

Studies on the clinical significance of  
serum fibroblast growth factor-23 concentration  
in dogs and cats with chronic kidney disease

Abstract of Doctoral Thesis

Hirosumi Miyakawa

Graduate School of Veterinary Medicine and Life Science

Nippon Veterinary and Life Science University



Fibroblast growth factor (FGF)-23 is a phosphaturic hormone used as an early marker of mineral metabolic disorders in chronic kidney disease (CKD) in humans. In veterinary medicine, some studies on FGF-23 have been recently reported. However, studies evaluating the clinical importance of FGF-23 in dogs and cats are limited. The present study investigated serum FGF-23 concentrations in dogs with CKD and assessed the clinical significance of increased serum FGF-23. Furthermore, this study evaluated serum FGF-23 concentrations in young and adult cats and the association between FGF-23 and hypercalcemia in cats with CKD and upper urolithiasis.

Firstly, the association between serum FGF-23 concentrations and CKD stage in dogs was investigated and compared with other phosphate metabolic markers. The results showed that serum FGF-23 concentrations in dogs with CKD increased in an earlier CKD stage compared with the serum intact parathyroid hormone and phosphorus concentration. Therefore, FGF-23 is a potential earlier marker of mineral metabolic disorders in canine CKD.

Secondly, the clinical significance of increased serum FGF-23 concentration in dogs with CKD without hyperphosphatemia was investigated. Increased serum FGF-23 concentrations were found to be significantly associated with the subsequent development of hyperphosphatemia and CKD progression. The results indicate that reducing serum FGF-23 concentrations can prevent hyperphosphatemia and CKD progression.

Thirdly, this study evaluated serum FGF-23 concentrations in young and adult cats with CKD and found that serum FGF-23 concentration increased with elevated CKD stages. Furthermore, increased serum FGF-23 concentrations were observed in an

earlier stage than serum phosphorus concentrations. Therefore, FGF-23 is also a potential early marker of mineral metabolic disorders in CKD in young and adult cats.

Finally, this study investigated whether blood calcium concentrations were related to serum FGF-23 concentrations in cats with CKD and upper urolithiasis. Increased serum FGF-23 concentrations were significantly associated with hypercalcemia independently of serum creatinine and phosphorus concentrations. Therefore, hypercalcemia is a potential cause of increased serum FGF-23 in cats.

This study demonstrated that increased serum FGF-23 concentrations in dogs with CKD occurred earlier than secondary hyperthyroidism and hyperphosphatemia and presented a risk for the subsequent development of hyperphosphatemia and CKD progression. In young and adult cats, FGF-23 was identified as an early marker of mineral metabolic disorders in CKD. Additionally, hypercalcemia was associated with increased serum FGF-23 concentrations in cats with CKD and upper urolithiasis.