

Biliary tract

The biliary tract's main purpose is to **transport bile** from the liver to the duodenum. Bile is a fluid of **yellowish-brown colour** which consists of bile salts, bile pigments (bilirubin, biliverdin), fatty acids, lipids, cholesterol etc. It partakes in the emulsification of fats. Around 0,5-0,7 l of bile is produced per day.

The biliary tract can be divided by the localisation into **intrahepatic** (inside of the liver) and **extrahepatic** (outside of the liver) *bile ducts*.

Intrahepatic bile ducts

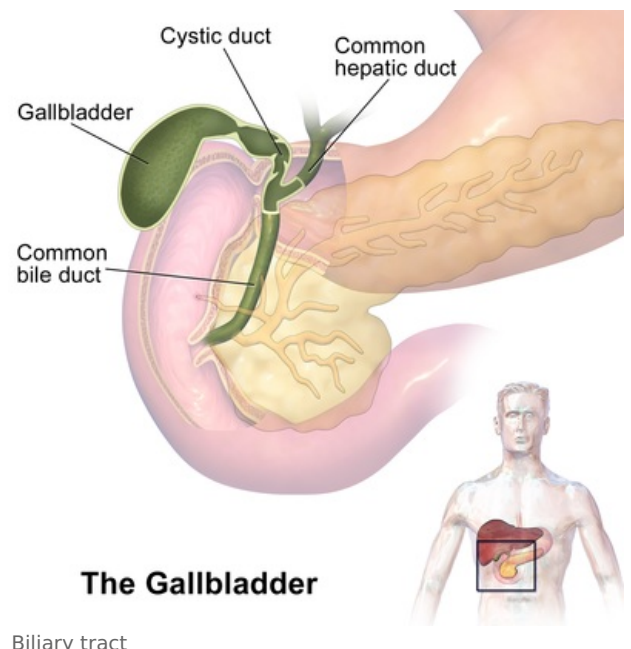
Intrahepatic bile ducts start in the liver as **bile capillaries** (*bile canaliculi*) between hepatocytes. They are thin and they are lined just by hepatocytes. The diameter of intrahepatic bile ducts is approx. 1-2 μm . **Bile** flows from the centre of the liver lobule to the periphery (portobiliary space) where **intrahepatic bile ductules** (*canals of Hering*) are formed. Canals of Hering are lined by low cuboidal epithelium. Those cells contain only a low number of organelles. They connect to **interlobular bile ducts** which are located in the portobiliary space as a part of the portal triad (as well as **portal vein** and **interlobular artery**). Portobiliary space is lined by three hepatic lobules. Interlobular bile ducts are lined by cuboidal epithelium supported by a basal lamina. They connect into **segmental bile ducts** which then form **right and left hepatic ducts** (*ductus hepaticus dexter et sinister*). Right and left hepatic ducts exit the liver at the **porta hepatis** (together with *v. portae* and *a. hepatica propria*).

Extrahepatic bile ducts

Extrahepatic bile ducts connect to intrahepatic bile ducts at the *porta hepatis*. They start as the *right hepatic duct* (made from the *anterior* and *posterior ramus*) and the *left hepatic duct* (made from *medial* and *lateral ramus*). They are lined by simple columnar epithelium. Right and left bile ducts then merge to create the **common bile duct** which is about 3-5 cm long and which enters the *hepatoduodenal ligament* (together with a *hepatic proper artery* on the left and *portal vein* in the back). Hepatoduodenal ligament is a part of *lesser omentum* and it makes the anterior margin of omental bursa - *omental foramen*. The common bile duct connects with the **cystic duct** (2-3 cm long) from the gallbladder in the *hepatoduodenal ligament* and together they create the **common bile duct**. The length of the *common bile duct* is approx. 6-9 cm.

The *common bile duct* can be divided into 4 parts according to its position in the *hepatoduodenal ligament*:

- **pars supraduodenalis** - located above duodenum;
- **pars retroduodenalis** - crossing behind the *superior duodenal flexure*
- **pars pancreatica** - located behind the head of the *pancreas*
- **pars intramuralis** - part inside the wall of the duodenum; the common bile duct and the pancreatic duct come together here and open into the duodenum as **major duodenal papilla** (*Vateri*)



The Gallbladder

Biliary tract

The common mouth of the *ductus choledochus* and the *ductus pancreaticus* on the **papilla duodeni major** occurs in 77 % of cases, in other cases it is separate. The *ductus choledochus* raises a fold during its course - *plica longitudinalis duodeni*. It is located in the *pars descendens duodeni*, on the posterior wall medially. In the middle of the fold is an elevated place - the **papilla duodeni major**. There is a cavity inside the papilla - the **hepatopancreatic ampulla** - which is the junction of the bile and pancreatic ducts. It is created in 50 % of cases. The connection takes place before the actual outlet on the papilla. The *ampulla* is closed by a sphincter - **m. sphincter ampullae hepatopancreaticae**. Also around the *ductus choledochus* and *ductus pancreaticus*, there is a sphincter - **m. sphincter ductus choledochi** (so-called **Oddi's sphincter**) and **m. sphincter ductus pancreatici**. The sphincters are contracted if there is no content in the gut. After eating, the *m. sphincter ductus choledochi* opens and releases bile while the *m. sphincter ductus pancreatici* remains contracted. It is a form of protection against the reflux of the bile into the pancreas. Bile activates pancreatic enzymes. If bile enters the pancreas, severe damage to the pancreas would follow, i.e. **acute pancreatic necrosis**.

Around 2 centimetres in cranial direction to the *major duodenal papilla* the **accessory pancreatic duct** opens into the duodenum as the **minor duodenal papilla** (*Santorini*)

Extrahepatic bile ducts are lined by simple columnar epithelium with **microvilli**. Nuclei are located in the base of the cell and there are mucin granules in the apical part of the cell. *Lamina propria mucosae* consist of loose connective tissue. Under *Lamina propria mucosae* smooth muscle cells are located. Smooth muscle cells form

sphincters along the end of the common bile duct, pancreatic duct and hepatopancreatic ampulla.

Gallbladder

The gallbladder (*vesica fellea*, *vesica biliaris*) is located beneath the liver in *fossa vesicae biliaris*. The surface of the gallbladder that is not in contact with the liver is covered by the peritoneum which comes from the visceral surface of the liver.

The *tunica mucosa* of the gallbladder is lined by **simple columnar epithelium** with *lamina propria mucosae* made of loose connective tissue. The tunica mucosa forms fold distributed evenly over the lumen of the gallbladder. Those folds are visible the most on an empty gallbladder. The *tunica muscularis* is thin and its smooth muscle cells are oriented circularly. On top of the muscular layer, there is the *tunica serosa*.

The main function of the gallbladder is to store bile produced in the liver and to concentrate it before it is released into the duodenum.

 For more information see *Gallbladder*.

Links

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- Diagnostic imaging methods of the gallbladder and biliary tract
- Operations of the gallbladder and biliary tract
- Inflammatory diseases of the gallbladder and biliary tract
- Cholelithiasis
- Summary of gastrointestinal hormones

Used literature

- ČIHÁK, Radomír. *Anatomie II*. 2.. edition. Praha : Grada, 2001. pp. 488. ISBN 80-247-0143-X.