Topic for Wednesday:

Intestinal Digestion & Absorption

Topics for today:

• Role of pancreas in digestion
• Control of pancreatic secretion
• Role of liver and bile
• Role of small intestine in digestion
• Absorption of digestion products
• Hepatic processing of absorbed material

Pancreatic secretions

Ductule secretion
• Bicarbonate-rich fluid

Acinar cell secretion
• Trypsinogen (trypsin precursor)
• Carboxypeptidase
• Amylase
• Lipase
Action of pancreatic lipase

Control of pancreatic secretion

Liver and gall bladder
Secretions from liver

Liver secretions
- Bile salts (not enzymes)

Bile is essential for emulsification of lipids, an action that aids lipid digestion

Intestinal tract

Small intestine
- Duodenum
- Jejunum
- Ileum

Large intestine

Small intestine design & function

Mucosal epithelium with microvilli for absorption

Primary site of digestion
Villus structure

Mucosal epithelium with microvilli… for absorption

Secretions from Small Intestine

Duodenal mucosal secretions
- Aminopeptidase
- Maltase
- Sucrase
- Lactase

Action of intestinal Maltase

\[
\text{maltose} \xrightarrow{\text{maltase}} 2\text{glucose}
\]
Regulation of digestion

**Neural control** (cephalic phase)
- Sight/smell of food stimulates gastric secretion via vagus nerve

**Hormonal control**
- Gastrin - stimulates gastric secretion
- Gastric inhibitory protein - blocks gastric flow
- Secretin - stimulates HCO$_3^-$ secretion from pancreatic ductules
- Cholecystokinin - stimulates secretion of enzymes from pancreatic acini

Absorption by Villi

- **Passive absorption** of lipophilic materials into lacteals
- **Active absorption** of hydrophilic materials into capillaries
Protein digestion & absorption

Lumen
Epithelial cell of villus
Capillary
Energy required

Lipid digestion & absorption

Lumen
Micelle
Aggregates and coated with lipoprotein
Short or medium chain
Basement membrane
Epithelial cell of villus
Capillary
Microvillus
Fatty acids, monoglycerides
Passive absorption

Hepatic processing of absorbed material

Portal system transports absorbed material to liver for processing
Hepatic lobule - functional units responsible for processing

Hepatic lobule - functional units responsible for processing
### Distribution of stored fuels*

<table>
<thead>
<tr>
<th>Storage form</th>
<th>Site of storage</th>
<th>Kcal stored</th>
<th>Equiv daily supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>glycogen</td>
<td>muscle</td>
<td>480</td>
<td>0.3 day</td>
</tr>
<tr>
<td>glycogen</td>
<td>liver</td>
<td>280</td>
<td>0.2 day</td>
</tr>
<tr>
<td>protein</td>
<td>muscle</td>
<td>24,000</td>
<td>14 days</td>
</tr>
<tr>
<td>triglyceride</td>
<td>adipose tissue</td>
<td>141,000</td>
<td>82 days</td>
</tr>
</tbody>
</table>

* See list on p721

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**Topic for Friday:**

**Nutrient Use & Metabolism**

Read p719-727