Digestion and Intestinal Absorption

Figure 3.1 Anatomy of the digestive tract and associated organs.
Figure 3.2 Control of gastric acid secretion. Plus signs indicate stimulation or activation; a negative sign indicates inhibition. The gastric and pyloric glands within the dotted boxes are greatly enlarged relative to the rest of the drawing.
Figure 3.3 Structure of a villus of the small intestine. One of the absorptive cells (enterocytes) on the surface is enlarged to illustrate the microvilli of the brush-border membrane.
Figure 3.4  **Vessels carrying the products of digestion away from the small intestine.**
Substances entering the bloodstream reach the hepatic portal vein, and are thus carried to the liver. The products of fat digestion are carried in the vessels of the lymphatic system.
Figure 3.5 Hormonal regulation of the secretion of digestive juices. Gastrin stimulates hydrochloric acid secretion by the parietal cells in the gastric glands. Secretin and cholecystokinin (CCK) promote the secretion of pancreatic juices. CCK also causes the gall bladder to contract, releasing bile into the duodenum.
Figure 3.1.1

Bile acid (cholate)

Conjugate base (Glycine)

Conjugated bile salt (Glycocholate)
Figure 3.6 Lipid digestion and absorption in the small intestine. Fatty acids and cholesterol enter the mucosal cells mainly by facilitated diffusion (Sections 2.2.1.3 and 3.3.3). Within the mucosal cells, 2-monoacylglycerols and fatty acids are re-esterified largely by the monoacylglycerol pathway (Figure 3.9) and packaged into chylomicrons.
Figure 3.7 Absorption of monosaccharides from the intestine. Monosaccharides enter the enterocytes across the brush border or apical membrane and leave the cell by the basolateral membrane using specific transporter proteins. Glucose and galactose absorption from the intestinal lumen via the GLUT2 route (shaded, dashed arrow) occurs only during maximal rates of absorption; later in the process of digestion brush border GLUT2 is recycled to intracellular stores. Based on Thorens (1993), Wright (1993) with updates on GLUT2 translocation from Kellett et al. (2008).
Figure 3.8 Esterification pathways for the formation of triacylglycerol. The monoacylglycerol pathway is prevalent in enterocytes, the phosphatidic acid pathway in other tissues. Chemical structures are detailed in Figure 1.4, p. 10. CoASH, coenzyme-A; P, inorganic phosphate; R represents the fatty acid hydrocarbon chain.