



 PURINA®
PRO PLAN®

BRAIN HEALTH

Effective nutritional solutions from PURINA® PRO PLAN®



NUTRITION PLAYS A KEY ROLE

Thanks to advances in nutrition and veterinary medicine, the life expectancy of cats and dogs has increased considerably in recent years.

While this is clearly a welcome development, it has made many of the associated signs of ageing more common – particularly the gradual and progressive loss of cognitive ability.

As dogs and cats age, changes take place in the brain that can affect memory, learning and other cognitive functions. Because these changes in the brain begin long before a pet's senior years, early intervention can moderate the consequences of ageing.

The behavioural changes observed by owners are initially subtle, but can worsen with time and may eventually interfere with day-to-day quality of life for both pets and owners.

Protecting cognitive function in ageing dogs and cats can improve their quality of life while helping to preserve the human-animal bond.

Nutrition plays a key role in the holistic approach to protecting the brain from age-related cognitive decline.

Dietary modification can moderate several changes associated with an ageing brain, particularly when early intervention is implemented.



BRAIN HEALTH IN DOGS

Essential for an optimal quality of life

For dogs, having a healthy brain is vital for an optimal quality of life.

Supporting brain function is important not only for the quality of life of the dog but also that of their owners and the dog-owner relationship.

The veterinary team is vital for explaining what can be done to help support brain function in dogs and advising on possible management strategies.

NORMAL AGEING CHANGES

Declining cognitive function in ageing dogs

As dogs get older, owners can start to notice physical and mental decline, as they show signs of cognitive decline due to normal brain ageing.

Owners describe them as less alert, disengaged or distant. However, they want to help them retain their alertness and love of life, and keep on enjoying their life together.

Nutrition has been shown to make a difference in supporting the brain of ageing dogs.

ADVANCED AGE-RELATED COGNITIVE DECLINE

Advanced Age-Related Cognitive Decline is common but under-identified.

It affects the brain of ageing dogs and over time it leads to a number of changes in affected dogs including:

- Memory Loss
- Reduced response to smell
- Deficits in learning
- Decreased awareness
- Disorientation
- Altered social interactions

Owners are unlikely to mention symptoms to a veterinarian because they believe these changes are normal and that nothing can be done about them.

On the other hand, veterinarians commonly do not question owners about cognitive function in their dogs.

Without intervention, the symptoms gradually worsen, leading to advanced cognitive decline.^{1,2}

Dogs with Advanced Age-Related Cognitive Decline can benefit from alterations to their environment and the way owners interact with them, for example:

Keep curtains and windows open during the day and increase day-time interactions to try to encourage night-time sleeping.

Increase physical and mental stimulation – consistent play and exercise routines help promote cognitive health.

Provide frequent opportunities for toileting with easy access to outdoors (e.g. ramps if required) to help void accidents.

Avoid marked changes in schedules and routines if possible.

Nutritional support can benefit dogs with Advanced Age-Related Cognitive Decline, Nutritionists are particularly interested in:

- MCT (Medium Chain Triglyceride) oil, which provides an alternative source of energy for the brain.
- Antioxidants to reduce oxidative stress in the brain.

As dogs get older their owners can start to notice their slowing down both physically and mentally

Research shows that nutritional support can benefit dogs with Advanced Age-Related Cognitive Decline. Nutritionists are particularly interested in: MCT, antioxidants and Omega-3

1. Manteca X. (2011) Nutrition and behaviour in senior dogs, Top Companion Anim Med. 26(1): 33-6

2. Pan et al. (2018) Cognitive enhancement in old dogs from dietary supplementation with a nutrient blend containing arginine, antioxidants, B vitamins and fish oil, Br J Nutr. 119(3): 349-358

BRAIN HEALTH IN CATS

Essential to maintain cat's unique behaviour

UNDERSTANDING THE CAT'S BRAIN

Cats, like humans, use their sensory skills of hearing, seeing, tasting, smelling and touching to receive information.

Stimulating the senses that send signals to the brain strengthens the neural pathways for learning.

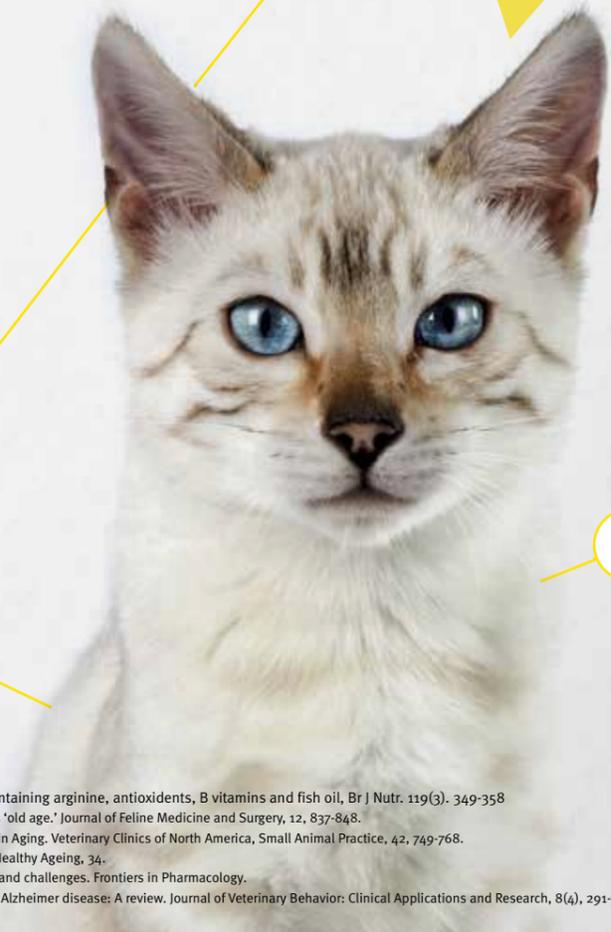
How ageing can affect cats?

As cats age, changes take place in their brain that may affect memory, learning and other cognitive functions.¹⁻³ Physical changes can include loss of neurons, deterioration of myelin, and atrophy of some brain regions.

Cognitive decline has been detected in apparently normal cats as early as 6-7 years using standardised, validated cognitive tests.^{4,5}

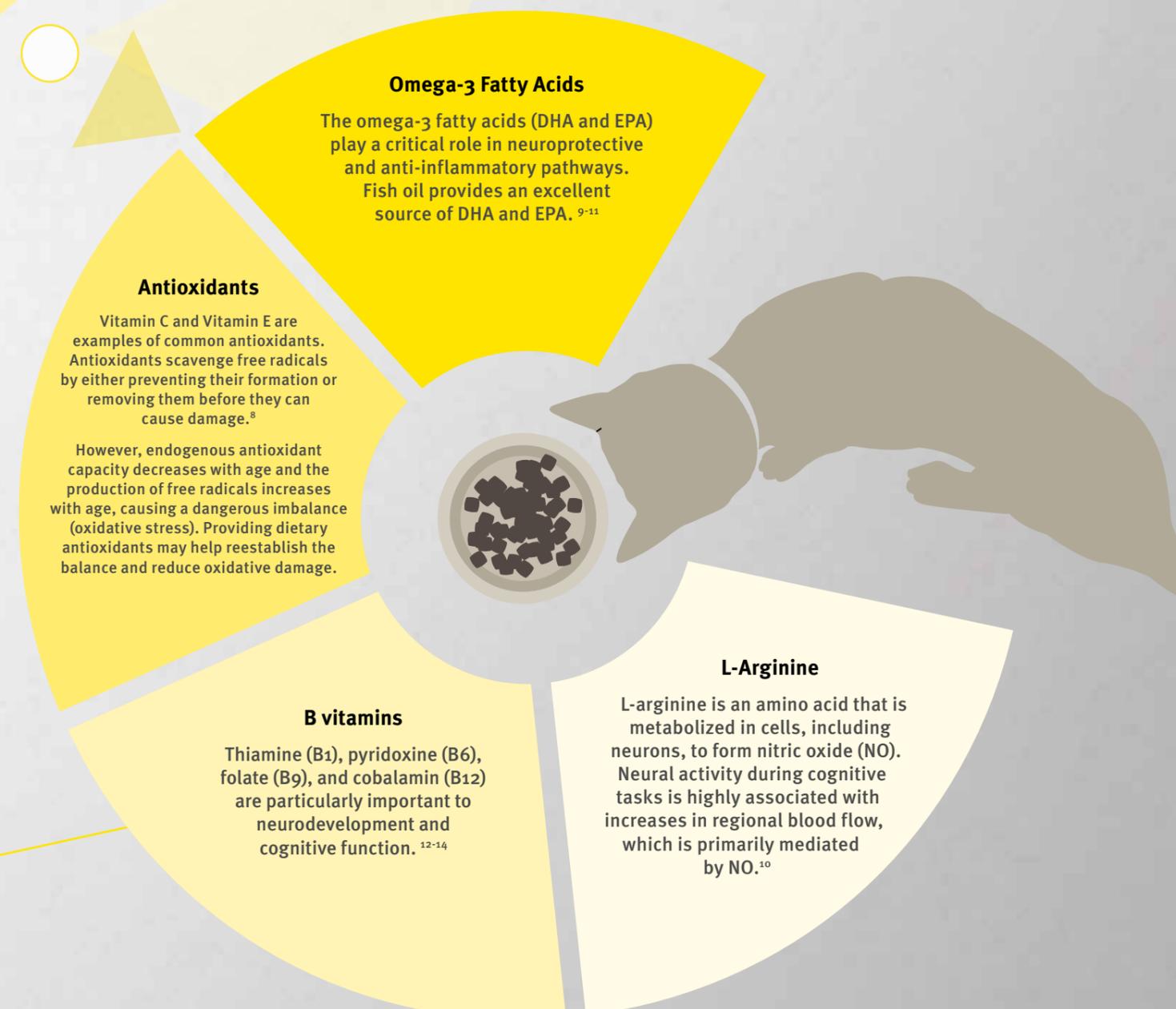
As well as in dogs, the behavioural changes can be difficult to identify by owners, but they can eventually interfere with day-to-day function and quality of life for both the cat and the owner.³⁻⁵

Behaviors that may be observed include increased anxiety and reduced coping ability, increased vocalization, social withdrawal, altered social interactions and decreased social flexibility, reduced ability to navigate environments, changes in sleeping patterns, and reduced ability to predict feeding time.^{3-5,6,7}



HOW NUTRITION CAN HELP?

No single nutrient or bioactive compound is likely to be sufficient for supporting brain health, therefore a combination of nutrients is required based on their ability to minimize or eliminate the risk factors associated with brain health. These nutrients include fish oil (Omega-3 Fatty acids), arginine, B vitamins and selected antioxidants.



1. Manteca X. (2011) Nutrition and behaviour in senior dogs, *Top Companion Anim Med*, 26(1): 33-6
2. Pan et al. (2018) Cognitive enhancement in old dogs from dietary supplementation with a nutrient blend containing arginine, antioxidants, B vitamins and fish oil, *Br J Nutr*, 119(3): 349-358
3. Landsberg, G., Denenberg, S. and Araujo, J. (2010). Cognitive dysfunction in cats: A syndrome we used to dismiss as 'old age.' *Journal of Feline Medicine and Surgery*, 12, 837-848.
4. Landsberg, G.M., Nichol, J., Araujo, J.A. (2012). Cognitive Dysfunction Syndrome: A Disease of Canine and Feline Brain Aging. *Veterinary Clinics of North America, Small Animal Practice*, 42, 749-768.
5. Landsberg, G. (2017). Canine and Feline Cognitive Dysfunction Syndrome. In: *ESVN-ECVN 30th Annual Symposium: Healthy Ageing*, 34.
6. Davis, P. and Head, E. (2014). Prevention approaches in a preclinical canine model of Alzheimer's disease: benefits and challenges. *Frontiers in Pharmacology*.
7. Cory, J. (2013). Identification and management of cognitive decline in companion animals and the comparisons with Alzheimer disease: A review. *Journal of Veterinary Behavior: Clinical Applications and Research*, 8(4), 291-301.

8. Head, E., Rofina, J. and Zicker, S. (2008). Oxidative Stress, Aging, and Central Nervous System Disease in the Canine Model of Human Brain Aging. *Veterinary Clinics of North America: Small Animal Practice*, 38(1), 167-178.
9. Phillips, C. (2017) Lifestyle Modulators of Neuroplasticity: How Physical Activity, Mental Engagement, and Diet Promote Cognitive Health during Aging. *Neural Plasticity*, 2017, Article ID 3589271.
10. Vauzour, D., Camprubi-Robles, M., Miguel-Kergoat, et al. (2017). Nutrition for the ageing brain: Towards evidence for an optimal diet. *Ageing Research Reviews*, 35, 222-240.
11. Bauer, J. (2008). Essential fatty acid metabolism in dogs and cats. *Revista Brasileira de Zootecnia*, 37(spe), 20-27.
12. Selhub, J., Troen, A. and Rosenberg, I.H. (2010). B vitamins and the aging brain. *Nutrition Reviews*, 68(Suppl 2), S112-S118.
13. Bourre, J.M. (2006). Effects of nutrients (in food) on the structure and function of the nervous system: update on dietary requirements for brain. Part 1: micronutrients. *Journal of Nutrition, Health & Aging*, 10(5), 377-385.
14. Duthie, S.J., Whalley, L.J., Collins, et al (2002). Homocysteine, B vitamin status, and cognitive function in the elderly. *American Journal of Clinical Nutrition*, 75, 908-913.

CANINE COGNITIVE ASSESSMENT SCALE (CCAS)

Developed by CAWEC for Purina



In order for Advanced Age Related Cognitive Decline to be identified in a dog, owners must observe their dog exhibiting specific behaviours. The CCAS helps owners identify these behaviours, enabling veterinarians and owners to work together to assess a dog's mental activity.

D DISORIENTATION

- 1 Stares intently where there is nothing visible
- 2 Does not remember its way back home
- 3 Gets stuck behind objects or furniture
- 4 Stays on the wrong side of the door
- 5 Does not respond to certain stimuli to which it used to respond (for example, doorbell)
- 6 Does not give any signal when it wants to go out

S SLEEP-WAKE CYCLES

- 7 Walks during the night (without an obvious reason), when it did not used to do this
- 8 Vocalises (barks, whines) during the night (without an obvious reason), when it did not use to do this

S SOCIAL INTERACTIONS

- 9 Does not recognise familiar people
- 10 Does not recognise familiar animals
- 11 Shows more signs of fear or aggression towards people and/or other dogs than it used to

L LEARNING AND MEMORY

- 12 Urinates and/or defecates in new (inappropriate) places (when it did not use to do it)
- 13 Finds it difficult to respond to previously learned commands

A ACTIVITY LEVEL

- 14 Is less active or playful than it used to be
- 15 Shows repetitive behaviours (chases own tail, snaps at 'invisible' flies, etc.)
- 16 Walks without obvious purpose

A ANXIETY

- 17 Shows more signs of anxiety when separated from its owners than before (main signs of anxiety are shaking, shivering or trembling, excessive salivation, restlessness/agitation/pacing, whining, loss of appetite)

Developed by CAWEC for Purina



CAWEC is an Organization made up of diplomates from the European College of Animal Welfare and Behavioural Medicine. It is part of the Animal Welfare group in the Veterinary School of the Universitat Autònoma de Barcelona (UAB).

FOR ADVANCED AGE-RELATED COGNITIVE DECLINE

NEUROCARE - The advanced nutritional solution from PURINA® PRO PLAN®

CLINICALLY PROVEN EFFICACY

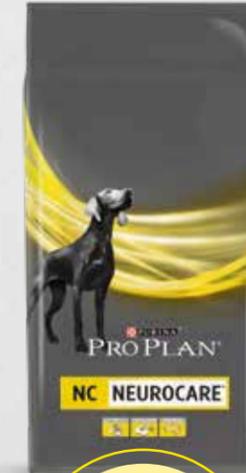
HIGH QUALITY INGREDIENTS

HIGHLY PALATABLE

Key indications

- Brain function
- Age-related cognitive decline

PURINA® PRO PLAN® CANINE NC NEUROCARE



First and only canine nutrition formulated with **6.5% MCTs***

Key Benefits

BRAIN FUNCTION



Formulated with MCT and neuroprotective nutrients clinically proven to help enhance canine brain function

COGNITIVE FUNCTION



Specially formulated to help support cognitive function in senior dogs. Visible results in 30 days

MCT



Ketogenic diet that provides an alternative source of energy for the brain

In addition to MCTs, NeuroCare contains a unique combination of nutrients that help support brain metabolism

ARGININE

Supports healthy circulation, blood pressure and brain function

EPA + DHA

Supports brain structure and function. EPA helps reduce inflammation

ANTIOXIDANTS

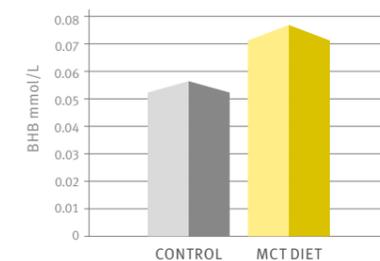
Vit C, Vit E, Selenium helps reduce oxidative stress

B VITAMINS

Used in energy metabolism and DNA maintenance

MCTs

- 1 Act as an alternative energy source for the brain
The brain usually utilises glucose as its primary energy source. In the face of compromised glucose metabolism, neurons may benefit from an alternative energy source. MCT's in the diet are metabolised to MCFA's (medium chain fatty acids) during digestion and converted in the liver to ketone bodies (β -hydroxybutyrate) which can act as an alternative energy source for the brain.
In addition, the MCFA's themselves are more readily oxidised by astrocytes in the brain than long chain triglycerides so they themselves can also be used as an alternative energy source by the brain.
- 2 Levels of ketone body, β -hydroxybutyrate are significantly higher in the blood of dogs fed a diet fortified with MCT's vs. control diet as an alternative energy source for the brain.¹⁵

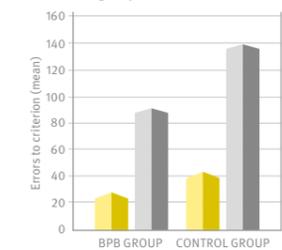


BRAIN PROTECTION BLEND (BPB)

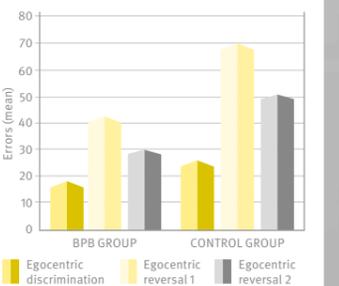
A recent study in dogs, conducted during 6 months, shows that long-term supplementation with a nutrient blend consisting of antioxidants, B vitamins, fish oil and L-arginine can have cognition-improving effects.¹⁶ The study supports the use of nutritional strategies in targeting brain ageing-associated risk factors as an intervention to delay cognitive ageing.

The BPB-supplemented group showed significantly better performance than the controls on the landmark discrimination learning tasks, and on two egocentric discrimination reversal-learning tasks.

Graph showing significantly lower error rate in landmark tests by dogs fed Brain Protection Blend compared to control group



Graph showing significantly fewer errors in egocentric tests by dogs fed Brain Protection Blend compared to control group



*Based on declared amount of MCT in the ingredient list

15. Law TH et al. (2015) A randomized trial of medium chain TAG diet as treatment of dogs with epilepsy, Br J Nutr. 114: 1438-1447

16. Pan et al., 2018. Cognitive enhancement in old dogs from dietary supplementation with a nutrient blend containing arginine, antioxidants, B vitamins and fish oil. Br J Nutr, 1-10.

FOR NORMAL AGEING CHANGES

Specially formulated to support cognitive function in senior dogs

HIGH QUALITY INGREDIENTS

SUCCESSFULLY TESTED FORMULAS

HIGHLY PALATABLE

Key Benefits Small & Mini Adult 9+

- SUPPORTS COGNITIVE FUNCTION**
With an alternative brain energy source fractionated from botanical oils resulting in a more curious and responsive dog
- SUPPORTS BETTER SOCIAL INTERACTION**
Helps maintain interaction with his family thanks to improved brain function
- TOTAL ORAL CARE**
The small crunchy kibble has a natural brushing effect on teeth and the extra special minerals added reduce tartar build up

Key Benefits Medium & Large Adult 7+

- SUPPORTS COGNITIVE FUNCTION**
With an alternative brain energy source fractionated from botanical oils resulting in a more curious and responsive dog
- SUPPORTS BETTER SOCIAL INTERACTION**
Helps maintain interaction with his family thanks to improved brain function
- MAINTAINS HEALTHY MOBILITY**
It contains EPA, an omega-3 fatty acid, and glucosamine to help support joint health and mobility

PURINA® PRO PLAN®
SMALL & MINI
ADULT 9+ WITH
OPTIAGE

PURINA® PRO PLAN®
MEDIUM & LARGE
ADULT 7+ WITH
OPTIAGE



Clinically proven
to enhance brain
function in
ageing dogs

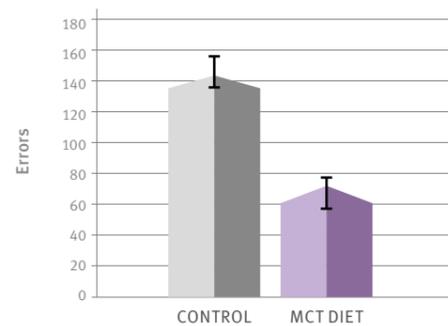
Visible results in 30 days

OPTIAGE™ is proven to improve cognitive function and mental alertness in senior dogs and has been included in PURINA® PRO PLAN® Small and Mini Adult 9+ and Medium and Large Adult 7+ products

A study from Nestlé PURINA has proven that the OPTIAGE™ blend:

- Improves memory and interactivity in older dogs
- Helps increase the ability of a senior dog to adapt and cope with changes
- Increases a senior dog's attention span and alertness

Dogs fed MCTs had improved cognitive function as measured during memory and learning task¹⁷



PURINA® PRO PLAN® products with the OPTIAGE™ blend are not just for dogs with clinical signs of an ageing brain

They are designed to support the overall health of ALL ageing dogs (medium dogs from age 7+ and small/mini dogs from age 9+)

TO SUPPORT CATS' BRAIN FUNCTION

Proven to nourish a cat's brain for vital senses support

SUCCESSFULLY TESTED FORMULAS

VITAL SENSES SUPPORT

HIGHLY PALATABLE

PURINA® PROPLAN® contains OPTIsenses™, a special nutrient blend of Omega-3 fatty acids, arginine, B-vitamins and antioxidants. Scientifically proven to nourish a cat's brain to support its vital senses. Specially formulated for adult cats.

PURINA® PRO PLAN®
STERILISED ADULT
WITH
OPTISENSES

PURINA® PRO PLAN®
ORIGINAL ADULT
WITH
OPTISENSES



Key Benefits Sterilized Adult

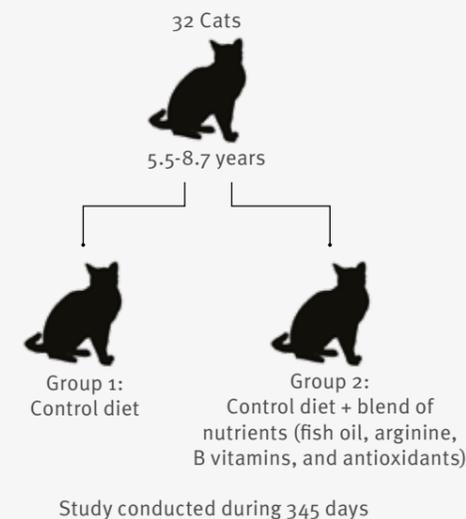
- Formulation specially developed to promote healthy kidneys
- Maintains urinary health in neutered cats
- Helps maintain a healthy body weight

Key Benefits Original Adult

- Formulation specially developed to promote healthy kidneys
- Supports a healthy immune system
- Helps protect teeth from plaque and tartar build-up



The science behind the nutritional support in ageing cats



Study¹⁸

• In a new study, 32 cats between 5.5 and 8.7 years were divided into two groups, one with a control diet and the other with the same control diet enriched with a blend of nutrients (fish oil, arginine, B vitamins, and antioxidants).

The context

• The study was conducted over 345 days, during this time, different types of cognitive tests were performed, testing the following abilities: visio-spatial learning, memory, problem solving, and reasoning.

The results

• Cats supplemented with the specific blend of nutrients (SBN) showed a better performance in most of the cognitive tests compared to the cats fed the control diet.

The conclusion

• By nourishing the brain with SBN the cats were able to perform many tasks, which required the cats to use their senses, significantly better than cats fed a control diet. Collectively, these results indicate that the SBN diet has global cognitive benefits in cats.

17. Pan Y, Larson BT, et al. (2010): Dietary supplementation with medium-chain TAG has long-lasting cognition-enhancing effects in aged dog. Brit J Nutr. 103: 1746-1754.

*Patent pending (for Europe)

18. Pan Y, Araujo JA, Burrows J, et al. (2013) Cognitive enhancement in middle-aged and old cats with dietary supplementation with a nutrient blend containing fish oil, B vitamins, antioxidants and arginine. Br J Nutr. 110(1):40-9.

BRAIN HEALTH

Product selector



**DOGS IDENTIFIED WITH
ADVANCED AGE-RELATED
COGNITIVE DECLINE**

ADULT DOGS

ADULT CATS

NC NEUROCARE

Normal ageing dogs
Small & Mini 9+

Normal ageing dogs
Medium & Large 7+

WITH
OPTIAGE

WITH
OPTISENSES

PURINA® PRO PLAN®
CANINE NC NEUROCARE



DOGS < 10KG OVER 9 YEARS
PURINA® PRO PLAN®
SMALL & MINI ADULT 9+



DOGS > 10KG OVER 7 YEARS
PURINA® PRO PLAN®
MEDIUM & LARGE ADULT 7+



PURINA® PRO PLAN®
STERILISED ADULT



PURINA® PRO PLAN®
ORIGINAL ADULT



Committed to provide a simple and effective nutritional solutions for brain health.
To find out more information, please contact your PURINA representative.