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**The Thistle QA CEU No is: MTS 18/062**

Each attendee should claim ONE CEU point for completing this Quality Control Journal Club exercise, and retain a copy of the relevant Thistle QA Participation Certificate as proof of registration on a Thistle QA EQA.

## CHEMISTRY LEGEND

August 2018

### Jaundice

Jaundice, also known as icterus, is a yellowish or greenish pigmentation of the skin and whites of the eyes due to high bilirubin levels. It is commonly associated with itchiness. The feces may be pale and the urine dark. Jaundice in babies occurs in over half in the first week following birth and in most is not a problem. If bilirubin levels in babies are very high for too long, a type of brain damage, known as kernicterus, may occur.

#### Signs and Symptoms

The main sign of jaundice is a yellowish discoloration of the white area of the eye and the skin. Urine is dark in colour. Slight increases in serum bilirubin are best detected by examining the sclerae, which have a particular affinity for bilirubin due to their high elastin content. The presence of scleral icterus indicates a serum bilirubin of at least 3 mg/dL. The conjunctiva of the eye is one of the first tissues to change color as bilirubin levels rise in jaundice. This is sometimes referred to as *scleral icterus*. The sclera themselves are not "icteric" (stained with bile pigment), however, but rather the conjunctival membranes that overlie them. The yellowing of the "white of the eye" is thus more properly termed *conjunctival icterus*.

Other Common symptoms of jaundice include:

- pale stools
- dark urine
- itchiness

#### Causes

Causes of jaundice vary from non-serious to potentially fatal. Levels of bilirubin in blood are normally below 1.0 mg/dL (17  $\mu$ mol/L) and levels over 2–3 mg/dL (34-51  $\mu$ mol/L) typically results in jaundice. High bilirubin is divided into two types: unconjugated (indirect) and conjugated (direct) Conjugated

bilirubin can be confirmed by finding bilirubin in the urine. Other conditions that can cause yellowish skin but are not jaundice include carotenemia from eating large amounts of certain foods and medications like rifampin.

High unconjugated bilirubin may be due to excess red blood cell breakdown, large bruises, genetic conditions such as Gilbert's syndrome, not eating for a prolonged period of time, newborn jaundice, or thyroid problems. High conjugated bilirubin may be due to liver diseases such as cirrhosis or hepatitis, infections, medications, or blockage of the bile duct. In the developed world, the cause is more often blockage of the bile duct or medications while in the developing world, it is more often infections such as viral hepatitis, leptospirosis, schistosomiasis, or malaria. Blockage of the bile duct may occur due to gallstones, cancer, or pancreatitis. Medical imaging such as ultrasound is useful for detecting bile duct blockage.

### **Diagnosis**

As part of the diagnosis a doctor may request blood tests to check bilirubin levels and the composition of the blood. These include:

- **Bilirubin tests:** A high level of unconjugated bilirubin compared to levels of conjugated bilirubin suggest hemolytic jaundice.
- **Full blood count (FBC), or complete blood count (CBC):** This measures levels of red blood cells, white blood cells, and platelets.
- **Hepatitis A, B, and C tests:** This tests for a range of liver infections.

Jaundice is classified into three categories, depending on which part of the physiological mechanism the pathology affects. The three categories are:

- a. Pre-hepatic- The pathology is occurring prior to the liver due to either: A. Intrinsic defects in RB cells  
B. Extrinsic causes external to RB cells
- b. Hepatic- The pathology is located within the liver caused due to disease of parenchymal cells of liver.
- c. Post-Hepatic- The pathology is located after the conjugation of bilirubin in the liver caused due to obstruction of biliary passage.

**Table 1:** Diagnostic Test

Function test	Pre-hepatic Jaundice	Hepatic Jaundice	Post-Hepatic Jaundice
<b>Total bilirubin</b>	Normal/Increased	Increased	Increased
<b>Conjugated bilirubin</b>	Normal	Increased	Increased
<b>Unconjugated bilirubin</b>	Normal/Increased	Increased	Normal
<b>Urobilinogen</b>	Normal/Increased	Decreased	Decreased / negative
<b>Urine color</b>	Normal	Dark (urobilinogen + conjugated bilirubin)	Dark (conjugated bilirubin)
<b>Stool color</b>	Normal	Slightly pale	Pale
<b>Alkaline phosphatase levels</b>	Normal	Increased	Increased
<b>Alanine transferase and aspartate transferase levels</b>	Normal	Increased	Increased
<b>Conjugated bilirubin in urine</b>	Not Present	Present	Present
<b>Large Spleen</b>	Present	Present	Absent

### Treatment

Treatment of jaundice is typically determined by the underlying cause.

If a bile duct blockage is present, surgery is typically required; otherwise, management is medical. Medical management may involve treating infectious causes and stopping medication that could be contributing. Among newborns, depending on age and prematurity, a bilirubin greater than 4–21 mg/dL (68–360 µmol/L) may be treated with phototherapy or exchanged transfusion. The itchiness may be helped by draining the gallbladder or ursodeoxycholic acid.

### References

1. <https://en.wikipedia.org/wiki/Jaundice>.
2. <https://www.medicalnewstoday.com/articles/165749.php>
3. <https://www.aafp.org/afp/2004/0115/p299.html>

### Questions

1. Define the term Jaundice.
2. Discuss the signs and symptoms of Jaundice.
3. How can Jaundice be treated?