

Correlation between serum B12 and small intestinal histopathologic changes in cats with chronic enteropathy

Mina Park¹, Paula Giaretta², Chee-Hoon Chang², Stefan Keller³, Judit Magnusson Wolcan³, Valerie Freiche⁴, Sina Marsilio¹

¹University of California Davis School of Veterinary Medicine, Davis, Department of Medicine & Epidemiology, Davis, CA, USA ²Texas A&M University School of Veterinary Medicine and Biomedical Sciences, College Station, TX, USA ³University of California Davis School of Veterinary Medicine, Department of Pathology, Microbiology & Immunology, Davis, USA ⁴L'école nationale vétérinaire d'Alfort, Maisons-Alfort, France

Introduction/ Background

- Cobalamin (Vitamin B12) is an essential nutrient, involved in various cellular metabolic processes, including DNA synthesis and mitochondrial metabolism
- After forming a complex with pancreatic intrinsic factor, dietary cobalamin from animal tissue is absorbed through receptor-mediated endocytosis in the ileum
- Serum cobalamin concentration has been linked to intestinal dysbiosis in humans and dogs¹⁻², and the degree and outcome of chronic enteropathy in dogs³
- A recent study found a correlation between the degree of ileal histopathologic lesions and serum cobalamin concentrations in dogs with chronic enteropathy⁴
- Despite its common use as a surrogate marker for intestinal absorption, the correlation between systemic deficiency and the degree of histopathologic lesions in the small intestine has not yet been investigated in cats

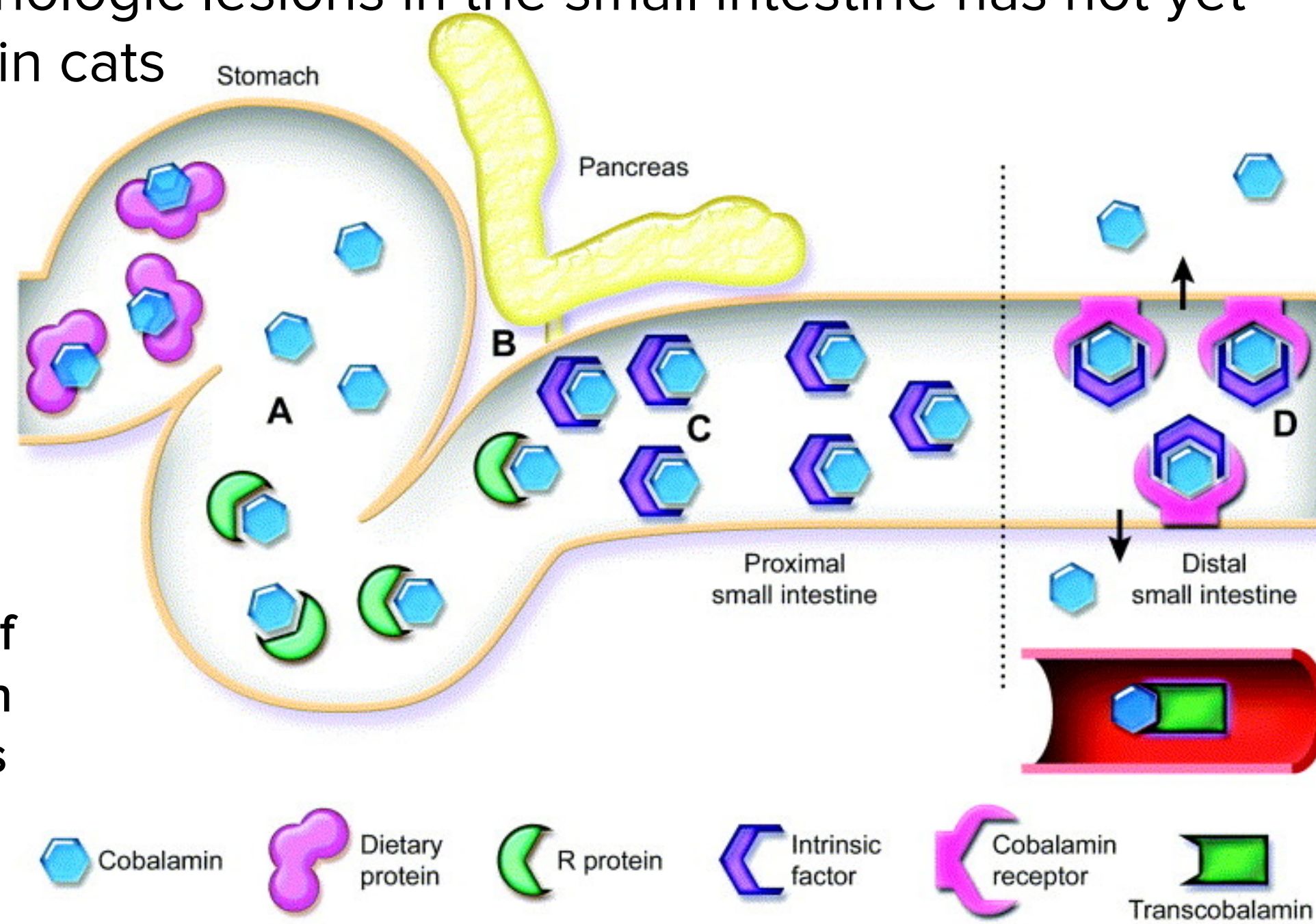


Figure 1. Normal mechanism of cobalamin absorption by cobalamin carriers in the distal small intestine⁵

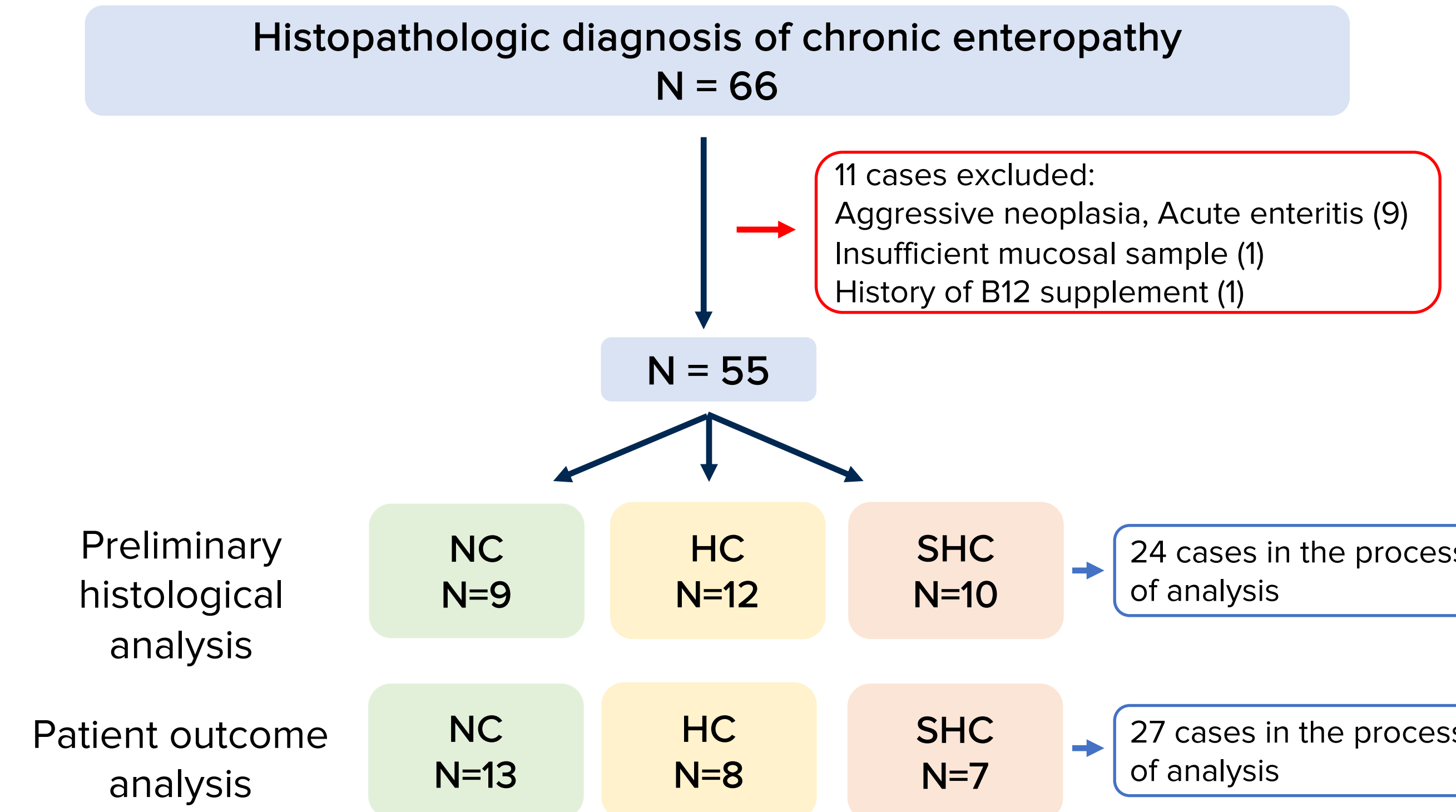
Hypotheses

- Serum cobalamin concentration will be negatively correlated with the degree of histopathologic lesions in upper small intestinal and ileal biopsy specimens from cats with chronic enteropathy
- Serum cobalamin concentration will correlate with disease severity and outcome in cats with chronic enteropathy

Methods

- Databases of the Veterinary Teaching Hospitals at UC Davis, Texas A&M University, and Alfort National Veterinary School were searched
- Cases were categorized as:
 - Normocobalaminemia (NC) (≥ 400 ng/L)
 - Hypocobalaminemia (HC) (between 400 and 150 ng/L)
 - Severe hypocobalaminemia (SHC) (≤ 150 ng/L)
- H&E slides of the upper small intestine and ileal biopsy specimens for each case were blindly scored by a board-certified pathologist on a World Small Animal Veterinary Association (WSAVA)⁶ scale
- Case history and outcome were assessed using a modified Feline Chronic Enteropathy Activity Index (FCEAI)⁷ scale based on medical records and client questionnaires

Sample Selection



Preliminary Results

	NC	HC	SHC	P value
Median age (Range)	11.7y (0.5-16.2)	11.35y (1.7-17.8)	14y (9.7-15)	0.6814
Median cobalamin (Range)	632 ng/L (409-955 ng/L)	223 ng/L (156-399 ng/L)	≤ 150 ng/L* (149-150 ng/L)	
Breed	DSH (12), DLH (2), Persian (2), Siamese (1), Himalayan (1)	DSH (6), DLH (7), DMH (1), mix (2), Persian (1), Bengal (1), Rex (1)	DSH (12), DLH (3), DMH (2), mix (1)	
Sex	MC (9), M (1), FS (7), unknown (1)	MC (8), M (1), FS (10)	MC (12), M (1), FS (3), unknown (2)	
Median modified FCEAI score (Range)	Initial: 3 (1-5)	Initial: 2.5 (2-5)	Initial: 3 (1-4)	0.9026
	Follow-up: 3 (0-5)	Follow-up: 3 (0-5)	Follow-up: 1 (0-4)	0.3557
Symptom management/ Treatment outcome				
Clinical remission	15.4%	11.1%	42.8%	
Clinical response	23.1%	33.3%	14.3%	
No change	23.1%	33.3%	14.3%	
Worse	38.4%	22.2%	28.6%	

*149-150 ng/L is the lowest level of cobalamin detection

	Histological Analysis		
Biopsy site	Spearman rank (correlation)	Simple linear regression	Logistic regression
Duodenum	P= >0.9999	P= 0.2437	P= 0.4107
Ileum	P= 0.15	P= 0.2287	P= 0.4594

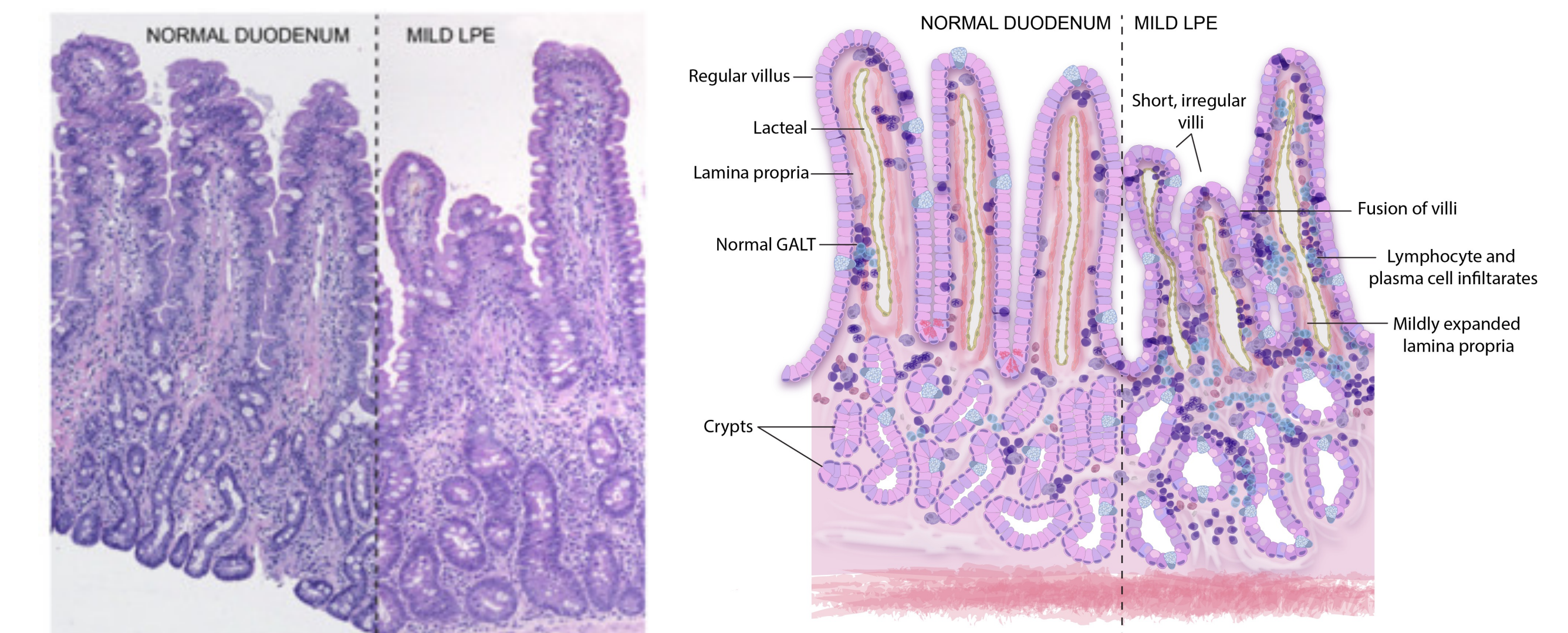


Figure 2. Hematoxylin and eosin (H&E) stained biopsy specimen of a normal feline intestine and mild LPE and their schematic view⁸

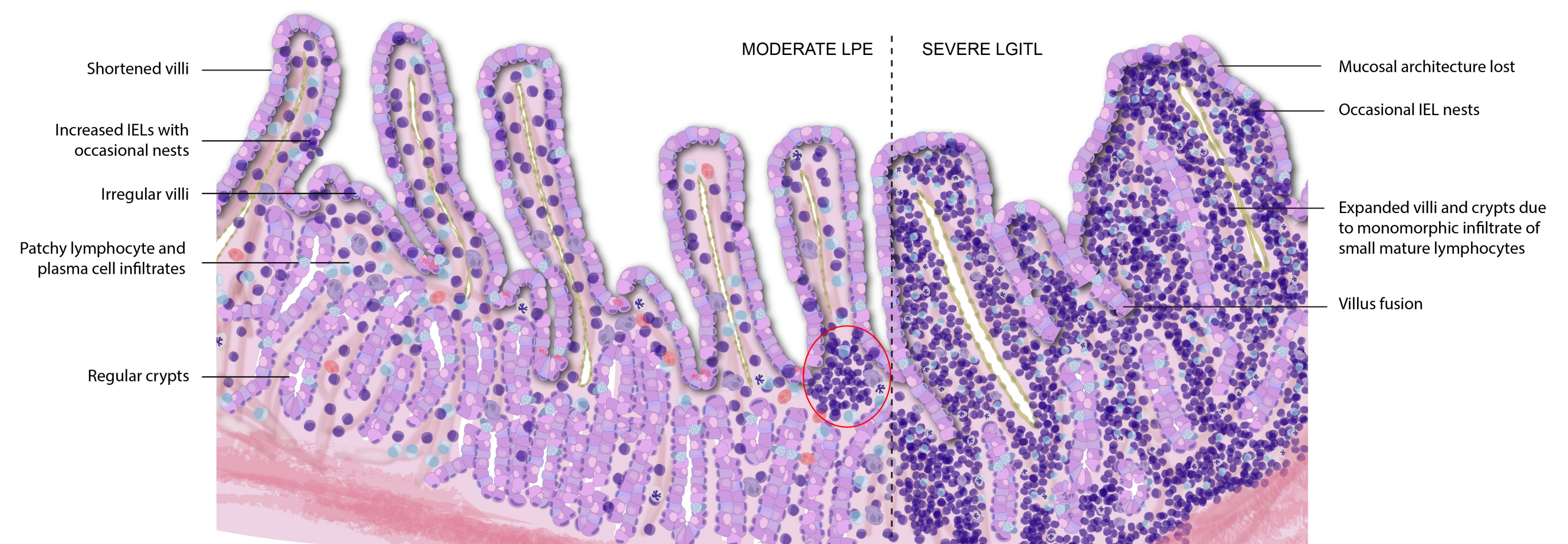


Figure 3. H&E-stained duodenal biopsy specimen from a cat with moderate LPE and marked LGITL and their schematic view⁸

Discussion/ Future Direction

- SHC had the highest percentage of clinical remission, possibly due to the bigger benefit of the B12 supplementation⁹
- A recent study by Pérez-Merino et al. has found a negative correlation between serum cobalamin and endoscopic and histologic score
 - Key differences:** including the WSAVA score, samples from upper small intestinal biopsy, and patient outcome data
- Limitations:** small sample size after stratification, retrospective collection of data, and limited follow-up data
- Future direction:** continue analyzing data, increase the sample size

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