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**Serum biochemical and urinary parameters of renal impairment in dogs with primary chronic enteropathy**

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1 **Evaluation of serum biochemical and urinary parameters suggesting renal involvement in a**  
2 **population of dogs with primary chronic enteropathy**

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8 Approximately a half of IBD human patients show extra-intestinal manifestations, in which 4-23%  
9 may develop renal and urinary involvement. These findings may be linked to several conditions,  
10 such as the immune-system response of the primary chronic enteropathy (CE), reduction in short-  
11 chain fatty acids, or endotoxemia. No specific studies have been conducted in dogs, except for those  
12 describing familiar protein-losing nephropathy and enteropathy in soft-coated wheaten terriers.

13 The aim of this study was to describe alterations of selected serum biochemical and urinary  
14 parameters suggesting renal injury in dogs with CE.

15 Retrospective multicentric (University of Pisa and Turin) study including dogs with CE. CE  
16 diagnosis was made after the exclusion of intestinal diseases of other etiologies and extra-intestinal  
17 diseases. Dogs with history of previous kidney or low urinary tract diseases (previous  
18 clinicopathological finding and/or imaging alterations) and with severe proteinuria (urine protein-  
19 to-creatinine ratio (UPC)>2) were excluded. Canine Chronic Enteropathy Activity Index Score  
20 (CCECAI), muscular condition score (MCS; 3-point scale), serum albumin, urea, creatinine,  
21 presence of glycosuria, proteinuria (UPC>0.5) and urinary casts were recorded for each dog. Dogs  
22 with albumin <2.7 mg/dL were classified as protein-losing enteropathy (PLE). Dogs with showed  
23 glycosuria, proteinuria and/or urinary casts were classified as having “kidney injury”. Mann-  
24 Whitney u-test was used to compare CCECAI of dogs with and without kidney injury. Chi-square  
25 test was used to evaluate the association of PLE and presence of kidney injury, and proteinuria  
26 (UPC>0.5).

27 One-hundred-six dogs with CE were included. Fifty-two dogs (49%) had mild-to-severe reduction  
28 in MCS. Only 6/106 dogs (6%) had azotemia (median creatinine 1.6 mg/dL; range 1.5-2.4 mg/dL),  
29 whereas 40/106 dogs (38%) showed kidney injury. In particular, 2 dogs had glycosuria, 23 dogs had  
30 proteinuria, and 23 dogs had urinary casts. CCECAI was not different between dogs with, and  
31 without kidney injury (both median=4; p=0.9). Forty-four dogs were classified as PLE. The  
32 prevalence of kidney injury was not different between PLE, and not-PLE (p=0.3) dogs, whereas  
33 PLE dogs showed a higher prevalence (61%) of proteinuria, than non-PLE dogs (p=0.03 OR 2.8  
34 95%CI 1-6.8). Serum markers of kidney injury should be interpreted with caution in CE dogs, since  
35 approximately half of our dogs showed a reduction in muscular mass. On the other hand,  
36 assessment of urinary markers of “kidney injury” may be useful and advisable, especially due to the  
37 high risk of proteinuria in PLE dogs.