Effect of glucagon like peptide-1 receptor agonists on gastrointestinal transit in healthy dogs

Abstract

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Glucagon like peptide-1 (GLP-1) receptor agonists have various pharmacological activities, thereby which ameliorate glycemic control in patients with diabetes. Especially, delay of gastrointestinal transit rate is important for decreasing postprandial hyperglycemia. However, few studies have reported the effect of GLP-1 receptor agonists on gastrointestinal transit time (gastric emptying time and small intestine transit time) in healthy dogs. In this study, we firstly examined whether the APAP method (evaluation of gastric emptying) and the SASP method (evaluation of small bowel movement) can use for evaluating gastrointestinal motility as in dogs. Furthermore, final objective of this study was to evaluate the influence of GLP-1 receptor agonists on canine gastric emptying time and small intestine transit time using the APAP and SASP method.

We evaluated the validity of commercial APAP detection kit, measuring canine serum levels after the administration of APAP. Serum APAP concentrations below 5 μg/ml were not able to evaluate accurately. Next, we evaluated the accuracy and reproducibility of serum APAP and SP concentration using HPLC in dogs. It would be better to measure the serum APAP concentration within 7 days. For investigating canine gastrointestinal motility, the APAP and SASP method and the Barium impregnated polyethylene spheres (BIPS) were compared. BIPS could not use for evaluating gastrointestinal motility in dogs. Next, the APAP and SASP method and the liquid contrast medium on canine gastrointestinal motility were compared. Additionally, blood metabolites were also compared. We considered that the APAP and SASP method is a reliable to evaluate the rate of gastric emptying and small intestine transit time without photographing X-ray. Finally, we investigated the effect of GLP-1 receptor agonists (Exenatide and liraglutide) on the gastrointestinal transit time and blood metabolic marker using the APAP and SASP method in healthy dogs. As a result, GLP-1 receptor agonists delayed gastrointestinal transit

time. Furthermore, delayed gastrointestinal transit time induced lowering postprandial blood metabolic marker.

In conclusion, we established a simultaneous assay method using high performance liquid chromatography method of serum APAP and SP concentration in dogs. Additionally, we confirmed that the APAP and SASP method is a reliable to evaluate the gastrointestinal transit time. Furthermore, we found that the GLP-1 receptor agonists delayed gastrointestinal transit time in healthy dogs. These results indicate that the APAP and SASP method can use for monitoring the gastrointestinal motility in dogs and GLP-1 receptor agonists may be useful for glycemic control in diabetes dogs in the future.