



## Case Report

## Positive impact of omega-3 fatty acid supplementation in a dog with drug-resistant epilepsy: A case study

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## ABSTRACT

Epilepsy is the most common neurological disorder in both dogs and humans. Although the pharmacological options for treatment of epilepsies have increased, it has been reported that two-thirds of dogs with epilepsy are refractory to antiepileptic drug therapy. To our knowledge, there are no experimental studies in the literature that show an effect of omega-3 supplementation on epilepsy in dogs. Our case study describes the effectiveness of daily intake of a moderate amount of fish oil in a case of canine epilepsy.

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## Introduction

Epilepsy is one of the most common neurological problems worldwide [1]. Approximately 3% of the general population will have epilepsy at some point in their life [1]. Epidemiological studies suggest that 70 to 80% of these cases will go into remission with proper treatment, with the remainder being refractory to currently available therapies [2].

Epilepsy is also the most common chronic neurological disorders in dogs, with a prevalence of 0.5 to 5.7% [3]. In most dogs, recurrent seizures have no identifiable underlying cause, and these cases are classified as idiopathic [3]. It is important to note that two-thirds of canine epilepsy patients are refractory to therapy, despite the availability of new antiepileptic drugs [3–5]. In human patients with epilepsy, several factors contribute to the variable therapeutic effect of treatments, including genetics, environment, and social and nutritional factors [6]. With respect to nutritional factors, omega-3 fatty acid deficiency has an interesting role in sei-

zure outcome [7,8]. Omega-3 fatty acids can enhance GABAergic transmission in animals with epilepsy by stimulating the formation of new hippocampal interneurons or by altering expression of calcium-binding proteins [9]. There is currently no evidence that omega-3 fatty acids, either alone or as add-on therapy, are therapeutic in canine epilepsy. This case report describes a substantial reduction in the frequency of bouts of idiopathic epilepsy affecting a female Great Dane when omega-3 fatty acids were added to marginally effective phenobarbital background therapy.

## Case history

A 2-year-old female Great Dane with a history of recurrent seizures was brought to a veterinary neurologist. Tonic-clonic seizures occurred at a frequency of three times per month and were characterized by facial automatisms, forelimb clonus, rearing and falling, and loss of consciousness. After a detailed physical and neurological examination, evaluation of hematology and serum biochemistry, and magnetic resonance imaging of the brain, the veterinarian diagnosed the condition as idiopathic epilepsy and began treatment aimed at seizure control. A trial therapy with phenobarbital (2.5 mg/kg, twice a day orally) failed to adequately control the seizures: after 8 weeks of treatment there remained two seizure episodes per month. Typically, potassium bromide is used to

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supplement phenobarbital in refractory cases. However, in this case, it was decided to supplement the dog's diet with moderate amounts of fish oil (oral omega-3 polyunsaturated fatty acids, 2 g/day). The frequency of the epileptic seizures markedly fell after 50 days of combination therapy with phenobarbital and omega-3 fatty acid. During the subsequent 18-month period, seizure frequency fell to one per 3 months, a reduction of about 85%.

## Discussion

We describe here the effectiveness of daily administration of moderate amounts of omega-3 fatty acids in a case of canine epilepsy. To our knowledge, there are no experimental studies in the literature describing a benefit of omega-3 fatty acid supplementation in the treatment of canine epilepsy.

Polyunsaturated fatty acids, including the *n*-3 fatty acids (omega-3) eicosapentanoic acid and docosahexanoic acid and the *n*-6 fatty acids (omega-6) dihomo- $\gamma$ -linolenic acid and arachidonic acid [11,12], are present at high levels in the brain [10]. In humans, intake of long-chain omega-3 fatty acids, commonly found in fish and fish oil, not only contributes to central nervous system development, but also may reduce the risk for certain adult nervous system diseases, including epilepsy [13]. The first randomized placebo-controlled study on omega-3 supplementation in patients with chronic epilepsy showed a reduction in seizure frequency that was, however, transient [8,10,14], but additional trials are required, as this finding was not confirmed by other researchers. These studies showed the safety of omega-3 supplementation in patients with epilepsy [10,14]. From an experimental point of view, we demonstrated previously that chronic treatment with omega-3 promotes neuroprotection and increases the number of parvalbumin-positive neurons in the hippocampus of rats with epilepsy, suggesting that omega-3 promotes plastic changes in the brain [9]. The case study reported here is compatible with this idea, and suggests that omega-3 intake may be an option for the treatment of epilepsy in dogs.

Finally, a number of dietary modifications and nutritional supplements may help prevent seizures or improve other aspects of health in patients with epilepsy [15]. It seems that the development of new therapeutic strategies like the addition of omega-3 fatty acids to more conventional treatments should be explored in the treatment of dogs with epilepsy. However, it is important

to note that nutritional therapy (including omega-3 supplementation) is not a substitute for conventional anticonvulsant medications. Experimental, epidemiological, and clinical studies should evaluate with precision the benefit of supplementation with omega-3 fatty acids on the treatment of canine epilepsy.

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