AlAYEN IRAQI UNIVERSITY
Health and Medical Technologies
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Scope of biochemistry in health and Disease
General Chemistry
Lec 1

Introduction of biochemistry

The word 'BIOCHEMISTRY'-means-Chemistry of Living beings or Chemical Basis of Life.

"Life" in Biochemistry point of view is: Hundreds of Biochemical reactions and Biochemical processes Occurring in sub cellular organelles of a cell in an organized manner.

- Biochemistry is a branch of life science. Which deals with the Study of Biochemical Reactions and Processes Occurring in living cells of organisms.

Branches of Biochemistry:-

Medical Biochemistry -Deals with chemical basis of human body.

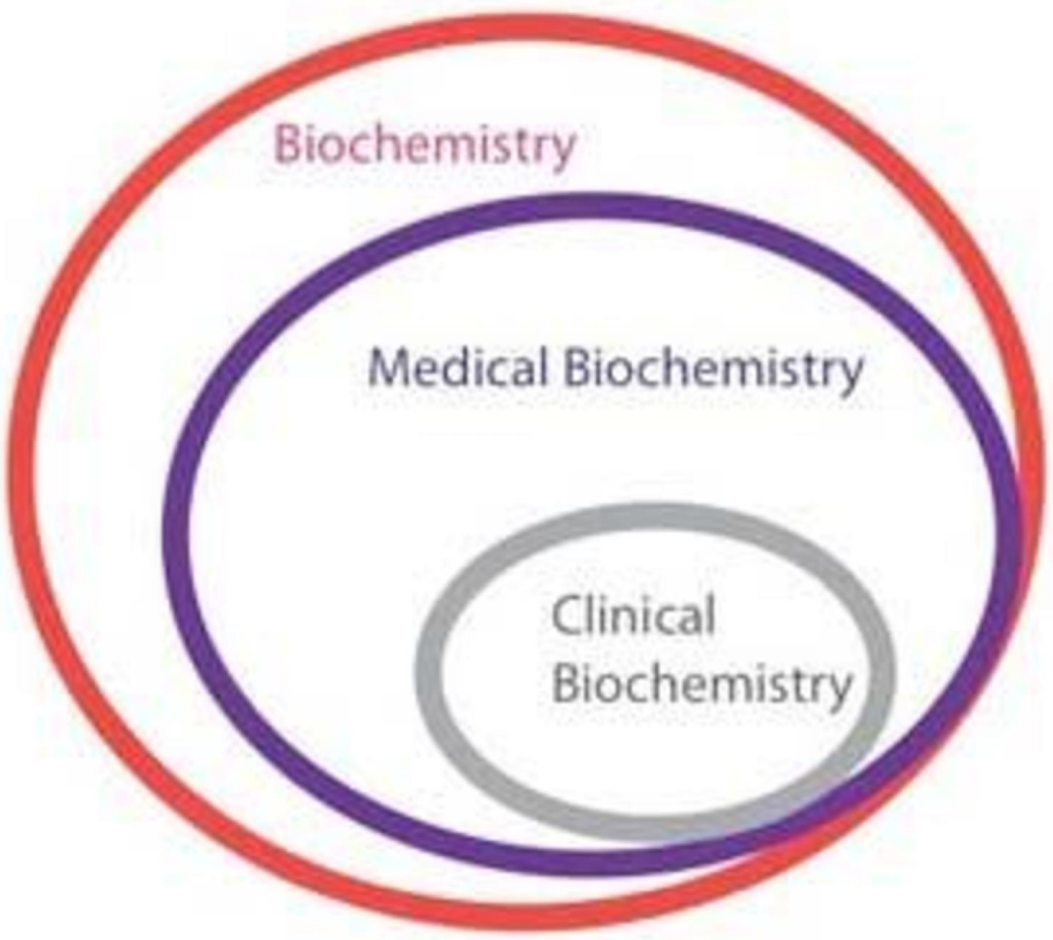
Clinical Biochemistry-Deals with clinical diseases/pathological conditions of human body.

Bacterial Biochemistry-Deals with Microbes.

Plant Biochemistry- Deals with Plants.

Animal Biochemistry-Deals with animals.

Industrial Biochemistry:- Deals with industrial products involved with microorganisms.



Clinical Biochemistry supports:
Diagnosis, Therapy and Research of Medical field.

***To know the various Biomolecules composed in Human body:**
Chemistry/Structure
Occurrence/Location
Functions/Role

***Determination of mode of action of Biomolecules is by:**
Isolation and Structural elucidation of Biomolecules.

***Understand completely all the organized Biochemical processes Occurring in living cells at the molecular/sub cellular level.**

***Identification of disease mechanisms:**
Study of Inborn Errors of metabolism.
Study of Oncogenes in cancer cells.

Medical or Human Biochemistry is a branch of Biochemistry which deals with:
Biochemical constituents of human body
Their interactions in body cells
To maintain normal health, growth and reproduction and **related diseases.**
Study of **various Biochemical constituents of cell:**
(Chemistry, properties , functions, metabolism and related disorders).

1. **Carbohydrates**
2. **Lipids**
3. **Proteins**
4. **Vitamins**
5. **Minerals**
6. **Water**

Metabolism of Biomolecules

1. Ingestion
2. Digestion
3. Absorption
4. Transport
5. Uptake and Assimilation of food constituents in human body.

Roles Of Important Biomolecules

***Carbohydrates:** serves as primary source of energy.

***Lipids:** serves as secondary source of energy.

***Proteins:** are structural and functional units of human body which are of prime importance and survival of human beings.

***Vitamins:** Fat soluble and Water soluble vitamins have specific functions which serve as accessory growth factors.

***Minerals:** Inorganic elements major and minor type has important role in building and functioning of human bodies.

*__Enzymes:__ are biomolecules which are Biocatalysts catalyzes specific biochemical reactions of metabolic pathways and considered as functional units of metabolism.

*__Hormones:__ the Endocrine substances, chemical messengers of human body.
They bring good coordination and regulate enzyme activities of metabolism.

***Nucleic acids** and Molecular Genetics DNA, RNA and Protein synthesis Regulation of gene expression Recombinant DNA technology.

Biochemical Aspects of Health and Disease

Healthy body in biochemical point of view is with- Normal metabolic functions in the body cells.
Balanced levels of all the biochemical constituents

Health depends on a harmonious balance of biochemical reactions occurring in the body

Disease reflects abnormalities in biomolecules, biochemical reactions, or biochemical processes in a human body.

Types Of Diseases Due to Biochemical Alterations:

***Nutritional Disorders**

***Inborn Errors of Metabolism**

***Endocrine/Metabolic Disorders**

***Genetic/Molecular Disorders**

***Immunological Disorders**

Nutritional Disorders

These are disorders **caused due to defect in pattern of nutrition:**

Over Nutrition

Under Nutrition

example :-Obesity, Iron Deficiency Anemia, and Tetany

Endocrine/Metabolic Disorders

These disorders are **due to defect in Endocrine system. Hypo and Hyper activity of Endocrine organs. Derangement in Hormones** which **affect the Enzyme activities of metabolic reactions.** This **in turn causes derangement in metabolism.**

Example:- Diabetes Mellitus, Hypothyroidism, Hyperthyroidism, Addisons Disease, Cushings Syndrome

Genetic/Molecular Disorders

These disorders are **due to defect in DNA molecule.**
Gene mutations in structural or regulatory genes
Mutated genes on expression **leads to structural defective Proteins.**
Defective structural Proteins **in turn affect the functionality of the Proteins leading to disorder**.
Example:- Inborn Errors of Metabolism, Cancer, Sickle Cell Anemia, Thallasemia

Immunological Disorders

Caused due to defective Immune System, **Hypersensitivity**
Auto immune Disorders-**Rheumatoid Arthritis**, **Multiple Myelomas**

Role Of Clinical Biochemistry In Diagnosis Of Diseases

In a specific diseased condition there occurs derangements in the hormonal actions Which affects, homeostatic mechanisms and metabolic processes Which in turn alters the normal concentrations of biochemical constituents in body cells and their fluids.

Metabolic changes associated with specific disorders may give rise to a changes in the body fluids.

Biochemical profile of a particular body fluid is analyzed for example **Blood Glucose in Diabetes mellitus**;

Glucose levels in the cerebrospinal fluid in bacterial meningitis (which are greatly reduced).

Hence, specific parameters are looked for in a specific body fluid when a disease is suspected

Suspected diseased cases by a physician are investigated for the levels of biochemical parameters

In **various collected biological specimens** viz Blood/plasma/serum/urine/CSF/other body fluids

The collected specimens are analyzed in a Clinical Biochemistry Laboratory using **various analytical methods** to obtain the results.

The obtained **results are compared with** the values with respective **normal/reference range.**

Results are reported to a physician for confirming the diagnosis and treatment of the patient.

THANK YOU!

؟؟ ANY QUESTIONS

PLEASE ASK