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学位論文内容の要旨
Abstract of the dissertation

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学位論文題名
The title of the doctoral dissertation

Application of contrast-enhanced ultrasonography to diagnose and evaluate chronic intestinal diseases in dogs

(犬の慢性腸疾患の診断と評価における造影超音波の応用)

Chronic intestinal signs (i.e. diarrhea, vomiting, weight loss) in dogs can be very challenging to diagnose and manage as these signs can be caused by various entities including inflammatory diseases and neoplasia. Chronic enteropathy (CE) is the most frequent inflammatory disease of intestine in dogs which often difficult to discriminate from intestinal lymphoma. In addition, there is still lack of appropriate biomarkers to evaluate disease severity and therapeutic response in dogs with CE. Contrast-enhanced ultrasonography (CEUS) utilizing microbubble contrast agent allows qualitative and quantitative evaluation of intestinal perfusion. This study was conducted within 3 chapters to establish the applicability of CEUS to assess canine duodenal perfusion with an expectation that this modality will be useful for the diagnosis and evaluation of CE in dogs.

First chapter aimed to clarify the repeatability (intraday variability) and reproducibility (interday variability) of quantitative CEUS in assessing duodenal perfusion of healthy sedated dogs. The results showed that repeatability and reproducibility of CEUS-derived perfusion parameters which include time to peak (TTP), peak intensity (PI), area under the curve (AUC), wash-in and wash-out rates (WiR and WoR, respectively) were clinically acceptable. The coefficients of variation (CVs) for all the corresponding parameters being less than 25%.

Second chapter aimed to investigate the effect of sedation with a combination of butorphanol and midazolam on TTP, PI, AUC, WiR, and WoR derived from CEUS of duodenum in healthy dogs. The results confirmed all the corresponding parameters were not significantly different before and after sedation. This finding indicates that the combination could be a good option for sedation prior to CEUS of duodenum in uncooperative dogs.

Third chapter aimed to (1) confirm the presence of duodenal perfusion changes related to CE and intestinal lymphoma by CEUS, (2) investigate the difference in duodenal perfusion between both entities, an (3) detect correlation between CEUS-derived perfusion parameters with currently available biomarkers (laboratory markers, clinical and histopathological scores). Findings suggested PI and AUC, which represent

the regional blood volume of duodenal mucosa, were significantly higher in dogs with symptomatic CE compared to control. A significant correlation between PI and clinical score was also detected. This finding suggests that PI and AUC could distinguish actively chronic inflammation from normal duodenum and might be valuable for the diagnosis and evaluation of CE in dogs. Unfortunately, no CEUS-derived parameters were significantly different between CE and intestinal lymphoma groups that decline the use of this modality to differentiate both entities.

In conclusion, this study established the quantitative CEUS method in the assessment of canine duodenal perfusion. This modality is repeatable and reproducible in healthy dogs and can be used in dogs under sedation using butorphanol-midazolam. The perfusion parameters derived from CEUS of duodenum especially PI and AUC could discriminate chronic inflamed duodenum in associated with CE from normal duodenum.