# Ultrastrucrural Characteristics of the Layer Stratum Compactum in Feline Stomach Mucosa

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The aim of the present study was to determine the ultrastructural arrangement of the specific layer stratum compactum at the cat stomach mucosa using electronmicroscopic technics.

The ultrastructure of the layer stratum compactum from the lamina propria mucosae of the feline stomach was investigated by transmitted electron microscope. The specific characteristic of the reticular disposition of the bundles of collagen fibres building the layer stratum compactum were established. The collagen fibres are associated with fibroblasts as well as with muscle cells from the lamina muscularis mucosae. Thus the collagen structure has determinant importance for the stomach wall solidity.

*Key words*: feline, stomach, mucosa, stratum compactum.

## Introduction

The layer stratum compactum from the stomach mucous structure in carnivores is specific structure of the stomach wall in comparison with other mammals [2, 6]. It is located between the bases of the mucous glands and the muscle lamina of the stomach mucous membrane. Earlier it was called lamina subglandularis and it was considered that present into the stomachs of the all carnivorous [1, 8, 9, 11, 12]. The information about its designation and compound is poor. We established the presence of the layer stratum compactum in stomachs from domestic and wild cats but it was absent from the canine and fox stomachs [7]. The investigations by immunohistochemical methods showed the very high expression of collagen type IV and fibronectin, moderate positive reaction of collagen type III, and a comparatively weakest expression of collagen types I and V in the structure of stratum compactum from cat stomach mucosa [10].

The aim of the present study was to determine the ultrastructural arrangement of the specific layer stratum compactum at the cat stomach mucosa using electronmicroscopic technics.

## Materials and Methods

Two cats (*Felis silvestris catus*), were included for electronmicroscopic investigations. The pets were under general narcosis by treatment with sodium pentobarbital (40 mg/kg) by intraperitoneal injection and the ethical principles and legal requirements for the welfare of the animals were kept. Then the animals were perfused transcardially with 500 ml phosphat buffered saline (PBS) with pH 7.4 containing 2.5 % glutaraldehyde and 4 % paraformaldehyde. After the perfusion and laparotomy the biopsy material was stored in the same fixative for 2 h. Biopsy was taken by partial gastrotomies from the stomach anatomic regions pars cardiaca, pars fundica and pars pylorica. Sections were postfixed with 1 % $OsO_4$ in PBS for 1 h dehydrated in graded series of ethanol and flat embedded in Durcupan (Fluka, Buchs, Switzerland) between acetate sheets. Blocks were trimmed out under a dissecting microscope and glued to epoxy blanks. Thin sections were cut with ultramicrotome (LKB, Stockholm-Bromba, Sweden). Sections were counterstained with uranyl acetate and lead citrate. Observation and fotodocumentation on magnification 10000× and 16000× were performed by electron microscope (500 Hitachi, Tokio, Japan).

## Results and Discussion

In the mucosa layer in all areas of the cat stomach there are exocrinocytes and endocrinocytes from the gland tubules and between them the fascicles of collagen fibers filling the intercellular matrix. The ultrastructure of the cells shows characteristic features described in other publications [4, 7, 10].

In the deep part of the lamina propria mucosae under the gastric glands various sections through the fascicles of collagen fibers are found (Fig. 1). The collagen fas-
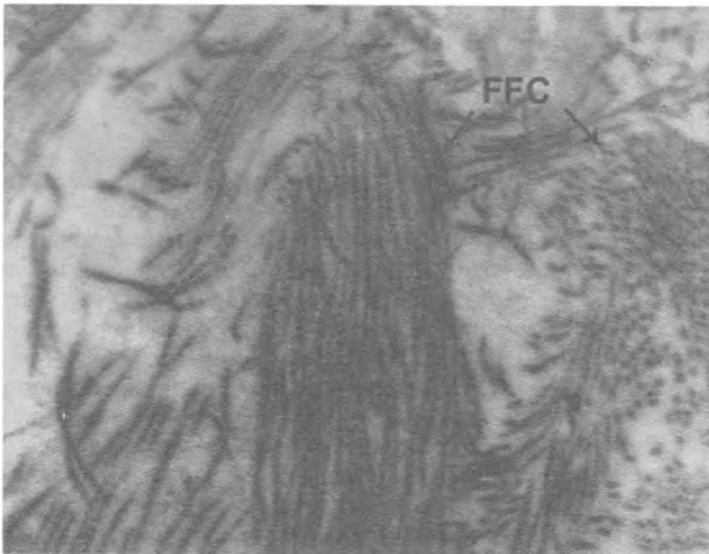


Fig. 1. Electronograma of reticular interweaved bundles of collagen fibres from the stratum compactum of the fundic region of the feline stomach. FFC – fasciculus fibrae collagenosae. 16000×
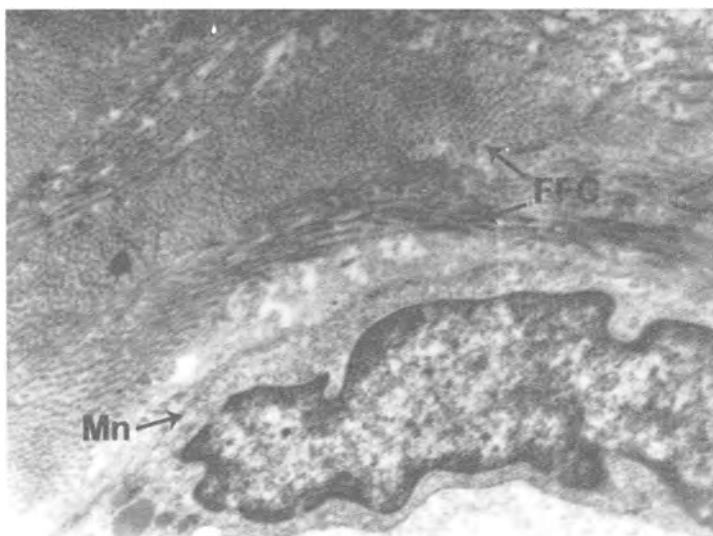
Fig. 2. Electronograma of myocytus nonstriatus from lamina muscularis mucosae associated with collagen fibres bundles of the layer stratum compactum. FFC – fasciculus fibrae collagenosae, Mn – myocytus nonstriatus. 10000×

cicles that build up the dense layer – stratum compactum of the cat stomach are cut at various angles. This determines the meshwork location of the fascicles that ensures their strength and elasticity. The longitudinal sections of the fascicles of collagen fibers show the cross lines of the collagen fibers and the lines are succeed in 640 Å [3]. The collagen fibers cross sections have oval sectional surface, which determines their trend to form fascicles of certain thickness and compactness. The collagen secreting fibroblasts are found on the fascicles surface bordering the gastric glands bottoms. They have specific heterochromatic nuclei and the chromatin is mainly located on the inner surface of the nuclear membrane. Its amount is smaller in the central part of the nucleus. On the collagen fascicles surface, from the side of lamina muscularis mucosae, a smooth muscle cells that seem associated with the collagen fibers are seen. Their heterochromatic nuclei are extended with deep invaginations of the nucleolema and typical position of the chromatin (Fig. 2). The opinion that smooth muscle cells secrete collagen like fibroblasts [5], support the hypothesis that they also contributed the construction of the stratum compactum layer by consolidation of its compound. All this data, as well as the increased presence of collagen fibers into the cat stomach wall mucosa, ensure its firmness when stretched, which is related to the increasing pressure when carnivorous animals are eating bones.

## Conclusion

The electron microscopic observations of the subglandular layer stratum compactum show the expressive network formation of the collagen fascicles.

The layer stratum compactum is located just above to the lamina muscularis mucosae and these smooth muscle cells are probably related to its formation.

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