

Basic study on serum fatty acid compositions in
dogs with mitral insufficiency

Abstract of Doctor Thesis

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The present study measured fatty acid composition in serum of the dogs that is thought to be associated with the pathologic condition of mitral insufficiency (MI), for the disease state analysis of dog with MI.

We examined practicability of fatty acid measurements by gas chromatography (GC) method using the kits for the methylated fatty acid and purification of methylated fatty acid. This method demonstrated a high correlation with all kinds of fatty acids between the conventional method (correlation coefficient: 0.875 to 1.000). Range of coefficient of variance (CV) in the reproducibility of the within-run and the between-run was below to 7.4%. Further, no significant differences were observed between examiners. Therefore, the practicality of this method was shown.

We examined the circadian variation in serum fatty acids to determine the optimal Blood sampling time point for measuring in healthy dogs. The healthy dogs were fed twice daily at 7:00 and 19:00. The blood samples collected immediately before food provision at 7:00 am (Pre) and every 3rd hour for 24 hours. There were no significant changes at 9 hours or more after. The results indicate that the optimal timing of blood sampling is when the animals are hungriest, i.e., before breakfast, and that it is desirable to interpose a 9 hour or more interval when sampling is performed after morning meal.

The healthy dogs were divided into groups of puppy, young adults and mature adults. Further, these groups were subdivided into an uncastrated male group, a castrated male group, an unsterilized female group, and a sterilized female group.

No significant differences by age or sex were observed in the

concentration, weight ratio and the ratio of serum fatty acids. Therefore, the criterion range of the fatty acid concentration was considered to be fixed regardless of age or sex.

We divided 30 dogs with MI into groups I, II, and III, based on MI severity, based heart function. AA concentration in groups I and II were significantly lower than that in the healthy group ($P < 0.01$, $P < 0.05$, respectively). Serum level and weight ratio of EPA in groups II and III were significantly lower than that in the healthy group ($P < 0.05$, $P < 0.01$, respectively). In addition, the EPA/AA ratio in groups II and III were significantly lower than that in healthy group ($P < 0.05$, $P < 0.01$, respectively). Furthermore, significant negative correlations of serum n-3 polyunsaturated fatty acids and echocardiographic parameters were noted in the MI group. The significant positive correlation was noted between n-6 polyunsaturated fatty acids and echocardiographic parameters. Furthermore, a significant negative correlation was noted between EPA/AA and LA/Ao ($R = -0.383$, $P = 0.048$). Cut-off values of EPA concentration and EPA/AA were $47.5 \mu\text{g/mL}$, and 0.029 , respectively). Since the associations between the composition of serum fatty acids and echocardiographic parameters were observed, the composition of serum fatty acids is likely reflected in changes in myocardial energy metabolism, in addition to cardiac dysfunction associated with functional changes by echocardiography. The values of EPA level and EPA/AA were likely to be the indicative of the timing of treatment of EPA.