



***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***

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## Lecture 1 (Series 1).

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

### Objectives:

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



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### □ Rationale for routine laboratory tests

#### Definition of Keys terms:

- 1. Test: critical evaluation**
- 2. Evaluation: Animals/Humans**
- 3. Routine: Regular (Time based) action**

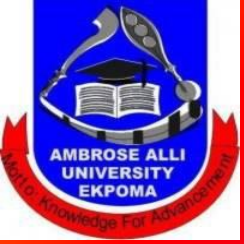


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### Reasons for Clinical Test

- 1. To monitor the several biochemical reactions occurring within the cells of an organism.**
- 2. To ensure that cellular metabolites are within acceptable or healthy ranges.**



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## **Clinical test of significance (9)**

- ✓ **Blood test**
- ✓ **Urine test**
- ✓ **Liver function test**
- ✓ **Saliva test**
- ✓ **Kidney (Renal function test)**
- ✓ **Endocrine test (Including fertility test)**
- ✓ **Test of haemoglobinopathies**
- ✓ **Coagulation defect test and**
- ✓ **Provocative test.**



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## **BLOOD TEST**

### ➤ **Significance**

- ❖ It provides clues to how the body is working
- ❖ It can be the first indicator of a health challenge.



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## **□ Blood Test Cont..**

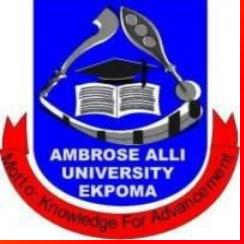
### **➤ Test Types:**

#### **✓ Complete Blood Count (CBC):**

##### **Measures :**

- **Number of Red Blood Cells (RBC)**
- **White Blood Cells (WBC)**
- **Hemoglobin (Hb)**
- **Packed Cell Volume (PCV) &**
- **other important blood values.**





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**Numbers outside normal range may indicate any of:**

- **Infection**
- **Immune system disorder**
- **Anemia**
- **Cancer.**



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## ✓ Lipoproteins

▪ This test is used to measure cholesterol levels or blood fats. They are broken down into:

- High Density Lipoprotein (HDL)
- Low Density Lipoprotein (LDL) and
- Triglycerides (TG).

❖ Results help determine the risk of cardiovascular disease(s).



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## ✓ Blood Glucose:

• **This test is often requested after an over-night fast to:**

- ✓ **Detect diabetes or**
- ✓ **Detect prediabetes.**



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## ✓ Metabolic Profile

➤ **Test results indicate if there are potential issues with muscles like:**

- **Heart**
- **Kidney**
- **liver and**
- **Bones\***

**\* Not a muscle.**



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## ✓ **Clotting Factor**

- **This test is used to determine whether blood is clotting properly.**
- **It is important to have normal clotting factors to avoid excessive blood loss.**



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## **□ Urine Test**

**▪ Urine Test = Urinalysis**

**• Urinalysis: Detect abnormalities of urine**

**• Help diagnose and manage:**

- Renal diseases**
- Urinary tract infections**
- Systemic diseases and**
- Inflammatory or**
- Neoplastic disorders.**



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➤ **Urinalysis may include the following:**

### **a. Colour:**

- ✓ **The color of normal urine is usually light yellow to amber.**
- ✓ **Generally the greater the urine solute the deeper the colour.**
- ✓ **Deviations from normal color can be caused by certain drugs and various vegetables.**



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### **b. Appearance**

- ✓ **Normal urine is transparent or clear**
- ✓ **Becomes cloudy upon standing.**
- ✓ **Cloudy urine may be evidence of:**
  - **Phosphates**
  - **Urates**
  - **Mucus**
  - **Bacteria**
  - **Epithelial cells or**
  - **Leukocytes.**





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### **c. Odour**

- **Urine does not have strong odour.**
- **Some diseases cause change in the odour of urine.**
  - **For example:**
    - **An infection with bacteria can cause a bad odor**
    - **while diabetes or starvation can cause a sweet, fruity odor.**



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## **d. Specific gravity**

- **measures density of urine**
- **Reflects how concentrated or dilute a sample is**
  - **measures density of urine**
  - **Reflects how concentrated or dilute a sample is**
- **Very dilute urine has a low specific gravity and is associated with conditions like diabetes, excessive water intake, diuretic use or chronic renal failure.**
- **Concentrated urine has a high value and is associated with diabetes mellitus, adrenal abnormalities or excessive water loss.**



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## **e. Acidity (pH)**

➤ **The pH level indicates the amount of acid in urine.**

**•Abnormal pH levels may indicate:**

**✓A kidney disorder or**

**✓A Urinary tract disorder.**



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### **f. Protein.**

- **Low levels of protein in urine are normal.**
- **large amounts may indicate a kidney problem.**



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### **g. Glucose & Ketones**

- **Normally amount of glucose/ketones in urine is too low to be detected.**
- **Detection of sugar/ketones in urine calls for follow-up testing for diabetes.**



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### **h. Occult blood**

➤ **Blood in urine may be a sign of:**

- ✓ **Kidney damage**
- ✓ **Infection**
- ✓ **Kidney or bladder stones**
- ✓ **kidney or bladder cancer**
- ✓ **or blood disorders.**



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### **i. Nitrites/Leukocyte esterase.**

- **Detection of either nitrites or Leukocyte esterase which is products of white blood cells is detected in urine, it may be a sign of a urinary tract infection.**



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## **j. Bilirubin.**

- ✓ **A product of red blood cell breakdown.**
- ✓ **Normally, carried in the blood and passes into the liver**
- ✓ **where it is removed and becomes part of bile**
- ✓ **Bilirubin in urine may indicate liver damage or disease.**





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### **k. Urobilinogen.**

- **A product of Red Blood Cells (RBCs) break down or heamolysis.**
  - **Elevation may indicate excess RBC breakdown**
  - **liver overburdening**
  - **Hematoma**
  - **poisoning or**
  - **liver cirrhosis.**
- **Decreased levels may indicate a blockage in the bile duct system or bile production failure.**



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