

Breed association of endoscopically diagnosed gastric neoplasia and metaplasia in purebred dogs A retrospective study

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INTRODUCTION

Gastric cancer is a rare pathologic finding, corresponding to one percent of all neoplasias identified in dogs.^{1, 2} The most common type is adenocarcinoma, which is diagnosed at around 10 years of age, having initial clinical signs similar to those of other chronic gastrointestinal disorders.²⁻⁵ In humans, such tumors evolve from superficial, flat changes classified as metaplastic or dysplastic according to their degree of cellular differentiation.^{6,7} However, their role as early changes in canine gastric carcinogenesis remains undetermined. Previous studies have shown breed predisposition to gastric neoplasia in Tervuren, Bouvier des Flandres, Groenendael, Collie, Poodle and Norwegian Elkhound, which implies a genetic background.¹⁻³ In Finland, information about breed association to gastric cancer has been lacking.

AIM OF STUDY

- ✓ To investigate which pure breeds are most commonly subject to gastroduodenoscopy (GDS) at the Small Animal Hospital at the University of Helsinki, a regional referral veterinary hospital.
- ✓ To determine the probability of dogs in different breeds to be diagnosed with gastric neoplasia or metaplasia, in search for evidence of breed predisposition.

MATERIALS & METHODS

- ✓ Retrospective analysis: computerized database search performed on 338 dogs undergoing GDS (2006-2015).
- ✓ Sampled population = 150 dogs meeting the following inclusion criteria:
 - ✓ Subject to gastroduodenoscopy (GDS) and complete histopathological report according to WSAVA guidelines.
 - ✓ Belonging to a pure breed, with a minimum of five GDS patients in the records.
- ✓ Statistical analysis:
 - ✓ Relative odds and risks to undergo GDS / be diagnosed with gastric metaplasia or neoplasia.
 - ✓ Logistic regression analysis (odds ratio) / Log-binomial model (risk ratio - RR).

RESULTS

Pure breeds undergoing GDS:

- ✓ Pure breeds with five or more GDS patients:
 - ✓ 19 breeds = 150 dogs = 44% of all GDS.
- ✓ Pure breeds with higher likelihood to undergo GDS (Table 1):
 - ✓ Wire-haired dachshund and collies.

Breed	Odds ratio	CI 95% lower	CI 95% higher
Dachshund, wire-haired	2.42	1.14	5.15
Smooth collie	2.36	1.04	5.32
Rough collie	1.72	1.05	2.81

Table 1: Breeds with increased odds to undergo GDS.

Metaplasia and neoplasia:

- ✓ Metaplasia (n = 6) / Carcinoma n = 6 (Table 2).
- ✓ Tervuren found at significantly higher risk for gastric neoplasia as compared to dogs of other breeds: RR = 29 (7.7-109).

Breed	Metaplasia	Neoplasia
Belgian, Tervuren	-	3
Smooth collie	-	1
Golden retriever	-	1
Rottweiler	-	1
Rough collie	2	-
Dachshund, wire-haired	1	-
Hovawart	1	-
Shetland shepherd	1	-
Siberian husky	1	-

Table 2: Dogs/breed diagnosed with gastric metaplasia or neoplasia

Endoscopic and histopathological diagnosis:

Examples of metaplasia (Fig. 1), dysplasia (Fig. 2) and neoplasia (Figs. 3-4). Visual enhancement techniques like chromoendoscopy and narrow band imaging (Fig. 2) can help improve the diagnostic yield of metaplastic areas.

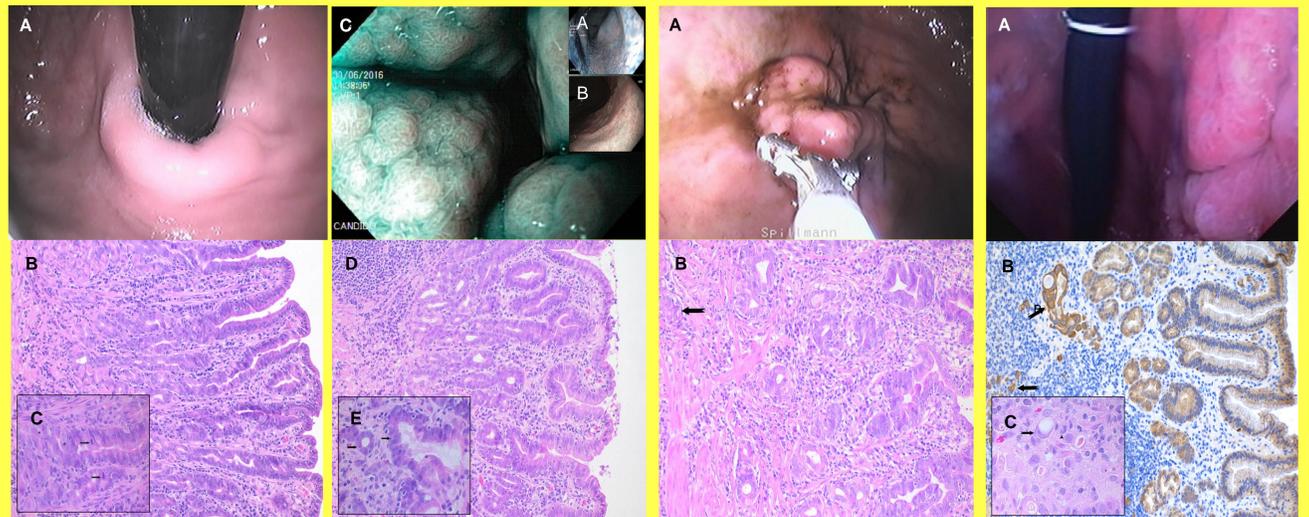


Fig. 1: (A) Endoscopic image of gastric fundus with discrete mucosal changes. Histology: (B) Mucous / intestinal metaplasia within the gastric fundus; elongated hyperplastic mucous neck regions of fundic glands and diffuse moderate lymphoplasmacytic gastritis. (C) Increased mitotic figures within the hyperplastic mucous cells of the glandular neck area (arrow). Scattered parietal cells are visible (arrowhead) within the basal area of the glands. HE stain: (B) 20x, (C) 40x.

Fig. 2: Endoscopic image of diffuse mucosal irregularity along gastric fundus and body. (A) Chromoendoscopy (CE), (B) Narrow band imaging (NBI), (C) CE and NBI combined. Histology: (D) Dysplasia of the fundic glands, with glandular dilatation and distortion. (E) Cellular dysplasia with flattening of the glandular cells, loss of cellular polarity (arrows). HE stain: (D) 20x, (E) 40x.

Fig. 3: (A) Endoscopic image of a gastric tumor. Histology: (B) Well differentiated gastric adenocarcinoma with tumoral invasion of the muscularis mucosae (arrow). HE stain: 20x.

Fig. 4: (A) Endoscopic image of a diffuse mass in the stomach. Histology: (B) Invasive gastric adenocarcinoma, with atypical tubular structures (arrow) and single cell invasion of deeper layers of the gastric wall (arrow), and (C) classical signet ring cells (arrow). (B) IHC cytokeratin stain 20x. (C) HE stain 40x.

CONCLUSIONS

- ✓ Tervuren undergoing GDS were found at a 29 times higher risk to have gastric carcinoma, further corroborating breed predisposition.
- ✓ High OR for wire-haired dachshund and collies to undergo GDS might indicate a higher prevalence of gastrointestinal disorders beside neoplasia, warranting further studies.
- ✓ Metaplasia of the gastric mucosa was as rare as gastric cancer, with no breed predisposition. Nonetheless, metaplasia can present as discrete, flat changes that are easily overlooked and possibly underdiagnosed, considering the limitations of current white light endoscopy techniques and non-directed sampling procedures.
- ✓ Future prospective studies in predisposed breeds should aim at applying more advanced endoscopic approaches such as chromoendoscopy or narrow band imaging to improve the knowledge about prevalence and breed predisposition of metaplasia and its possible association to canine gastric cancer.

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