HISTOCHEMICAL CHANGES IN THE MUCOSA IN DUODENAL UICERATION

A THESIS

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BY

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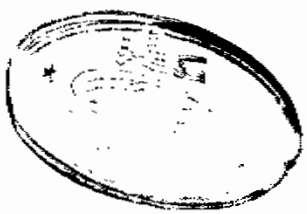

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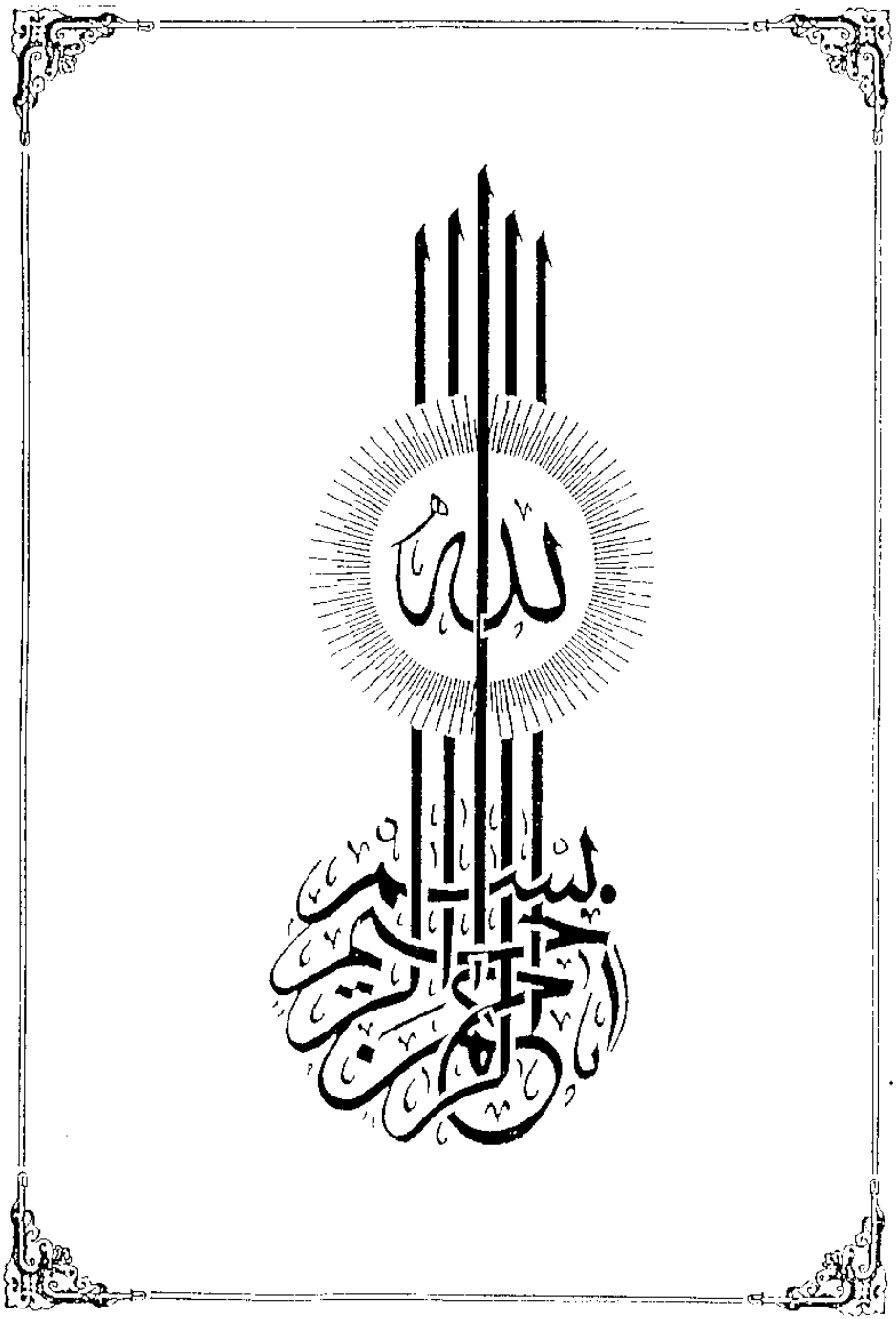

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Introduction & Aim Of The Work

INTRODUCTION & AIM OF THIS WORK

Mucosubstances in human duodenum are normally secreted from goblet cells in the epithelium of the villi as well as from Brunner's glands lying in the submucosa.

Histochemical studies have been carried out on epithelial mucins in the digestive tract of human subjects. They consist of both neutral and acidic mucins. There is very little information about the changes in duodenal mucins in duodenal ulceration.

Metaplasia towards a gastric type mucosa as a protective response to the presence of ulceration has been suggested by Gregory, Moshal and Spitaeles (1982).

So the aim of this work is to study the histochemical changes in the mucosa in duodenal ulceration and allied conditions.

Review Of Literature

ANATOMY OF THE DUODENUM

The duodenum is the first part of the small intestine and it is the shortest and most fixed part of this organ. It is approximately 25 cm long and forms a C-shaped curve, the concavity of which faces upward and to the left and is filled by the pancreas. Its diameter varies from 3-5 cm.

It is convenient to subdivide the duodenum into four portions, the first or superior part which corresponds to the duodenal cap or bulb, the second: vertical part, the third: horizontal part, the fourth: oblique or ascending portion.

The first portion is shaped like a hollow cone, with its base resting on the pylorus and its apex is pointing to the right and slightly posteriorly. It is about 5 cm long and begins at the pylorus about $\frac{1}{2}$ inch to the right of the median plane at the level of the first lumbar vertebra and passes backwirds, upwards and to the right and ends close to the neck of the gall bladder. The mucosal pattern of the duodenal cap can be distinguished radiographically and endoscopically from that of the remaining part of the duodenum. In the cap, relatively shallow folds run longitudinally and often are obliterated as the cap is distended or compressed. Begining abruptly at the junction between the first and second

portions of the duodenum, one sees the deeper, permanent transverse valvulae conniventes (folds of kerkring) characteristic of the small intestine.

The second part of the duodenum is about 8 cm long, it descends from the level of the first to the third lumbar vertebrae with a curve around the head of the pancreas. The bile duct and the main pancreatic duct (of Wirsung) join each other to form a common opening which enters in the posteromedial aspect of the second part of the duodenum just below its middle. The common opening of the bile duct and main pancreatic duct form a dilatation called hepato-pancreatic ampulla (of Vater) inside the wall of the duodenum. The ampulla of Vater opens in the lumen of the duodenum by a narrow opening found on top of an elevation called the major duodenal papilla which is guarded by a sphincter. The accessory pancreatic duct (of Santorini) opens into the second part of the duodenum on top of a smaller elevation called the minor duodenal papilla which lies about one inch above the major duodenal papilla.

The third part of the duodenum is about 10 cm long, it passes horizontally from right to left just below the subcostal plane (at the level of the third lumbar vertebra) crossing the right psoas major muscle, the

inferior vena cava and the aorta and the lift side of the body of the third lumbar vertebra and is crossed infront by the root of the mesentry and the superior mesentric vesseles.

The fourth part of the duodenum is about 2-3 cm long, it ascends along the left side of the bodies of the third and second lumbar vertebrae and ends by curving forward to form the duodenojejunal flexure on the left side of the body of the second lumbar vertebra. (Warwick and William's, 1973).

HISTOLOGICAL ASPECT OF THE DUODENAL MUCOSA

If the duodenum is opened by a longitudinal incision through its wall, a series of definite folds will be seen on its inner surface. They are parallel to one another and pass in a circular or oblique mannar partly around the lumen of the tube, these folds are known as plicae circularis or valves of Kerkring. They are absent in the upper part of the duodenum. These folds involve the entire mucosa and a portion of the submucosa. The mucosa is further carried up into finger-like projections, the villi, which cover not only the surface of the plicae, but the entire surface of the duodenum, the villi of the duodenum are leaf-shaped. Opening between the villi and extending into the mucosa as far as the musculars mucosa are simple glandular pits, the crypts (of Lieberkuhn).

The wall of the duodenum consists of four coats; mucosa, submucosa, muscularis externa and serosa.

MUCOSA OF THE DUODENUM:

The duodenal mucosa is formed of its lining epithelium, a lamina propria with its connective tissue and glands, and a limiting muscularis mucosa below.

The duodenal villi are leaf-like projections, situated close together and covering the entire mucosal surface.

They give the interior of the duodenum a soft velvety appearance. Each villus consists of a core of delicate loose connective tissue and an epithelial covering. The connective tissue, the lamina propria of the mucosa, is infiltrated with lymphocytes to a variable extent. In addition to these and the cells of the connective tissue, occasional isolated smooth muscle cells from the muscularis mucosa are present. A single small lymphatic vessel (lacteal) with defenite endothelial lininy traverses the center of each villus, begining at the tip in a slightly dilated, blind extremity. The blood capillaries of the villus form a network which lies, for the most part, away from the lacteal, Just beneath the basal lamina of the intestinal epithelium.

The epithelium covering the villi is a single layer of columnar cells attached to a delicated basement membrane. The epithelium consists mainly of two quite different kinds of cells, columnar absorbing cells and goblet cells. Enteroendocrine cells are also present in a small number (Copenhaver et. al., 1978).

The Columnar Absorbing Cells:

The absorptive epithelial cells that cover the villi are simple columnar with a striated border, as seen by

ordinary microscope, and oval nuclei located near the base (Cocco, et al., 1966).

The columnar cell has four sufaces, the luminal surface faces the lumen, this consists of about 3000 microvilli per cell, composed of tall finger like structures, average length 1.0 micron and width 0.08 micron as seen bt electron microscope (Eric, et al., 1968). The microvilli are surrounded by the two layers of the plasmalemma or plasma membranes, which are part of and continuous with those of lateral and basal membranes of the epithelium (Trier, 1967). The outer leaflet of the plasmalemma over the microvilli has very slender branching filaments which form a coat of fuzzy appearance(glycocalyx), this surface coat gives staining reaction of protein polysaccharides (glycoprotein) that is rich in acid residues and ranges in thickness from 0.1 to 0.5 micron (Padykula, 1973). Radio autographic evidence indicates that the carbohydrate portion of this glycoprotein is synthesized in the Golgi complex and linked to the protein moiety, this secretion migrates through the cytoplasm and is added to the cell coat (Bennett, 1970). It has been stated that its functions include protection of the cell against bacteria and specific binding of protein before pinocytosis. It may also be the site of disaccharide activity and may be responsible for the apparent absorption of some pancreatic enzymes to the mucosal surface (Ito, 1969).

The basal surface of the cell lying on basement membrane separating it from the lamina propria.

The surface facing the adjacent cell is called the lateral surface. The lateral plasma membranes of the adjacent absorbing cells show abundant interdigitations. They are held together by various Junctional complexes, from above dowenwards, the zonula occludens, the zonula adherens and the desmosomes (Padykula, 1973).

Owing to this fine internal structure of microvilli, they lie parallel to each other in regular fashion, as effective arrangement for maintaining a free surface of maximal area on a cell which faces a moving stream of semisolid material. These microvilli increase epithelial surface area up to 40 times (Brown , 1962). The 0.05 micron spaces between the microvilli constitute narrow channels (Hamilton and Mc Michael; 1968) through which substances must pass to their bases.

There is increasing evidence that the microvilli also serve important digestive as well as absorptive functions as indicated by the high concentration of enzymes demonstrable histochemically by light and electron microscopy. These enzymes include alkaline phasphatase, adenosine triphosphatase, and acid phasphatase which are found associated with microvilli (Trier and Rubin, 1965).