

# Data Interpretation: LFTs

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# Liver Function Tests

- Albumin
- AST (aspartate transferase)
- ALT (alanine transferase)
- ALP (alkaline phosphatase)
- GGT (gamma glutamyltransferase)
- Bilirubin
- Prothrombin time/INR

# Liver Function Tests

Albumin	
AST	
ALT	
ALP	
GGT	
Bilirubin	
Prothrombin time/INR	

# Liver Function Tests

Albumin	<ul style="list-style-type: none"><li>- Synthetic function</li><li>- Chronic assessment (half-life 20 days)</li></ul>
AST	<ul style="list-style-type: none"><li>- Hepatocyte damage</li></ul>
ALT	<ul style="list-style-type: none"><li>- Hepatocyte damage</li><li>- More sensitive than AST</li></ul>
ALP	<ul style="list-style-type: none"><li>- Increased in cholestatic disease</li></ul>
GGT	<ul style="list-style-type: none"><li>- Produced in bile tract</li><li>- Induced by alcohol</li></ul>
Bilirubin	<ul style="list-style-type: none"><li>- Red cell breakdown</li><li>- increased red cell breakdown or decreased biliary excretion</li></ul>
Prothrombin time/INR	<ul style="list-style-type: none"><li>- Vit K dependent clotting factors</li></ul>

# Sources - extrahepatic

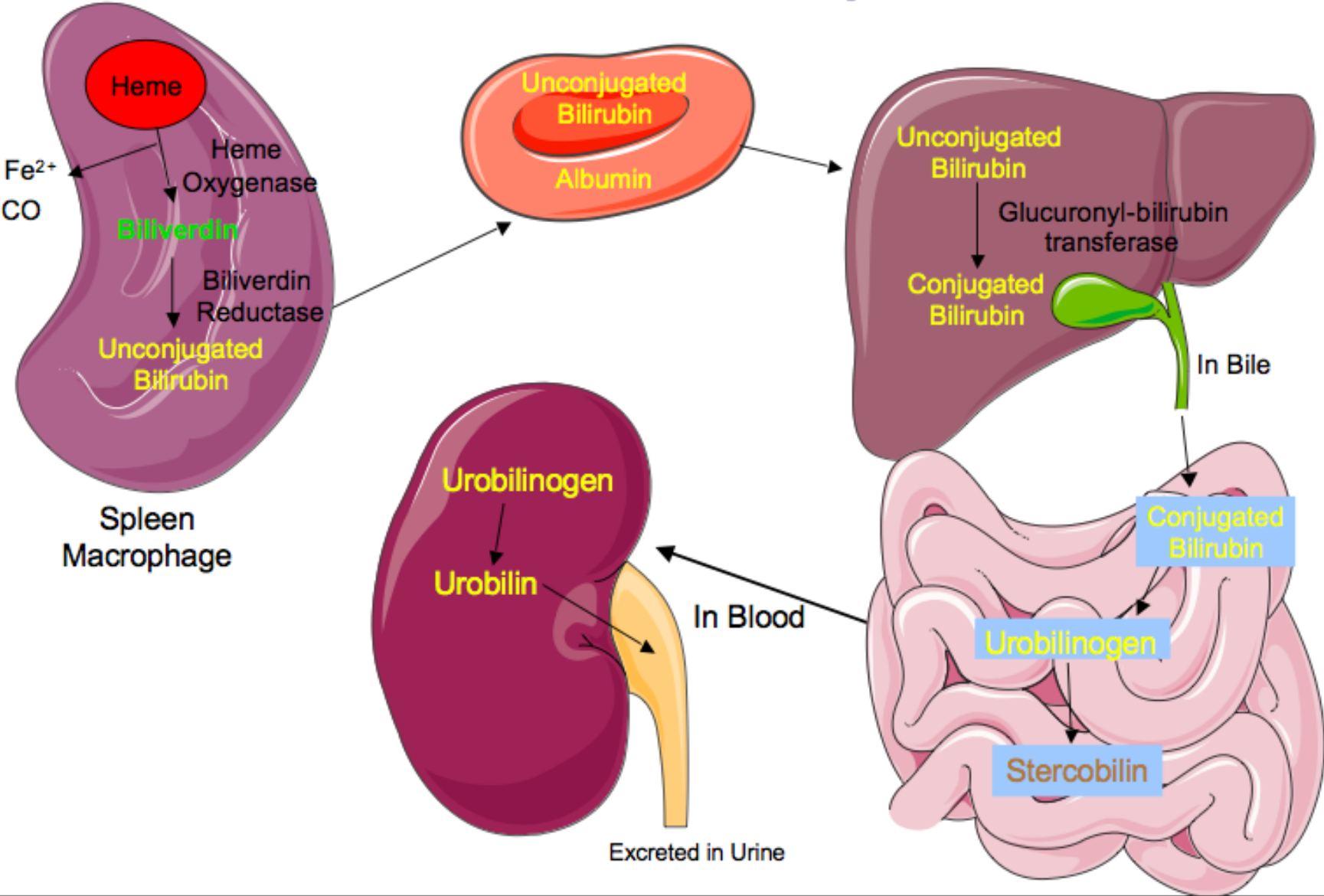
Test	Extra-hepatic source
Bilirubin	
AST	
ALT	
ALP	

# Sources - extrahepatic

Test	Extrahepatic source
Bilirubin	<ul style="list-style-type: none"><li>- Red blood cells<ul style="list-style-type: none"><li>- Haemolysis</li><li>- Intra-abdominal bleed</li></ul></li></ul>
AST	<ul style="list-style-type: none"><li>- Muscle (skeletal/cardiac)</li><li>- RBCs</li></ul>
ALT	<ul style="list-style-type: none"><li>- Muscle (skeletal/cardiac)</li><li>- Kidneys</li></ul>
ALP	<ul style="list-style-type: none"><li>- Bone</li><li>- Kidneys</li><li>- Placenta (first trimester)</li></ul>

# Bilirubin

# Bilirubin Transport



# Bilirubin

- Unconjugated
  - Present in blood
  - Not soluble in water
- Conjugated
  - Conjugated in liver
  - Excreted via bile into small intestine
  - Converted to urobilinogen (excreted in urine) and stercobilin (excreted in faeces)



# General principles of derangement

- Pre-hepatic
  - ↑ unconjugated bilirubin
  - Other LFTs largely normal
- Hepatic
  - ↑ AST/ALT
- Post-hepatic (obstructive)
  - ↑ ALP/GGT

# Jaundice

- Yellowing - caused by bilirubin
- Pre-hepatic
- Hepatic
- Post-hepatic

# Jaundice - causes

- Pre-hepatic
  - Haemolysis
  - Ineffective red cell production (Vit B12 deficiency)
- Hepatic
  - Hepatitis
  - Cirrhosis
  - Tumours
  - Drugs
  - Gilbert's
- Post-hepatic
  - Gallstones
  - Biliary stricture
  - Ca – cholangiocarcinoma, head of pancreas
  - Cholangitis

# Hepatitis- Acute

- Early ↑↑ ALT / AST
- Followed by ↑ bilirubin
- Can be some mild ↑ ALP
- Causes:
  - Viral hepatitis
  - EBV
  - CMV
  - Drugs/toxins

# Hepatitis – Chronic/Cirrhosis

- ↑ ALT / AST
- Other LFTs may be normal
- Could be ↓ albumin, ↑ PT/INR, ↓ cholesterol

# Cholestasis (obstructive)

- ↑↑ ALP
- ↑ GGT/bilirubin
- May be some mild ↑ ALT/AST

# Alcoholic hepatitis

- ↑ AST/GGT
  - Less ALP and bilirubin increase
- Acute:
  - 10x ↑ in AST and GGT
- Chronic
  - ↑ ALT, bilirubin, ALP
  - ↓ albumin
  - May be ↑ MCV
- Other Sx:
  - Nausea, hepatomegaly, ankle oedema, ascites

Test	Hepatitis	Obstruction
ALT	+++	+
AST	+++	+
ALP	±	+++
GGT	±	+++
Bilirubin	++	+++
Urine bilirubin	++	±



Disorder	Unconjugated	Conjugated	ALT	ALP	GGT	Synthetic	DDx	Comments
<b>Pre-hepatic (unconjugated) Jaundice</b>	↑	↔	↔	↔	↔	↔	All causes of haemolysis	Unconjugated bilirubin does not enter urine, so urine is pale or dark from Hb
<b>Non-haemolytic (unconjugated)</b>	↑	↔	↔	↔	↔	↔	Gilbert's syndrome (mild) Crigler-Najjar (rare but serious)	Unconjugated bilirubin does not enter urine, so urine is pale or dark from Hb
<b>Hepatic (conjugated)</b>	↔/↑	↑	↑↑	↔	↔	↓ (if chronic)	Viral Drugs Alcohol Cirrhosis	Dark urine, pale stool May have hepatomegaly
<b>Post-hepatic (conjugated)</b>	↔	↑	↑	↑↑	↑	↔	Stones Strictures Masses (liver or pancreas) Pancreatitis	Dark urine, pale stool
<b>Bone Disease</b>	↔	↔	↔	↑	↔	↔	Malignancy, Paget's, CKD	