



# DIETARY SUPPLEMENTATION WITH A NUTRIENT BLEND CONTAINING ARGININE, ANTIOXIDANTS, B VITAMINS AND FISH OIL DEMONSTRATED COGNITIVE ENHANCEMENT IN OLD DOGS

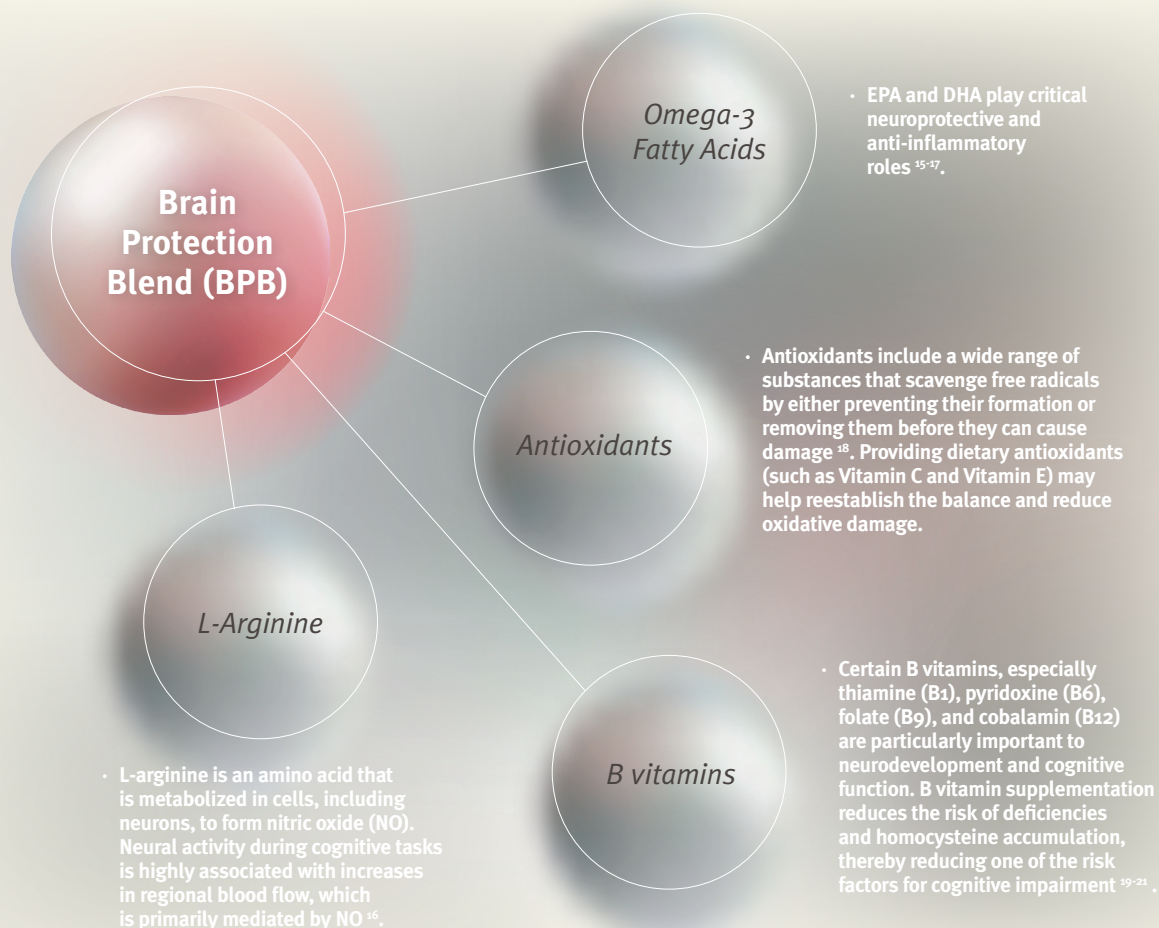
## Introduction

A recent clinical study investigated the effect of feeding a diet supplemented with a blend of nutrients in cognitive function on dogs<sup>1</sup>. The study, conducted over 6 months, showed that long-term supplementation with a nutrient blend consisting of antioxidants, B vitamins, fish oil and L-arginine can have cognition-improving effects. The study supports the use of nutritional strategies in targeting brain ageing-associated risk factors as an intervention to delay cognitive ageing<sup>1</sup>.

Cognitive function in dogs declines with ageing<sup>2</sup>, and an accelerated brain ageing in dogs can result in cognitive dysfunction syndrome (CDS)<sup>3,4</sup>, a condition similar to human dementia including Alzheimer's disease (AD), which has no known cure<sup>1</sup>. The prevalence of CDS has been reported to be around 28–29.5% of 11–14-year-old dogs and 47.6–68% of dogs over 15 years of age<sup>5,6</sup>.

The risk factors of CDS in dogs have not been fully studied<sup>7</sup>, but some nutritional factors could be associated, including DHA deficiency, high blood homocysteine, and low status of vitamin B6, vitamin B12 and folate<sup>1</sup>.

The blend of nutrients used in this new study includes fish oil, arginine, B vitamins and selected antioxidants. Fish oil, such as menhaden fish oil, ocean white fish oil and hake fish oil, contains DHA and EPA and was included to correct DHA deficiencies and to provide anti-inflammatory benefits<sup>8,9</sup>. L-Arginine was selected to enhance nitric oxide (NO) synthesis, which has been linked to circulation, blood pressure control and cognition<sup>10,11</sup>. B vitamins prevent and correct any B vitamin deficiency and minimise the risk of elevated blood homocysteine<sup>12-14</sup>.



Previous research showed that a blend of nutrients composed of fish oil, B vitamins, antioxidants and arginine confers cognitive benefits to aged cats<sup>22</sup>. The new study was performed to determine if the same combination of nutrients confers similar benefits to aged dogs.



## Study objective

This study focused on the hypothesis that cognitive decline in aged dogs could be attenuated by dietary supplementation with a nutrient blend consisting of antioxidants, B vitamins, fish oil and L-arginine, referred to hereafter as the Brain Protection Blend (BPB).

## Study design

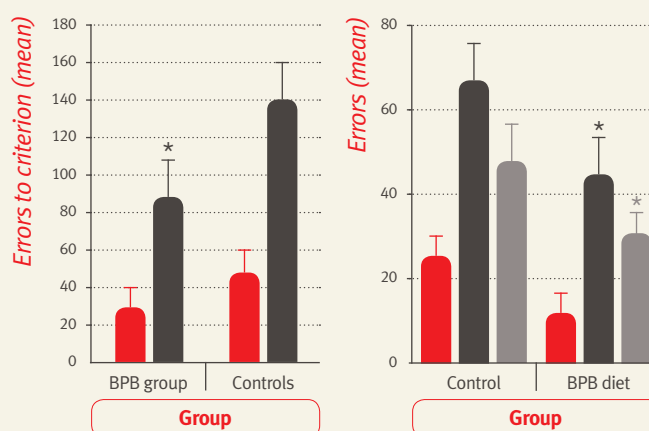
Aged dogs (9.1 to 11.5 years of age) were fed either a control diet (complete and balanced, but not supplemented) or the test diet with the blend of fish oil, B vitamins, antioxidants (including vitamin C, vitamin E and selenium) and arginine. Cognitive testing was performed prior to the study to establish a baseline, and throughout the 6-month trial: landmark discrimination (locating objects in space based on external cues) and egocentric discrimination (spatial learning relevant to own body position) with reversal (to assess executive function, which includes goal-oriented behavior, decision making, problem solving, planning, organizing and sequencing tasks) were performed and compared to baseline and between groups. Metabolomic analysis was performed and compared between groups.

**Clinical relevance:** Long-term supplementation with a nutrient blend of fish oil, B vitamins, antioxidants and arginine provides cognitive benefits, particularly with more complex cognitive tasks - such as those that assess executive function, which includes goal-oriented behavior, decision making, problem solving, planning, organizing and sequencing tasks.

*In summary, the results from this study strengthen the support for the hypothesis that the healthy brain ageing and cognitive functions may be successfully promoted by retarding ageing-induced changes in the brain and reducing or eliminating risk factors associated with brain ageing.*

## Results

Although there was no significant difference between the control and supplemented (test diet) dogs on the basic landmark and egocentric tasks, the supplemented dogs performed significantly better than controls on the more complex landmark and egocentric reversal tasks. Metabolomic analysis revealed that supplemented dogs had higher plasma levels of arginine, alphatocopherol (vitamin E), and the omega-3 fatty acids docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), indicating that the supplemented nutrients were absorbed and metabolized as expected.



**Fig. 1.** Effects on brain protection blend (BPB) diet on dog's performance in the landmark tests. Values are means ( $n$  12 for each group), with their standard errors represented by vertical bars. The performance was expressed as errors to criterion. ■, Land-0; ■, land-1. \*Mean values were significantly different between the control and the BPB groups ( $P = 0.0446$ ).

**Fig. 2.** Effects of brain protection blend (BPB) diet on dog's performance in egocentric tests. Values are means ( $n$  12 for each group), with their standard errors represented by vertical bars. The performance was expressed as errors to criterion. ■, Egocentric discrimination; ■, egocentric reversal 1; ■, egocentric reversal 2. \*Mean values were significantly different between the control and the BPB groups ( $P = 0.005$  for the reversal 1;  $P = 0.01$  for the reversal 2).

The present results provide further support for the use of nutritional intervention strategies, which focus on a consumption of a blend of nutrients to modulate decline in brain function associated with ageing.

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