

The Enterohepatic Circulation

- Enterohepatic circulation refers to the circulation of bile acids and salts from the liver to the small intestine and back to the liver via the portal vein after reabsorption from the small intestine (Figure 20.2). The enterohepatic circulation helps to maintain an adequate bile acid pool

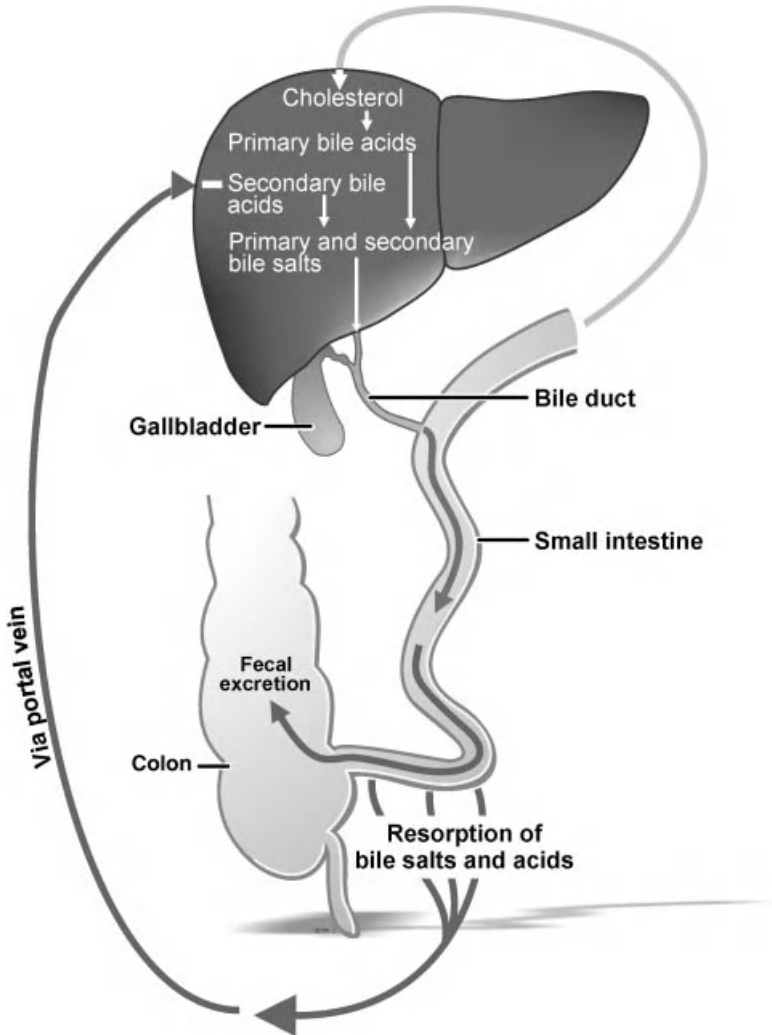


Figure 20.2 The enterohepatic circulation.

for digestion and absorption and minimizes the need for production of bile acids by hepatocytes.

- Hepatocytes synthesize approximately 600 mg of primary bile acids and salts per day:
 - in normal healthy persons, the total bile acid pool is 2–4 g;
 - on average, the bile acid pool cycles through the enterohepatic circulation two to four times per meal.
- During fasting, bile acids and salts are secreted into the bile ducts and stored and concentrated in the gallbladder.
- After a meal is ingested, the gallbladder contracts in response to cholecystokinin, and bile is secreted into the cystic duct, which drains into the duodenum via the bile duct. The gallbladder remains contracted during the meal.
 - This pattern of bile acid secretion and storage is maintained even after cholecystectomy, in which case the bile acids may be stored in the proximal small intestine.
- Reabsorption of bile acids and salts:
 - The majority of the bile acid pool in the small intestine is reabsorbed in the terminal ileum by active transport mediated by the ileal bile acid transporter.
 - A small fraction of the bile acids is absorbed throughout the small intestine by passive diffusion. About 600 mg per day of bile acids and bile salts are not absorbed and are excreted in the stool.
- Circulation of bile acids:
 - The bile acids absorbed in the terminal ileum enter the portal vein bound to albumin or high-density lipoprotein. The majority of the bile acids are taken up by hepatocytes and secreted back into bile canaliculi.
 - Depending on the type of bile acids, 10–50% of the bile acids returning to the liver via the portal vein are not taken up by the liver and instead are absorbed into the bloodstream. This fraction of bile acids is filtered by the kidneys. The bile acids are actively reabsorbed from the renal tubules, with less than 2% excreted in the urine.
- Hepatic uptake and secretion of bile acids:
 - The periportal hepatocytes primarily absorb and secrete recirculating bile acids; the pericentral hepatocytes predominantly secrete newly synthesized bile acids.
 - The secretion of recycled bile acids through the periportal hepatocytes induces hepatic bile flow, thus maintaining the enterohepatic circulation.
 - Secretion of bile acids into bile canaliculi occurs via the ATP-dependent bile acid efflux pump and is the rate-limiting step in the transport of bile acids from the portal system to the bile duct.