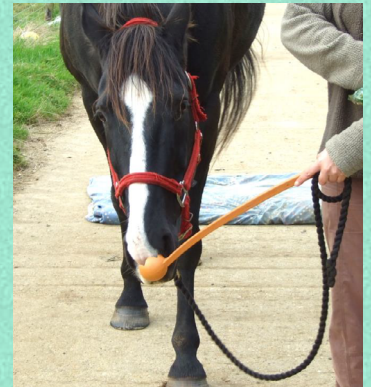
*Pen vs crate vs small room rest

*Wound management

*Static enrichment

*Slow, controlled movements Keep the nose down!

- station training (or placed treats)
- target following
- reward training



Intellectual Property Dr A Batson 2021

What can we do if we've got it wrong?



*Hormone therapy NOT REALLY

*Melatonin

In a recent study, melatonin (3mg/10kg) given to castrated males increased their serotonin concentration, reduced their cortisol levels and increased their testosterone levels. Salavati, Nazifi et al 2018

In a second study, melatonin (3mg/10kg) given immediately postoperatively (castration) for 1 month, reduced inflammatory proteins and cytokines compared to when given for 1 month to intact males and to castrated males where melatonin was not given. Nazifi et al 2020

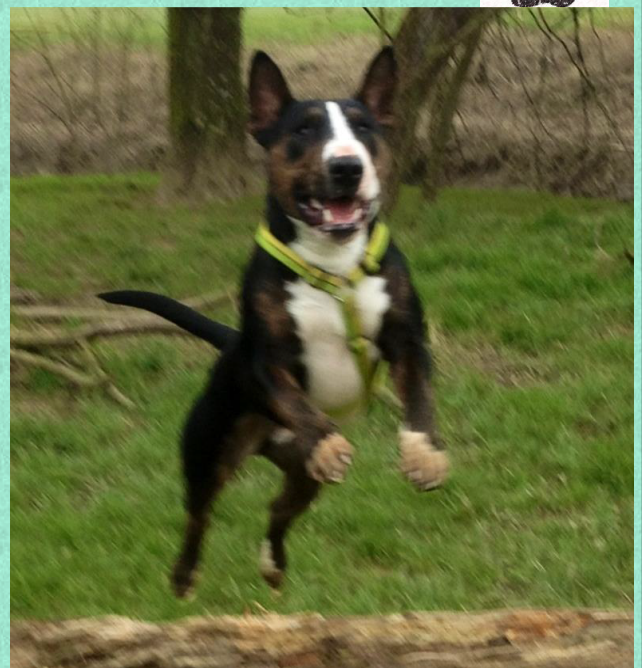
Now in female dogs, melatonin given from 1 day preop, has been shown to modulate the oxidative stress response that accompanies ovariohysterectomy. Salavati et al 2021 but no behavioural effect studied as yet.

*Behaviour modification for the learning theory (extinction, systematic desensitisation or counter conditioning)

*Changes to intestinal microbiota? Pre / pro / post biotic use?

*Anti-anxiety medications (SSRIs, GABA ergic, oxytocin in the future??)

*Environmental enrichment programmes



Online Courses

by Amber Batson

MIND THE GAP

“Mind the gap: exploring the links between body, brain and behaviour in the dog”

This 4 part webinar will have an up to date delve into the connections between body and brain and why that matters in relation to providing the best emotional and physical health & wellbeing for our pet dogs.

We will have a look at practical tips on how we can live alongside our dog in a way that helps them achieve optimal balance in body and brain in a way that provides better opportunities for the most desirable behaviour or that sets us on a path to start truly addressing issues that already exist.

www.nosey-barker.co.uk/profesional/mindthegap/

NEW ONLINE AGGRESSION IN DOGS FOR PROFESSIONALS AGGRESSION COURSE

This 1 year course is aimed at people working professionally with dogs who regularly give advice to owners of potentially aggressive individuals, eg. dog trainers, behaviourists and vet nurses/vets.

Topics covered include types of aggression, physiology of aggression, learning theory, medical problems affecting aggression, basic behavioural pharmacology, impact of procedures such as neutering, aggression and welfare, and successful client interactions.

Certificate of participation will be awarded to learners who submit notes on two case studies after each of modules 3 & 6. Please note no individual feedback will be available although discussion of elements of the answers via the platform will be encouraged

www.nosey-barker.co.uk/profesional/amber-batson-aggression-2022/

PUPPY POWER COURSE

All about puppies – Professionals package

Module 1 – The puppy from conception to juvenile, Physical and emotional needs of the puppy, Body language development, Personality development, Weaning, The role of play, The early vet visits, Preparing to move

Module 2 – Preparing the house for the puppy arrival, Introductions to other family members, Bonding with new owners, Selecting puppy classes, Teaching the puppy, Expanding their world, Neutering

Module 3 – The role of the dog professional “pre-purchase” and in organising puppy classes, Assisting owners with puppy fear based issues, Assisting owners with puppy separation related problems, Assisting owners with puppy early onset aggression / resource guarding, Compulsive disorders in puppies, The hand reared or caesarean born puppy, making the most of a difficult situation

www.nosey-barker.co.uk/profesional/amberpup/



PART TWO – Troublesome Teens: What other factors affect teenage behaviour

There are a number of factors that contribute to the behaviour of the adolescent.

In part one we talked a little about the changes in brain chemistry during the adolescent period – particularly changes in dopamine circuits in the brain that affect aspects such as perception of reward, focus, concentration etc.

We recognize that in adulthood the brain has a tendency to start producing dopamine in the reward pathway (mesolimbic) on anticipation of potential reward with continued release during the “consumption” / receipt, of the reward as well. Before adulthood, the brain activates the reward pathway most for receipt / consumption of the reward (this is not just food, rewards could also be getting to drink when you are thirsty, playing with a familiar companion, getting to lie in a sunny spot when you were feeling a bit cold etc) with limited activation during anticipation of the reward.

Practically this can mean that adolescents (and younger life stages) have the potential to be more frustrated if they cannot acquire the perceived reward easily, compared to adult dogs. And without as much input from higher brain centres such as the Pre Frontal Cortex, frustration may quickly emerge as an undesired behaviour for those alongside living / working the teenage animal.

We know that frustration is often affected by sugar levels in body and brain. The recently fed individual is less likely to be as easily frustrated as the hungry individual, even in contexts initiating frustration that aren't about acquiring food (perhaps the teenage dog is desperate for social contact or exploration opportunities and on lead, being led by the owner not having the opportunity to make their own choices, frustration builds, potentially faster in the hungry teenager than the recently fed individual). Adolescence is accompanied by increased growth hormone production, growth hormone due to interactions with insulin, affects sugar availability. The teenage life stage is often accompanied by increased hunger, or at least a greater tendency to be frustrated, in part due to impacts on sugar levels.

We know that relationships matter. Dogs with signs of insecure relationships with owners seem to be the ones with less trainability, more inclined to ignore owner cues. Stress plays a part in both the relationship perception and on the brain chemistry. Persistent elevated cortisol can lead to changes in the reward pathways so that the individual experiences less pleasure for previously pleasurable experiences – we call this stress induced anhedonia. Perhaps in the presence of the owner with whom they have a more negative relationship, and therefore an increased stress response, this reduction in reward sensitivity, even anhedonia, may be heightened, and explain why these teenagers respond better to other people such as trainers, than their owners.

There are of course multiple sources of stress for any animal. These will vary depending on the species, and their life experience (alongside genetics and epigenetic factors, and more). It is the frequent recurrence of stress inducing experiences or the longer term persistence of stress experiences that is of greatest effect to the brain and body.

Prolonged release of cortisol and the other “chronic” stress hormones such as prolactin and aldosterone, seems to have greater effect on the brain of teenagers than in other life stages. For example work on rodents has shown that early adolescence, around the prepubertal period, finds stressors resulting in greater or more protracted hormonal stress responses (including ACTH and corticosterone levels). Adolescents tend to take longer to recover physiologically from stress inducing experiences too.

Stress experienced during this life stage in which there is another wave of rapid brain development, can have long lasting effects which appear to contribute to future behaviour expression. Whilst adolescence is a period during which the brain significantly “prunes” potential or actual connections between brain cells, significantly altering the potential for a variety of actions including learning, some parts of the brain don’t experience this “pruning” including an area of the brain involved in fear memory / learning. Negative experiences that occur during adolescence have the potential to be less easily forgotten as a result.

There have been increasing amounts of research looking at the impact of social relationships during the adolescent period in a variety of species over the last 10 years. For social species like the dog, rabbit, horse, perhaps female cats more than males? (cats are social animals, but their social structure and the way they manage social encounters eg via smells and pheromones, perhaps more than “in proximity” has made it harder for us to appreciate this in cats), social isolation is a significant stressor. Research into the effects of the absence of positive social relationships (not just the presence of specific negative experiences) shows how important “social buffering” is, where the stress axis (HPA axis) is less reactive in adults who had appropriate social contact during adolescence. There may be sex differences in the responses to social isolation during adolescence too, with a number of studies finding that male brains may be more sensitive to the negative effects of social isolation.

Direct negative experiences such as the use of punishment on animals including dogs is known to be a stressor. Research on dogs where training has involved the use of punishment, or even a mixture of punishment and positive reinforcement, can result in greater problematic behaviours reported by those dogs’ owners. More recent studies are finding that positive, social interactions between owners and their dogs, influences the attachment, or bond, between them, and this will have an influence on the dog’s stress experience.

Rather than just focussing on what we can teach animals during adolescence, we should consider the role of social interactions, including strength of social bonds, and focus on responsiveness and connectivity before, during and after adolescence rather than just outcomes from training alone.

Where stress has been a feature during adolescence, we may be able to reverse some of the longer term negative outcomes, by the use of enrichment. Providing enriched environments can have a number of positive effects on body and brain that can reverse (and if not actually physically reverse, provide alternative brain paths to facilitate different outcomes) negative behaviours.

Much focus is often given to food enrichment. The individual species will dictate the value of that type of enrichment, where species like horses and rabbits that time budget large amounts to acquisition and ingestion, potentially benefiting more. Whereas animals like the dog who typically go on foray to locate and acquire food maybe 2 or 3 times across 24 hours and in total for less than 5% of each 24 hours, this not being the most valuable type of enrichment. Most studies that have looked at the value of enrichment, particularly during the adolescent period, have used increased social contact and more opportunities to explore and voluntarily move and exercise the body, to gain the positive change (eg use of non food toys, tunnels, platforms). There may be additional benefits from moving to slower, volunteered, body aware movements as well as benefits from using the nose (which can be social, and non food location, just as much as using the nose to find food).

Another aspect of the animal’s environment which has significant potential to affect behaviour is sleep. A recent study by Gilchrist and colleagues 2021, has shown how replacing any other activity with sleep, had a significant effect on emotional health in human teenagers who were not getting enough sleep.

From the available research, we do not know that adolescent dogs need more sleep than adults but we do know that on average most dogs after the first 4 months of life, need around 11-12 hours sleep in every 24 hours. A few studies have also highlighted the social nature of sleep in the dog, with dogs preferring proximity to companions to sleep and getting better quality sleep when in social proximity. Again, different species will vary in sleep needs and methods, with cats preferring elevation off the ground and needing a greater total of hours in every 24 (minimum of 14-16 hours in every 24) and horses very much using social proximity for sleep efficacy, yet taking a total of less than 4 hours rest and sleep across 24 hours, broken into short patches. Lying down in lateral recumbency is a need for horses to achieve REM sleep, true of many species including the dog – or at least lying in a posture where head, neck and spine are fully supported. Individual life stages including adolescence are times when we often see peak emerge

nce of certain diseases. In the dog, certain skin diseases are more commonly initially diagnosed at this time, along with inflammatory bowel disorders, and in some, the onset of seizures.

The last 5- 10 years has seen a huge emergence of information about the relationship between the gut bugs (intestinal microbiota) and the immune system (and the skin!) and the brain. The gut-brain-axis (or a variety of names given to describe these multifaceted connections) varies during the life stages. The gut bugs are not only responsible for helping break down ingesta, but also they produce enzymes, chemicals and other metabolites (eg short chain fatty acids) which play essential roles in the maintenance of normal gut function, immune function and brain function. The influence of gut bug actions is outside the scope of this presentation, however one important element to note is the effect that stress has on the conversion of tryptophan into one of its compounds. Tryptophan is converted into serotonin and/ or indoles and/or kynurenine. Stress is now recognised as a factor in shifting the amount that is converted into serotonin compared to kynurenine, having effects on gut activity and function as well as effects on behaviour and the immune system.

Stress has been recognised as a result of symptoms such as pruritus too. Providing intimate connections between health and behaviour and future health.

Whilst there are no specific studies on the intestinal microbiota of adolescent dogs as yet, other species research reveals differences in its composition during adolescence compared to during other life stages. This more fragile intestinal microbiota may mean that stressors, antibiotics, exercise types and diet etc have the potential for greater influence during this life stage than others.

The way we exercise teenage animals is therefore a necessary consideration. If we look to their ethogram (list of normal behaviours for the species in a natural environment) we might recognise that certain activities occur in different frequency, intensity or duration during adolescence.

Interestingly, adolescence is often described as a time reduced in social play, because the drive to increase social circles rather than increase existing bonds, and to increase environmental exploration, takes over. Yet at least in domestic dogs (and perhaps horses) we see a large drive for faster social play, and this may be a result of the dog (or horse) not getting adequate day to day, hour by hour, social contact as they evolved to have at this time – this can result in rebound behaviour. Rebound behaviour is where we see a normal species behaviour pattern offered in increased amounts, durations or intensities following a period of restriction. It is so common for pet dogs (and horses) to be both spatially and socially restricted that observing more intense social patterns when opportunities present, may mean we perceive these as normal. Intense, prolonged social play (along with prolonged, intense object such as ball, chase) will result in stress chemical production, as well as hyperthermia and anaerobic muscle activity which can result in metabolic acidosis. These elements of physiology not only can be part of persistent stress, but may decrease effective sleep and impact on gut blood flow affecting the intestinal microbiota balance.

This is not to suggest that adolescent dogs should not be exercised of course, it is more about finding practical ways to facilitate the normal calmer exercise types we would see in the species, to assist with that balance between exercise and rest (sympathetic vs parasympathetic control).

Incorporating more opportunities for social contact day to day will reduce the rebound effect, and this can be a mixture of on or off lead with social exploration being just as important as free play. Also the use of exploratory opportunities using all 5 senses, and opportunities to move the body in a calm, deliberate manner – proprioceptive type activities – such as climb on/ off, go through, go under, different surfaces, balance etc can be beneficial on a number of levels.

There are many ways we can support our teenage companion animals including careful consideration of any neutering, social support / interactions, exercise types, diet/feeding, sleeping and training alongside stress minimisation. A life stage where there is truly so much to be gained.

APBC VET CONFERENCE

TERRIBLE TEENS: How do we survive adolescence?!

PART TWO

Dr Amber Batson MRCVS 2021



Responsiveness to training

The brain's response to perception of reward:

Activation levels of the dopamine system during anticipation of a reward increase with age, while activation levels during receipt of the reward decrease with age.

Taken together, these findings indicated that activation of the dopamine reward circuit shifts from being driven primarily by the receipt of reward to the anticipation of reward from young adolescents to young adults.

Adolescents are initially motivated by the actual reward itself, but as they get older, it is the anticipation of the reward that begins to trigger dopamine release.

Practically: be careful of making puzzle solving opportunities or opportunities to earn rewards in training, too hard in the adolescent – frustrations may occur quicker at this age, in the main due to brain reward activation being in receipt of the outcome, not the anticipation, however, sugar levels, which may be affected by hormones including growth hormone, may also play a part.



Intellectual Property Dr A Batson 2021

Frustration in the adoglescent

Younger dogs are more intolerant of frustration. Adolescence may be the time when frustration due to a variety of factors is maximal.

“Younger dogs have higher levels of impulsivity and have greater sensitivity to rewards.

Younger dogs are more interested in exploring and barriers to exploration such as being on a lead, may result in higher levels of frustration.

Frustration is defined as an emotional reaction experienced after a given expectation is violated.

Frustration can arise in a number of circumstances: absent, reduced or delayed rewards; situations where one is thwarted from obtaining/ retaining a resource; where barriers to autonomous control exist or with intrusions into personal space and territory.

Frustration can be manifested as aggression including redirected aggression, in the display of displacement activities or even the development of repetitive disorders such as stereotypies.”

McPeake et al 2019 The Canine Frustration Questionnaire

Ensuring adoglescents are given appropriate tasks to learn for their current abilities, that this training is well “shaped” with easy to earn rewards and with appropriate attention paid to body language suggestive that the individual would prefer to avoid or is becoming anxious, is crucial to limiting frustration in their training. Like in all training, ensuring a low stress day to day environment, including assessment of attachment relationship with owners / care givers, is an essential element.

Intellectual Property Dr A Batson 2021



Responsiveness to training

Relationships matter:

Dogs with insecure attachments have now been shown to reach puberty quicker than securely attached individuals, and also insecure attached dogs are more likely to show “disobedience” to their carer (ignore learnt cues). Asher et al 2020

Stress anhedonia

Persistently elevated cortisol as part of chronic stress, is well known to negatively influence the reward pathways in the brain creating “anhedonia”

The sensitivity of the chronic stress pathway during adolescence suggests that anhedonia in chronically stressed adolescents may result in anhedonia effects quicker than in other age groups.

This maybe one reason why insecure attached adolescent dogs are poorer to respond to training by their owners.



Intellectual Property Dr A Batson 2021

Stress matters MORE in adolescence

“I m SO STRESSED!”

FEAR

recurrent
inescapable

SOCIAL ISOLATION

FRUSTRATION OF SPECIES GOALS

OVEREXERTION

too much exercise
too fast exercise
lack of rest / sleep

PAIN / MEDICAL DISORDERS

Intellectual Property Dr A Batson 2021

Acute vs Chronic

(Sympathetic nervous system)

Lasts seconds to minutes
The Sympathetic-Adreno-Medullar axis or SAM

Brain releases adrenaline, noradrenalin,
dopamine brain chemicals,

AND osteocalcin released from bone
AND vasopressin from the brain

activating the SNS nerves to trigger release of
NA and adrenalin from adrenal glands
(adrenal medulla)

Aim: move faster
increase blood to muscles
(↑HR, BP, RR)
decrease digestion
prepare body for injury
(increase inflammatory pathways)
decrease pain perception

(production of glucocorticoids)

Starts in minutes, lasts minutes, hours, days,
weeks

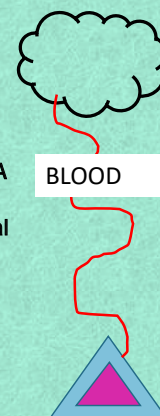
Hypothalamic-Pituitary-Adrenocortical Axis or HPA

Brain releases chemicals to stimulate the adrenal
glands to produce glucocorticoids (steroids)

CORTISOL (and aldosterone and prolactin)

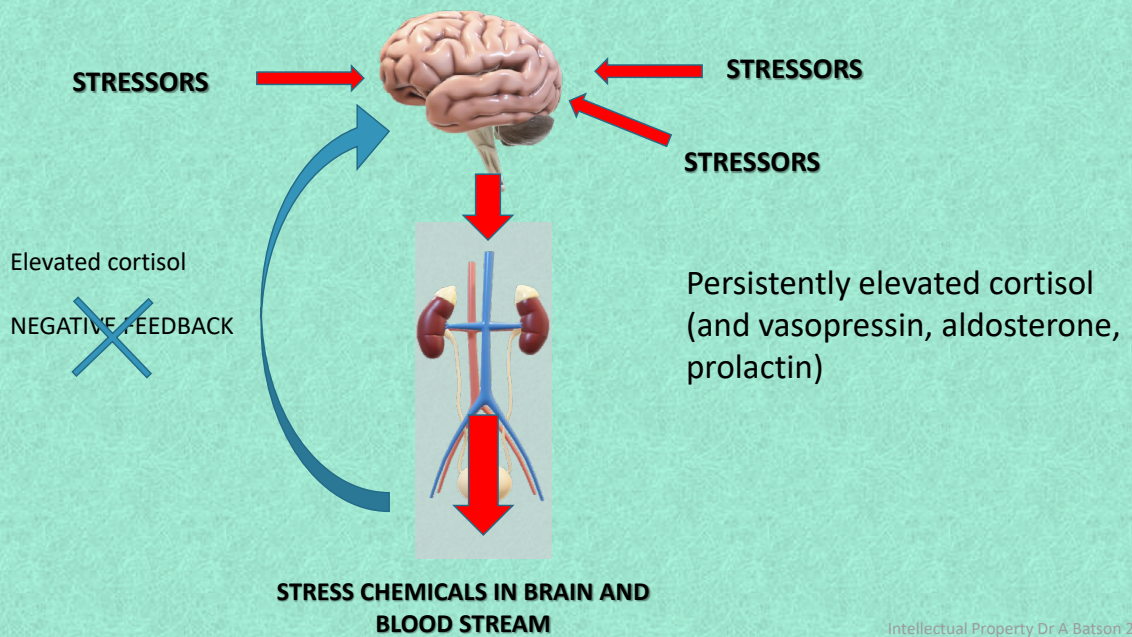
from adrenal cortex into the blood stream

Aim: dampen down acute stress changes
keep body more active
move circulating immune cells to tissues
switch off ‘longer term energy rich
projects’
(decrease immunity, decrease new hair
growth, decrease bone growth,
decrease fertility, decrease sleep)



Intellectual Property Dr A Batson 2021

Stress: What is it?



Homeostasis



The brain is the organ in the body primarily responsible for maintaining homeostasis.



The brain needs to balance both the chemicals inside it (neurotransmitters) and all the chemicals outside the brain, in the bloodstream and other tissues (hormones).

The brain also needs to keep the nervous system in balance which it does by controlling the 'switch on' nervous system or sympathetic system against the 'switch off' nervous system or parasympathetic system.

Each individual species is adapted to find homeostasis in body AND brain in the activities (including their amount and frequency) that is found within their ethogram.

Life stages also affect how this balance is created at that time.



Introducing behavioural physiology

Everything about a species is adapted to its originating environment.

Domestication is a challenge to this adaptation.

Our brain (and bugs?! See later) dictates our behaviour.

Normal behaviour requires normal brain (and gut) function.

Normal brain function requires balance achieved through a full range of normal behaviours.

Stress patterns are normal – where the individual is able to use species specific patterns to alleviate or adapt to that stress inducing situation.

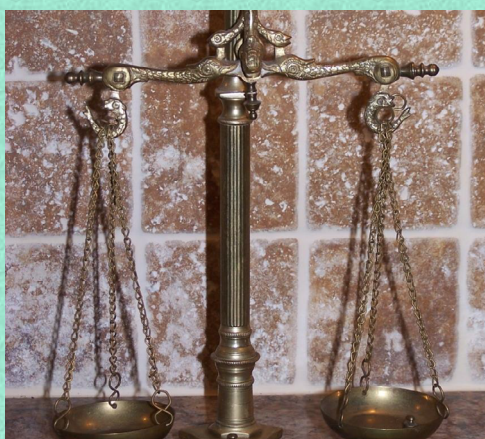


A trio of teens !!



Intellectual Property Dr A Batson 2021

IT'S ALL A BALANCING ACT



“The neurotransmitter homeostasis in the organism is influenced by the ability to display natural behaviors resulting from the dog’s ethogram.

An appropriate balance between activity and rest is a determinant of homeostasis.

Such a balance is extremely important, as stimulation triggers the release of excitatory neurotransmitters (dopamine, noradrenaline, glutamate) and activates the sympathetic nervous system.

In turn, restful activities promote the release of gamma-aminobutyric acid and serotonin and stimulate the parasympathetic system.”

From Karpinski et al 2021

Intellectual Property Dr A Batson 2021

Does stress affect adolescents differently to adults?

YES !!!

“We suggest that, due to a number of converging factors during this period of maturation, the adolescent brain may be particularly sensitive to stress induced neurobehavioural dysfunctions with important consequences on an individuals immediate and long term health and well-being” Elland & Romeo 2013 Stress and the developing adolescent brain

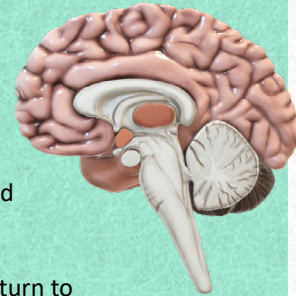
*Volumetric increases in the hippocampus and amygdala in early stages of puberty

*Dynamic cortical grey and white matter changes throughout adolescence

*In response to acute stressors prepubertal animals display greater or more protracted hormonal stress responses (including ACTH and corticosterone levels)

*ACTH and corticosterone levels around mid-adolescence can take twice as long to return to baseline following both psychological and physiological stressors compared to adults.

*Repeated exposure to the same stressor can result in habituated ACTH / corticosterone responses in adults whereas in prepubertal animals show a sensitised response to repeated stressors.



Intellectual Property Dr A Batson 2021

Does stress affect adolescents differently to adults?

YES !!!

“We suggest that, due to a number of converging factors during this period of maturation, the adolescent brain may be particularly sensitive to stress induced neurobehavioural dysfunctions with important consequences on an individuals immediate and long term health and well-being” Elland & Romeo 2013 Stress and the developing adolescent brain

*Also child abuse 3-5 yo results in decreased hippocampal volume whereas abuse during adolescence results in decreased PFC volume with no effect on hippocampus (Leussis and Andersen 2008)

*Twice weekly changes in social grouping in mice resulted in chronic stress exacerbation with male mice having hyperactive HPA axis one week after returning to familiar groupings but perhaps more concerningly, these individuals showed an increased visceral/fat ratio one year later as well as spatial memory impairments in the previously stressed adolescent mice compared with non stressed controls of the same age.



Why does the prefrontal cortex matter?

Inputs in to limbic system for higher control over 'emotional' responses

Impulse control

Logical thinking

Puzzle solving



Intellectual Property Dr A Batson 2021

Stressed out teens

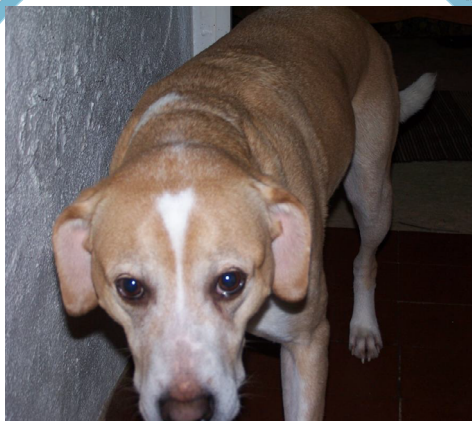
The limbic system is a part of the mid brain that processes information to create emotion and memory.

The amygdala is the main threat detecting centre in the brain.

The adolescent brain seems particularly sensitive to stress, and that may result in an increase in potential threat detection: increased vigilance and increased reactivity.

The adolescent brain and body take longer to process stress chemicals – it is likely to take longer for the stressed adolescent to recover from a potentially threatening experience / or over exertion / or frustration as examples.

This means that trigger stacking in the adolescent is a greater potential



Adolescence is a period of time with extensive brain remodelling that involves substantial “pruning” and cellular remodelling of neurons.

However there is diminished plasticity in certain circuits at this time – such as those associated with fear memories. This includes a region of the brain (ventromedial PreFrontal Cortex) involved in fear extinction.

Since fear extinction is essential to recover from certain stresses, recovery from stress exposure of emotional types may well be delayed, if not prevented, in the adolescent.

WE MUST FOCUS ON MAKING THE ADOLESCENT PERIOD AS STRESS FREE, PARTICULARLY FEAR FREE, AS POSSIBLE TO AVOID UNWANTED LONG TERM CONSEQUENCES.

Intellectual Property Dr A Batson 2021

Social isolation during adolescence

- *Reduced synaptic density in the infralimbic cortex and cingulate cortex
- *Reduced myelination of the PFC in males (not females)
- *Behavioural hyperactivity

*Social housing during adolescence diminishes the adult pituitary-adrenocortical stress response.

From Social behaviour and social stress in adolescence: a focus on animal models
Buwalda et al 2011



SOCIAL BUFFERING

Social buffering occurs when the presence of one animal attenuates another's stress response during a stressful event and/or helps the subject to recover more quickly after a stressful event.



Constant effect: the presence of quality companionship helps reduce the HPA axis activity both at "rest" and in presence of "life stressors"

Recovery effect: the presence of quality companionship helps renormalise the overactivity of the HPA axis in the presence of specific stressors.



The multi-dog effect.....

"Company of other dogs was associated with a lower probability of aggressive behaviour [towards people]; dogs living with other dogs were less likely aggressive than dogs living without other dogs.

Number of household dogs also decreased aggressive behaviour toward the owner in a study of Hsu and Sun....

Similarly, dogs living in multi-dog households showed less aggressive behaviour toward the owner and other dogs in a more recent study of Serpell and Duffy (2016)"

From Mikkola et al 2021

"Isolation is a potent stressor for adolescent rats; however, individually housed rodents are commonly used as the control condition for chronic stress studies because of the potential for group housing to buffer the effects of chronic stress. Isolation housing, in comparison to pair housing, altered behavior in the elevated plus maze and forced swim test in our study suggesting that isolation housing alone had the potential to induce anxiety-like and depressive-like behavior. This difference was most noticeable in males and may illustrate an important sex difference in the social buffering of behavioral responses that others have also observed." From Bourke 2011



Intellectual Property Dr A Batson 2021

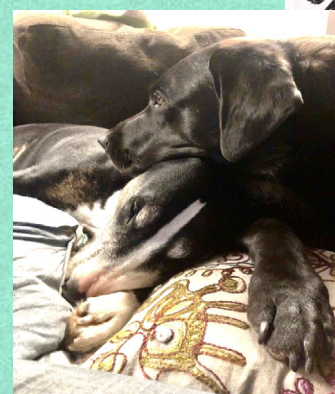
SOCIAL BUFFERING



*QUALITY OF ATTACHMENT
(DOGS AND OWNERS)

*ALMOST CONSTANT SOCIAL CONTACT
(DOGS AND OWNERS)

*REASSURANCE THROUGH TOUCH /
VERBAL / POSITIVE EYE GAZE etc AT THE
TIME OF AND AFTER POTENTIAL
STRESSORS



The trouble with the train...

Several scientific papers have specifically looked at the response of dogs to frequent use of the different outcomes in training sessions



Training type may influence the dog-owner bond.....

Dogs trained using positive R appear to have a more positive attachment to their owners – secure attachment type

De Castro et al 2019

And the prevalence of problematic behaviours...

“Our data suggest that the use of specific training methods may be linked to increased exhibition of problematic behaviours. The number of times owners reported using punishment based methods correlated positively with the number of potentially problematic behaviours they reported. Furthermore, those owners who trained their dogs using a regime entirely based on punishment, or a combination of punishment and reward, reported significantly more problems than those using reward based or miscellaneous methods. It may be that punishment increased the number of problematic behaviours displayed perhaps by creating a state of anxiety of conflict in the dog that is later expressed as a problematic behaviour”
Hiby et al 2004

“Pawrenting” the a“dog”lescent

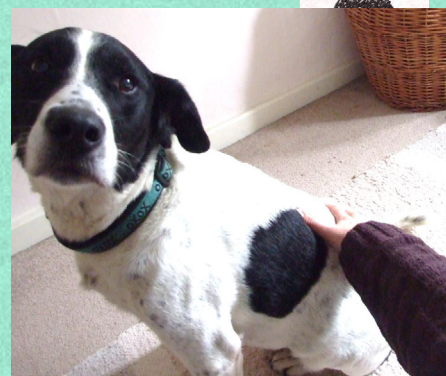


“An association was found between dogs seeking owner proximity during a threatening situation and their owners interacting with them with more ‘warmth’. Warmth was operationalised by smiling and speaking with a high-pitched friendly tone of voice.

In another study dogs interacted less during play sessions with their owners, if the owners reported to use choke chains or pinch collars, the squirting of water in the dog’s face, the rubbing of the dog’s nose in faeces, yanking the dog back, lifting the dog using the collar, flicking on the dog’s ear, and/or shaking the dog.

A final example was in 43% of owners reporting their dogs to respond by growling, baring teeth, snapping, lunging or biting if the owners confronted undesired dog behaviour by hitting or kicking.

Similar dog responses were reported at 31% when the owners performed a so-called ‘alpha roll’, forcing their dogs on their backs and at 26% when grabbing their dogs’ jowls or scruffs.” van Herwijnen 2021



Intellectual Property Dr A Batson 2021

The better kind of medicine ? SOCIAL BUFFERING



*QUALITY OF ATTACHMENT
(DOGS AND OWNERS)

*ALMOST CONSTANT SOCIAL CONTACT
(DOGS AND OWNERS)

*REASSURANCE THROUGH TOUCH /
VERBAL / POSITIVE EYE GAZE etc AT THE
TIME OF AND AFTER POTENTIAL
STRESSORS



Remember "Relationships matter"
insecure attached dogs are more likely to show "disobedience" to their carer (ignore
learnt cues). Asher et al 2020

Boost relationships with emotionally responsive actions and activities.
Use positive reinforcement in any training.
Focus on connectivity (not just "outcomes") before, during and after adolescence.



Intellectual Property Dr A Batson 2021

Creating recovery opportunities

Rats subjected to variable juvenile stressor programmes, subsequently housed in an enriched environment had reversed adult behaviour, physiological and neurobiological stress responses compared to those subjected to the juvenile stressor programme kept in standard housing (Llin and Richter-Levin 2009)

In this experiment EE consisted of larger, higher cages containing differently shaped plastic containers, different coloured platforms and suspended objects (the value of environmental exploration compared to food enrichment)

Once per week they also moved to a different box with more objects, a wheel, and food enrichment – apple, carrot, cucumber and granola.



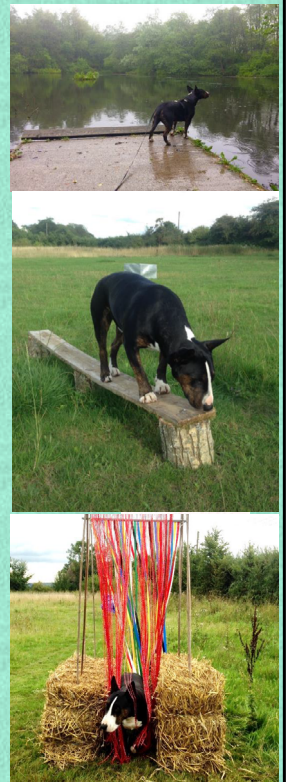
Intellectual Property Dr A Batson 2021

ENRICHMENT IS NOT JUST ABOUT FOOD IT IS TRULY “BEYOND THE BOWL”

The majority of studies showing the positive effects of enrichment on brain structure and activity have involved increased social contact and opportunities for physical exploration, rather than using food as the source of the activities.

Positives that may come from exploration rather than simply “running” may include

- *Improved gut function / balance of gut bugs (the faster the exercise, the more, and longer, blood is diverted away from the gut to the muscles, potentially influencing the health of gut bugs)
- *Activation / development of the cerebellum – yep that part of the brain that handles balance, but now we know it also inputs into the “higher” executive brain regions as well as inputting into the limbic system, affecting emotional responses and social behaviours.
- *Using the nose (which cant be done as the dog becomes hot during faster exercise) has been linked in some preliminary studies to “optimism” or “positive cognitive bias”
- *Keeping stress and excitatory chemicals at lower levels.
- *Reduced chance of injury?



Dog tired:
why sleep
matters too



SLEEP

“Among adolescents getting less than the recommended amount of sleep, replacing any behavior with sleep was generally associated with better mental health outcomes.

Results provide further support for the critical role of sleep in promoting healthy development during adolescence, though more sleep than is recommended may confer little benefit for mental health.”

Gilchrist and colleagues 2021



Intellectual Property Dr A Batson 2021

Sleep: how does it differ in adoglescents?

We don't know 100%

Kinsman et al 2020 Sleep duration and behaviours: a descriptive analysis of a cohort of dogs up to 12 months of age.

Kinsman et al research showed

16 wo pups slept longer in the day (3.5 hours) than 12 month old dogs (3 hours)

16 wo pups slept less over night (7 hours) than 12 month old dogs (7.3 hours)

Previous studies (referenced in this paper) suggested dogs 1.5 yo or older slept 60-80% of a 12 hour night time period.

Main problem with this research was it was based entirely on owner observation and assumptions rather than actual knowledge of when sleep was occurring.

Adolescence is linked with substantial changes in sleep architecture and duration, the authors considered whether the age of the 12 month old dog (around adolescence) may have affected the numbers in this study.



Intellectual Property Dr A Batson 2021

Tired out teens: recipe for disaster!

Research has shown that dogs prefer sleep environments:

***Social**

(Kinsman 2020 found that >86% of dogs with the choice preferred to sleep in close proximity to people)

(Kortekaas 2020 showed that dogs slept better in a group than when on their own)

***Options for temperature control**

***Options to use elevation**

***The need to lie flat out / body supported for REM sleep**

***They are polyphasic ! Not all sleep happens at night.
Average adult total sleep around 12 hours per 24 hours**



Intellectual Property Dr A Batson 2021

Stress matters MORE in adoglescence

Skin disease such as pyoderma and atopy;
gut disease such as IBD / food intolerances;
epilepsy

Are some of the most common diseases diagnosed in the adolescent dog.

These diseases are known to influence the brain's chemical functioning, as well as being known to be worsened by recurrent or persistent stress.

“I m SO STRESSED!”

FEAR

**recurrent
inescapable**

SOCIAL ISOLATION

FRUSTRATION OF GOALS

OVEREXERTION

**too much exercise
too fast exercise
lack of rest / sleep**

PAIN / MEDICAL DISORDERS

Intellectual Property Dr A Batson 2021

WE ARE NOT ALONE !

The living community of tiny organisms in the gut plays several important roles in a dog's health and homeostasis

- *Break down of ingested food (nutrient and mineral absorption)
- *Making of enzymes
- *Making of vitamins
- *Making of amino acids
- *Making of SCFA's
- *Making of chemical messengers (serotonin, dopamine, GABA etc)
- *Influence local (?) immune system

THE GOOD

THE BAD

AND THE ... NEUTRAL ?

Intellectual Property Dr A Batson 2021

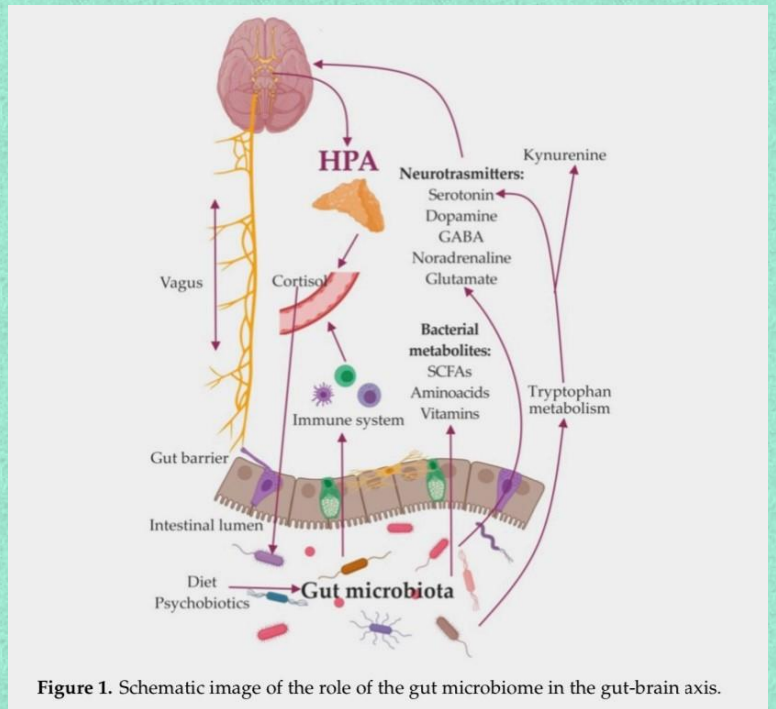


Figure 1. Schematic image of the role of the gut microbiome in the gut-brain axis.

Fig from Averina et al 2020

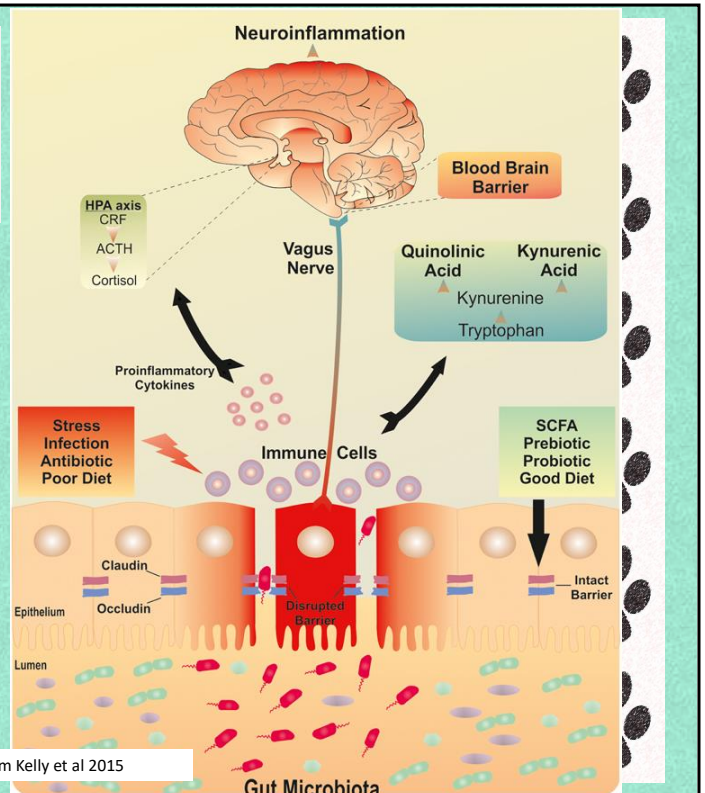
How does stress affect the gut .. and then the brain ... and then the body?!

Long standing activation of stress pathways seem to result in a loss (reduction) of the tight junctions between gut cells. This allows the bacteria normally trapped in the lumen to move in and around the gut cells, triggering an inflammatory response.

The inflammatory response can trigger changes in the blood brain barrier causing further stress pathway activation as well as affecting the tryptophan pathway among several other effects (more tryptophan converted to KYNA pathway means less available for making serotonin in gut and brain)

Local, gut, changes in immunity that follow the inflammatory state, disrupt the normal "control" mechanisms that keep the bugs in balance – changes in bug types and ratios will follow.

Image from Kelly et al 2015



Itchy makes you “witchy” & “twitchy”

“The results showed that itch severity in dogs with cAD [canine atopic dermatitis] was associated with increased frequency of behaviours often considered problematic, such as: mounting, chewing, hyperactivity, coprophagia (eating faeces), begging for and stealing food, attention-seeking, excitability, excessive grooming and reduced trainability.

Dogs with cAD did not differ from controls for trait-level scales associated with fearfulness/neuroticism, and as such our hypothesis was accepted; that chronic stress may be secondarily associated with chronic pruritus.

Since causality cannot be established from association studies, well-controlled prospective studies are required to elucidate whether these associations are, in fact, secondarily associated with pruritus.

However, given the large body of evidence demonstrating the impact of stress on skin barrier function, and the increased stress reported by human patients with AD it is plausible that psychological stress experienced by dogs with cAD could prolong and exacerbate allergic flares, potentially compounding the disease with idiopathic dermatoses.” Harvey et al 2019



Intellectual Property Dr A Batson 2021



Beware of the bugs

“The adolescent period is a key developmental period which marks the transition from childhood to adulthood. It is during this last developmental stage before adulthood that the brain is highly responsive to certain environmental cues that will shape neuronal architecture and promote maturation of social behaviours, emotional and cognitive capabilities and is hence a vulnerable period for the onset of psychiatric diseases.

The gut microbiota composition of an adolescent is usually simpler and more unstable when compared with that of an adult, which is highly diverse and stable. These differences are probably due to relative immaturity of the gut microbiota during the adolescent period, which makes it more vulnerable to environmental stressors such as infection, use of antibiotic and poor diet.” Lach et al 2020

Our gut bugs significantly impact our behaviour !

Studies in dogs have shown differences in bug populations in dogs with aggressive tendencies, phobic responses and those with behaviour viewed as normal.

Even more reason to be mindful of stress at this fragile time, and for more careful consideration of antibiotic therapy, sleep amounts, diet and exercise levels as these are all well known to impact on gut bugs (intestinal microbiota)



Intellectual Property Dr A Batson 2021



They feel the need: the need for speed....

Social play (compared with object play / environmental exploration) may be decreased in the adolescent however, it is still part of the normal behaviour repertoire.

Fast play patterns – such as social chase, allow bursts of fast aerobic, likely anaerobic, exercise which gives a variety of chemical benefits as well as maintaining physical fitness.

Periods of fast play should be considered normal on a daily basis but in the well socialised, psychologically normal adolescent, these will probably be bursts of 2-5 minutes built in amongst slower aerobic play such as wrestling / object tug and regularly interspersed with sniffing, grooming, exploring as “parasympathetic” calmer activities.



Practical companionship

- *Living alongside other dogs
- *Daily time on walks with other dogs (note: walk and explore, not just “play dates”)
- *Regular meet ups with other dogs – different ages, sexes.
- *Exploring the scent of other dogs – toy swap, bedding swap, grooming brush swap, cloths wiped on the dogs ... time to investigate odours whilst on walks

Managing the rebound

Intellectual Property Dr A Batson 2021



Rebound activities



Rebound behaviours are defined as normal behavioural patterns done in excess of that in the ethogram (in either intensity, frequency or duration) as a result of a period of time without the ability to act out that behaviour.

As an example, an equine study showed that housing horses individually (stabling) and therefore preventing normal movement and social interactions, resulted in increased mutual grooming and play behaviours when the horses were allowed to spend time together in a larger, enclosed space (barn).

One period of spatial restriction and social deprivation resulted in 6 weeks of rebound activities.

Spatial versus social restriction has been studied in dogs and found that “dogs housed in the greatest degree of social isolation spent the most time moving, exhibited the greatest number of bizarre movements and vocalised the most”

“When housed in pairs, dogs spent more time sleeping and vocalised less than when housed singly” “Forced treadmill exercise did not significantly alter behaviours.” “In assessing the psychosocial wellbeing of dogs, social isolation may be as harmful or more harmful than spatial restriction.” Hetts et al 1992

Intellectual Property Dr A Batson 2021

Bounding due to rebound ...



Because many adolescent dogs are living by themselves, and are spatially restricted in some way (do not have free movement, lack choices, are regularly confined) we are often dealing with both social and locomotor rebound problems.

We must be careful not to set ourselves up in creating associations between going on a walk, or being attached to a lead, as predictors of potential exploration / play or social opportunities.

Because dogs learn easily by association, we can find ourselves in situations where just preparing for the walk is resulting in immediate release of excitatory, arousal chemistry and we have a “bouncing” “unable to listen” teenager before we ve even left the house!

*Social opportunities and exploring opportunities at home (scent of other dogs, items to investigate, puzzle solving games)

*Putting the lead on should predict a calm, non arousing opportunity in the home that occurs BEFORE we head out on the walk (or to / from the car) - lead on = find treats lead on = lickimat lead on = enjoyable grooming/ touch)

*Choose locations and friends wisely!

*Practice “arousal followed by calmness” short bursts of faster play / exploration lead to encouraged, valuable calm activities – treat finding, scent location, grooming then a return to faster patterns if the dog still feels the need. Always aiming to end on calmness

Intellectual Property Dr A Batson 2021

Exercise for body and brain.....

A recent small study showed that daily yoga at school improved the attention, concentration, memory and self esteem of children approaching / within puberty (10-12 years old) Gulati et al 2019

Kanchibhotla and colleagues (2020) showed that a group of over 300 human adolescents had significant (>30%) improvements in mental well-being, emotional stability and cognitive capacity following attendance of a meditation retreat.

Gulati, K., Sharma, S.K., Telles, S. and Balkrishna, A., 2019. Self-esteem and performance in attentional tasks in school children after 4½ months of yoga. *International journal of yoga*, 12(2), p.158.

Kanchibhotla, D., Subramanian, S. and Kulkarni, S., 2020. Improvement in Cognitive Abilities, Mental and Emotional Well-being of Teenagers following a Meditation Retreat: An Open-Trial Pilot Study. *Adolescent Psychiatry*, 10, pp.00-00.



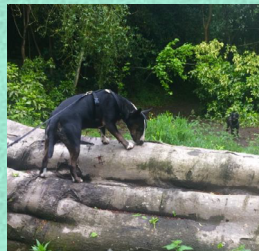
Intellectual Property Dr A Batson 2021

Providing appropriate exercise and stimulation

Proprioception / “body work”

Two types:

Obstacle: natural vs artificial



Intellectual Property Dr A Batson 2021

Providing appropriate exercise and stimulation

Proprioception / "body work"

Two types:

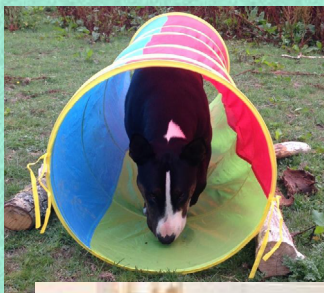
Obstacle: natural vs artificial

All Feet on Floor based movements



Intellectual Property Dr A Batson 2021

New calm experiences through self exploration: a driver in the adolescent brain



Exploration – through all 5 senses

Thanks to The Dog Nose, Wiltshire for some of these images

Surviving the “Terrible Teens”

- *Be aware adolescence extends beyond puberty
 - *Understand the changes in brain as well as body in the adolescent
 - *Avoid social isolation
 - *Minimise stress, fear and frustrating experiences
 - *Maximise sleep opportunities
 - *Feed to stabilise brain sugar levels
 - *Beware over stimulation / over exercise
 - *Seriously consider timing of neutering
- Enjoy the change!



Understand
Animals

Send Message

REFERENCES

- Asher, L., England, G.C., Sommerville, R. and Harvey, N.D., 2020. Teenage dogs? Evidence for adolescent-phase conflict behaviour and an association between attachment to humans and pubertal timing in the domestic dog. *Biology letters*, 16(5), p.20200097.
- Averina, O.V., Zorkina, Y.A., Yunes, R.A., Kovtun, A.S., Ushakova, V.M., Morozova, A.Y., Kostyuk, G.P., Danilenko, V.N. and Chekhonin, V.P., 2020. Bacterial Metabolites of Human Gut Microbiota Correlating with Depression. *International Journal of Molecular Sciences*, 21(23), p.9234.
- Barnard, S., Wells, D.L. and Hepper, P.G., 2018. Laterality as a predictor of coping strategies in dogs entering a rescue shelter. *Symmetry*, 10(11), p.538.
- Bourke, C.H. and Neigh, G.N., 2011. Behavioral effects of chronic adolescent stress are sustained and sexually dimorphic. *Hormones and behavior*, 60(1), pp.112-120.
- Boyd, C., Jarvis, S., McGreevy, P.D., Heath, S., Church, D.B., Brodbelt, D.C. and o'Neill, D.G., 2018. Mortality resulting from undesirable behaviours in dogs aged under three years attending primary-care veterinary practices in England. *Animal Welfare*, 27(3), pp.251-262.
- Branson, N.J. and Rogers, L.J., 2006. Relationship between paw preference strength and noise phobia in *Canis familiaris*. *Journal of Comparative Psychology*, 120(3), p.176.
- de Castro, A.C.V., Barrett, J., de Sousa, L. and Olsson, I.A.S., 2019. Carrots versus sticks: The relationship between training methods and dog-owner attachment. *Applied Animal Behaviour Science*, 219, p.104831.
- Demirbas, Y.S., Isparta, S., Ozturk, H., Safak, E., Emre, B., Piskin, I., Kaya, U., Sagmanligil, V., Akgul, B. and Pereira, G.D.G., 2019. Functional cerebral asymmetry in dogs living under different environmental conditions. *Behavioural processes*, 165, pp.4-8.
- Gilchrist, J.D., Battista, K., Patte, K.A., Faulkner, G., Carson, V. and Leatherdale, S.T., 2021. Effects of reallocating physical activity, sedentary behaviors, and sleep on mental health in adolescents. *Mental Health and Physical Activity*, 20, p.100380.
- Hart BL, Hart LA, Thigpen AP, Willits NH. Assisting decision-making on age of neutering for 35 breeds of dogs: associated joint disorders, cancers and urinary incontinence. *Front Vet Sci*. (2020) 7:388. doi: 10.3389/fvets.2020.00388
- Hart, L.A. and Hart, B.L., 2021. An Ancient Practice but a New Paradigm: Personal Choice for the Age to Spay or Neuter a Dog. *Frontiers in Veterinary Science*, 8, p.244.
- Harvey, N.D., Craigon, P.J., Blythe, S.A., England, G.C. and Asher, L., 2016. Social rearing environment influences dog behavioral development. *Journal of Veterinary Behavior*, 16, pp.13-21.
- Harvey, N.D., Craigon, P.J., Shaw, S.C., Blott, S.C. and England, G.C., 2019. Behavioural Differences in Dogs with Atopic Dermatitis Suggest Stress Could Be a Significant Problem Associated with Chronic Pruritus. *Animals*, 9(10), p.813.
- Hetts, S., Clark, J.D., Calpin, J.P., Arnold, C.E. and Mateo, J.M., 1992. Influence of housing conditions on beagle behaviour. *Applied Animal Behaviour Science*, 34(1-2), pp.137-155.

- Hiby, E.F., Rooney, N.J. and Bradshaw, J.W.S., 2004. Dog training methods: their use, effectiveness and interaction with behaviour and welfare. *ANIMAL WELFARE-POTTERS BAR THEN WHEATHAMPSTEAD*, 13(1), pp.63-70.
- Jardim-Messeder, D., Lambert, K., Noctor, S., Pestana, F.M., de Castro Leal, M.E., Bertelsen, M.F., Alagaili, A.N., Mohammad, O.B., Manger, P.R. and Herculano-Houzel, S., 2017. Dogs have the most neurons, though not the largest brain: trade-off between body mass and number of neurons in the cerebral cortex of large carnivorous species. *Frontiers in neuroanatomy*, 11, p.118.
- Karpiński, M., Ognik, K., Garbiec, A., Czyżowski, P. and Krauze, M., 2021. Effect of Stroking on Serotonin, Noradrenaline, and Cortisol Levels in the Blood of Right-and Left-Pawed Dogs. *Animals*, 11(2), p.331.
- Kelly, J.R., Kennedy, P.J., Cryan, J.F., Dinan, T.G., Clarke, G. and Hyland, N.P., 2015. Breaking down the barriers: the gut microbiome, intestinal permeability and stress-related psychiatric disorders. *Frontiers in cellular neuroscience*, 9, p.392.
- Kinsman, R., Owczarczak-Garstecka, S., Casey, R., Knowles, T., Tasker, S., Woodward, J., Da Costa, R. and Murray, J., 2020. Sleep duration and behaviours: a descriptive analysis of a cohort of dogs up to 12 months of age. *Animals*, 10(7), p.1172.
- Kortekaas, K. and Kotschal, K., 2020. Social Context Influences Resting Physiology in Dogs. *Animals*, 10(12), p.2214.
- Lach, G., Fülling, C., Bastiaanssen, T.F., Fouhy, F., O'Donovan, A.N., Ventura-Silva, A.P., Stanton, C., Dinan, T.G. and Cryan, J.F., 2020. Enduring neurobehavioral effects induced by microbiota depletion during the adolescent period. *Translational psychiatry*, 10(1), pp.1-16.
- Ilin, Y. and Richter-Levin, G., 2009. Enriched environment experience overcomes learning deficits and depressive-like behavior induced by juvenile stress. *PLoS One*, 4(1), p.e4329.
- Marshall-Pescini, S., Barnard, S., Branson, N.J. and Valsecchi, P., 2013. The effect of preferential paw usage on dogs' (*Canis familiaris*) performance in a manipulative problem-solving task. *Behavioural processes*, 100, pp.40-43.
- McGreevy, P.D., Starling, M., Branson, N.J., Cobb, M.L. and Calnon, D., 2012. An overview of the dog-human dyad and ethograms within it. *Journal of Veterinary Behavior*, 7(2), pp.103-117.
- McGreevy, P.D., Wilson, B., Starling, M.J. and Serpell, J.A., 2018. Behavioural risks in male dogs with minimal lifetime exposure to gonadal hormones may complicate population-control benefits of desexing. *PLoS One*, 13(5), p.e0196284.
- Mikkola, S., Salonen, M., Puurunen, J., Hakanen, E., Sulkama, S., Araujo, C. and Lohi, H., 2021. Aggressive behaviour is affected by demographic, environmental and behavioural factors in purebred dogs. *Scientific reports*, 11(1), pp.1-10.
- Ogi, A., Mariti, C., Baragli, P., Sergi, V. and Gazzano, A., 2020. Effects of stroking on salivary oxytocin and cortisol in guide dogs: preliminary results. *Animals*, 10(4), p.708.
- Pal, S.K., 2010. Play behaviour during early ontogeny in free-ranging dogs (*Canis familiaris*). *Applied Animal Behaviour Science*, 126(3-4), pp.140-153.

Pal, S.K., Ghosh, B. and Roy, S., 1998. Dispersal behaviour of free-ranging dogs (*Canis familiaris*) in relation to age, sex, season and dispersal distance. *Applied Animal Behaviour Science*, 61(2), pp.123-132.

Roulaux, P.E., van Herwijnen, I.R. and Beerda, B., 2020. Self-reports of Dutch dog owners on received professional advice, their opinions on castration and behavioural reasons for castrating male dogs. *PloS one*, 15(6), p.e0234917.

Shenoda, Y., Ward, M.P., McKeegan, D. and Fawcett, A., 2020. "The Cone of Shame": Welfare Implications of Elizabethan Collar Use on Dogs and Cats as Reported by their Owners. *Animals*, 10(2), p.333.

Sommerville, R., O'Connor, E.A. and Asher, L., 2017. Why do dogs play? Function and welfare implications of play in the domestic dog. *Applied animal behaviour science*, 197, pp.1-8.

van Herwijnen, I.R., 2021. Contribution to the Special Issue on Clinical Ethology: Educating dog owners: how owner–dog interactions can benefit from addressing the human caregiving system and dog-directed parenting styles. *Behaviour*, 1(aop), pp.1-22.

Xu, X., Hu, Y., Yan, E., Zhan, G., Liu, C. and Yang, C., 2020. Perioperative neurocognitive dysfunction: thinking from the gut?. *Aging (Albany NY)*, 12(15), p.15797.

Yu, Y., Wilson, B., Masters, S., van Rooy, D. and McGreevy, P.D., 2021. Mortality Resulting from Undesirable Behaviours in Dogs Aged Three Years under Attending Primary-Care Veterinary Practices in Australia. *Animals*, 11(2), p.493.

Feline references

Cafazzo, S., Bonanni, R. and Natoli, E., 2019. Neutering effects on social behaviour of urban unowned free-roaming domestic cats. *Animals*, 9(12), p.1105.

McDonald, J.L., Cleasby, I.R., Brodbelt, D.C., Church, D.B. and O'Neill, D.G., 2017. Mortality due to trauma in cats attending veterinary practices in central and south-east England. *Journal of Small Animal Practice*, 58(10), pp.570-576.

Turner, D.C., 2014. Social organisation and behavioural ecology of free-ranging domestic cats. *The domestic cat: the biology of its behaviour*, 3, pp.63-80.

Vendramini, T.H., Amaral, A.R., Pedrinelli, V., Zafalon, R.V., Rodrigues, R.B. and Brunetto, M.A., 2020. Neutering in dogs and cats: current scientific evidence and importance of adequate nutritional management. *Nutrition research reviews*, 33(1), pp.134-144.

Intellectual Property Dr A Batson 2021

Introducing Reconcile[®]


fluoxetine hydrochloride

Separation happens...
Anxiety doesn't have to.

– the first licensed
fluoxetine for dogs

Join us to find out more through
our e-learning CPD programme
presented by Dr Sarah Heath FRCVS

This free CPD series will discuss the most up-to-date scientific information on the management and treatment of separation related disorders in dogs and introduce **Reconcile[®]**.

 COURSE STARTS ON 12TH OCTOBER 2021 AT 8PM.

 LIVE AND ON DEMAND.

 4 HOURS OF CPD FOR VETS AND VET NURSES



To register visit: <https://www.veterinarywebinars.com/forte/>

Reconcile[®] contains fluoxetine hydrochloride. POM-V. Further information available in the SPC: www.vmd.defra.gov.uk/ProductInformationDatabase or from Forte Healthcare Ltd., Block 3, Unit 9, CityNorth Business Campus, Stamullen, Co. Meath, K32 D990, Ireland. **Tel:** 01 292 80013. **Email:** vets@fortehealthcare.com (technical enquiries) or enquiries@fortehealthcare.com (all other queries).

Date of preparation: May 2021. FOR185.


Forte
Healthcare

Presenter

Gwen Covey-Crump

BVetMed, CertVA, DipECVAA, MRCVS, CertVetAc(IVAS)



RCVS Recognised Specialist in Veterinary Anaesthesia

EBVS® European Specialist in Veterinary Anaesthesia and Analgesia

Senior Clinician in Veterinary Anaesthesia and Analgesia

Rehabilitation and Pain Management Service

Langford Vets

Not ‘Just Getting Old’ And ‘Slowing Down’, Pain Where You Least Expect It

Much focus has been on recognition of chronic pain in the older dog or cat and rightly so. With osteoarthritis so prevalent in the pet population this suffering of the older generation is slowly gaining awareness. However, even less attention has been paid to identification of pain in younger pets; Behaviour change, the logical output of the pain experience, is often put down to naughty puppies and crazy cats if it is deemed troublesome by their human companions.

The lecture explores some of the myths about pain in pets including the assumption that young animals don't get arthritis; the mis-construed idea that both pet owners and even vets know when animals are in pain; the barriers to effective treatment of pain, and why pain and behaviour are so important.

We briefly explore some of the causes of pain in younger animals and how acute pain, left untreated, may become chronic.

The process of a consultation for a potentially painful animal is outlined, taking into consideration the needs of the animal, client and veterinary team by preparing in advance, gathering information, thinking about the location and content of the consult itself, treatment plan and follow-up.

We look at a simple case example to demonstrate how wrong assumptions may have taken the vet down the wrong (and very expensive) treatment path for that dog-owner unit at that moment in time.

The last couple of slides in the lecture give some useful resources for the many further questions which may be generated by this talk.

NOT 'just getting old, just slowing down'

Pain where you least expect it

Gwen Covey-Crump

RCVS and European Specialist in Veterinary Anaesthesia and Analgesia

Langford Vets 

 University of
BRISTOL

<https://www.camonline.com/why-dont-you-listen-book/>



"Why don't you listen?" is a must read for all families that share their lives and homes with our four legged friends.

With 23% of UK households owning at least one dog, the human-dog bond seems to be flourishing. However, behind this rosey statistic lurk common behaviour problems that lead to emotional suffering, frequent rehoming and even euthanasia.

Many behaviour problems result from an innocent misinterpretation, miscommunication, or lack of understanding. **All these can be avoided if we learn to listen.**

Canine Arthritis Management is a vet-led organisation dedicated to raising awareness and delivering solutions to ensure dogs and their owners lead long and happy lives.

The more I work with dogs, the more I have come to realise that they work hard to fit in with people; so if there is a problem with their behaviour, we have to stop and ask the question why. The answer is often that either we have not been clear in communicating what we want, or we are asking too much. For a dog in pain, or discomfort, asking them to move or do a specific action like sit can be a real challenge, and so we should not be surprised if they are not keen. This book is a wonderful way to open up our minds to this. Owners will learn a lot and children will undoubtedly grow up to be more sensitive to their dog's needs. Isn't that what any owner wants for their dog? so please read it carefully for dog's sake!

Prof Daniel Mills
BVSc CCAB FRSB FHEA FRCVS
EBVS® European Veterinary Specialist in Behavioural Medicine

Outline

- Pain is under recognised
- Pain is subjective
- Acute pain can become chronic
- Consult and Management plan
- Case example



Pain myth – young animals don't get OA

- It is common

Osteoarthritis affects
200,000UK dogs, 20%
of dogs >1yr

Radiographic evidence
of osteoarthritis present
in ~ 90% of cats

- Anderson, K. L., et al. (2018). Prevalence, duration and risk factors for appendicular osteoarthritis in a UK dog population under primary veterinary care. *Scientific reports*, 8(1), 5641. doi:10.1038/s41598-018-23940-z
- Pfizer Animal Health proprietary market research survey of 200 vets; Johnston, S. A. (1997). Osteoarthritis: Joint Anatomy, Physiology, and Pathobiology. *Veterinary Clinics of North America: Small Animal Practice*, 27(4), 699-723.
- Lascelles, et al. (2010). Cross-Sectional Study of the Prevalence of Radiographic Degenerative Joint Disease in Domesticated Cats. *Veterinary Surgery*, 39(5), 535-544. doi:10.1111/j.1532-950X.2010.00708.x

Pain myth – young animals don't get OA

- It is common

Osteoarthritis affects 200,000 UK dogs, 20% of dogs >1yr

Radiographic evidence OA in 20 of 25 cats age 6mo – 5years

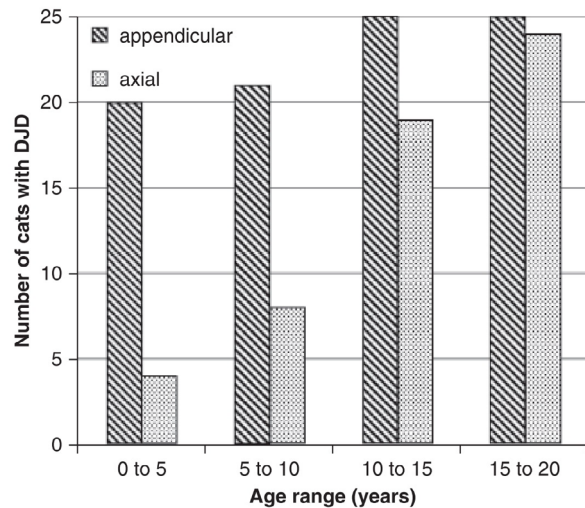


Figure 3 Prevalence of appendicular and of axial radiographic degenerative joint disease (DJD) in cats in different age ranges (n = 25 cats in each age range). Cats that were exactly 5, 10, or 15 years old were assigned to the 6 months–5 years, 5–10 years, and 10–15 years groups, respectively.

- Anderson, K. L., et al. (2018). Prevalence, duration and risk factors for appendicular osteoarthritis in a UK dog population under primary veterinary care. *Scientific reports*, 8(1), 5641. doi:10.1038/s41598-018-23940-z
- Pfizer Animal Health proprietary market research survey of 200 vets; Johnston, S. A. (1997). Osteoarthritis: Joint Anatomy, Physiology, and Pathobiology. *Veterinary Clinics of North America: Small Animal Practice*, 27(4), 699-723.
- Lascelles, et al. (2010). Cross-Sectional Study of the Prevalence of Radiographic Degenerative Joint Disease in Domesticated Cats. *Veterinary Surgery*, 39(5), 535-544. doi:10.1111/j.1532-950X.2010.00708.x

Pain myth – environment has no impact on pain later in life

- Exercise matters! ↑ risk hip (HD) and elbow dysplasia (ED)
 - High octane, high impact exercise (e.g ball/stick chasing)
 - Puppies <3months climbing stairs (HD)
 - Moderate off-lead exercise ↓ risk HD
- Slips matter!
 - rearing puppies on slippery floors ↑ risk HD (Boxers)
- Puppy fat matters!
 - ↑ Dietary fat and body weight ↑ risk for developing HD
 - 25% dietary reduction delayed onset and ↓ severity hip OA
- Sallander, M. H., et al. (2006). Diet, exercise, and weight as risk factors in hip dysplasia and elbow arthrosis in Labrador Retrievers. *J Nutr*, 136(7 Suppl), 2050s-2052s. doi:10.1093/jn/136.7.2050s
- Krontveit, R. I., et al. (2012). Housing- and exercise-related risk factors associated with the development of hip dysplasia as determined by radiographic evaluation in a prospective cohort of Newfoundlands, Labrador Retrievers, Leonbergers, and Irish Wolfhounds in Norway. *Am J Vet Res*, 73(6), 838-846. doi:10.2460/ajvr.73.6.838
- van Hagen Marjan, A. E. (2005). Incidence, risk factors, and heritability estimates of hind limb lameness caused by hip dysplasia in a birth cohort of Boxers. *Am J Vet Res*, 66(2), 307.
- Smith, GK. (2006). Lifelong diet restriction and radiographic evidence of osteoarthritis of the hip joint in dogs. *Journal of the American Veterinary Medical Association*, 229(5), 690.

Pain myth – painful animals present with ‘pain’



animals



Article

Pain and Problem Behavior in Cats and Dogs

Daniel S. Mills ^{1,*}, Isabelle Demontigny-Bédard ², Margaret Gruen ³, Mary P. Klinck ⁴, Kevin J. McPeake ¹, Ana Maria Barcelos ¹, Lynn Hewison ¹, Himara Van Haeveermaet ¹, Sagi Denenberg ^{5,6}, Hagar Hauser ⁷, Colleen Koch ⁸, Kelly Ballantyne ⁹, Colleen Wilson ¹⁰, Chirantana V. Mathkari ¹¹, Julia Pounder ¹, Elena Garcia ¹², Patricia Darder ¹², Jaume Fatjó ¹² and Emily Levine ¹³

- Pain is under-reported
 - 23 - 82% = proportion of behaviour cases with pain suspicion
 - 16 - 79% of these with confirmed diagnosis
 - 15 - 45% had other medical conditions (some of which might be painful)

• Mills, et al. (2020). Pain and Problem Behavior in Cats and Dogs. *Animals*, 10(2). doi:10.3390/ani10020318

Pain myth – painful animals will present with ‘pain’



animals



Article

Pain and Problem Behavior in Cats and Dogs

- Hip – 8-71% (39%)
- Stifle – 1-54% (28%)
- Spine – 7-39% (24%)
- Derm – 13-27% (20%)
- Ear – 1-26% (13.5%)
- Elbow – 4-15% (9%)
- Carpus/tarsus – 1-29% (8%)
- Abdomen – 1-27% (8%)
- Other musculoskeletal – 4%
- ‘Allodynia’ – 3%
- Shoulder – 1-2% (1.5%)
- Dental – 1%
- Gastrointestinal
- Neurological
- Glaucoma/ophthalmological
- Anal sac disease
- Dermatological
- Hypothyroid/endocrine
- Hypertension
- Respiratory
- Autoimmune
- Dental/oral
- Liver
- Cancer

• Mills, et al. (2020). Pain and Problem Behavior in Cats and Dogs. *Animals*, 10(2). doi:10.3390/ani10020318

Pain myth – I'd know if my pet was in pain

- Clients perceptions:
 - He runs around when on walks so he can't be in pain
 - When she slips she just gets up and carries on
 - He is just 'slowing down'



Belshaw, et al. (2020). Could it be osteoarthritis? How dog owners and veterinary surgeons describe identifying canine osteoarthritis in a general practice setting. *Preventive Veterinary Medicine*, 185, 105198. doi:<https://doi.org/10.1016/j.prevetmed.2020.105198>

Pain myth – vets always treat pain?

- Owner must present animal – recognise there is a problem
- Many elements of clinical environment impact behaviour
- Pain assessment?
- Pain vs anxiety?



Belshaw, Z., & Yeates, J. (2018). Assessment of quality of life and chronic pain in dogs. *The Veterinary Journal*, 239, 59-64. doi:<https://doi.org/10.1016/j.tvjl.2018.07.010>

Pain myth – vets always treat pain?

- Do Vets under-treat?
- Owner factors
- Assessment
- Expense
- Risk averse?
- Knowledge?
- Time?

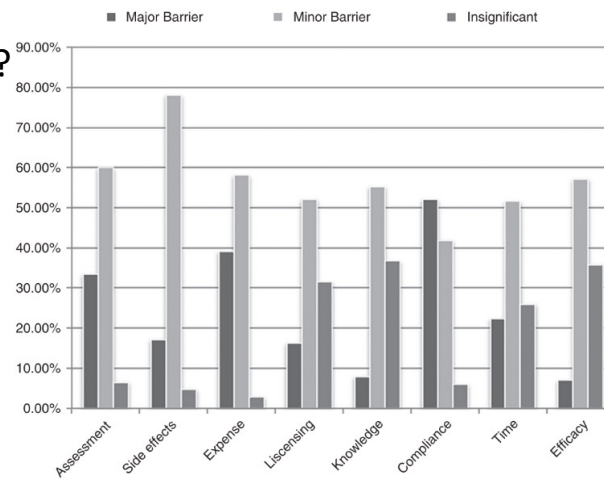


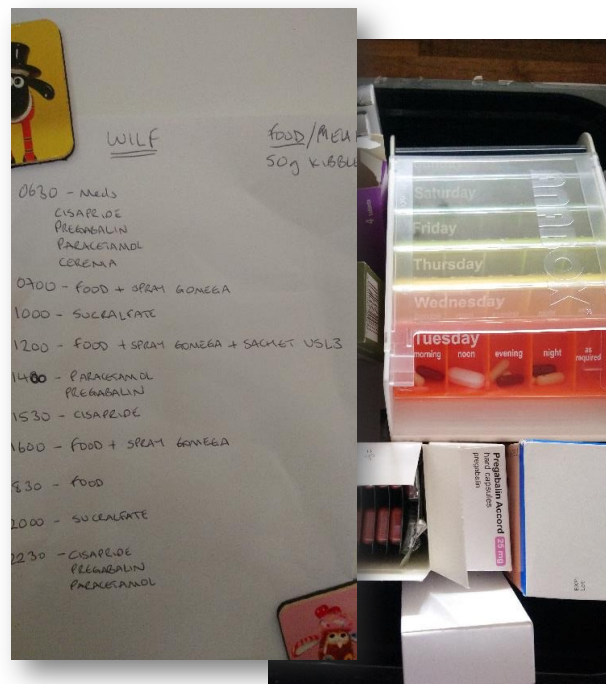
FIG 3: UK practitioners responses to the question, 'what do you perceive as barriers to adequate treatment of chronic pain in dogs?'

Bell, A., Helm, J., & Reid, J. (2014). Veterinarians' attitudes to chronic pain in dogs. *Vet Rec*, 175(17), 428. doi:10.1136/vr.102352

Belshaw, Z., et al. (2016). The attitudes of owners and veterinary professionals in the United Kingdom to the risk of adverse events associated with using non-steroidal anti-inflammatory drugs (NSAIDs) to treat dogs with osteoarthritis. *Prev Vet Med*, 131, 121-126. doi:10.1016/j.prevetmed.2016.07.017

Pain myth – it only affects the dog

- Impact on client:
 - Grief/ loss/ guilt
 - Impact on daily living
 - Expense of treatment
 - Complexity of treatment



Belshaw, Z., et al. (2020). Slower, shorter, sadder: a qualitative study exploring how dog walks change when the canine participant develops osteoarthritis. *BMC Veterinary Research*, 16(1), 85. doi:10.1186/s12917-020-02293-8

Belshaw, Z., et al. (2020). "You can be blind because of loving them so much": the impact on owners in the United Kingdom of living with a dog with osteoarthritis. *BMC Veterinary Research*, 16. doi:10.1186/s12917-020-02404-5

Pain & behaviour – why is it important?

- Under-reporting limits recognition
- Relationship is complex but always logical
- Musculoskeletal, dermatological and visceral pain
- Don't ignore – even if 'normal for breed'
 - Unusual gait
 - Unexplained behaviour signs
- Err on the side of caution if lesion not identified
 - Analgesia trial with careful evaluation of response

exacerbation of one or more signs of problem behavior as a result of pain, or adjunctive behavioral signs are associated with pain. We conclude that, in general, it is better for veterinarians to treat suspected pain first rather than consider its significance only when the animal does not respond to behavior therapy.

Mills, et al. (2020). Pain and Problem Behavior in Cats and Dogs. *Animals*, 10(2). doi:10.3390/ani10020318

Passive veterinary medicine

- Coping behaviours of pets may or may not demand owners and, therefore, our attention
- Clients may not detect pain in their pet – we are their advocates
- Waxing and waning severity may cause us to believe it is not a problem



Be proactive **not reactive**
- go and look for it!

Behaviour changes in dogs

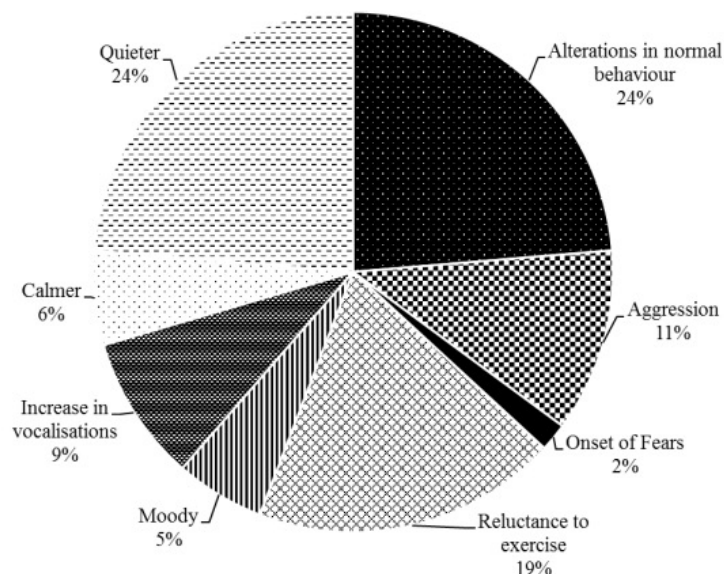
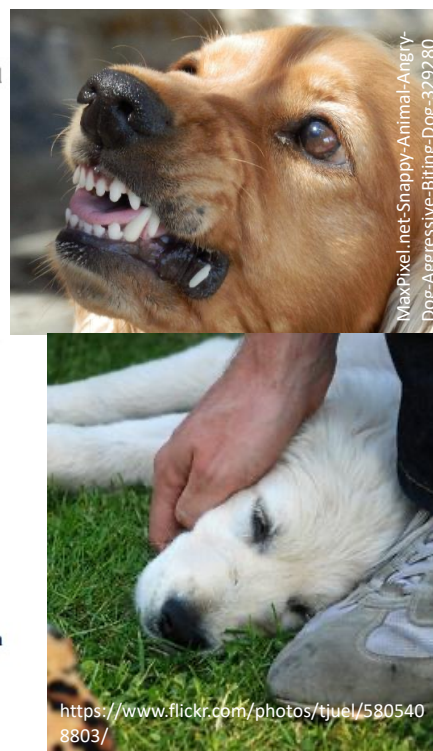


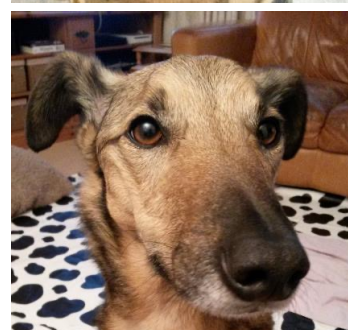
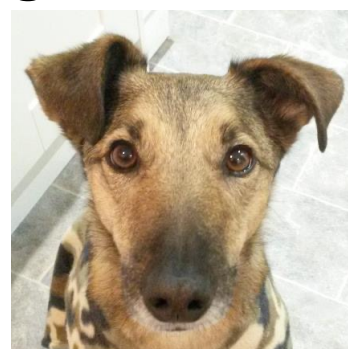
Figure 5: Chart showing the percentage of behaviours exhibited by dogs recorded in the EPRs \pm 3 months of OA diagnosis

Anderson, K., et al. 2018



Behaviour changes in dogs

- Reluctance to move or perform particular task eg jump
- Poor obedience (e.g 'sit') in puppy classes
- Excitability
- Lethargy, uninterested in walks, freezing, requiring frequent rests
- Anxiety, reactivity to animals/humans
- Refusal to enter a particular room
- Comfort/attention seeking, clinginess
- Overgrooming/barbaring or self mutilation
- Star-gazing, fly-snapping, licking surfaces
- Adopting unusual postures (eg 'down-dog'/bow)
- Abnormal facial expressions
- Waking owner at night
- Abnormal posture to urinate or defaecate
- Yawn, shake, tremor, interrupted body shake



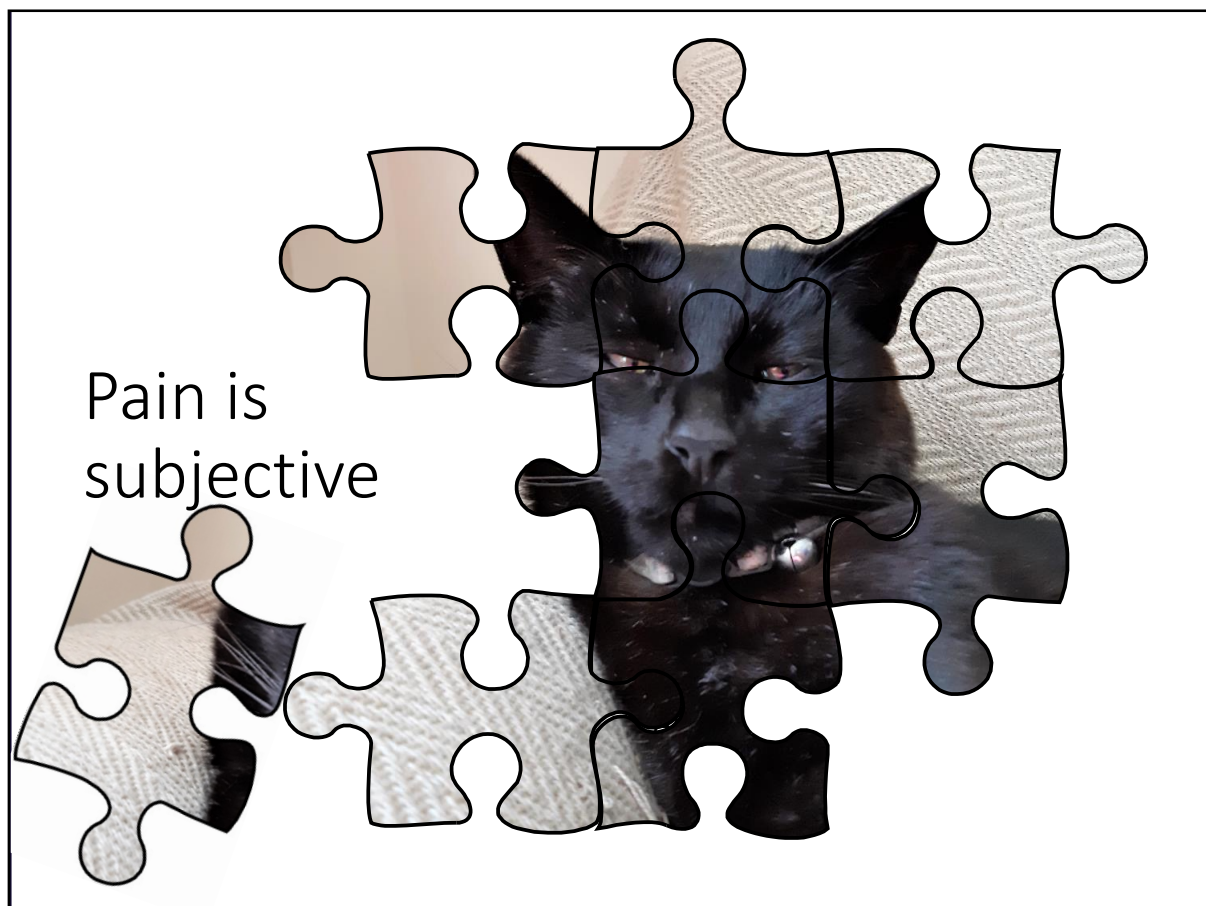
Recognising pain in cats

- Owners may be unaware of changes in mobility
 - Overt signs of lameness not most common clinical sign (Clarke & Bennett 2006)
- 4 behavioural domains particularly useful to assess pain in cats – vets and owners (Bennett and Morton, 2009):
 - Grooming
too much or too little
 - Mobility
accessing hiding places, rest places, litter trays
 - Activity
 - Temperament
social interactions
tolerance of handling
poor mood
defensiveness
fearfulness




Lameness not a useful indicator in cats

All pain is not the same

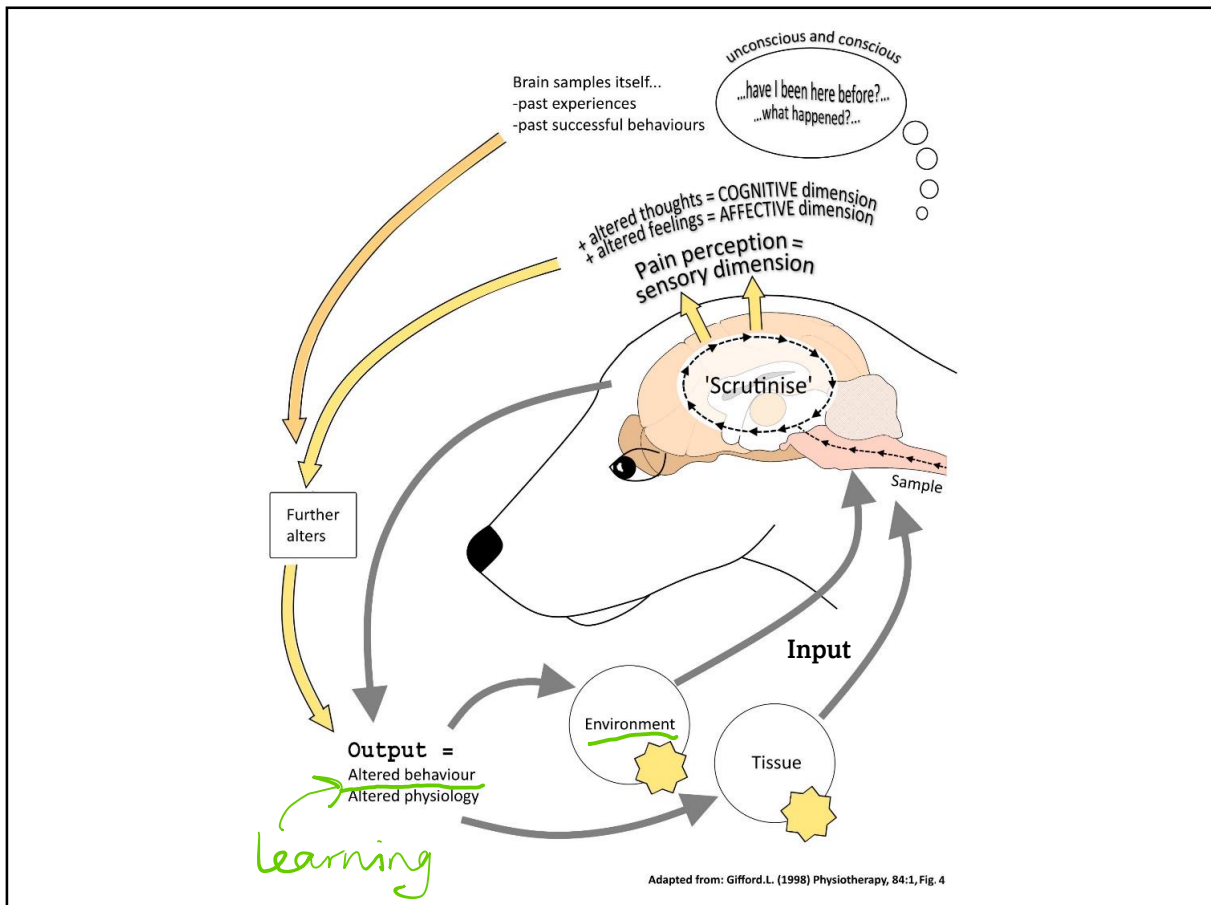


Pain is subjective

- Sensory - discriminative
 - When
 - Where
 - Intensity
- Motivational - Affective
 - Unpleasantness
 - Feelings
 - Wellbeing
- Cognitive - evaluative
 - Attention
 - Anticipation



A single puzzle piece with a black dog's face, positioned to the left of the text.



Acute pain may become chronic

Acute pain

- Adaptive
- Behavioural response removes animal from harm
- Appropriate stress response
- Pain severity linked to disease process *

Chronic pain

- Maladaptive
- Behavioural response - no evolutionary benefit*
- Chronic stress response
- Pain severity disconnected from disease process

Development of chronic pain

Brief noxious stimuli

Millisecs -

Seconds -

Minutes -

Short-term Inflammation

Hours -

Days -

**Long-term Inflammation
Neuropathy**

Weeks -

Months -

Amplification – increasing the 'gain'

C & Aδ fibres
Brief activation spinal cord
Transmission to brain

Transient pain

Peripheral sensitisation
-Local inflammatory factors
-nociceptors sensitised (↓ threshold)
-new nociceptors recruited

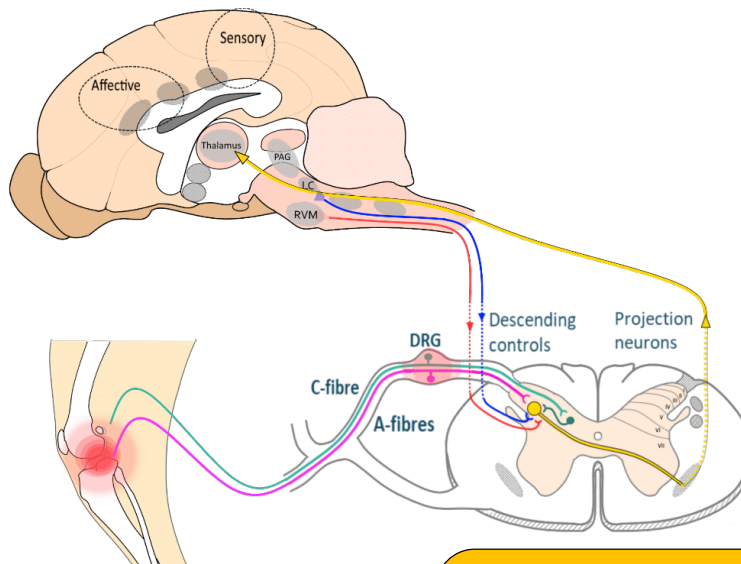
1° Hyperalgesia

Central sensitisation
-NMDAr activation
-Ca²⁺ influx
-↓threshold
-↑receptive field

**2° Hyperalgesia
Sustained pain
Allodynia**

CNS changes
Sprouting of terminals
Neural & glial remodelling
New receptors created
Inhibitory (interneuron) cell loss
Failure of descending inhibition
Long-term potentiation

**Chronic pain
Pathological
'Disconnected'**

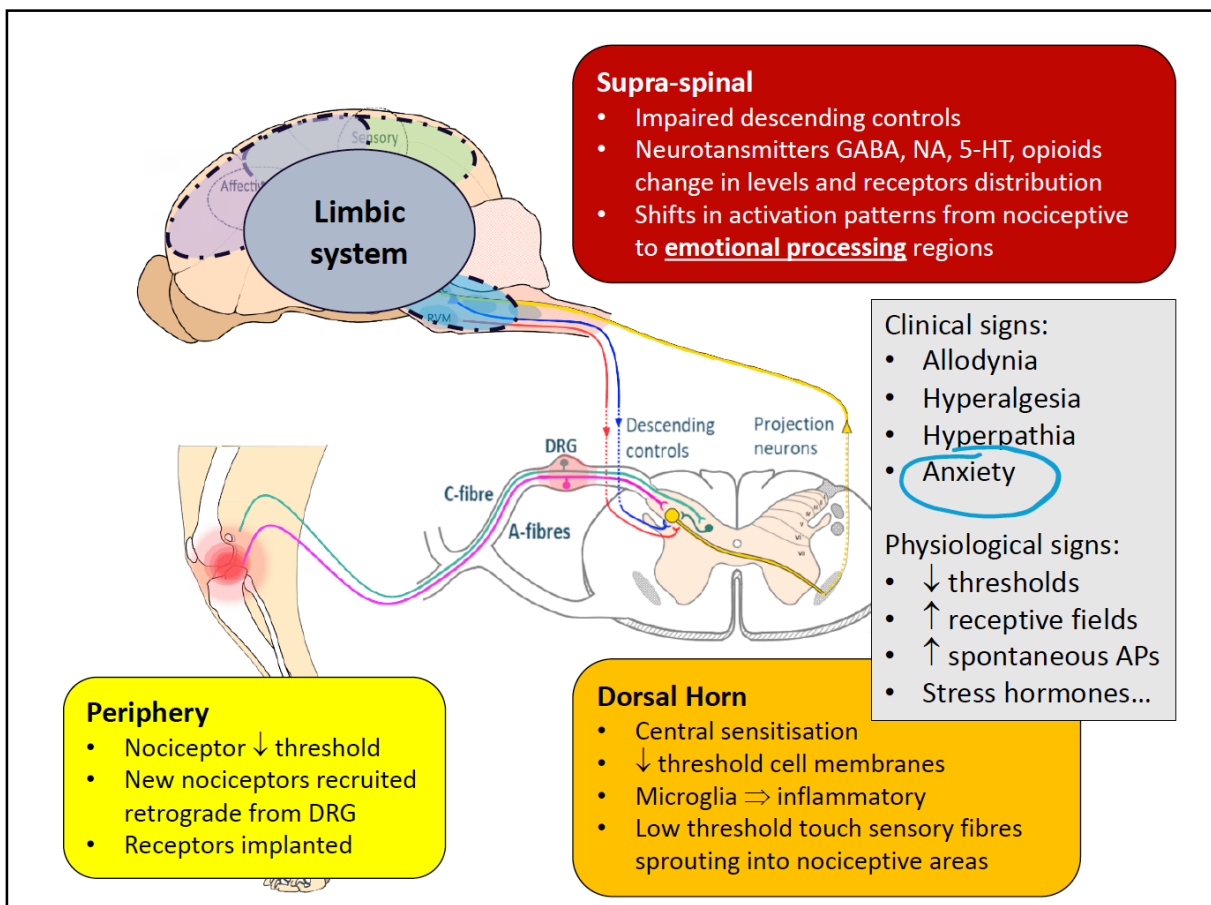
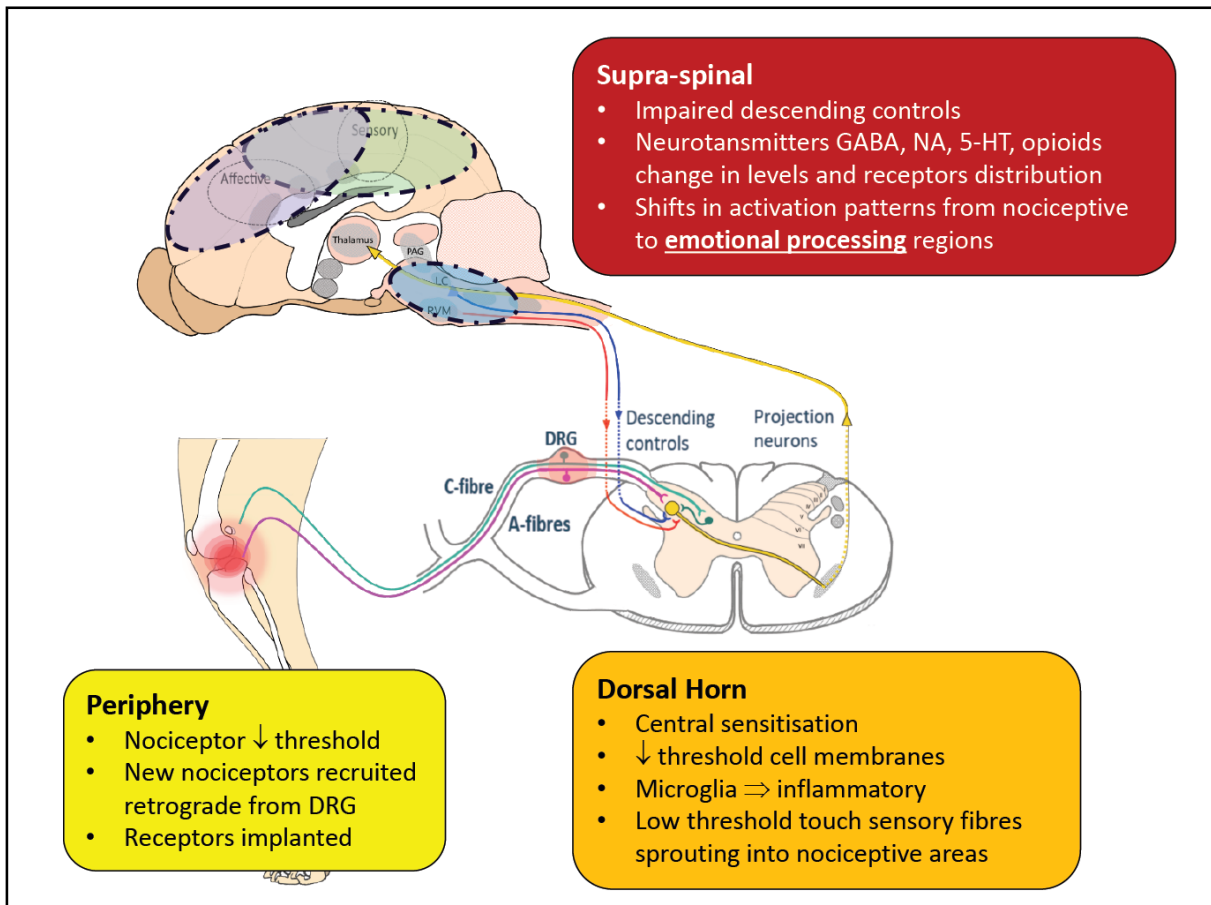


Periphery

- Nociceptor ↓ threshold
- New nociceptors recruited retrograde from DRG
- Receptors implanted

Dorsal Horn

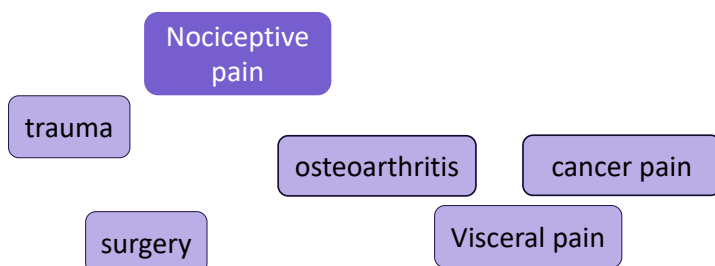
- Central sensitisation
- ↓ threshold cell membranes
- Microglia ⇒ inflammatory
- Low threshold touch sensory fibres sprouting into nociceptive areas



Pain type

Nociceptive/inflammatory

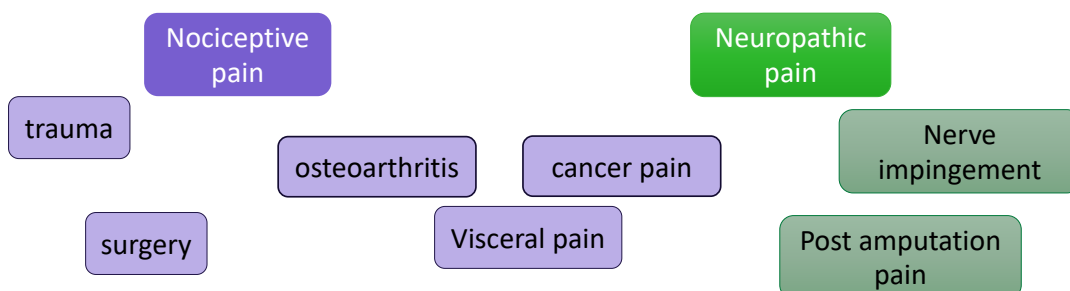
Caused by activity in neural pathways in response to potentially tissue damaging processes



Pain type

Nociceptive/inflammatory

Caused by activity in neural pathways in response to potentially tissue damaging processes



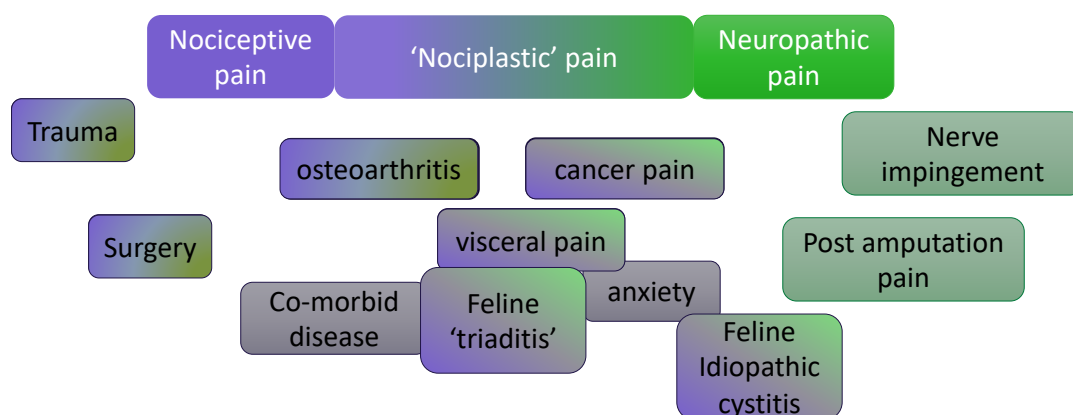
Pain type

Nociceptive/inflammatory

Caused by activity in neural pathways in response to potentially tissue damaging processes

Neuropathic

Initiated or caused by primary lesion or dysfunction in the nervous system



Painful conditions in young dogs

Orthopaedic	Degenerative joint disease, IMPA , Hip dysplasia, Legg-Calve-Perthes disease, Elbow dysplasia, Metaphyseal osteopathy, Panosteitis, Septic arthritis, Varus/Valgus, Medial luxating patellae, Osteochondrosis (shoulder, elbow, tarsus)
Neurological	Meningio-myelitis, syringomyelia, IVDD, chondrodysplasia, arachnoid cyst, transitional vertebra/sacralised L7
Visceral	Neoplasia, Pancreatitis, Hiatus hernia, Inflammatory Bowel Disease, partial bowel obstruction, anal sac disease
Dermatological	Chronic otitis, atopy, deep pyoderma, neoplasia
Oral	Dental disease, neoplasia
Ophthalmological	Entropion, distichiasis, corneal erosions, glaucoma

Painful conditions in young cats

Orthopaedic

Degenerative joint disease, Breed related – Scottish fold cats, osteochondrosis, luxating patellae, elbow dysplasia, neoplasia

Neurological

Meningio-myelitis, feline orofacial syndrome, transitional vertebra/sacralised L7

Visceral

Femoral artery thrombosis, Chronic/acute pancreatitis, gastritis, enteritis cholecystitis, triaditis, constipation, FIP, FLUTD - urolithiasis, urethral plugs, anatomical defects, idiopathic cystitis, neoplasia

Dermatological

Otitis, atopy, flea allergic dermatitis

Oral

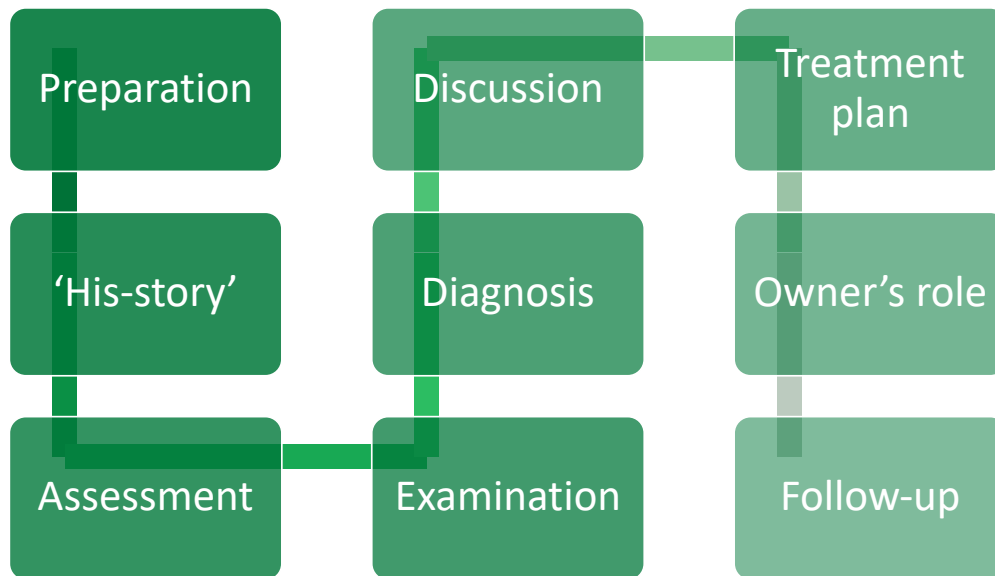
Dental disease, Feline chronic gingivo-stomatitis, neoplasia

Ophthalmological

corneal erosions, glaucoma

Pain Consultation

The Consultation



Preparation



- Before consult:
 - Questionnaire for owner,
 - Identify key discussion points
 - Decide on location/ environment of appointment

'His-story'

Or her's ;-)

• His-story

- Build a timeline - events, behaviour change, treatments
- Story of a typical day
- Details of medication, previous therapies, exercise, household environment, diet
- Presenting complaints/primary concern



Langford Vets 

 University of
BRISTOL

Assessment

- Assessment of daily behaviours in the home environment
- Pain assessment tools developed for acute pain are not suitable for chronic pain
- Examination in the clinic frequently fails to indicate the location or severity of pain

It is almost impossible to diagnose chronic pain by examination in the consulting room (personal communication, Sarah Heath)




Examination

- Observe
 - Gait, posture, activity
- Gain trust
- The examination
 - Gentle handling
 - Consent
 - Examine suspect painful areas last
 - Continue another day
- Tests & diagnostic procedures based on exam findings



Diagnosis

- Specific cause identified – great 
 - Further diagnostics
 - Initiate appropriate treatment
- No specific cause identified \Rightarrow analgesia trial
- Identify:
 - Pre-disposing factors
 - Initiating triggers
 - Maintenance factors



Discussion

- What are the goals?
 - Cure, manage, palliate?
- Avoid triggers, stop maintaining factors
- Safety – work with behaviourist
- Management
 - Body weight
 - Therapy – maintain movement
 - Exercise restriction – issues
 - Surgery
- Medication
 - Analgesics
 - Behaviour modifying drugs



Treatment Plan

One size does not fit all

- Tailored plan should fit what you are treating
- Pain characteristics differ between patients
 - ...and within patients over time!
- Communication with pet owner is key
- Involve whole 'dog unit'
 - Vet
 - VN
 - receptionist
 - Owner + family...friends



Owner role

- Agree treatment goals
- Carry out recommendations
- Diary to track progress
- Videos
- Pain assessment tools
- Report back
 - Successes
 - Failures
 - Difficulties



Does the plan match the capabilities?

Follow-up

- Agree interval with client
- Monitor & record
 - clinical signs, severity and impact on daily living and quality of life.
 - long term progression, co-morbidities.
- Review medication
 - adverse effects including lack of effect.
 - rescue options
- Review reports from fellow professionals – physio/behaviour...
- Discuss owner's understanding of the condition
 - offer educational resources.
 - concerns, ability to access treatments, personal preferences.
 - support to self-manage the pet.

Vet or RVN?

Interventions

Non-pharmacologic:

- Weight management
- Adapt environment/ hazards/ social exposures
- Exercise management
- Physiotherapy
- Acupuncture
- Therapeutic diet, supplements

Pharmacologic:

- NSAIDs
- Paracetamol
- Anti-hyperalgesics
- Opioids?
- Antidepressants?

Interventional techniques:

- Joint injections
- Epidural/nerve blocks
- Surgery



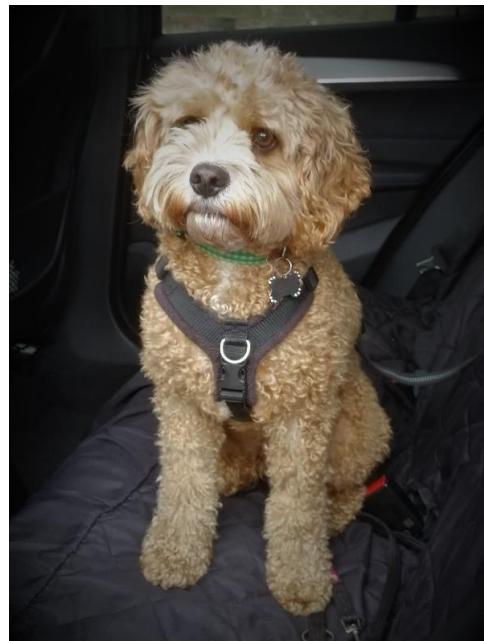
Restricted exercise & emotional health

- Confinement leads to muscle atrophy, loss of strength, joint laxity, reduced joint range of motion
- Restricting exercise through a regime of strict rest has potential emotional consequences – Sarah Heath
- Loss of the emotional benefits of exercise impacts on a number of emotional systems (Panksepp)
 - Desire-seeking
 - Social play
 - Fear-anxiety
 - Panic-grief
 - Frustration

Case example

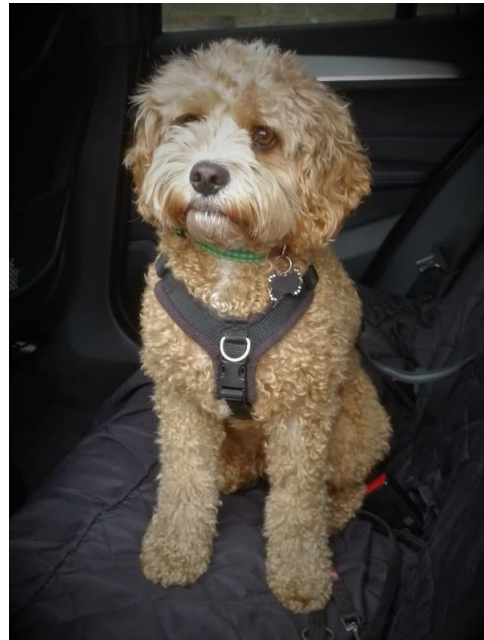
Bailey

- 2y Male Cavapoo
- Presented for syncope
- Cardiac work up
 - normal
- Examination
 - Suspected pain hips or L-S
 - Previcox 10 days
 - Report no improvement
- Referred to pain clinic



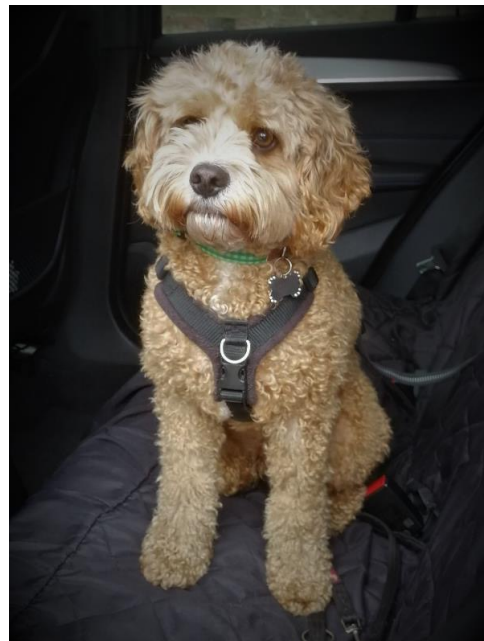
Bailey

- Pain clinic – ‘his-story’
 - Stopped jumping
 - Lies down on walks or goes home
 - Playing less, timid, ‘snappy’
 - May cry out/scream when back is touched
 - Resents tail touched
 - Falls over if cocks left leg
 - Cannot maintain squat posture
- Analgesia trial - 4 week course meloxicam



Bailey

- Significant improvement
 - ~~Lies down on walks or goes home~~
 - ~~Playing less, timid, ‘snappy’~~
 - ~~May cry out/scream when back is touched~~
 - Resents tail touched
 - Falls over if cocks left leg
 - Cannot maintain squat posture
- MRI, C-T or X-rays?



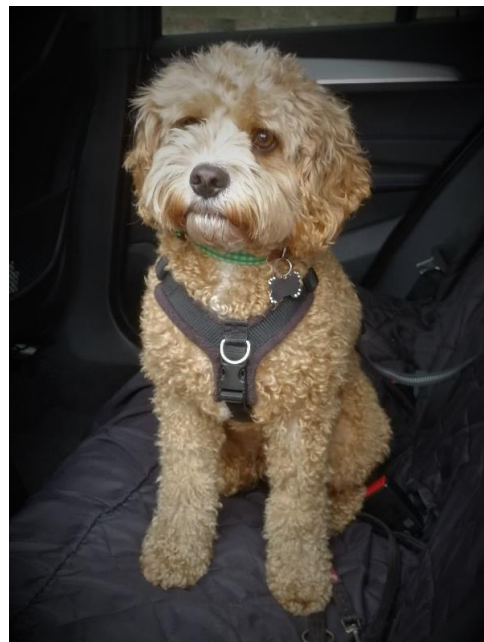
Bailey

- Transitional/sacralised L7 vertebra?
- Dynamic nerve root L7 compression?
- Evidence early hip OA?

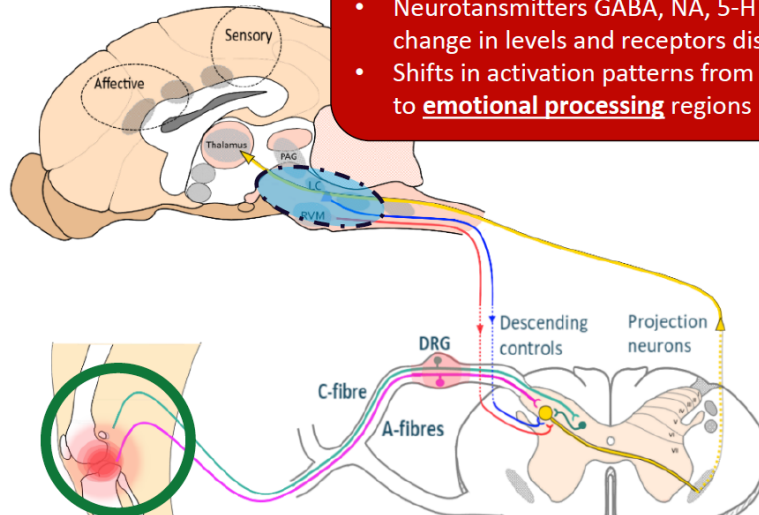


Bailey

- Significant improvement
 - Response to NSAID fits with inflammation
- Resents tail touched
 - Anal saculectomy at 1 yr old...
- Falls over if cocks left leg
 - Hip pain or weakness???
- Cannot maintain squat posture
 - ↓ strength low back/pelvis/hindlimbs



Target pain type



Supra-spinal

- Impaired descending controls
- Neurotransmitters GABA, NA, 5-HT, opioids change in levels and receptors distribution
- Shifts in activation patterns from nociceptive to **emotional processing** regions

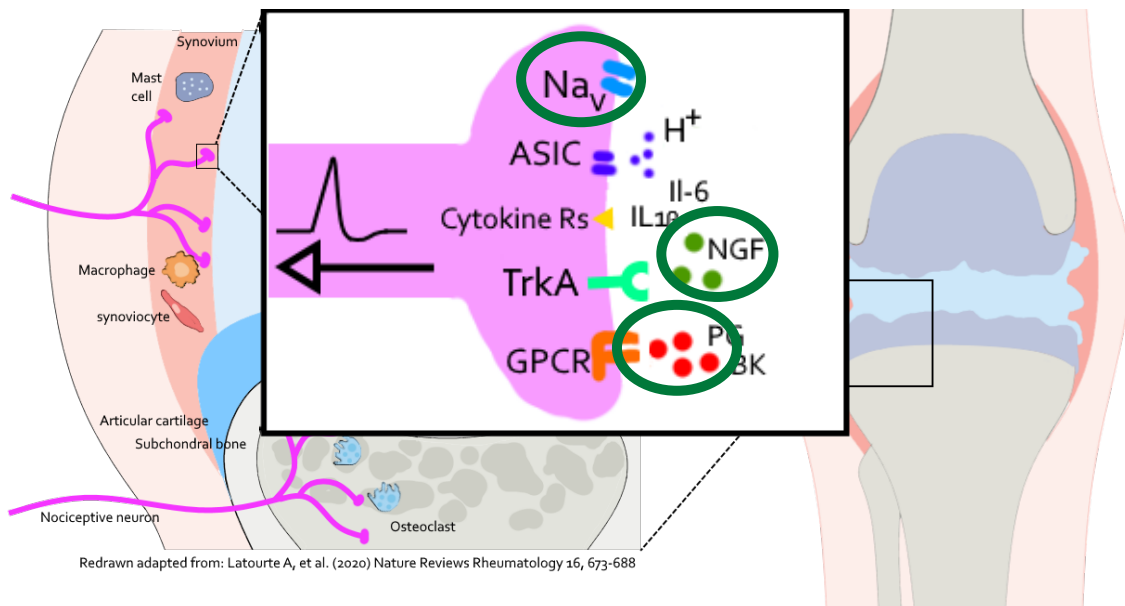
Periphery

- Nociceptor ↓ threshold
- New nociceptors recruited retrograde from DRG
- Receptors implanted

Dorsal Horn

- Central sensitisation
- ↓ threshold cell membranes
- Microglia ⇒ inflammatory
- Low threshold touch sensory fibres sprouting into nociceptive areas

Drug Targets

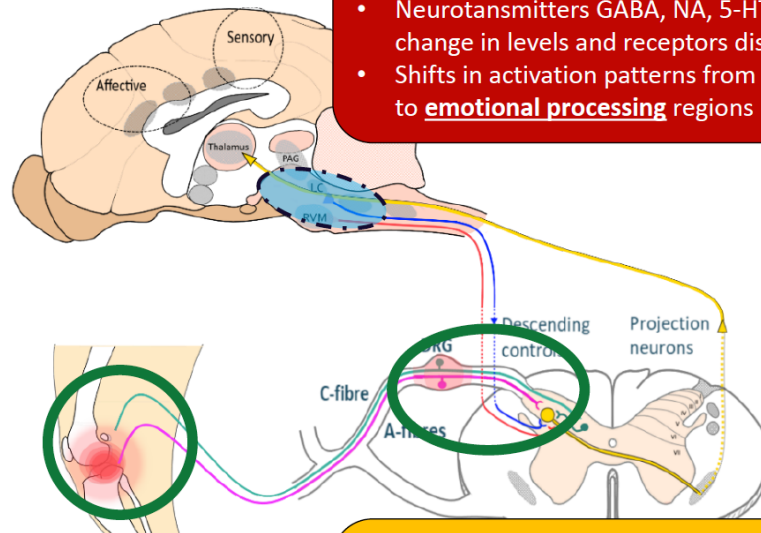


Redrawn adapted from: Latourte A, et al. (2020) Nature Reviews Rheumatology 16, 673-688

Non-Steroidal Anti-Inflammatory Drugs

- First line therapy for chronic pain management
- Peripheral anti-inflammatory
- Central nervous system anti-inflammatory
- Licenced for long-term pain:
 - Dogs – Meloxicam, carprofen, robenacoxib (onsior), cimicoxib (cimalgex), firocoxib (previcox), ketoprofen, mavacoxib (trocoxil), enflicoxib (daxocox)
 - Cats - Meloxicam, Robenacoxib (Onsior),

Target pain type



Supra-spinal

- Impaired descending controls
- Neurotransmitters GABA, NA, 5-HT, opioids change in levels and receptors distribution
- Shifts in activation patterns from nociceptive to **emotional processing** regions

Periphery

- Nociceptor ↓ threshold
- New nociceptors recruited
- Receptors implanted
- Retrograde from DRG

Dorsal Horn

- Central sensitisation
- ↓ threshold cell membranes
- Microglia ⇒ inflammatory
- Low threshold touch sensory fibres sprouting into nociceptive areas

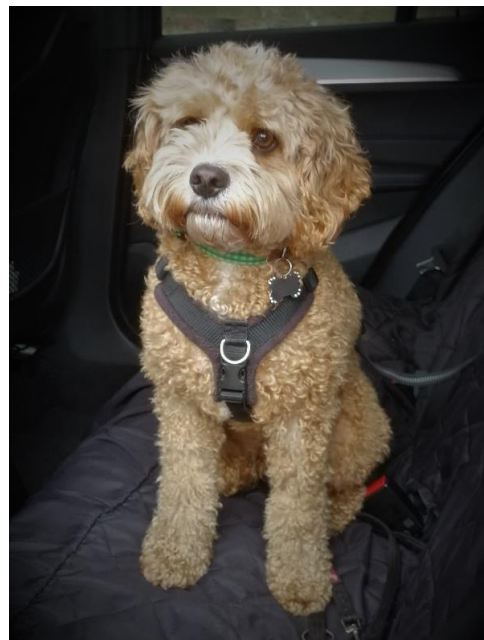
Misconception - how long to treat?

- Meloxicam improved activity and weight bearing but no effect on sensitisation after 3 weeks in cats with OA (Monteiro et al., 2016)
- Improvements were seen at day 42 meloxicam and further at day 84 in dogs (Walton et al., 2014)
- My advice – treat min. 4 weeks to judge effect

Chronic pain takes time to build...
...it takes time to dismantle

What next?

- Refer for physiotherapy
- Manage triggers (activities, environment, interactions)
- Maintain lean bodyweight
- Follow-up

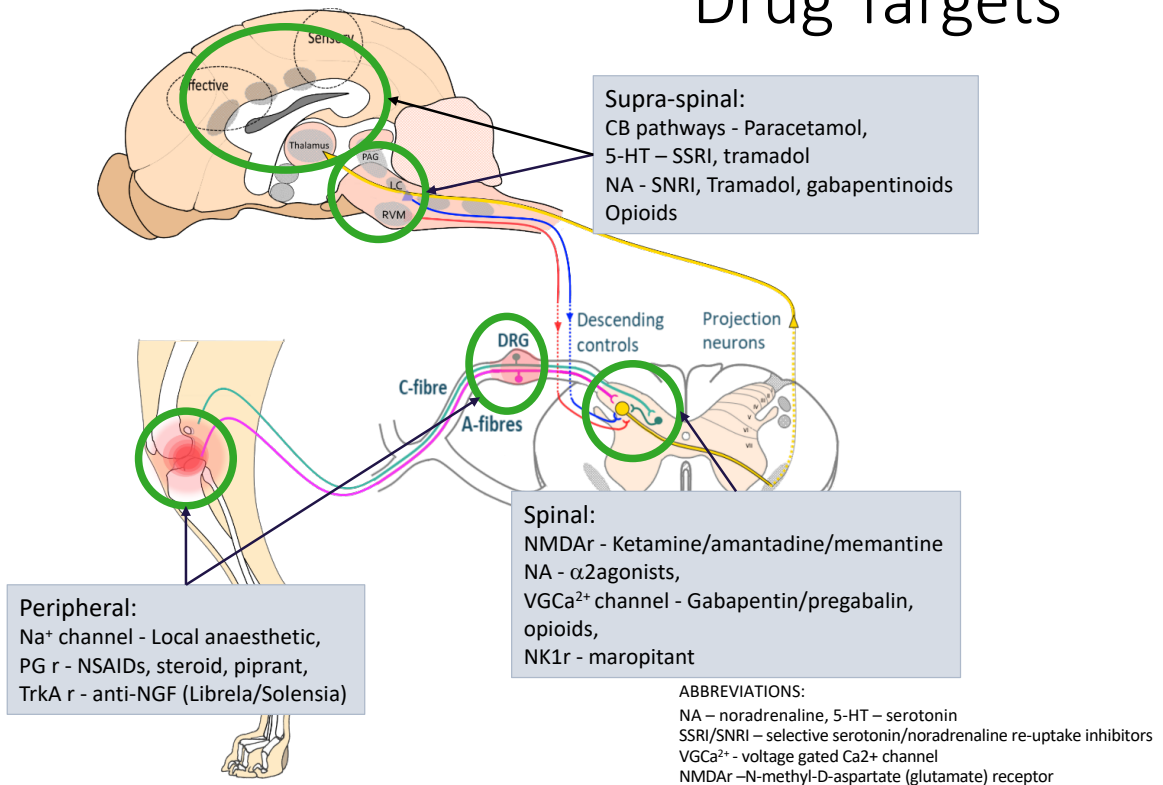


What next?

- Next options
- Further diagnostics
- Surgery
- Other drugs
 - Bedinvetmab 'Librela' (anti-NGF monoclonal antibody)?
 - Galliprant
 - Amantadine/memantine
 - Gabapentinoids?
 - Tramadol/amitiptyline?



Drug Targets



Anxiety, comorbidities, breakthrough pain

- Be a behaviourist
 - Treating pain/ anxiety/both?
- Interacting problems
 - Medications become ineffective
 - New health problem
 - Medication now contra-indicated
 - Breakthrough pain?
 - Don't assume a flare is 'just OA'
- Chronic disease waxes & wanes
 - Plan for flexible analgesia
 - Give owners some control



Summary

Summary

- Pain is common and under-recognised
- Behaviour change is the output of pain
- Untreated acute pain becomes chronic
- Take a wholistic approach
 - Manage the animal's environment
 - Targeted approach to analgesic use
 - Involve the client, family and vet team



References:

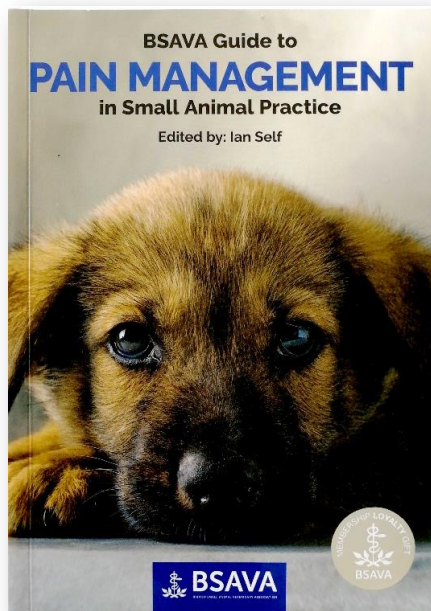
- Anderson, K. L., et al. (2018). Prevalence, duration and risk factors for appendicular osteoarthritis in a UK dog population under primary veterinary care. *Scientific reports*, 8(1), 5641. doi:10.1038/s41598-018-23940-z
- Bell, A., Helm, J., & Reid, J. (2014). Veterinarians' attitudes to chronic pain in dogs. *Vet Rec*, 175(17), 428. doi:10.1136/vr.102352
- Belshaw, Z., Asher, L., & Dean, R. S. (2016). The attitudes of owners and veterinary professionals in the United Kingdom to the risk of adverse events associated with using non-steroidal anti-inflammatory drugs (NSAIDs) to treat dogs with osteoarthritis. *Prev Vet Med*, 131, 121-126. doi:10.1016/j.prevetmed.2016.07.017
- Belshaw, Z., & Yeates, J. (2018). Assessment of quality of life and chronic pain in dogs. *The Veterinary Journal*, 239, 59-64. doi:https://doi.org/10.1016/j.tvjl.2018.07.010
- Belshaw, et al. (2020). Could it be osteoarthritis? How dog owners and veterinary surgeons describe identifying canine osteoarthritis in a general practice setting. *Preventive Veterinary Medicine*, 185, 105198. doi:https://doi.org/10.1016/j.prevetmed.2020.105198
- Belshaw, Z., et al. (2020). Slower, shorter, sadder: a qualitative study exploring how dog walks change when the canine participant develops osteoarthritis. *BMC Veterinary Research*, 16(1), 85. doi:10.1186/s12917-020-02293-8
- Belshaw, Z., et al. (2020). "You can be blind because of loving them so much": the impact on owners in the United Kingdom of living with a dog with osteoarthritis. *BMC Veterinary Research*, 16. doi:10.1186/s12917-020-02404-5
- Bennett, D., & Morton, C. (2009). A study of owner observed behavioural and lifestyle changes in cats with musculoskeletal disease before and after analgesic therapy. *J Feline Med Surg*, 11(12), 997-1004. doi:10.1016/j.jfms.2009.09.016
- Clarke, S. P., & Bennett, D. (2006). Feline osteoarthritis: a prospective study of 28 cases. *Journal of Small Animal Practice*, 47(8), 439-445. doi:https://doi.org/10.1111/j.1748-5827.2006.00143.x
- Pfizer Animal Health proprietary market research survey of 200 vets; In: Johnston, S. A. (1997). Osteoarthritis: Joint Anatomy, Physiology, and Pathobiology. *Veterinary Clinics of North America: Small Animal Practice*, 27(4), 699-723.
- Krontveit, R. I., et al. (2012). Housing- and exercise-related risk factors associated with the development of hip dysplasia as determined by radiographic evaluation in a prospective cohort of Newfoundlands, Labrador Retrievers, Leonbergers, and Irish Wolfhounds in Norway. *Am J Vet Res*, 73(6), 838-846. doi:10.2460/ajvr.73.6.838
- Lascelles, et al. (2010). Cross-Sectional Study of the Prevalence of Radiographic Degenerative Joint Disease in Domesticated Cats. *Veterinary Surgery*, 39(5), 535-544. doi:10.1111/j.1532-950X.2010.00708.x
- Mills, et al. (2020). Pain and Problem Behavior in Cats and Dogs. *Animals*, 10(2). doi:10.3390/ani10020318
- Monteiro, B. P., et al. (2016). Analgesic efficacy of an oral transmucosal spray formulation of meloxicam alone or in combination with tramadol in cats with naturally occurring osteoarthritis. *Veterinary Anaesthesia and Analgesia*, 43(6), 643-651. doi:10.1111/vaa.12360
- Sallander, M. H., et al. (2006). Diet, exercise, and weight as risk factors in hip dysplasia and elbow arthrosis in Labrador Retrievers. *J Nutr*, 136(7 Suppl), 2050s-2052s. doi:10.1093/jn/136.7.2050s
- van Hagen Marjan, A. E. (2005). Incidence, risk factors, and heritability estimates of hind limb lameness caused by hip dysplasia in a birth cohort of Boxers. *Am J Vet Res*, 66(2), 307.
- Smith, G.K. (2006). Lifelong diet restriction and radiographic evidence of osteoarthritis of the hip joint in dogs. *Journal of the American Veterinary Medical Association*, 229(5), 690.
- Walton, M. B., et al. (2014). Mavacoxib and meloxicam for canine osteoarthritis: a randomised clinical comparator trial. *Veterinary Record*, 175(11), 280. doi:10.1136/vr.102435



Resources



www.caninearthritis.co.uk



<https://bova.co.uk/bova-scholars/>

Louise Clarke, How does acute pain become chronic and how can we manage it?

www.zeropainphilosophy.com



www.langfordvets.co.uk
email: rehabpain@bristol.ac.uk

Another
Mother.

VIRTUAL ADMIN
BUSINESS SUPPORT
CUSTOMER SERVICE
DIGITAL MARKETING



We specialise in helping independent vets, behaviourists
and trainers with their business.

Let us
give you
your life back

supporting the APBC and its members

Flexible, affordable, outsourced admin and business
support - personalised to you.

www.anothermotheradmin.co.uk

excite taste buds



calm anxiety



The tasty choice for anxious dogs & cats

Alphazium TT contains a unique ingredient combination specifically formulated to target the three main neurological pathways involved in the regulation of mood and emotional balance.

Our patented TastyTech™ manufacturing process means Alphazium TT:

- Has exceptional palatability of up to 100%*
- Guarantees preservation of delicate ingredients
- Is a stress-free way to give tablets

For practice support materials and more information, speak to your TVM territory manager or visit tvm-uk.com/alphaziumtt

PALATABILITY
UPTO
100%
PALATABILITY



*Palatability test conducted by Panelis, Aug 2020 (ref. 09FD0G03)

Use medicines responsibly. www.noah.co.uk/responsible.

For further information, please contact TVM-UK Animal Health Ltd, Kirtlington Business Centre, Slade Farm, Kirtlington, Oxfordshire OX5 3JA. tvm-uk.com

tvm

Smart. Inspired.
Essential.

Presenter

Caroline Clark



Behavioural Awareness for the Veterinary Team

The COVID-19 pandemic has resulted in wide-ranging changes to the way we live and work. One effect, particularly during lockdown, was a massive surge in pet ownership. To fulfil this demand, there was an increase in illegally imported puppies and unscrupulous breeding practices were prevalent. Unfortunately, that rendered some off-spring to being more predisposed to developing health and behaviour problems.

For veterinary practices, the lockdown pet boom gave rise to a huge influx of puppies and kittens and, because of social distancing regulations, many of these individuals were (and still are) taken in to the clinic for primary vaccinations and treatments without their owners. For some, this will have been a stressful experience especially for those that had an impoverished start in life. On top of that, puppy parties were cancelled and there were no real opportunities to make socialisation trips to the practice. As a consequence of these factors we should expect there to be a rise in fear-related problems including those associated with veterinary visits.

Many of these same puppies and kittens have now reached adolescence and this may coincide with their first trip to the veterinary practice since their initial experience. Because adolescence is a sensitive phase, when they are particularly vulnerable to developing fear-related problems, it is imperative that veterinary practices develop a greater behavioural awareness when receiving, handling and treating them.

According to the recent Pet Food Manufacturers Association (PFMA) survey, there are still an estimated 1.9 million people thinking about acquiring a pet and, despite the relaxation of Covid-19 regulations, many veterinary clinics still do not allow owners in to the consulting rooms. Knowing how this might affect puppies, kittens and all our other patients, means that we can prepare the whole veterinary team to make the experience better and prevent behaviour problems from developing.

Behavioural awareness begins with the receptionist. Their role includes:

- Providing telephone advice to owners about what measures might help their pets, such as covering cat carriers, bringing towels, bedding and items of their clothing to provide familiar scents. Favourite treats and toys may also be useful for creating positive associations with the practice and this is especially important for primary vaccinations.
- Preparing and maintaining a calm atmosphere in the waiting area.
- Spot cleaning and ensuring the waiting area is well-ventilated to prevent a build-up of stress pheromones and unpleasant smells.
- Directing clients to seating areas in order to separate dogs from cats and advising cat owners to place cats in elevated locations.
- Observing body-language for signs of fear and taking the necessary action to alleviate their stress.
- Having good product knowledge about over-the-counter behaviour adjuncts such as pheromone therapy and calming medications.

Meeting and greeting should be done with some awareness of our own body-language. Dogs may find a direct approach threatening and the following measures may help reduce their fear:

- Avoid making a direct approach
- Move slowly with closed body-posture
- Avoid making eye contact
- Chat to the client a little distance away as this helps them to relax and, as dogs often take cues from their owners, can help them relax too
- Sitting down can be less fear-inducing and avoids any looming over the patient which can be another source of stress

Retaining a sense of security and control helps prevent and reduce fear and anxiety in most animals. However, this can prove challenging when trying to carry out procedures and restrain animals for examinations. Nevertheless, there are numerous ways we can help which may include:

- Providing a quiet environment. Feliway Optimum and Adaptil can help create a sense of calm.
- Dimmed lighting may help, especially for cats.
- Cats should be covered until they enter the consulting room. Allow them to come out of the carrier in their own time.
- Dogs should also be given time to investigate and sniffing and searching for food on the floor and on the table can help to act as a stress buster, gives them a sense of freedom as well as helping create positive associations with the clinic.
- Lifting the top off detachable cat carriers means cats can remain inside the bottom tray for examinations where they may feel safer.
- Keeping four paws on the ground enhances a cat's sense of security and control so, where possible, avoid lifting them up.
- For cats that are hidden beneath bedding, if possible, expose parts of the body for examination rather than uncovering them completely.
- If being removed from owners, an item of their clothing and some bedding with familiar scents can help alleviate stress. These can be placed close-by during the examination.
- Handling should be done gently with minimal force. Avoid grabbing at collars.
- Cats should never be scruffed as this is threatening and a cause of discomfort.

When it is apparent that the patient's fear is escalating it is best to stop what you are doing and re-evaluate the situation. Chemical restraint, rescheduling the appointment and prescribing suitable anxiolytics may be required and, where necessary, prompt referral to a suitably qualified behavioural practitioner should be made.

In summary, some of the challenges that all cats and dogs face in the veterinary environment include lack of control through forced restraint and handling, changes in routine, unfamiliar scents, strange noises and different people and animals. These may be compounded by previous experiences, removal from a source of security, especially during sensitive phases in their lives. Nevertheless, If we take time to think about how we can manage these triggers and reduce their impact it will make life easier, not just for puppies, kittens and adolescents but for all our patients.

Growing Pains: Addressing Adolescence in Companion Animals Behavioural Awareness for the Veterinary Team



Caroline Clark RVN, Cert Ed.

Post Graduate Diploma (AS) in Companion Animal Behaviour Counselling

Full Member of Association of Pet Behaviour Counsellors (APBC)

Association of Behaviour & Training Council (ABTC) Registered Clinical
Animal Behaviour Counsellor

Candidate Member of FABC

www.peteducationandtraining.co.uk

www.petcourses.co.uk

Aim of the Presentation

- ▶ To highlight the impact of lockdown on puppy and kitten development and how this may have affected them with regard to vet visits
- ▶ To help recognise some of the signs of stress
- ▶ To help mitigate stress for pets (and owners) when being taken away from their attachment figures
- ▶ To provide ideas on how vet visits can be made less stressful for all pets particularly puppies, kittens and those individual's who are now adolescents
- ▶ To help enhance the welfare of feline and canine patients

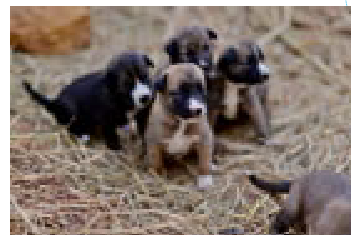
Impact of Lockdown

- ▶ Massive surge in new puppies and kittens
- ▶ PFMA survey
2.1m collected a new pet in lockdown
- ▶ 1.8m still plan to acquire a pet
- ▶ Unscrupulous breeders



Impact of Lockdown

- ▶ Early life stressors
- ▶ Missed opportunities for habituation and socialisation
- ▶ Stress of whole families at home



Impact of Lockdown Human-Pet Relationship

- ▶ Dogs especially receptive to humans
- ▶ Mirror emotions
- ▶ Stress levels are synchronized in dogs and their owners (Sundman *et al.* 2019)
- ▶ Cat owners with *neurotic traits* reported their cats as having more behavioural problems: including anxious/fearful behaviour Finka *et al.* (2019)



Impact of Lockdown in Veterinary Context

- ▶ Primary vaccinations & treatment without attachment figure
- ▶ Attachment Loss: focus of security
- ▶ Dogs: Owner
- ▶ Cats: Familiar environment/scent
- ▶ Fear - Frustration - Aggression

Impact of Lockdown in Veterinary Context

- ▶ Fear/anxiety:
 - ✓ Car journey
 - ✓ Confinement
 - ✓ Fear pheromones
 - ✓ Painful procedure



Impact of Lockdown in Veterinary Context

- ▶ Forgone socialisation visits to practice
- ▶ No puppy parties
- ▶ Next visit may not be until adolescence!



How Might This Affect the Individual?

- ▶ Neuro-development affected
- ▶ Lacking life skills
- ▶ Poor emotional resilience
- ▶ Negative associations with the practice
- ▶ Potential for developing fear-related problems

What Does this Mean for the Veterinary Team?

- ▶ Need to be behaviourally aware
- ▶ Create positive associations and mitigate stress in the vet environment
- ▶ Appreciate the effects of adolescence
- ▶ Provide owners with, and guide them to, good information

Adolescence

- ▶ Juvenile brain develops in to adult brain
- ▶ Reaching puberty
- ▶ Period of prolonged but rapid neuro-development and hormonal activity
- ▶ ‘Teenager’ phase (Asher *et al.* 2020)



Facts about Adolescence

- ▶ Sensitive period development of fear behaviours
- ▶ Extinction memory is impaired during adolescence, so bad experiences are more likely to be remembered



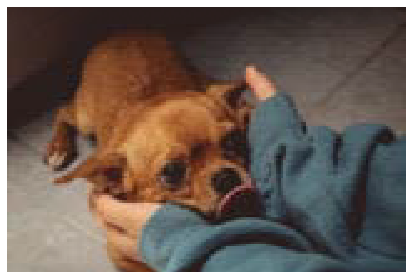
Behavioural Awareness

- ▶ Involve whole team
- ▶ Design and follow protocols
- ▶ Starts in reception



Behaviour Triage

- ✓ Phone
- ✓ History/notes on records
- ✓ Age
- ✓ Owners feedback
- ✓ Reading body language



Environment: Waiting Room

- Advise client where to sit
- Partitions
- Olfaction & Chemo-signals
- Pheromones
- Spot cleaning
- Reading material



Reading Body-Language: Young Dogs



Active Submission

- ▶ Fiddle!
- ▶ Goofy youngster
- ▶ Jumping up/ Mouthing
- ▶ Laying on back resisting with hind legs



Feline Behaviour: Response to Stressful Situations

- ▶ Avoidance
- ▶ Distance
- ▶ Hiding
- ▶ Seek elevated location
- ▶ Provide access to coping strategies



Meeting and Greeting

- Approach, Stance, avoid direct eye contact
- Relax owner (and dog) by chatting
- Sit down
- Dog-directed speak (Benjamin & Slocombe 2018)
- Tell clients what you do to reduce stress
- Assess behaviour

Canine Body-Language: Appeasement signals



Examination Rooms

- ▶ Environmental considerations
- ▶ Respect sense of smell
- ▶ Take time
- ▶ Think about your body language
- ▶ Observe signalling

Observations in the Examination Room



How to Respond?

- ▶ Back off
- ▶ Lean Back
- ▶ Time out
- ▶ Re-evaluate your body-language

Examination Rooms: Dogs

- ▶ Retain sense of control
- ▶ Sniffing
- ▶ Searching
- ▶ Exploring
- ▶ Positive associations



Making Positive Associations

- Preparation of treats
- Well-timed!



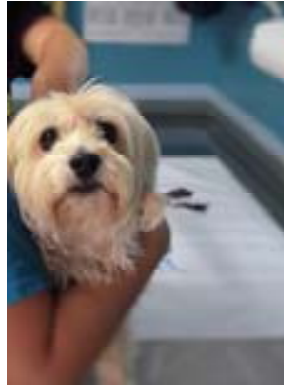
Making Positive Associations

- ▶ Choice
- ▶ Side on approach
- ▶ No looming
- ▶ Familiar scents/ objects
- ▶ Floor level

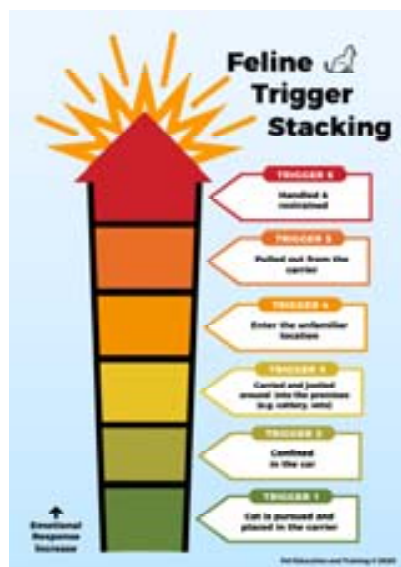


Handling Techniques

- ▶ Gentle handling
- ▶ No grabbing
- ▶ Building from light touch to firm pressure
- ▶ T Touch techniques



Feline Behaviour: Trigger stacking



Feline Behaviour

- ▶ Food less likely to be successful
- ▶ Help them retain sense of security
- ▶ Provide familiar scents



Examination Rooms: Cats

- ▶ Minimal handling
- ▶ Allow to exit carrier themselves
- ▶ Investigate
- ▶ Provide towels
- ▶ Examine under covers if necessary



Examination Room: Cats

- ▶ Detach top
- ▶ Reduce sensory input
- ▶ 4 feet on the ground



Feline Examination

- ▶ LIMA
- ▶ Least
- ▶ Intrusive
- ▶ Minimally
- ▶ Invasive



How to Respond Once Above Threshold

- ▶ Back off/ Time out
- ▶ At least 30 minutes for cats to calm
- ▶ Chemical restraint
- ▶ Consider rescheduling appointment
- ▶ Medication prior to appointment

What Can Cat Owners do to help?

- ▶ Habituation and socialisation
- ▶ DS and CC
- ▶ Choose detachable carrier
- ▶ Cover
- ▶ Bedding to hide under
- ▶ Refer to icatcare



Scent Swapping

- ▶ Harvest scent
- ▶ Transfer to cat carrier



What Can Dog Owners do?

- ▶ Habituation and socialisation
- ▶ Touch and treat
- ▶ Rehearsal visits
- ▶ “Stop and Sniff”
- ▶ Bring blanket/treats/item of owners clothing
- ▶ Adjuncts



Advising Clients

- ▶ Educate and guide to resources
- ▶ Advice about acquiring pups and kittens
- ▶ Nutraceuticals and adjuncts
- ▶ Medication
- ▶ Referral to behaviourist



Is it all bad news?

- ▶ Some pets cope better without their owners!
- ▶ Now commonplace for owners to wait in the car
- ▶ Waiting rooms tend to be less congested
- ▶ Opportunities to re assess behaviour protocols
- ▶ An opportunity to strengthen practice-client-pet bond

Summary

- ▶ Consider the effects of the pandemic
- ▶ Adolescence is a sensitive time
- ▶ Develop behavioural awareness
- ▶ Full team effort
- ▶ Manage environment
- ▶ Support coping strategies

References & Resources

- ▶ Approaching a Dog in practice video demonstration: <https://www.youtube.com/watch?v=lpecvb9Q7QY>
- ▶ Barking Brains: <https://www.facebook.com/neuroscienceisawesome/>
- ▶ Cat carrier training: webinar for vets & nurses: <https://zylkenepet.co.uk/vets-and-vet-nurses/>
- ▶ Fear Free Pets: <https://fearfreepets.com/>
- ▶ International Cat Care <https://icatcare.org/advice/taking-your-cat-to-the-vet/>
- ▶ Puppy Contract: <https://puppycontract.org.uk/>
- ▶ Benjamin & Slocombe *Who's a good boy: Dogs prefer naturalistic dog-directed speech* Animal Cognition 21 (2) (2018) DOI:[10.1007/s10071-018-1172-4](https://doi.org/10.1007/s10071-018-1172-4)
- ▶ Finka LR, Ward J, Farnworth MJ, Mills DS Owner personality and the wellbeing of their cats share parallels with the parent-child relationship (2019). PLOS ONE 14(2): e0211862. <https://doi.org/10.1371/journal.pone.0211862>
- ▶ Sundman, AS, Van Poucke, E, Svensson Holm, AC et al. Long-term stress levels are synchronized in dogs and their owners. *Science Rep* 9: 7391 (2019). <https://doi.org/10.1038/s41598-019-43851-x>

Images Courtesy of:

- ❑ Image(s) or Footage (as applicable), used under license from
- ❑ [Shutterstock.com](https://www.shutterstock.com)
- ❑ elements.envato.com/
- ❑ Free images:
- ❑ www.pixabay.com www.unsplash.com www.pxfuel.com

Photographs (with permission granted) - kindly provided by:

- ❑ Aldgate veterinary Clinic
- ❑ Swanbridge Veterinary Hospital
- ❑ We Care Veterinary Clinic
- ❑ Dr. Hannah Donovan-Calam CCAB

Thank you for listening





Pet Education & Training **Courses & Seminars**

Programmes of study to suit the whole team

Webinars, short courses and fully accredited certificate programmes.

- ➔ Secure Online Learning Platform
- ➔ Self-Paced Distance Learning

About Caroline Clark Lead Tutor

Caroline has over 30 years' experience working within the animal industry. She is a qualified registered veterinary nurse, a clinical animal behaviourist and has a professional teaching qualification. Caroline's teaching experience is varied, having taught students from level one through to undergraduates on degree courses. During her career she has worked for a number of colleges and was an external verifier for the Royal College of Veterinary Surgeons, ensuring standards were met on the Veterinary Nursing programme.

1 www.petcourses.co.uk



Lifetime Access

Complete flexibility to learn at home at your own pace. Lifetime access gives you the ability to go over material to refresh your learning.



Continually Updated

We make numerous changes and additions to the courses throughout the year, which you can access even after completion.



Tutorial & Technical Support

Pose any questions about the course material privately to Caroline and get technical support from our friendly administrator if you get stuck.

Provide them with a bubble of calm this fireworks season

You can be confident when recommending pheromone support with **ADAPTIL®** and **FELIWAY®**



ADAPTIL[®] Calm

WWW.ADAPTIL.COM/UK



FELIWAY[®] Optimum

WWW.FELIWAY.COM/UK

Further information is available from Ceva Animal Health Ltd,
Unit 3, Anglo Office Park, White Lion Road, Amersham, Bucks, HP7 9FB.
Tel: 01494 781510 www.ceva.co.uk



FELIWAY[®] Optimum

NEW PHEROMONE DISCOVERY



Happy Family

Helps solve all common signs of stress for enhanced serenity



FELIWAY[®] Optimum's superior performance shows a huge 70% reduction in stress related behaviours.¹



Scratching



Urine spraying



Tensions & conflicts



Changes



Fears

1. Field Efficacy Study: Ceva Santé Animale Internal Report 19-DPH-941(2020).

feliway.com/uk



Thank You

Thank you for Joining us for The APBC 2021 Virtual Veterinary Conference, we hope you enjoyed the content.

Thank you also to all of our presenters and our sponsors.

If you have any queries about the conference please email us at info@apbc.org.uk





APBC

ASSOCIATION OF PET
BEHAVIOUR COUNSELLORS

Association of Pet Behaviour Counsellors

www.apbc.org.uk E: info@apbc.org.uk