

Hypercoagulability in dogs with chronic enteropathy and association with albumin status

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ABSTRACT:

Dogs with protein-losing enteropathies (PLE) are at risk of developing a hypercoagulable state¹, however the prevalence of hypercoagulability in dogs with chronic enteropathies and normal serum albumin is unknown.

Dogs with chronic gastrointestinal signs with chronic inflammatory enteropathy were included between 2017 and 2019. Thromboelastography (TEG) was performed at presentation and reaction time (R), kinetic time (K), α -angle, maximal amplitude (MA) and global clot strength (G) were recorded. Dogs were considered hypercoagulable if the G value was $\geq 25\%$ above the reference interval.

17/38 (44.4%) dogs with chronic enteropathies were hypercoagulable. The G value did not differ between the 19 dogs with normal (≥ 28 g/L) serum albumin concentrations (9.05 Kdyn/cm²; 95% CI 7.26 – 10.84, SD 3.71) or 19 dogs with hypoalbuminemia (11.3 Kdyn/cm²; 95% CI 9.04 – 13.6, SD 4.77) (P=0.11). G value was negatively correlated with hematocrit, albumin and duration of signs and positively correlated with age.

Dogs with chronic enteropathies and normal serum albumin concentration can be hypercoagulable as measured by TEG.

INTRODUCTION:

Thromboelastography (TEG) is a validated method in veterinary medicine for overall assessment of coagulation by measuring clot formation, clot strength and fibrinolysis.² Various diseases have been associated with a hypercoagulable state in dogs as assessed by TEG, including protein-losing enteropathy (PLE).¹ Increased G value has been proposed as a measured of hypercoagulability.³ The prevalence of hypercoagulability in dogs with chronic enteropathies but normal serum albumin concentrations has not been investigated.

MATERIALS AND METHODS:

38 dogs with a final diagnosis of chronic inflammatory enteropathy and TEG available for review were included; 19 had normal albumin (albumin ≥ 28 g/L) and 19 had hypoalbuminemia (<28 g/L). Laboratory parameters, clinical characteristics and TEG parameters were included for analysis between the two groups. Normally distributed (parametric) variables were compared between the two groups using a Student's t-test and nonparametric variables were compared using a Mann-Whitney-U test. Pearson's and Spearman's rank correlation coefficient were used to evaluate for correlation of G value and patient and clinicopathologic variables. Hypercoagulability was defined as G value >10 Kdyn/cm².

RESULTS:

Table 1. Patient and clinicopathological data (age, duration of clinical signs, CIBDAI score, hematocrit, platelet count and cobalamin) of 19 normoalbuminemic and 19 hypoalbuminemic dogs with chronic enteropathies.

Variable	Group	Median	Range	P-value
Age (years)	Low albumin	7	1 - 13	0.04*
	Normal albumin	3	1 - 10	
Duration of signs (weeks)	Low albumin	6	2 – 260	0.07
	Normal albumin	12	3 - 156	
CIBDAI score	Low albumin	5	1 - 11	0.30
	Normal albumin	4	1 - 11	
Hematocrit (L/L)	Low albumin	0.44	0.32 - 0.63	0.01*
	Normal albumin	0.50	0.26 – 0.61	
Platelet count ($\times 10^9/L$)	Low albumin	321	113 - 1211	0.11
	Normal albumin	270	159 - 403	
Cobalamin (pmol/L)	Low albumin	250	79 - 791	0.22
	Normal albumin	342	123 - 776	

- 11/19 dogs in hypoalbuminemic group and 6/19 dogs in the normoalbuminemic group were hypercoagulable (G >10Kdyn/cm²)
 - No significant difference in G value or other TEG variables between the groups (P>0.05)
 - Post-hoc power calculation using prevalence of hypercoagulability in each group showed underpowered to detect a significant difference in G value at power of 80%.
- Haematocrit, albumin and duration of clinical signs were negatively correlated with G value
 - There was a weak positive correlation of age with G value.

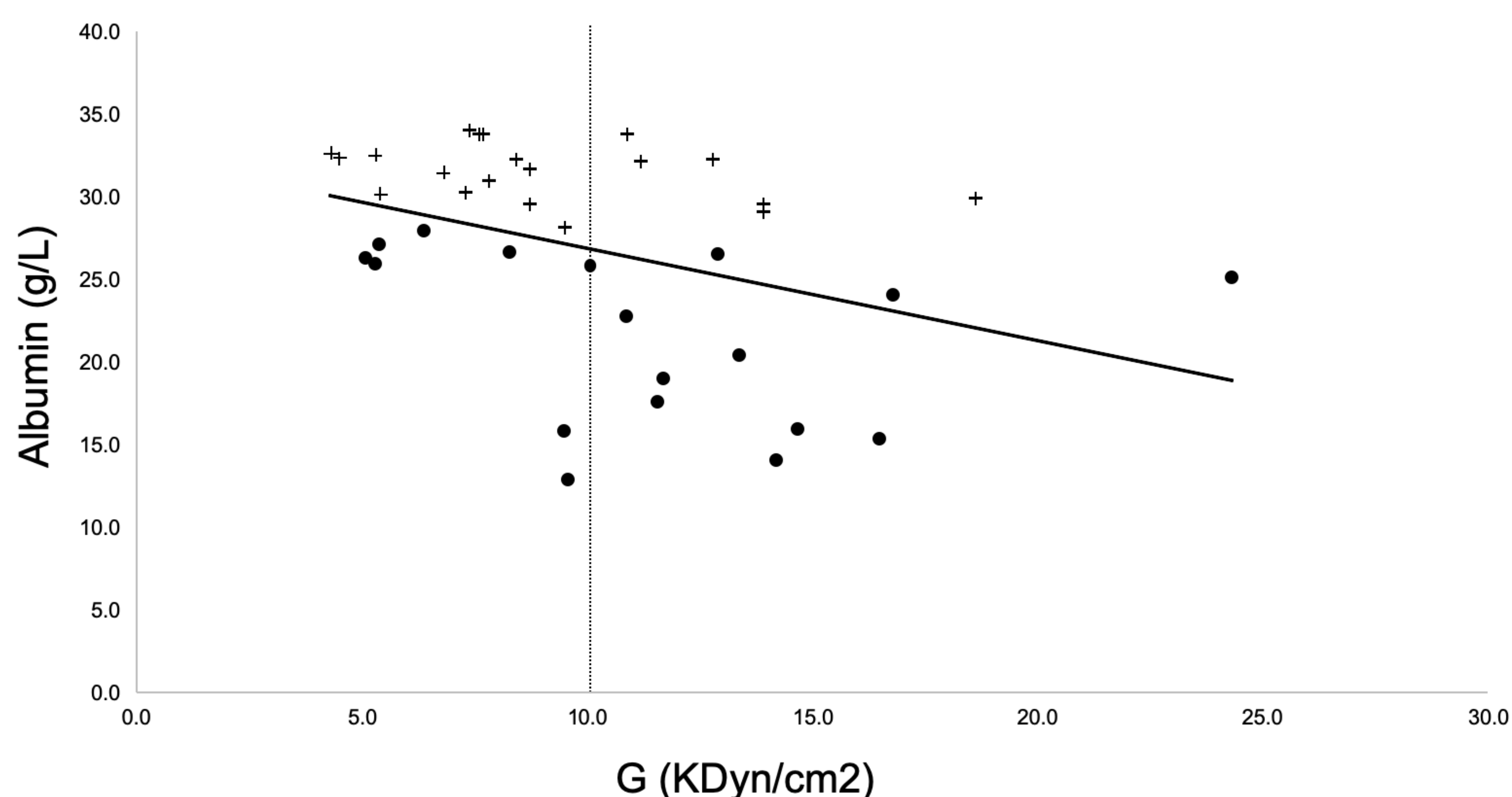


Fig 1. Relationship between serum albumin concentration (g/L) and G (Kdyn/cm²) in dogs with chronic enteropathies. Hypoalbuminemic dogs (albumin <28 g/L) are represented by a bullet point (●) and normoalbuminemic (albumin ≥ 28 g/L) dogs are represented by a cross (+). The dotted vertical line represents cut-off of hypercoagulability (>10 Kdyn/cm²) and the solid line represents a trendline.

DISCUSSION AND CONCLUSIONS:

- Dogs with chronic enteropathies without hypoalbuminemia can be hypercoagulable as measured by TEG, though serum albumin concentration is negatively correlated with increasing G value.
- This may reflect an underlying inflammatory process resulting in a hypercoagulable state, as has been identified in humans with inflammatory bowel disease (IBD)⁴, rather than loss of antithrombin through the intestinal tract.
- The relationship of a hypercoagulable TEG and thromboembolic risk in gastrointestinal disease is unknown.
- A gastrointestinal history should be obtained in dogs undergoing TEG analysis.

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