Anatomy & Histology of The Small intestine

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Figure 4.25. Structures contained within the hepatoduodenal ligament. Tributaries of the (common) bile duct and branches of the common hepatic artery.
Biliary Tract

- Gall bladder
- Cystic duct
- Common bile duct
- Ampulla of Vater
- Sphincter of Oddi
- Hepatic duct
- Pancreatic duct
MESENTERY

- Peritoneal fold
- Broad fan shaped
-Suspends jejunum and ileum from posterior abdominal wall
- Support
- Conveys nutrition & innervates the gut
- Consists of 2 layers - from greater sac

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<table>
<thead>
<tr>
<th>S.No</th>
<th><strong>Jejunum</strong></th>
<th><strong>Ileum</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Location</td>
<td>Upper part of the peritoneal cavity</td>
</tr>
<tr>
<td>2.</td>
<td>General appearance</td>
<td>Wider, thicker walled and reddish</td>
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<tr>
<td>3.</td>
<td>Attachment of mesentery</td>
<td>To the posterior abdominal wall above and to the left of the aorta</td>
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<td>4.</td>
<td>Arterial arcades</td>
<td>Only one or two arcades / vasa recta is long</td>
</tr>
<tr>
<td>5.</td>
<td>Translucent windows</td>
<td>Translucent windows are clearly seen (less fat)</td>
</tr>
</tbody>
</table>
Jejunum

Ileum

arterial arcades
superior mesenteric artery

fat

Jejunum

Ileum

arterial arcades
superior mesenteric artery

thick wall
plicae circulares

thin wall
Peyer's patch
smooth mucous membrane
Histology:
Duodenum, jejunum, and ileum share the same wall structure formed by, a mucosa, a submucosa, a muscularis interna, a muscularis externa, and a serosa.
The mucosa of the small intestine, comprising simple columnar epithelium and a lamina propria, forms finger-like projections, villi, which protrude into the lumen, and deep cavities, the crypts of Lieberkühn (intestinal glands) between the villi.

The predominant cell in the epithelium is the absorptive enterocyte with microvilli on its apical membrane. Interspersed between the enterocytes are the oval, mucous goblet cells.
Deep in the crypts of Lieberkühn, the epithelium contains entero endocrine cells with granules (secrete hormones).
Intestinal glands (crypts of Lieberkühn): permanent mucosal infolds

Crypt epithelium: enterocytes, goblet cells, enteroendocrine cells, stem cells, Paneth cells (regulate gut flora), M cells (antigen-transport cells)
The lamina propria consists of loose connective tissue. In the lamina propria of each villus there are blood vessels. Central lymph vessel, the lacteal.

In the submucosa throughout the intestines but mainly in the ileum, there are large lymphoid aggregates Peyer’s patches (un encapsulated lymphoid nodules). **M cells** form part of the epithelium covering the Peyer’s patches (they are concerned with immune system of the intestine).

The **jejunum** and **ileum** are histologically identical, except for their villi and the presence of Paneth cells. The villi of the jejunum are tall and cylindrical, while they are short and cylindrical in the ileum. **Paneth cells** are especially found in the jejunum, they have eosinophilic cytoplasmic granules and occur in clusters at the bases of crypts. They secrete digestive enzymes.
Nerve supply of the intestine

The myenteric plexus (Auerbach's plexus) provides motor innervation to both layers of the muscular layer of the gut, having both parasympathetic and sympathetic input (Ganglionic cell bodies belong to parasympathetic innervation and fibres from sympathetic innervation).

The submucous plexus has only parasympathetic fibres and provides secretomotor innervation to the mucosa nearest the lumen of the gut
**Chylomicrons** (small fat globule composed of protein and lipid) transport lipids absorbed from the intestine to adipose, cardiac, and skeletal muscle tissue, where their triglyceride components are hydrolyzed by the activity of the lipoprotein lipase, allowing the released free fatty acids to be absorbed by the tissues.
Histology of Duodenum

MUCOSA:
LINED BY SIMPLE COLUMNAR EPITHELIUM WITH FINE MICROVILLI and MUCOUS SECRETING GOBLET CELLS.

The inside surface of duodenum is thrown into villi. PLYCA CIRCULARIS IS A MUCOSAL FOLD WITH A CORE OF SUBMUCOSA.

LAMINA PROPRIA:
Contains Crypts of Lieberkühn (TUBULAR INTESTINAL GLANDS)

CRYPTS OF LIEBERKUHN CONSISTS OF FOLLOWING CELLS,
1. STEM CELLS:
ACTIVE, UNDIFFERENTIATED CELLS.
2. **GOBLET CELLS:** Secrete mucous.

3. **ENTERO ENDOCRINE CELLS:** produce gastrointestinal hormones

4. **ARGENTAFFIN CELLS:** They produce and release hormones in response to a number of stimuli. Hormones may be distributed as local messengers. They may also stimulate a nervous response.

5. **PANETH CELLS:** They are ZYMOSGENIC CELLS, PRODUCING DIGESTIVE ENZYMES AND LYSOZYMES (an antimicrobial enzyme that forms part of the immune system)

**MUSCULARIS MUCOSA:** Circular muscle layer limits the lower aspect of the mucosa

**SUBMUCOSA:**
MADE UP OF LOOSE AREOLAR CONNECTIVE TISSUE. It contains **MUCOUS SECRETING BRUNNER’S GLANDS.**
MUSCULARIS EXTERNA: INNER CIRCULAR and OUTER LONGITUDINAL. PARASYMPATHETIC GANGLION CELLS OF MYENTERIC PLEXUS CAN BE SEEN.

SEROSA:
OUTER MOST LAYER MADE UP OF FEW CONNECTIVE TISSUE CELLS AND FIBRES, COVERED BY MESOTHELIUM OF VISCERAL PERITONEUM.

FUNCTIONS:
VILLI HAS ABSORPTIVE FUNCTION. MICROVILLI INCREASE THE SURFACE AREA OF ABSORPTION. BRUNNER’S GLANDS SECRETE ALKALINE FLUID RICH IN HCO₃⁻. MUSCULARIS EXTERNA HELPS IN CHURNING FOOD PARTICLES SEROSA IS SUPPORTIVE AND PROTECTIVE
Duodenum

- Intestinal glands
- Muscularis mucosa
- Brunner's glands