The the liver converts a portion of the

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Theliver carries many important physiological functions which include: processingof absorbed substances; synthesis and secretion of bile acids; bilirubinproduction and excretion; participation in metabolism of key nutrients, including carbohydrates, proteins, and lipids; and detoxification and excretionof waste products. LIVER METABOLICFUNCTIONS Theliver participates in carbohydrates, proteins, and lipids metabolism.

Duringcarbohydrate metabolism, the liver performs gluconeogenesis, stores glucose asglycogen, and releases stored glucose into the bloodstream, when glucose level islow. During protein metabolism, the liver synthesizes non-essential amino acidsand modifies amino acids so that they may enter biosynthetic pathways forcarbohydrates. In addition, the liver also synthesizes almost all plasmaproteins, including albumin and the clotting factors. Patients with liverfailure develop hypoalbuminemia which may lead to edema due to loss of plasmaprotein oncotic pressure and clotting disorders. The liver also converts toxicammonia which is byproduct of protein catabolism, to urea, which is later excretedin the urine.

When it comes to lipid metabolism, the liver participates infatty acid oxidation and synthesizes lipoproteins, cholesterol andphospholipids. The liver converts a portion of the cholesterol to bile acids, which participate in lipid digestion and absorptionBILIRUBIN PRODUCTIONAND EXCRETIONThereticuloendothelial system (RES) processes senescent red blood cells. Whenhemoglobin is degraded by the RES, one of the byproducts is biliverdin which lateris converted to yellow-colored bilirubin.

Later Bilirubin is bound to albuminin the circulation and carried to the liver, where it is taken up by thehepatocytes. In hepatic microsomes, bilirubin is conjugated with glucoronicacid via the enzyme UDP glucuronyl transferase. (BecauseUDP glucuronyltransferase is synthesized slowly after birth, some newborn babies develop” newborn jaundice.

“) Conjugated bilirubin is water-soluble and a portion of it easilyis excreted in the urine. The remainder of the conjugated bilirubin is secretedinto bile and then, via bile, into the small intestine. The conjugatedbilirubin travels down to the terminal ileum and colon, where it isdeconjugated by bacterial enzymes and metabolized to urobilinogen, some ofwhich is absorbed via the enterohepatic circulation and delivered back to theliver; the remainder is converted to urobilin and stercobilin, which areexcreted in the feces. BILE SECRETIONBileis necessary for the digestion and absorption of lipids in the small intestine. In contrast with carbohydrates and proteins, lipids pose special problems fordigestion and absorption because they are insoluble in water. Bile, a mixtureof bile salts, bile pigments, and cholesterol, solves this problem ofinsolubility. Bile is produced and secreted by the liver, stored in thegallbladder, and ejected into the lumen of the small intestine when stimulatedto contract.

In the lumen of the intestine, bile salts emulsify lipids toprepare them for digestion and then solubilize the products of lipid digestionin packets called micelles. The hepatocytes of the liver continuouslysynthesize and secrete the constituents of bile. The components of bile includethe bile salts, cholesterol, phospholipids, bile pigments, ions, and water. Bile flows out of the liver through the bile ducts and fills the gallbladder, where it is stored .

The gallbladder then concentrates the bile salts byabsorption of water and ions. When chyme reaches the small intestine, CCK issecreted.

. In the small intestine, the bile salts emulsify and solubilize dietary lipids. When lipid absorption is complete, the bile salts are recirculated to the livervia the enterohepatic circulation . The steps involved in the enterohepaticcirculation include absorption of bile salts from the ileum into the portalcirculation, delivery back to the liver, and extraction of bile salts from theportal blood by the hepatocytes . DETOXIFICATION OF SUBSTANCESThe liver protects thebody from potentially toxic substances that are absorbed from the GI tract. These substances are presented to the liver via the portal circulation, and theliver modifies them in so-called “ first pass metabolism,” ensuring that littleor none of the substances make it into the systemic circulation. For example, bacteria absorbed from the colon are phagocytized by hepatic Kupffer cells andthus never enter the systemic circulation.

In another example, liver enzymesmodify both endogenous and exogenous toxins to render them watersoluble andthus capable of being excreted in either bile or urine. Phase I reactions, which are catalyzed by cytochrome P-450 enzymes, are followed by phase IIreactions that conjugate the substances with glucuronide, sulfate, amino acids, or glutathione