

1998: Freeman L M; Rush J E; Kehayias J J; Ross J N; Meydani S N; Brown D J; Dolnikowski G G; Marmor B N; White M E; Dinarello C A; Roubenoff R

**Nutritional alterations and the effect of fish oil supplementation in dogs with heart failure.**

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Alterations in body composition and nutritional status are common in humans with heart failure and are related, in part, to increases in cytokine concentrations. Cytokines have not been studied previously in dogs with naturally occurring cardiac disease nor has fish oil administration been used in this population to decrease cytokine production. The purposes of this study were to characterize nutritional and cytokine alterations in dogs with heart failure and to test the ability of fish oil to reduce cytokines and improve clinical outcome. Body composition, insulinlike growth factor-1, fatty acids, and cytokines were measured in 28 dogs with heart failure and in 5 healthy controls. Dogs with heart failure then were randomized to receive either fish oil or placebo for 8 weeks. All parameters were measured again at the end of the study period. At baseline, 54% of dogs with heart failure were cachectic and the severity of cachexia correlated with circulating tumor necrosis factor-alpha concentrations ( $P = .05$ ). Cytokine concentrations at baseline, however, were not significantly increased in dogs with heart failure compared to controls. Baseline plasma arachidonic acid ( $P = .02$ ), eicosapentaenoic acid ( $P = .03$ ), and docosahexaenoic acid ( $P = .004$ ) concentrations were lower in dogs with heart failure than in controls. Fish oil supplementation decreased interleukin-1 beta (IL-1) concentrations ( $P = .02$ ) and improved cachexia ( $P = .01$ ) compared to the placebo group. The mean caloric intake of the heart failure dogs as a group was below the maintenance energy requirement ( $P < .001$ ), but no difference was found in food intake between the fish oil and placebo groups. Insulinlike growth factor-1 concentrations ( $P = .01$ ) and reductions in circulating IL-1 concentrations over the study period ( $P = .02$ ) correlated with survival. These data demonstrate that canine heart failure is associated with cachexia, alterations in fatty acids, and reduced caloric intake. Fish oil supplementation decreased IL-1 concentrations and improved cachexia. In addition, reductions in IL-1 predicted survival, suggesting that anticytokine strategies may benefit patients with heart failure.