Scope of Biochemistry

Modern Biochemistry has two branches, descriptive Biochemistry and dynamic Biochemistry. Descriptive Biochemistry deals with the qualitative and quantitative characterization of the various cell components and the dynamic Biochemistry deals with the elucidation of the nature and the mechanism of the reactions involving these cell components. Many newer disciplines have been emerged from Biochemistry such of Enzymology (study of enzymes), Endocrinology (study of hormones) Clinical Biochemistry (study of diseases), Molecular Biochemistry (Study of Biomolecules and their functions). Along with these branches certain other specialties have also come up such as Agricultural Biochemistry, Pharmacological Biochemistry etc.

Objectives of Biochemistry

The major objective of Biochemistry is the complete understanding of all the chemical processes associated with living cells at the molecular level. To achieve this objective, biochemists have attempted to isolate numerous molecules (Bio molecules) found in cells, to determine their structures and to analyze how they function. Biochemical studies have illuminated many aspects of disease and the study of certain diseases have opened up new therapeutic approaches. In brief the objectives can be listed as follows:

1. Isolation, structural elucidation and the determination of mode of action of biomolecules.
2. Identification of disease mechanisms.
3. Study of in born errors of metabolism
4. Study of oncogenes in cancer cells
5. The relationship of biochemistry with genetics, physiology, immunology, pharmacology, toxicology etc.

Importance of biochemistry in MEDICINE

• Physiology: Biochemistry helps one understand the biochemical changes and related physiological alteration in the body.

• Pathology: Based on the symptoms described by the patient, physician can get clue on the biochemical change and the associated disorder. For example if a patient complains about stiffness in small joints, then physician may predict it to be gout and get confirmed by evaluating uric acid levels in the blood. As uric acid accumulation in blood results in gout.

• Nursing and diagnosis: In nursing importance of clinical biochemistry is invaluable. Also almost all the diseases or disorders have some biochemical involvement. So the diagnosis of any clinical condition is easily possible by biochemical estimations.

Importance of biochemistry in AGRICULTURE

• Prevent diseases and Enhance Yield/ growth: It helps for prevention, treatment of diseases and also increase the production or yield. Some hormones promote growth, while other promote flowering, fruit formation etc. In fisheries, use of substances to promote fish growth, their reproduction etc can be understood.

• Adulteration: Even the composition of food material produced, their alteration or adulteration for example in honey can be found by biochemical tests. Biochemistry tests

help prevent contamination.

• Biochemical tests for the pesticide residues or other toxic waste in plant, food grain and soil can be evaluated. Hence during import and export of food grains a biochemical check of the toxic residues is done to fix the quality.

• In animal husbandry, the quality of milk can be checked by biochemical tests. It also helps diagnose any disease condition in animals and birds.

• In fisheries the water quality is regularly monitored by biochemical tests. Any drastic change in water chemistry & composition of fishery ponds can lead to vast death of fishes and prawns, hence the tests are done on regular basis to see salt content (calcium content), pH, accumulation of waste due to not changing water for long etc.

• In Plant/ Botany: Biochemistry of plants gave way to breakthrough of how food is synthesized in them and the reason why they are autotrophs i.e. not dependent on other living beings for food. Biochemistry in plants describes; Photosynthesis; Respiration; Different sugars; Plants secondary metabolites.

Importance of biochemistry in NUTRITION

• Food chemistry gives an idea of what we eat. The nutrients value of food material can also be determined by biochemical tests.

• Role of nutrients: Due to biochemistry the importance of vitamins, minerals, essential fatty acids, their contribution to health were known. Hence there is frequent recommendation for inclusion of essential amino-acids, cod liver oil, salmon fish oil etc. by physicians and other health and fitness experts.

• Physician can prescribe to limit usage of certain food like excess sugar for diabetics, excess oil for heart & lung problem prone patients etc. As these carbohydrate and fat biochemical can inhibit the recovery rate from said disorder. This knowledge is due to their idea on food chemistry and related

Importance of biochemistry in PHARMACY

• Drug Constitution: Biochemistry gives an idea of the constitution of the drug, its chances of degradation with varying temperature etc. How modification in the medicinal chemistry helps improve efficiency, minimize side effects etc.

• The half life and Drug storage: This is a test done on biochemical drugs to know how long a drug is stable when kept at so and so temperature. For example many enzymes, hormones are stored for dispensing. These get deteriorated over time due to temperature or oxidation, contamination and also due to improper storage.

• Drug metabolism: It also gives an idea of how drug molecules are metabolized by many biochemical reactions in presence of enzymes. This helps to avoid drugs which have poor metabolism or those with excessive side effects from being prescribed or dispensed to the patient.