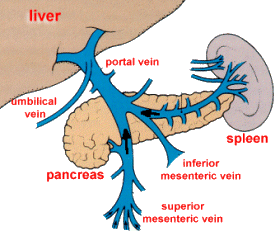
**LIVER**

**HEPATIC CERCULATION :-**



The liver is unusual in that it has a double blood supply; the right and left hepatic arteries carry oxygenated blood to the liver, and the portal vein carries venous blood from the GI tract to the liver.

The venous blood from the GI tract drains into the superior and inferior mesenteric veins; these two vessels are then joined by the splenic vein just posterior to the neck of the pancreas to form the portal vein. This then splits to form the right and left branches, each supplying about half of the liver.

On entering the liver, the blood drains into the hepatic sinusoids, where it is screened by specialised macrophages (Kupffer cells) to remove any pathogens that manage to get past the GI defences. The plasma is filtered through the endothelial lining of the sinusoids and bathes the hepatocytes; these cells contain vast numbers of enzymes capable of braking down and metabolising most of what has been absorbed.

The portal venous blood contains all of the products of digestion absorbed from the GI tract, so all useful and non-useful products are processed in the liver before being either released back into the hepatic veins which join the inferior vena cava just inferior to the diaphragm, or stored in the liver for later use.

**What is the blood flow through the liver?**

Blood also flows from branches of the hepatic artery and mixes in the sinusoids to supply the hepatocytes with oxygen. This mixture percolates through the sinusoids and collects in a central vein which drains into the hepatic vein. The hepatic vein subsequently drains into the inferior vena cava.

**KEY POINTS**

The hepatic portal vein supplies 75% of the blood to the liver, while the hepatic arteries supply the remaining 25%.

Approximately half of the liver's oxygen demand is met by the hepatic portal vein, and half is met by the hepatic arteries.

The hepatic portal system connects the capillaries of the gastrointestinal tract with the capillaries in the liver. Nutrient-rich blood leaves the gastrointestinal tract and is first brought to the liver for processing before being sent to the heart.

**Description of LIVER:-**

* Liver is the largest gland in our body ( weight 1-2.30 KG)
* Situated in the upper parts of the abdominal cavity on right side, beneath the diapharm.
* Its a four(4)lobe gland but mainly divided in to two Right & Left lobe (others two are Quodrate & Coudate lobe.)
* Average life span of Liver cell is 150 Days.
* Almost 500 types of function can be made by these Liver cell.
* Normal Structure and function of the liver depends upon a balance between cell death and regeneration.
* Urea cycle take place at per portal Hepatocytes.

**(Zink supplementation improve Urea cycle enzyme**)

**Main Function**:-

* Regulate Blood Cloths
* Immunity against Infection
* Execrates Bile for Fat digestion
* Produce Pro Thrombin and Fibrin.
* Formation of protein and cholesterol.
* Liver has an active Detoxification activity
* Execrates wastes via Bile as Liver secret Bile.
* Converts excess glucose to Starch, for storage.
* Liver utilize bilirubin and convert to non-reactive.
* Maintain body temperature by metabolic activities.
* Liver Clean Blood from Toxic Drugs, Chemical & Alcohol.
* Liver produce RBC in **Fatal** stage of life **as Reticule Endothelial organ**.
* Liver also takes part in the destruction of **exhaust** RBC as **Reticule Endothelial organ.**
* Liver stores and distribute many **Nutrients** like Vitamins (ADEK), Glucose, Fats Iron Etc. that is why **LIVER Oil** is a good sources of those substance.

**ACTION ON FATS:-**

With the help of Bile salt LIVER prepare Fat final breakdown in to the end products of Carbonic Acid and water. So any decrease in Bile salt reduce fat absorption and pass-on-through the Faces in unaltered form.

**HEPAWIN (MoA):-**

HEPAWIN works as a :

1) Detoxifier

2) Regenerator &

3) Metabolizer

**AS A DETOXIFIRE:-** Hepawin converts toxic AMONIA in to no Toxic) URIA cycle:-

**Ammonia (NH3) + CO2 +ATP** 🡨 **🡨 🡨 🡨 🡨 Ornithine Urea**

\ /

I ***Split with the help of ARGINASE***

**Carbamyl Phosphate** /\

( an enzyme responsible for Detoxification) I

I I

**Citrulline** -> -> **Arginosuccinic Acid (known as ARGININE**) ->->

***(ARGINASE AN ENZYME FOUND IN LIVERKIDNY AND SPLEEN)***

2) AS A **REGENATOR:-**

Normal liver structure and function depends upon the balance between cell Death and regeneration. The normal life span of liver cell is about 10 days.

When there is a needs of additional HEPATOCYTE, QUIESNCENT cell stimulate by mediators to move in to the prime stage ( G 0 –G1 ) then Growth factor can stimulate DNA synthesis and cellular replication take place.

3) AS A **METABOLISER:-**

Hepawin improves energy balance by CREB CYCLE or TCA Cycle

There are series of reaction take place in MITOCONDRIA by which CARBON, FATY ACIDS and AMINO ACIDS are metabolize and form Co2, H2O and ATP. These ATP moves out of the cell and Hydrolyze to ADP and become ready supplier of ENERGY, (process is).

ASPARTATE - Through Transamination convert to OXALOACITATE which oxidizes in to MITOCHONDRIA where carbon molecule of protein, carbohydrate and Fats BREAKDOWN in to Co2, H2o and ATP.

**What is metabolism:-**

A continuous series of chemical change in the living body, by which life is maintain. Food and tissues are breakdown (Catabolism) to form a new substances to create growth and rebuilding (anabolism) of body. In Anabolism energy is released and these energy is being used in catabolism and heat production, (ADP –ATP).

**What is Catabolism:-**

A continuous series of chemical reactions in the living body in which complex substance (taken as food) are breakdown in to a simple one and release energy also. The energy is needed in anabolism and other activity of the body. ATP, Metabolic – Catabolic.

**What is Anabolism:-**

The series of Chemical reaction in the living body Require Energy to change Simple Substance to Complex one is known as Anabolism, like ADP-ATP metabolism.

**Bilirubin**

* Bilirubin is a reddish yellow pigment made during the normal breakdown of [red blood cells](http://www.medicinenet.com/complete_blood_count/article.htm).
* Normal levels vary slightly from lab to lab; they range from about 0.2 – 1.2 mg/dL.
* Signs and symptoms of high bilirubin levels in adults very with the underlying cause; however, symptoms usually include [jaundice](http://www.medicinenet.com/image-collection/jaundice_picture/picture.htm) and [itching](http://www.medicinenet.com/itch/article.htm).
* High bilirubin levels in adults usually means that there may be an underlying problem involving the red blood cells, [liver](http://www.medicinenet.com/liver_anatomy_and_function/article.htm), or gallbladder; however, other problems also may be found.
* Symptoms of high bilirubin levels in newborns are skin and/or [scleral jaundice](http://www.medicinenet.com/newborn_jaundice_neonatal_jaundice/article.htm).
* High bilirubin levels in a [newborn](http://www.medicinenet.com/babies_quiz/quiz.htm) means that the neonate is not processing red cell breakdown effectively or an underlying cause is responsible

**PROCESS OF BILIRUBIN FORMATION:-**

The normal life span of **HAEMOGLOBIN (RBC**) is 120 days. So after production of RBC, gradually after few days it starts its flexibilities and become lazy and it’s a time to replace with new one to perform normal physiological activities. **Reticule Endothelial organ (**Like **Spleen, Liver and Bone marrow)** are responsible to replace old and lazy RBC and at the same time to supply the fresh one. In these process when blood passes through these **Reticule Endothelial organ** (as picture shown) specially **Spleen work like a Funnel** and the Old, lazy as well as inflexible RBC are being destroyed as **HEAM** (iron) and **GLOBIN** (Protein)

**HEAM** Converted in the Spleen – First to **Biliverdin** and after which the [enzyme](https://en.wikipedia.org/wiki/Enzyme) [biliverdin reductase](https://en.wikipedia.org/wiki/Biliverdin_reductase" \o "Biliverdin reductase) performs the second steps to produce **bilirubin** from biliverdin. This bilirubin is called as **Free bilirubin** or indirect bilirubin. This Free and indirect bilirubin transported to the Liver. Where, bilirubin is conjugated with [glucuronic acid](https://en.wikipedia.org/wiki/Glucuronic_acid) by the enzyme [glucuronyl transferase](https://en.wikipedia.org/wiki/Glucuronyltransferase" \o "Glucuronyltransferase), making it soluble in water, these conjugated version is the main form of bilirubin present in the "direct" bilirubin fraction. Much of its store in the **Gall Bladder** as bile and thus out into the small intestine. Though most [bile acid](https://en.wikipedia.org/wiki/Bile_acid) is reabsorbed in the [terminal ileum](https://en.wikipedia.org/wiki/Terminal_ileum) to participate in [enterohepatic circulation](https://en.wikipedia.org/wiki/Enterohepatic_circulation), conjugated bilirubin is not absorbed and instead passes into the [colon](https://en.wikipedia.org/wiki/Large_intestine).

There, colonic bacteria deconjugate the conjugate bilirubin and metabolize the bilirubin into colorless [urobilinogen](https://en.wikipedia.org/wiki/Urobilinogen), which can be oxidized to form [urobilin](https://en.wikipedia.org/wiki/Urobilin" \o "Urobilin) and [stercobilin](https://en.wikipedia.org/wiki/Stercobilin). Urobilin is excreted by the kidneys to give urine its yellow color and stercobilin is excreted in the faeces giving stool its characteristic brown color.

(So when any problems or deficiencies arises, then a good quantities of bilirubin release in to the blood and characteristics of Jaundice reflects and specially in case of NEONATS as this is there fast growing stage so more numbers of RBC are being destroyed in the spleen but at the same time their Liver, Gall Bladder, Intestinal colon are not fully develop so they are more and more vulnerable to Jaundice that is **Infantile Jaundice**. It’s a very critical stage because at that time their Blood Bran Barrier also not develop fully and it may damage Brain cells).

**Erythrocytes (RBC)**

* has no Nucleus
* has no endoplasmic Reticulum
* has no Mitochondria

But there is some Glucose Oxidation which can produce ATP.

**In case of normal Human**

**RBC -** Quantitie**s** are **45 -55 Lacs** and it life span is about 120 days

**WBC-** Quantities are **6 thousand - 10 thousand** and its life span is about 24 hours only.

**PLATELETS-** Quantities are **2.50 – 5 Lacs** and its life span is about 8 to 9 days.