Branch of science dealing with chemical processes taking place with in the living organisms.

Study of biological processes at cellular & molecular level.

Study of behaviour of complex molecules in biological materials and the ways these molecules interact to form cells, tissues and whole organisms.

**Significance of biochemistry:**

The importance of biochemistry is so vast that it is indispensable in our daily life activities.

It is used in clinical diagnosis, manufacture of various biological products, treatment of diseases, in nutrition, agriculture, etc.

The [study](http://biochem.missouri.edu/undergrad-program/undergraduate-courses.php) of biochemistry helps one understand the actual chemical concepts of biology.

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[Biochemistry](http://www.amazon.com/Lehninger-Principles-Biochemistry-David-Nelson/dp/1429234148/ref=sr_1_2?ie=UTF8&qid=1440858303&sr=8-2&keywords=biochemistry) is one of the [branches of chemistry](https://www.studyread.com/what-are-the-branches-of-chemistry/) which deals with chemical basis of life in plants and animals.

Biochemistry in general deals with body substance like [enzymes](https://www.studyread.com/applications-enzymes-role/), carbohydrates, amino acids, fats, proteins, [hormones](https://www.studyread.com/list-hormones/), DNA, RNA, pigments, etc.

It describes their origin, formation, function, deficiency symptoms, etc. It tries to explain life regarding biochemical reactions. One can understand all the chemical reactions happening at the molecular level in a living cell or living being. The role of biochemistry and its importance in various fields is as described below.

Medicine:

Biochemistry is a valuable subject in medicine without which there would have been no such advancement in the field.

* **Physiology**: Biochemistry helps one understand the biochemical changes and related physiological alteration in the body. Pathology of any disease is studied through biochemical changes.
* **Pathology**: Based on the symptoms described by the patient, the physician can get a clue on the biochemical change and the associated disorder. For example, if a patient complains about stiffness in small joints, then the 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.
* **Nutrition deficiency**: In the present scenario, many people rely on taking multivitamin & minerals for better health. The function and role of the [**vitamin**](https://www.naturalremedieshome.com/vitamins-and-what-they-do) in the body are described only by biochemistry.
* **Hormonal deficiency**: There are many disorders due to hormonal imbalance in especially women and children. The formation, role of hormones in the normal body function is taught in biochemistry by which the physician can understand the concerned problem during treatment.

Clinical Biochemistry:

In nursing, the importance of clinical biochemistry is invaluable. When a patient is in the hospital nurses, need to keep a watch on how his condition is progressing through clinical biochemistry. That is the treatment for helping him recover from said condition etc. Almost all the diseases or disorders have some biochemical involvement. So the diagnosis of any clinical condition is easily possible by biochemical estimations.

1. **Kidney function test**: For example in kidney disorders, other chemotherapy treatment, etc. urine test help understand the extent of excretion of drugs or other metabolites, the change in pH, the color of urine, etc.
2. **Blood test**: In diabetes,  biochemical [analytical test](https://www.studyread.com/importance-of-analytical-chemistry-in-our-daily-life/) for blood glucose level (above 150mg/deciliter) helps one understand the severity of diabetes disorder.
3. **Liver function tests** help understand the type of disease or damage to the liver, the effect of any medication on the liver, etc.
4. **Serum cholesterol test:** Evaluation of blood cholesterol level and other lipoproteins helps to understand the proneness of the patient to cardiovascular diseases.

Agriculture:

In agriculture, biochemistry plays a valuable role in farming, fishery, poultry, sericulture, beekeeping, etc.

* **Prevent diseases**: It helps for prevention, treatment of diseases and also increases the production or yield.
* **Enhance growth**: Biochemistry gives an idea of how the use of fertilizers can increase plant gr1owth, their yield, quality of food, etc.
* **Enhance Yield**: Some [**hormones promote growth**](https://www.studyread.com/plant-growth-hormones/), while other encourage flowering, fruit formation, etc. In fisheries, use of substances to promote fish growth, their reproduction, etc. can be understood.
* **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.

Food chemistry:

In nutrition, biochemistry describes the food chemistry. For maintenance of health, optimum intake of many biochemicals like macro, micronutrients, vitamins, minerals, essential fatty acids & water is necessary.

1. [**Food chemistry**](https://foodscience.cals.cornell.edu/graduate/ms-and-phd-research-concentrations/food-chemistry-concentration) gives an idea of what we eat, i.e., it’ s components like carbohydrates, proteins, fats, etc. and also the possible physiological alteration due to their deficiency.
2. **The role of nutrients**: Due to biochemistry the importance of vitamins, minerals, essential fatty acids, their contribution to health were known. Hence there is a frequent recommendation for inclusion of crucial amino acids, cod liver oil, salmon fish oil, etc. by physicians and other health and fitness experts.
3. The **nutrients** value of food material can also be determined by biochemical tests.
4. The 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 diets can inhibit the recovery rate from said disorder. This knowledge is due to their idea of food chemistry and related

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](https://www.studyread.com/what-is-medicinal-chemistry/) helps improve efficiency, minimize side effects, etc.
* **The half-life**: This is a test done on biochemical drugs to know how long a drug is stable when kept at so and so temperature.
* **Drug storage**: The storage condition required can be estimated by the biochemical test. 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 the presence of enzymes. This helps to avoid drugs, which have a poor metabolism or those with excessive side effects from being prescribed or dispensed to the patient.
* **Biochemical tests:**These tests help fix the specific half-life or date of expiry of drugs.

PLANT SCIENCES

Biochemistry of plants gave way to the 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

1. **Photosynthesis**: This describes how [carbohydrates](https://www.studyread.com/function-carbohydrates-physiological-importance/) are synthesized by use of sunlight, CO2, and water in the green leaves of plants. It goes on to explain about different complex enzymes involved in the process to combine the energy of sun within the molecules H2O+ CO2 in the form of carbohydrates.
2. 2. **Respiration**: By use of above photosynthesis pathway, plants leave out Oxygen while taking up Carbon dioxide from the [air](https://www.studyread.com/importance-of-air/). This air is used to generate energy in a cell like that of animal cells.
3. **Different sugars**: Biochemistry defines different types of carbohydrates formed in plants like trioses (3 carbon sugars, i.e., glyceraldehyde), tetroses (4), pentoses (5), hexoses (6= glucose), heptuloses (7), etc. Heptuloses are the carbohydrates which go on to form the nucleic acids, i.e., deoxyribonucleic acid (DNA), ribonucleic acid (RNA).
4. 4. **Plants secondary metabolites**: Biochemistry also describes how the plant products like gums, tannins, alkaloids, resins, enzymes, [phytohormones](https://www.studyread.com/plant-growth-hormones/) are formed inside the plants.
5. 5. **Other functions**: It also describes how plants fruits get ripened, how to plant seed germinates, the respiration process inside the [plant cell](https://www.studyread.com/animal-cell-plant-cell/), how proteins and [amino acids](https://www.studyread.com/list-essential-nonessential-amino-acids/) are formed on rough endoplasmic reticulum and fats are formed on smooth ER.