



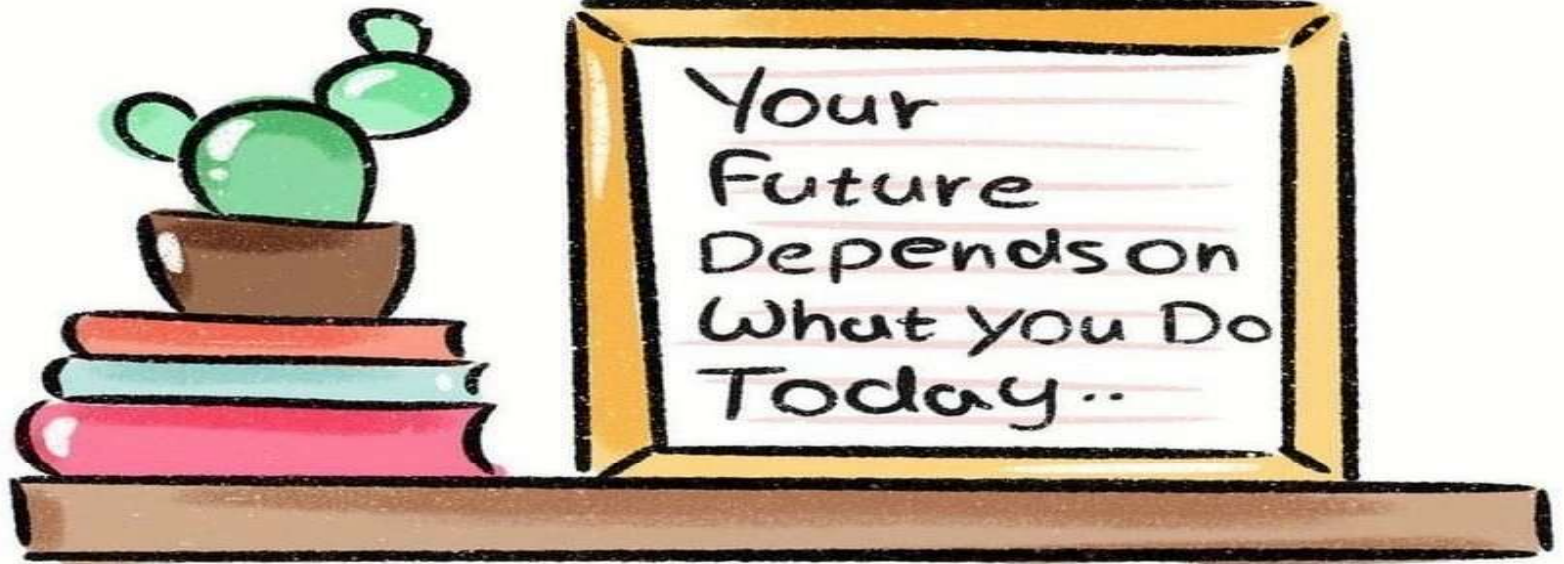
**Dr. Muslim Al-Eidani**

***Metabolism  
(Practical)***

***Second Stage***

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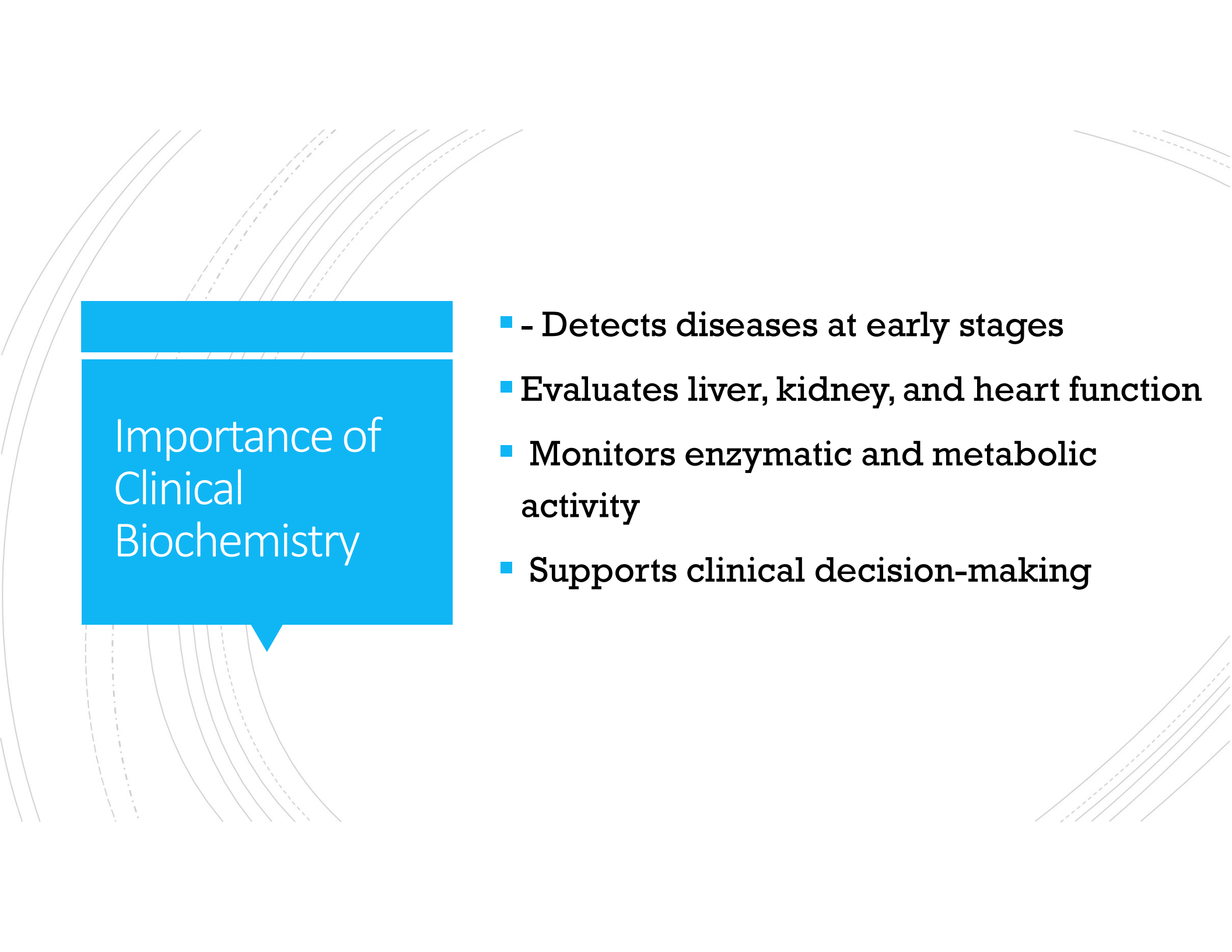


خديجة بدر  
@Holydej

مستقبلك يعتمد  
على ما تفعله اليوم

## **What is Clinical Biochemistry?**

It studies the chemical processes in the human body and examines biological fluids to help in diagnosis and treatment. It connects chemistry with medicine to understand metabolism and how organs work.

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## Importance of Clinical Biochemistry

- - Detects diseases at early stages
- Evaluates liver, kidney, and heart function
- Monitors enzymatic and metabolic activity
- Supports clinical decision-making

# Laboratory Safety



- Always wear a lab coat, gloves, and goggles

Never eat or drink in the lab

Dispose of waste properly

Handle glassware and chemicals carefully



## Common Instruments

- Spectrophotometer

Calorimeter

Centrifuge

Micropipette



**Micropipette**



**Spectrophotometer**



**Calorimeter**



**Centrifuge**





# Calorimetry

**Calorimetry measures the heat released or absorbed during physical or chemical processes. It determines the energy content and reaction enthalpy.**



## Principle of Calorimetry

- When a reaction occurs, heat is either absorbed (endothermic) or released (exothermic).

$$q = m \times c \times \Delta T$$

( $q$  = heat,  $m$  = mass,  $c$  = specific heat,  $\Delta T$  = temperature change)

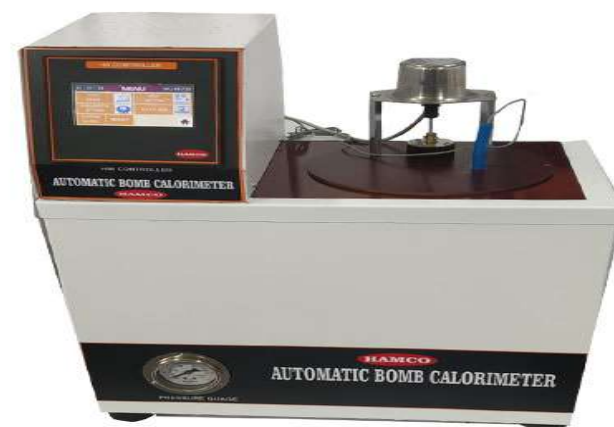
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## Types of Calorimeters

1. Simple Water Calorimeter
2. Bomb Calorimeter
3. Differential Scanning Calorimeter (DSC)

# Components of a Bomb Calorimeter

- Reaction vessel (bomb)
- Water bath



**Stirrer and  
thermometer**  
- Ignition  
system  
Calibration  
ensures  
accuracy.





# Applications of Calorimetry

Determining energy content of food

Measuring metabolic rates

Studying thermodynamics

Pharmaceutical quality control

## Spectrophotometry

- Spectrophotometry measures light absorbance by a solution. Essential in biochemical and clinical assays





## Beer–Lambert Law

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$$A = \varepsilon \times c \times l$$

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**A = absorbance,**

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**$\varepsilon$  = molar absorptivity,**

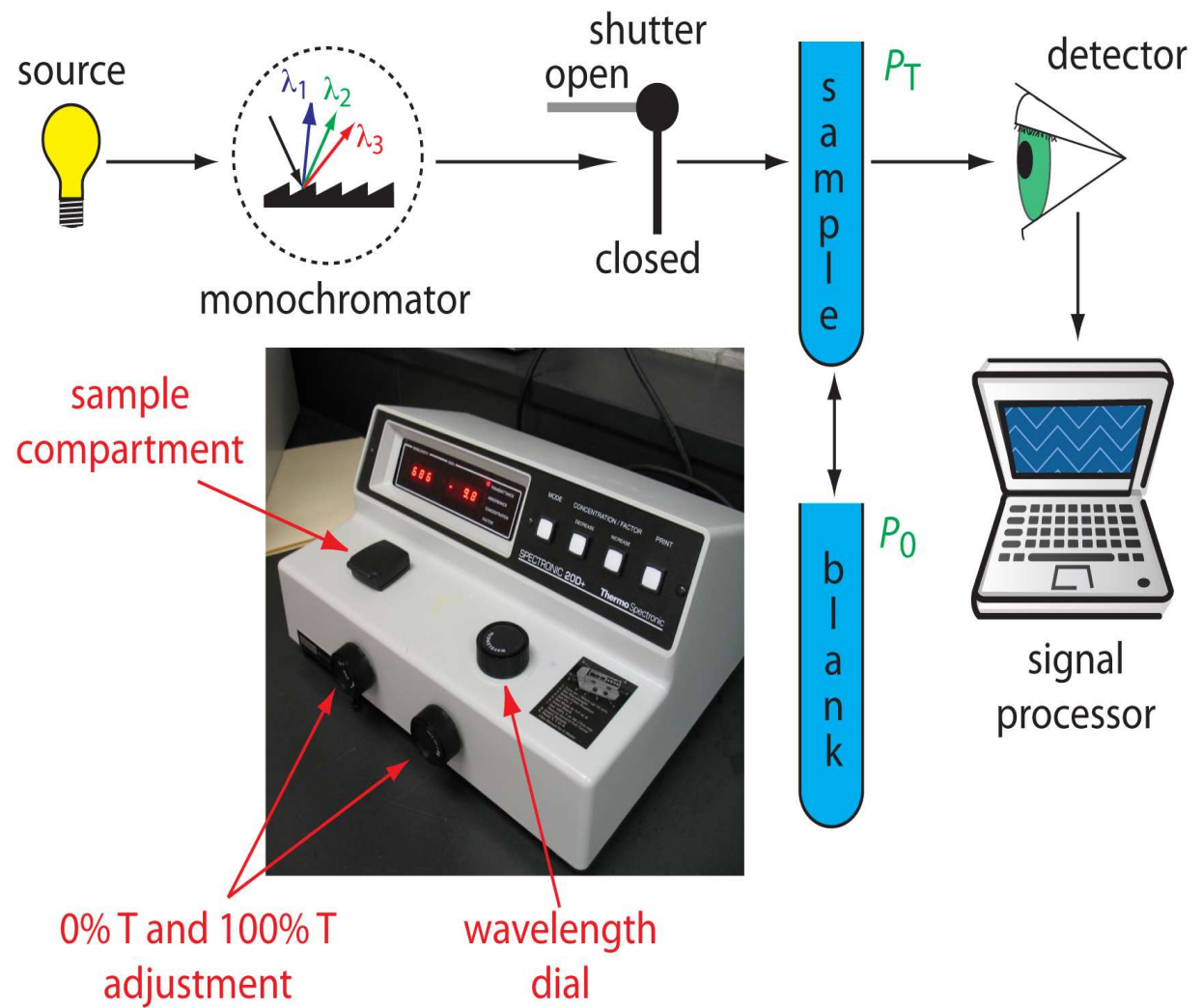
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**c = concentration,**

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**l = path length. Absorbance is directly proportional to concentration.**

# Components of a Spectrophotometer



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## Procedure

1. Turn on and warm up instrument
2. Select wavelength
3. Calibrate using a blank
4. Measure absorbance

# Applications of Spectrophotometry

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graph LR; A[Applications of Spectrophotometry] --> B[-Protein and enzyme assays]; B --> C[Glucose and cholesterol tests]; C --> D[DNA and RNA quantification]; D --> E[Drug analysis];
```

-Protein and  
enzyme  
assays

Glucose and  
cholesterol  
tests

DNA and  
RNA  
quantification

Drug analysis

Comparison  
Between  
Calorimetry and  
Spectrophotometry

PARAMETER	Calorimetry	Spectrophotometry
Measured	Heat energy	Light absorbance
Output	Temperature change	Absorbance value
Application	Energy analysis	Concentration measurement

