**Functions of the Liver**

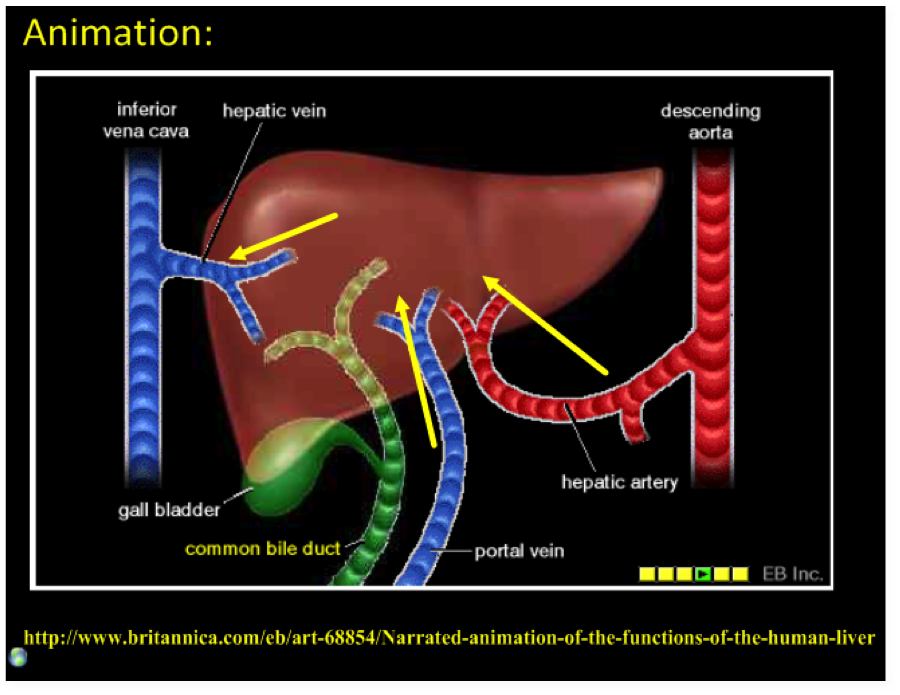
*Apply: Dual blood supply to the liver and differences between sinusoids and capillaries.*

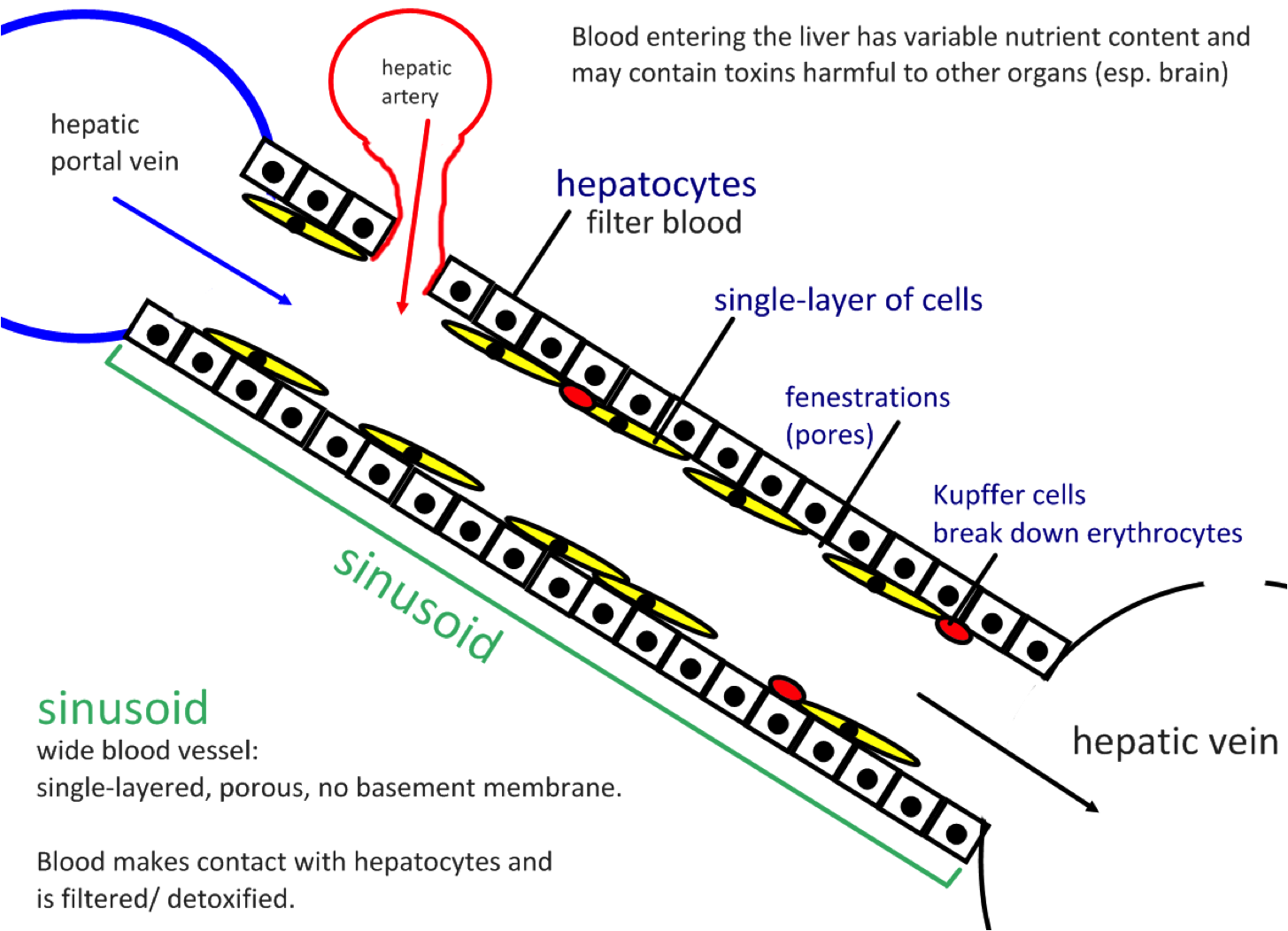
Hepatic portal vein carries \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ but nutrient rich blood (if absorption is happening at the time) into the liver.

This vessel divides into vessels called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which are wider than normal capillaries with very porous walls. Blood traveling through the sinusoids are in close contact with the surrounding \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The hepatic artery carries \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the aorta. Branches of the hepatic artery join the sinusoids and provide oxygen to the hepatocytes.

The sinusoids drain into \_\_\_\_\_\_\_\_\_\_\_ vessels that are branches of the hepatic vein.





*The liver intercepts blood from the gut to regulate nutrient levels.*

When certain nutrients are in excess in the blood, hepatocytes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and store them, releasing them when they are at too \_\_\_\_\_\_\_\_\_\_\_\_\_ a level.

CARBS

For example when blood glucose is too \_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_ stimulates hepatocytes to absorb glucose and to convert it to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for storage. When blood glucose is too low, glucagon stimulates hepatocytes to break down glycogen and release \_\_\_\_\_\_\_\_\_\_\_\_ into the blood.

AMINO ACIDS

The liver cells also adjust the level of amino acids as the blood passes over the liver sinusoids. A pool of amino acids is maintained in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, in the liver and in other tissues undergoing rapid protein synthesis.

The body cannot store \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Excess amino acids are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the liver. The organic acid part of each amino acid is removed and respired, or converted to fat or carbohydrate.

By this deamination process, the liver ensures that soluble \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is not formed and released in the tissues. \_\_\_\_\_\_\_\_\_\_ is removed from the blood in the kidneys.

LIPIDS

The fatty acids (and glycerol) that reach the liver are combined to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. These are combined with proteins in the liver, and may be stored there. Alternatively they are transported in the blood plasma, mostly as low-density lipoproteins (LDLs), to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Here lipids may be stored as food reserves (fat), or immediately broken down and respired as a source of energy.

*Some nutrients in excess can be stored in the liver.*

Iron, retinol (vitamin A) and calciferol (vitamin D) are also stored in the liver when there is a \_\_\_\_\_\_\_\_\_\_\_\_\_, and released when there is a \_\_\_\_\_\_\_\_\_\_\_\_ in the blood.

Stores glycogen and releases as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when needed.

*Endoplasmic reticulum and golgi apparatus in hepatocytes produce plasma proteins.*

The rough \_\_\_\_\_\_\_\_\_ in the hepatocytes produce 90% of the proteins in the blood plasma, including all of the albumin and fibrinogen.

Plasma proteins are processed by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in hepatocytes before being released into the blood.

*Surplus cholesterol is converted to bile salts.*

Hepatocytes convert cholesterol into bile salts which are part of the bile produced in the liver. What is the role of bile salts? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hepatocytes can also synthesize cholesterol if amounts in the diet are insufficient.

*The liver removes toxins from the blood and detoxifies them.*

The liver \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ harmful substances such as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or renders drugs and toxins that have entered the blood stream as harmless forms for excretion.

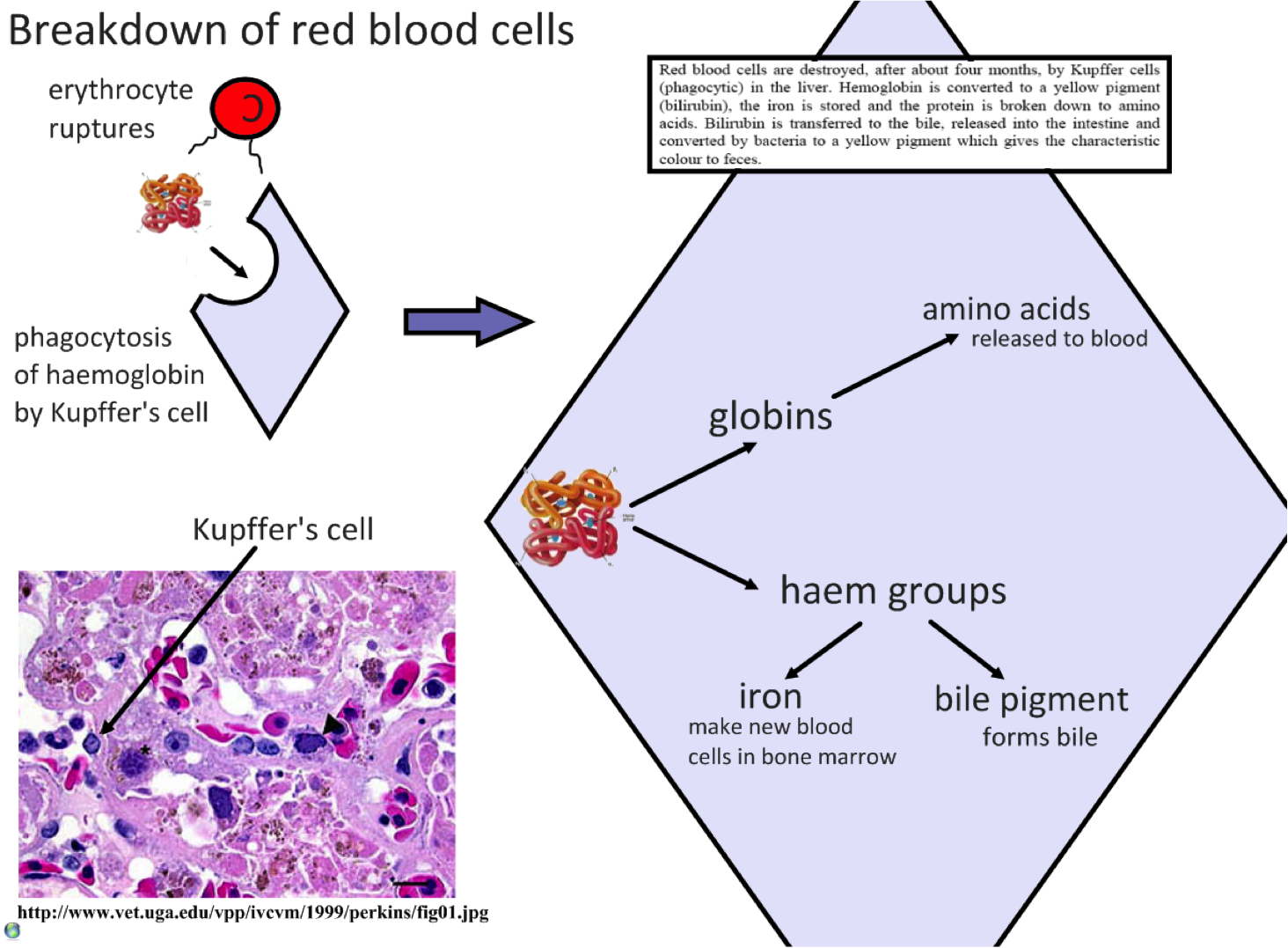
Drugs such as the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ penicillin and erythromycin are handled in this way, as are sulphonamides.

Hormones like thyroid hormone, and steroid hormones such as oestrogen, testosterone, and aldosterone are similarly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, ready for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the blood.

*The breakdown of erythrocytes (RBC’s) starts with phagocytosis of red blood cells by the liver.*

*Components of red blood cells are recycled by the liver.*

*Iron is carried to the bone marrow to produce hemoglobin in new red blood cells.*

**

Can you use the information in the graphic above and put it into your own words to describe how the liver deals with red blood cells?

Research the following:

*Apply: Cholesterol as an indicator of the risk of coronary artery disease.*

*Apply: Causes and consequences of jaundice.*