



***Ambrose Alli University, Ekpoma***  
***Faculty of Life Sciences.***

***COURSE TITLE: CLINICAL BIOCHEMISTRY (BCH 413)***

***BY***  
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***COURSE SESSION: 2017/2018***

***COURSE UNIT: 3***

***DATE OF LECTURE COMMENCEMENT: 13/06/2018.***



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## **□ Welcome to Lecture 1 (Series 2)**

**➤ Topic 1: Biochemical basis of routine laboratory test of clinical significance**

### **➤ Objectives**

- **To understand the rationale for routine laboratory test**
- **To know the clinical test of significance and**
- **Give examples of some of these test.**



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**Examples of Important Clinical Test Continues**



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### **□ Liver function test**

➤ **Determines the health status of the liver by measuring the levels of:**

- **Proteins**
- **Liver enzymes or**
- **bilirubin in the blood.**

➤ **Either higher- or lower-than-normal values can indicate a problem with the liver.**



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**□ Some common liver function tests include:**

**➤ Alanine transaminase (ALT) test:**

- A high result on this test can be a sign of liver damage**
- Low ALT is not indicative of any health issues.**



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## ➤ **Aspartate Aminotransferase (AST) test**

### ➤ **This enzyme is found in the:**

- **Heart**
- **Liver and**
- **Muscles.**

❖ **AST levels are not specific for liver damage, it is usually measured together with ALT to check for liver problems.**

**An ALT-to-AST ratio may help with diagnosis.**



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- ❖ **A high result on an AST test might indicate a problem with the liver or muscles**
- ❖ **Low AST is not indicative of any health issues**



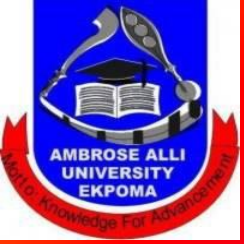
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## **□ Alkaline Phosphatase (ALP) test**

**✓ An enzyme found in:**

- Bones**
- Bile ducts and**
- Liver.**





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- **High levels of ALP may indicate:**
  - ✓ **Liver damage**
  - ✓ **Blockage of the bile ducts or**
  - ✓ **Bone disease.**



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## **Albumin Assay**

- **Albumin made by liver**
- **Measures how well the liver is making Albumin**
- **A low value indicates liver not functioning properly.**



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### ➤ **Bilirubin test**

✓ **A waste product of red blood cells breakdown**

✓ **It is processed by the liver**

✓ **It is excreted through the stool**

✓ **A damaged liver cannot properly process bilirubin**

✓ **This leads to an abnormally high level of bilirubin**

✓ **High bilirubin indicates the liver not functioning properly.**



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### □ Kidney (Renal) function test:

- An most important functions is to filter waste materials from the blood and expel them from the body as urine.
- There are simple blood and urine tests that can identify problems with the kidneys
- These tests include:



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## ➤ **Albumin.**

- ✓ **A protein found in blood**
- ✓ **Very little in urine if kidneys are healthy**
- ✓ **High values is indicative of kidneys damage**
- ✓ **Albumin may leak out of the kidneys and into urine increasing its level.**



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## ➤ **Glucose.**

- **Levels of glucose in the urine indicate glycosuria.**
- **Renal glycosuria occurs when the renal tubules fail to reabsorb all glucose at a level that is normal.**



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### ➤ **Blood Urea Nitrogen (BUN).**

✓ **Urea nitrogen byproduct from food proteins breakdown**

✓ **As kidney function decreases, the BUN level rises.**



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### ➤ **Creatinine:**

- **A waste product from the muscles of the body.**
- **Levels vary depending on age, race and body size.**
- **Elevated levels may indicate kidneys dysfunction.**
- **Level in the blood rises as kidney disease progresses.**





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## ➤ **BUN- to - Creatinine Ratio**

- **An increased ratio may be due to a condition that causes a decrease in the flow of blood to the kidneys.**



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### ➤ **Estimated Glomerular Filtration Rate (eGFR)**

#### ❖ **Test is a measure:**

- ✓ **Effectiveness of waste removal by the kidneys**
- ✓ **Excess fluid from the blood.**

• **The normal value for GFR is  $\geq 90$**

• **Decrease with age.**

• **A GFR below 60 is a sign of kidneys impairment**

• **A GFR below 15 indicates kidney failure.**



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## ➤ **Carbon Dioxide:**

• **The kidneys and lungs balance the levels of:**

✓ **Carbon dioxide**

✓ **Bicarbonate, and**

✓ **Carbonic acid in the blood**

❖ **Carbon dioxide levels can help diagnose kidney disease.**



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## ➤ **Calcium:**

- ✓ **Help determines amount of calcium excreted**
- ✓ **Help diagnose kidney stones**



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## ➤ **Chloride:**

- ✓ **Chloride is an electrolyte**
- ✓ **Increased level in blood may indicate kidney disease**



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### ➤ **Phosphorus:**

- ✓ **Functional Kidneys remove extra phosphorus from the blood.**
- ✓ **High phosphorus levels is an indication of kidneys damage.**



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## ➤ **Potassium.**

- **Kidney disease is the most common cause of high blood potassium.**

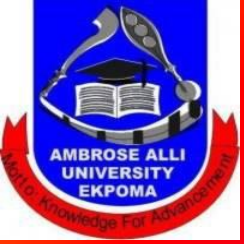


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## ➤ **Sodium**

- **Abnormal levels of sodium help to determine if the kidneys are properly removing sodium from the body.**





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## □ Saliva test

➤ **Saliva testing is the most reliable way to measuring hormones like:**

- **Cortisol**
- **Estrogen**
- **Melatonin**
- **Progesterone and**
- **Testosterone.**



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## ➤ **Advantages of saliva testing**

- ✓ **It is more accurate than blood testing.**
- ✓ **It is more affordable than blood testing.**
- ✓ **While blood and serum tests determine the level of hormones that are present in tissues (bound hormones), saliva testing determines the (unbound hormone levels).**



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## ➤ **Advantages of saliva testing Cont.**

- ✓ **It provides a better idea of the levels of hormones that are actually influencing the tissues, rather than just the level of hormones that are present in the tissues.**



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## ➤ **Estrogens:**

✓ **Produced by fat cells**

✓ **Elevated level indicates of possible breast and uterine cancers disposition.**



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## ➤ **Testosterone:**

- ✓ **Decreased testosterone produces a drop in libido.**
- ✓ **Excess may be the result of polycystic ovary syndrome (PCOS); possible symptoms include:**
  - **Irregular periods**
  - **Male-pattern baldness**
  - **Deepening voice, and**
  - **excess body hair.**



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### ➤ **Melatonin :**

- ✓ **Primarily secreted at night to induce sleep**
- ✓ **Level decreases with age**
- ✓ **Explains why some older adults have insomnia and**
- ✓ **Depression.**



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### ➤ **Cortisol:**

✓ **Elevated level is indicative of:**

- **Stress**
- **Suppression of the immune system and**
- **Linked to abdominal fat accumulation**



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### ➤ **Progesterone :**

#### ✓ **Low progesterone promotes :**

- **Depression**
- **Irritability**
- **Increased inflammation**
- **Irregular menses**
- **Breast tenderness**
- **Urinary frequency and**
- **Prostate gland enlargement.**





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**End of Lecture 1 (Series 2)**