

チンチラの大腸上皮細胞の微細構造

誌名	Japanese journal of veterinary science
ISSN	00215295
著者名	藤原,公策 潘陳,眞眞
発行元	Japanese Society of Veterinary Science
巻/号	51巻5号
巻号補足	
掲載ページ	p. 1079-1082
発行年月	1989年10月

農林水産省 農林水産技術会議事務局筑波産学連携支援センター

Tsukuba Business-Academia Cooperation Support Center, Agriculture, Forestry and Fisheries Research Council
Secretariat



Electron Microscopy of Absorptive Enterocytes in the Large Intestine of the Chinchilla (*Chinchilla laniger*)

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(Received 18 January 1989/Accepted 12 July 1989)

Jpn. J. Vet. Sci. 51(5): 1079–1082, 1989

KEY WORDS: basal infolding, chinchilla.

The chinchilla (*Chinchilla laniger*) is an animal species of the order rodentia closely related to the guinea pig (*Cavia porcellus*). They are capable of surviving without feeding and drinking for 2 weeks or over. The animal is characterized by the large intestine 1.5 times longer than the small intestine, as well as by the sacculated cecum and large colon being comparable with those of the pig, horse and rabbit. This study is to disclose the ultrastructure of enterocytes in the large intestine of the chinchilla.

Eleven adult male chinchillas aged 2 to 3 years were fed freely with water and pelleted laboratory chow (Oriental Yeast, Chiba). Animals were anesthetized with pentobarbital sodium (Nembutal, Abbott Lab., North Chicago, U.S.A.) and perfused through the cranial mesenteric artery with physiologic saline and 0.1 M cacodylate buffer, pH 7.4, containing paraformaldehyde (1%) and glutaraldehyde (2.5%) (CBFG). For transmission electron microscopy, portions of the ileum, cecum, proximal and distal large and small colons were fixed in CBFG, rinsed with 0.1 M cacodylate buffer, pH 7.4, and postfixed with 1% osmium tetroxide. After dehydration with graded series of ethanol tissues were embedded in araldite, and ultrathin sections were stained with uranyl acetate and lead citrate. For scanning electron microscopy, tissues were fixed overnight in CBFG and then rinsed with 0.1 M cacodylate buffer, macerated in 20% NaOH at 60°C for 30 min. Tissues were then rinsed thoroughly with 0.1 M cacodylate buffer and sputter-coated with gold after dehydration at room temperature.

The mucosa of the large intestine was covered with simple columnar epithelium (Fig. 1) consisting of absorptive, mucous (goblet) and endocrine cells. By transmission electron microscopy, a Golgi apparatus was present in the supranuclear area of epithelial cells. The smooth- and rough-surfaced endoplasmic reticulum and mitochondria



Fig. 1. Glycogen particles (arrows) within enterocytes of the large colon mucosa. The bar indicates sampling for electron microscopy. Toluidine blue stain. $\times 100$.

were dispersed throughout the cytoplasm, being less in number at lower portion of the cytoplasm. There were many vesicles and various-shaped lysosomes mainly at the intranuclear region. Glycogen particles were seen only in the absorptive enterocytes of the cecum and large colon (Figs 1, 2).

The absorptive enterocytes of the cecum and large colon had infoldings faced on the basement membrane (Fig. 2). The basal infoldings were 1.25 to 1.6 μm high. The cytoplasm within the infoldings had dense bodies 50 to 80 nm in diameter as well as coated vesicles and microfilaments (Fig. 3). By scanning electron microscopy, the different-sized basal infoldings were observed as finger-shaped projections (Fig. 4).

No basal infoldings were observed in crypt cells, goblet cells, endocrine cells nor in most follicle associated epithelial cells (FAE cells) of the large intestine (Figs 5, 6). There were no infoldings in absorptive enterocytes of the small intestine and small colon, which had well-developed lateral interdigitations.



Fig. 2. Basal infoldings (arrowheads) of large colon enterocytes with perinuclear glycogen particles (arrowhead). Bar=1 μ m.

These ultrastructural characteristics might be probably related to the colonic separation mechanism described by Bornhag [3, 4]. The basal infoldings in the absorptive enterocytes of the cecum and large colon might reflect active transport of electrolytes and water as seen in the renal convoluted tubules [15] and the striated ducts of the salivary glands [17]. While the basal infoldings in renal tubular epithelium are made up of the lateral interdigitations [14, 16], those of the large intestine of the chinchilla were formed by the basal cytoplasmic membrane. Similar morphology was described with the salt glands of avian and turtle species [1, 18], as well as the ciliary body [7], the choroid plexus [9] and the clear cells of the eccrine sweat glands [10, 12] of other species. Glycogen accumulation in entero-

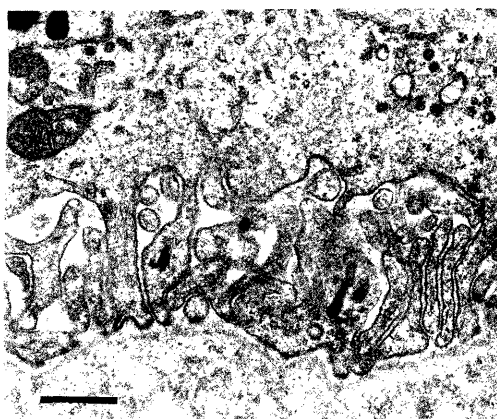


Fig. 3. Basal infoldings with dense bodies and microfilaments at a non-taenia coli site of the large colon. Bar=0.6 μ m.

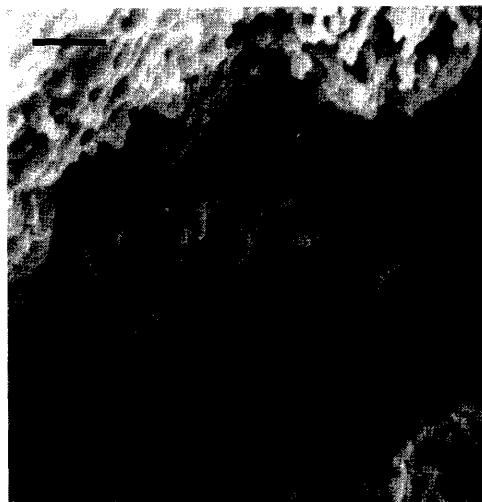


Fig. 4. Irregular finger-shaped basal infoldings. Bar=1.2 μ m.

cytes was described in the fetus of the rat, human, rabbit and guinea pig [2, 6, 8, 11] but not in the weanling rat [13] and adult rabbit [5], suggesting that the enterocytes of the large colon of the chinchilla might be of less differentiated type.

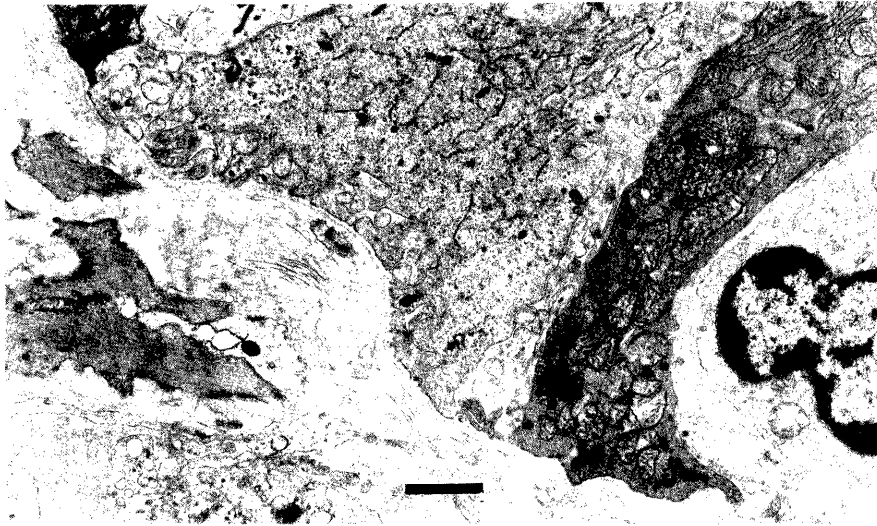


Fig. 5. Enterocytes with basal infoldings and a goblet cells in the large colon. Bar=1.3 μ m.

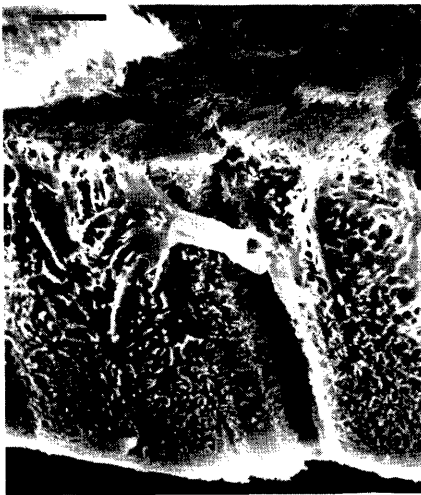


Fig. 6. The cells with and without (arrow-heads) basal infoldings after removal of the basement membrane. Bar=2 μ m.

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要 約

チンチラの大腸上皮細胞の微細構造(短報): 潘陳眞眞・藤原公策¹⁾(東京大学農学部家畜解剖学教室,¹⁾日本大学農獣医学部第二病理学教室)——チンチラの大腸上皮細胞を透過および走査電子顕微鏡で検査した。上皮細胞の微細構造は部位によって違いを示し、盲腸および大結腸の吸収上皮細胞はグリコゲン顆粒と基底陥入を持っていたが、小結腸には見られなかった。また、大腸の杯細胞、内分泌細胞、AFE細胞などにもグリコゲン顆粒や基底陥入は認められなかった。