Omega-3 fatty acids in health and disease

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FIGURE 1: CT scan of a dog with a large aortic thrombus due to protein losing nephropathy, a condition where fish oil supplements may be of benefit.

What are omega-3 fatty acids?

Omega-3 fatty acids are one of four different types of fatty acids found in the body. Fatty acids are compounds that serve vital functions including: being a fuel source, as part of cell membranes, for transport of fat-soluble vitamins and in inflammation.

Why are they called omega-3 fatty acids?

Fatty acids can be saturated (i.e. contain no double bonds), monounsaturated (i.e. contain one double bond) or polyunsaturated (i.e. contain multiple double bonds). Omega-3 fatty acids are polyunsaturated and are named due to the location of the first double bond (i.e. on the third carbon from the methyl end). Examples of omega-3 fatty acids include alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

What are the other types of fatty acids?

There are also omega-6, omega-7 and omega-9 fatty acids in the body; which are classified by the same system (i.e. location of the first double bond).

What are essential fatty acids?

Essential fatty acids are those that are needed in the diet because they cannot be synthetized in the body. Linoleic acid (an omega-6 fatty acid) is essential for both dogs and cats, but cats also need another omega-6 fatty acid called arachidonic acid. ALA or EPA and DHA are also thought to be essential in certain life stages. Omega-7 and omega-9 fatty acids are not considered essential, as these can be synthetized in the body.

What are the signs of fatty acid deficiency?

Signs of omega-6 fatty acid deficiency include skin disease (e.g. alopecia, scaly skin), reproductive disorders (e.g. foetal death) and poor growth. Signs of omega-3 fatty acid deficiency include neurological disorders. DHA in particular is needed for brain, auditory and retinal development in the young.

What are fish oil supplements?

EPA and DHA are sometimes called fish oil supplements because marine animals and plants (i.e. algae) contained a high amount of these two omega-3 fatty acids. ALA on the other hand is derived from plant sources e.g. linseed oil. The body can produce some EPA and DHA from ALA; however, this conversion is poor so a dietary source of fish oils is recommended for supplementation.

Do fish oil supplements help manage disease?

EPA and DHA are used in human medicine for a large number of disorders. Studies in dogs have shown that EPA and DHA can help with dogs with cardiac diseases (i.e. reduce arrhythmias in Boxer dogs with cardiomyopathy[1] and help with cardiac cachexia[2]), kidney disease (reduce proteinuria[3]), orthopaedic disease (improve signs of osteoarthritis[4]) and in metabolic disease (reduce hypertriglyceridaemia[5]).

How do they work?

Classically, fish oil supplements are thought to modulate inflammation by producing less inflammatory mediators; however, recent research has highlighted other mechanisms including effects on gene transcription and immune function.

What is the recommended dose?

The recommended dose for DHA is 25–30 mg/kg/day and a dose of 40 mg/kg/day is recommended for EPA. For a diet supplemented with EPA and DHA, a combined amount of 80–150 mg of DHA and EPA per 100 kcal is recommended.

What formulation is best?

There are a few veterinary omega-3 fatty acid supplements on the market. It is thus very important to ensure the product contains EPA and DHA as the main omega-3 fatty acids (rather than ALA) due to the poor conversion of ALA to EPA and DHA in dogs and cats. Formulations may come in liquid and capsule forms.

Will human products work?

Human fish oil supplements (available from health food shops) can also be used to treat dogs. These capsules however tend to very large and several capsules may need to be given to achieve the recommended dose rate.

Are there any side effects?

The most commonly reported side effects to fish oil supplements are gastrointestinal e.g. vomiting and diarrhoea. Other suspected but unproven adverse effects are related to inhibition of coagulation, negative effects on wound healing, heavy metal toxicity and hypervitaminosis.

What does the future hold?

Use of potent omega-3 fatty acid formulations have been reported in human medicine and these products may also play a role in canine and feline medicine in the future.

References and further reading are available at www.bsavalibrary.com and in *e-Companion*.

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