

Integrated Biochemistry & Pathology Practical Class

Liver Function Tests

Enzyme	Hepatic Jaundice	Obstructive Jaundice	Hemolytic Jaundice
ALT (mainly in liver, cytoplasmic)	Markedly increased	Slightly raised	Normal
AST (liver, myocardium and other tissue, cytoplasmic and mitochondrial)	Markedly increased	Slightly raised	Normal
ALP (liver, bone and other tissue, result of more synthesis)	Raised	Markedly increased	Normal
GGT (in liver and other tissue, microsomal enzyme)	Increased(Very high in Alcoholic Hepatitis)	Markedly increased	Normal

Case 1: *Pre hepatic jaundice (Hemolytic jaundice)*

- **Q1. In the light of his medical history, interpret the results of his complete blood tests and liver function tests.**
- Complete Blood tests show only decreased hemoglobin due to hemolysis induced by chloroquine in Glucose-6-phosphate dehydrogenase (G6PD) deficient patient.
- LFT: Only increased serum bilirubin (unconjugated) because the increased breakdown of hemoglobin exceeds the capacity of liver cells to conjugate bilirubin.

Case 1: *Pre hepatic jaundice (Hemolytic jaundice)*

- **Q2. What are the most likely causes (hypotheses)**

Pre hepatic jaundice (Hemolytic jaundice) induced by chloroquine in Glucose-6-phosphate dehydrogenase (G6PD) deficient patient.

Case 1: *Pre hepatic jaundice (Hemolytic jaundice)*

- **Q3. What are the underlying mechanisms for his jaundice?**

Chloroquine destroys RBCs in G6PD deficient patient leading to increased breakdown of hemoglobin exceeding the capacity of liver cells to conjugate bilirubin.

Case 2 *Hepatic jaundice (Viral hepatitis)*

- **Q1. In the light of his medical history, interpret the results of his complete blood tests and liver function tests.**

Complete blood tests show only decreased White blood cell count due to viral infection.

LFT:

- 🎬 ALT and AST are markedly increased.
- 🎬 ALP is elevated (much higher levels in obstructive jaundice).
- 🎬 PT is slightly increased due to low prothrombin synthesis by liver cells.
- 🎬 Bilirubin in urine increased because conjugated bilirubin is water soluble & can pass through glomerular filter in kidney.

Case 2 *Hepatic jaundice (Viral hepatitis)*

- Q2. What are the most likely causes

Hepatic jaundice (Viral hepatitis).

Case 2 *Hepatic jaundice (Viral hepatitis)*

- **Q3. What are the underlying mechanisms for his jaundice?**

- 🎬 Viral Diseases of liver parenchymal cells decrease its capacity to conjugate bilirubin leading to increased unconjugated bilirubin in blood.
- 🎬 Damage to liver cells affects Enterohepatic circulation & increased leaking of conjugated & unconjugated bilirubin into blood.
- 🎬 Bilirubin in urine increased because conjugated bilirubin is water soluble & can pass through glomerular filter in kidney.

Case 3 *Obstructive jaundice*

- **Q1. In the light of his medical history, interpret the results of his complete blood tests and liver function tests.**

Complete blood tests: Haemoglobin is decreased due to malnutrition or low intake (cancer).

LFT:

🎬 Serum bilirubin is increased (conjugated).

🎬 AST and ALT are slightly increased.

🎬 ALP and GGT are markedly increased (obstructive jaundice).

🎬 Serum albumin is decreased because of malnutrition or low food intake (cancer).

Case 3 *Obstructive jaundice*

- Q2. What are the most likely causes (hypotheses)

Obstructive jaundice due to pancreatic carcinoma.

Case 3 *Obstructive jaundice*

- Q3. What are the underlying mechanisms for his jaundice?

Pancreatic carcinoma obstruct the flow of bile leading to increased conjugated bilirubin.

Case 4 *Drug toxicity*

- **Q1. In the light of his medical history, interpret the results of her complete blood tests and liver function tests.**

Complete blood tests: Normal.

LFT:

🎬 Serum bilirubin is increased (conjugated and unconjugated).

🎬 AST and ALT are slightly increased.

🎬 ALP and GGT are slightly increased.

🎬 Prothrombin time is increased due to low prothrombin synthesis by liver cells.

Case 4 *Drug toxicity*

- **Q2. What are the most likely causes (hypotheses)**

Paracetamol Drug toxicity.

Case 4 *Drug toxicity*

- **Q3. What are the underlying mechanisms for her jaundice?**
 - 🎬 **Depletion of reduced glutathione (GSH) makes the hepatocytes more susceptible to cell death caused by reactive oxygen species.**
 - 🎬 **Diseases of liver parenchymal cells decrease its capacity to conjugate bilirubin leading to increased unconjugated bilirubin in blood.**
 - 🎬 **Damage to liver cells affects Enterohepatic circulation & increased leaking of conjugated & unconjugated bilirubin into blood.**