ELECTRON MICROSCOPIC OBSERVATION OF SCIRRHOUS CARCINOMA OF THE STOMACH

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Summary

Electron microscopic findings obtained from seven scirrhous carcinomas of the stomach were analyzed dividing each carcinoma into superficial, deep, and peripheral parts. Proliferation of collagen fibrils, disappearance of plasma membranes, and extracellular release of cell organelae of cancer cells were considered to be peculiar findings to this type of cancer. These phenomena were observed frequently at the deep part of the cancer, but rarely at the peripheral and superficial parts. Replacement of damaged cells by the proliferated collagen fibrils at the central area of the cancer and disconnection of cancer cells from scirrhous lesion at the peripheral part were considered to contribute to the biological behaviour of this carcinoma.

Key Words: scirrhous carcinoma, collagen fibril, cancer cell, plasma membrane, mucous granule.

Scirrhous carcinoma of the stomach is characterized by a tremendous proliferation of collagen fibers among cancer cells. The proliferation of collagen fibers may relate to the biological behaviour of this type of cancer. There are many reports concerning light microscopic observations of the stroma of gastric cancer1-5), but electron microscopic studies of collagen fibrils are very rare6,7). Recently the present authors8) reported that scirrhous type of gastric cancer developed from mucocellular carcinoma characterized by signet ring cell. In this paper developmental behaviour of collagen fibrils and its correlation to cancer cells were studied electron microscopically being based on the previous study9). The findings were also discussed in comparison with light microscopic observation.

Materials and Methods

Small pieces of tissues taken from seven scirrhous carcinomas and five adenocarcinomas of the stomach were examined electron microscopically. In each carcinoma, the tissues were taken from three parts, namely from superficial, deep, and peripheral parts, at the time of operation.

They were fixed immediately after biopsy with 2.5% glutaraldehyde buffered at pH 7.4 with 0.1 M phosphate buffer, post-fixed with buffered 1.0% osmium tetroxide, dehydrated in graded ethanol, and embedded in Epon9) for electron microscopy. Thin sections were cut with an LKB ultramicrotome, doubly stained with uranyl acetate10) and lead citrate11), and were observed in a Hitachi HU-11A electron microscope.

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For light microscopic study, tissues were taken from the same cancerous lesions including the portions from which the tissues for electron microscopic study had been excised. They were fixed with 10% formalin, dehydrated in graded ethanol and embedded in paraffin. Sections were cut 5 to 6 μm thick and were stained with hematoxylin and eosin.

The findings obtained from electron microscopic observation were carefully analyzed in comparison with the light microscopic findings in each corresponding part.

Results

Light microscopically the deep part, in other words, central area of the cancer was characterized by poorly differentiated carcinoma cells diffusely infiltrating among tremendously proliferated fibrous tissue (Fig. 1). Individual cells were found to be scattered in the stromal tissue without forming any alveolar structure and were observed not to contain mucus in the cytoplasm at the light microscopic level (Fig. 2). The specimens taken from this part revealed some electron microscopic findings peculiar to this type of cancer. Proliferation of collagen fibrils was marked in this part, and cancer cells which contained some mucous granules were observed among them (Fig. 3). Development of the collagen fibrils varies from thicker one carrying cross bands to fine one without any bands. The periodicity of the cross bands was 640 Å (Fig. 3b). The cancer cells found among collagen fibrils showed from partial to almost total disappearance of plasma membrane, and sometimes the outer membrane of the nuclear envelope also became vague. At the part where the plasma membrane had disappeared, collagen fibrils were observed to touch upon the cell surface. The outer membrane of the nuclear envelope, however, became vague without contacting with the collagen fibrils (Fig. 4).

The collagen fibrils easily invaded into cytoplasm passing through the cell surface where plasma membrane disappeared. The disappearance of plasma membrane and the proliferation of collagen fibrils resulted in release of intracellular organellae such as mitochondria, endoplasmic reticulum, lysosomes, ribosomes, lipid droplets, and mucous granules into the intercellular substances consisting

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**Fig. 1.** General view of scirrhous carcinoma of the stomach. A, B, and C indicate the sites where the tissues shown in Fig. 2, 7, and 9 were taken, respectively. H-E, ×1.5

**Fig. 2.** Light microscopic feature of the deep part of the scirrhous carcinoma marked by A in Fig. 1. Poorly differentiated cancer cells accompanied by fibrous tissue are observed in muscle layer. H-E, ×40