DIAGNOSTICS 1  
INTRODUCTION TO CHEMICAL PATHOLOGY

**Professor Karim Meeran** ([k.meeran@imperial.ac.uk](mailto:k.meeran@imperial.ac.uk))

**Learning objectives**

1. List five common diagnostic tests carried out by the department of chemical pathology
2. Know how to collect specimens for common tests including electrolytes, urea, glucose and glycosylated haemoglobin
3. Describe a typical chemical pathology request form

The Department of Chemical Pathology processes samples and measures the concentrations of many important metabolites. Changes in the concentration of metabolites can suggest particular illnesses.

The most commonly requested tests include:

1. **Electrolytes** (including, sodium and potassium).
2. **Urea and creatinine**. High levels suggest failure of renal excretion of these substances and hence renal failure.
3. **Calcium and phosphate**
4. **Markers of liver function** (liver enzymes). Only very small amounts of liver enzymes should enter the bloodstream. Damage to the liver may result in extra amounts of these enzymes leaking into the blood. Particular diseases seem to be associated with particular patterns of liver enzymes. Enzymes commonly measured include
   1. alkaline phosphatase
   2. aspartate amino-transferase (AST)
   3. alanine amino-transferase (ALT)
   4. gamma glutamyl transferase (GGT)
5. **Hormone assays** are done within a subdivision of the chem. Path department (endocrinology). Hormones commonly measured include thyroxine, TSH and cortisol.
6. **Glucose**. This can be rapidly measured using a glucose sensitive stick which can be undertaken in the Ward/clinic/home. A more accurate method is carried out within the laboratory. Red cells will consume glucose, even after it is out of the patient, unless they are poisoned.

What poison is used for this purpose? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Case Study**

Billy is a 26-year-old who has blood taken by his GP.

The chemical pathology department undertake the following tests using the GP request form.

* U + E
* LFT
* Glucose

1. What can you infer from the electrolytes? (Na and K).

2. If the potassium is raised, what important question does the lab need to check?

3. What can you infer from the discrepancy between the urea and the creatinine?

4. Liver “function” tests include albumin and bilirubin as well as the liver enzymes.

5. What can you infer from Billy’s Albumin result?

6. What can you infer from the Bilirubin result, and what would you see on careful examination of Billy’s eyes?

7. Looking at the rest of the form, what are “cardiac enzymes”?