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Short Report

Derivation and Termination of Fusiform Vesicles in the Transitional Epithelium of the Rat Urinary Bladder

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AMANO, O., KATAOKA, S. and YAMAMOTO, T.Y. *Derivation and Termination of Fusiform Vesicles in the Transitional Epithelium of the Rat Urinary Bladder.* Tohoku J. exp. Med., 1988, **156** (4), 417-418 —— Ultrastructural behavior of fusiform vesicles with an asymmetrical unit membrane in the rat transitional epithelium was investigated by in situ injection of gold colloidal particles and gold-labeled *Ricinus communis* lectin, and by section staining with the lectin. These experiments suggest that the fusiform vesicles are not formed from the luminal cell membrane by contraction of the urinary bladder, and that old luminal cell membranes are removed via multivesicular bodies. ——— urinary bladder ; transitional epithelium ; fusiform vesicle ; RCA-I lectin ; ultrastructure

The luminal cell membrane of superficial cells of the transitional epithelium consists of a thick asymmetrical unit membrane (AUM). The apical cytoplasm of these cells contains numerous vesicles of AUM, called fusiform vesicles (FVs). Not a few multivesicular bodies are also contained. About the derivation of FVs, two major doctrines have so far been proposed ; derived from 1) the luminal cell membrane (Noack et al. 1975) and from 2) the Golgi apparatus (Hicks 1966). In order to settle the discrepancy, we studied the dynamic behavior of AUM.

Urinary bladders of Wistar rats were used. Either gold colloidal particles (E-Y Laboratories, San Mateo, CA, USA) or gold colloidal particles-labeled *Ricinus communis* lectin (G-RCA-I) (E-Y Laboratories) was in situ injected into the emptied urinary bladder. One hr after injection, the urinary bladder was contracted and removed from the animal. It was fixed in 2.5% glutaraldehyde followed by 1% osmium tetroxide. For the bladder injected with gold colloidal particles, 0.05% ruthenium red (Chroma, Stuttgart, FRG) was added to the osmium tetroxide. The specimens were then processed according to the conventional electron microscopy. Untreated urinary bladders were also fixed in a mixture of 0.1% glutaraldehyde and 4% paraformaldehyde, embedded in LR-White, ultrasectioned and stained with G-RCA-I. As a control, 0.2 M galactose was mixed with the lectin. Observations were done with a transmission electron microscope (H-500 ; Hitachi, Tokyo).

After gold colloidal particles injection, no particles were observed in either lumen or superficial cell cytoplasm (Fig. 1), suggesting no active phagocytosis of the cell. The luminal cell membranes, especially complex infoldings, were stained with ruthenium red, but neither FVs nor other organelles were (Fig. 1). So, the FVs were discriminated from the infolded luminal cell membrane. Section staining with G-RCA-I demonstrated numerous gold particles at AUM not only of the luminal cell membrane but also of the FVs (Fig. 2).

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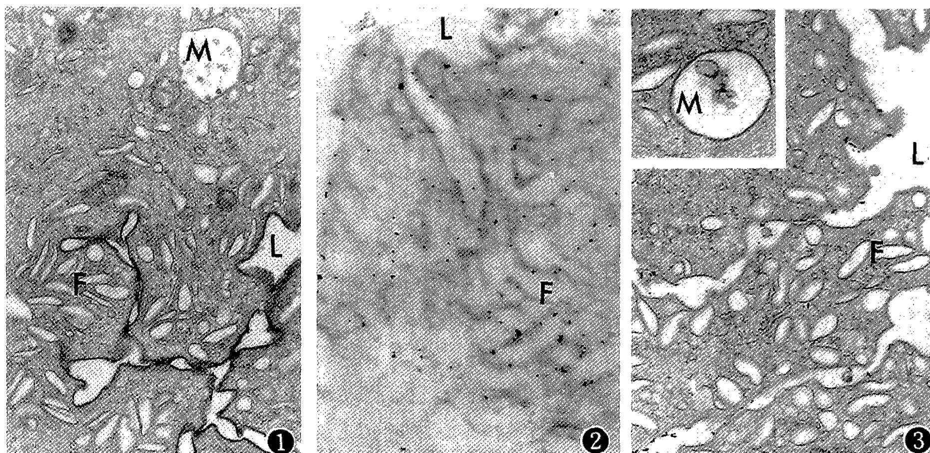

Fig. 1. Electron micrograph of a gold colloidal particles-injected and ruthenium red-block stained specimen. No gold particles are seen. The luminal cell membrane is stained with ruthenium red, but fusiform vesicles (F) are not. L, lumen ; M, multivesicular body. ×10,000.

Fig. 2. A section stained with G-RCA-I. Gold particles are observed along the luminal cell membrane and the membrane of fusiform vesicles. ×12,000.

Fig. 3. The bladder injected with G-RCA-I. Gold particles are observed along the luminal cell membrane and in a multivesicular body (inset). Note that no particles are in the fusiform vesicles. ×12,000. Inset : ×21,000.

Concerning the conjugation with RCA-I, both AUMs seemed to be equivalent. In the case of G-RCA-I injection, however, gold particles were observed along the luminal cell membrane, especially at the bottom of infoldings, and in the multivesicular bodies, but never in the FVs (Fig. 3). These results suggest that the multivesicular bodies bounded by AUM were derived from the luminal cell membranes exposed to G-RCA-I, whereas no FVs had a chance to contact with the lectin. AUMs were occasionally observed at Golgi lamellae (not figured).

We conclude that : 1) FVs are not infoldings of the luminal cell membrane, 2) FVs are not formed from the luminal cell membrane, with no possibility of recycling of AUM between luminal cell membrane and fusiform vesicles during expansion and contraction of the urinary bladder (Minsky and Chlapowsky 1978), 3) FVs are probably formed at Golgi apparatus and stored in the apical cytoplasm as reserves for the luminal cell membrane, and 4) old luminal cell membranes are removed via the multivesicular bodies.

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