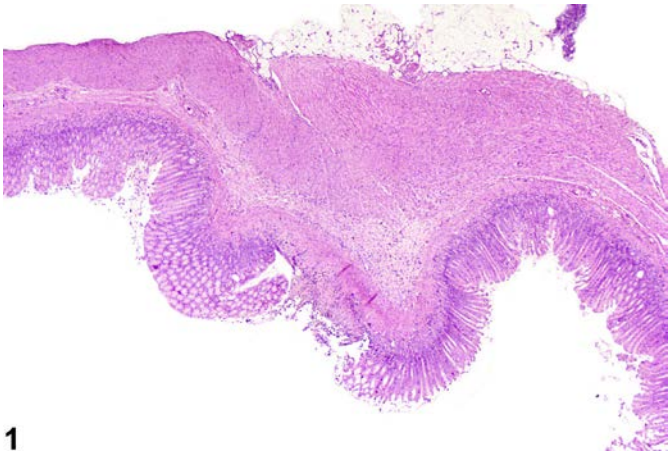
NTP Nonneoplastic Lesion Atlas

Stomach, Glandular Stomach - Ulcer



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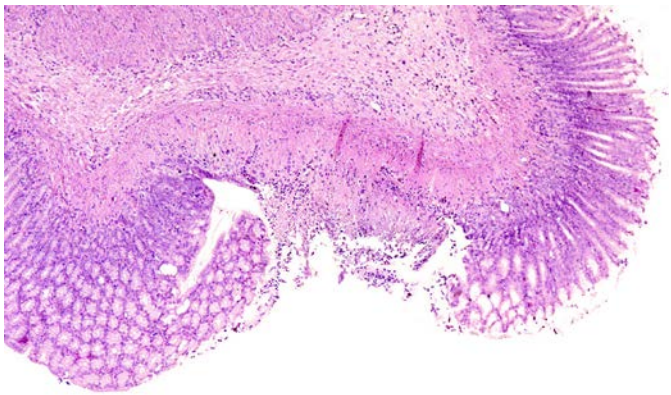

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Figure Legend: Figure 1 Stomach, Glandular stomach - Ulcer in a male F344/N rat from a chronic study. The lesion extends through the entire mucosa. **Figure 2** Stomach, Glandular stomach - Ulcer in a male F344/N rat from a chronic study (higher magnification of Figure 1). The lesion extends through the entire mucosa.

Comment: Spontaneous occurrence of ulceration of the glandular stomach is uncommon in NTP studies in mice and F344/N rats. Ulceration is seen primarily in treated rats and has been experimentally induced as a model for ulcer in humans. An ulcer (Figure 1 and Figure 2) is defined as the loss of the entire epithelial thickness down to or through the basement membrane and muscularis mucosa, whereas an erosion (see Stomach, Glandular Stomach - Erosion) is a partial thickness loss of epithelium. In comparison, necrosis of epithelium is diagnosed instead of ulceration if the necrotic epithelium is still present and at least partially attached to the underlying lamina propria. Bacterial infections can occur secondary to erosion or ulceration due to local trauma from a gavage procedure or necrosis/ischemia. Indigenous bacteria in the stomach of the rat are normally found adherent to only the most luminal mucosa but not in the gastric pits. Following erosion/ulceration, bacteria can gain access to deeper portions of the mucosa and stomach wall. Compounds that produce erosions and ulcers can act via effects on mucosal blood flow, mucosal cell kinetics, mucus or acid/bicarbonate secretion, or maintenance of the mucus barrier. High-fat diets, chronic pantothenic acid deficiency, deficiency of gluconeogenic amino acids, platelet-activating factor, increased reflux of bile salts, and reduced exocrine pancreatic function are associated with ulceration but only with intact vagal innervations. The mediators of ulceration may be metabolites of the lipooxygenase pathway of

arachidonic acid metabolism. Pharmaceutical agents that are leukotriene blockers prevent ulceration by some ulcerogens.

Recommendation: Ulceration of the glandular stomach should be diagnosed and graded based upon the extent and distribution of the lesion. Edema, inflammation, and hyperplasia of the adjacent epithelium should not diagnosed separately unless they are a prominent component of the lesion. Necrosis of epithelium is diagnosed instead of ulceration if the necrotic epithelium is still present and at least partially attached to the underlying lamina propria.

References:

Ackerman SH, Hofer MA, Weiner H. 1975. Age at maternal separation and gastric erosion susceptibility in the rat. Psychosom Med 37:180-183.
Abstract: http://www.ncbi.nlm.nih.gov/pubmed/1079604

Betton GR. 1998. The digestive system I: The gastrointestinal tract and exocrine pancreas. In: Target Organ Pathology (Turton J, Hooson J, eds). Taylor and Francis, London, 29-60.

Brown HR, Hardisty JF. 1990. Oral cavity, esophagus and stomach. In: Pathology of the Fischer Rat (Boorman GA, Montgomery CA, MacKenzie WF, eds). Academic Press, San Diego, CA, 9-30.
Abstract: http://www.ncbi.nlm.nih.gov/nlmcatalog/9002563

Hirose M, Hakoi K, Takahashi S, Hoshiya T, Akagi K, Lin C, Saito K, Kaneko H, Shirai T. 1999. Sequential morphological and biological changes in the glandular stomach induced by oral administration of catechol to male F344 rats. Toxicol Pathol 27:448-455.
Abstract: http://www.ncbi.nlm.nih.gov/pubmed/10485826

Leininger JR, Jokinen MP, Dangler CA, Whiteley LO. 1999. Oral cavity, esophagus, and stomach. In: Pathology of the Mouse (Maronpot RR, ed). Cache River Press, St Louis, MO, 29-48.
Abstract: http://www.cacheriverpress.com/books/pathmouse.htm

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