

Biochemistry and Chemical Processes in Living Organisms

Posted on August 31, 2019

According to Balliet, “Biochemistry refers to the study of chemical processes and transformations in a living organism.” Biochemistry allows learners to understand how chemical processes, for example, respiration influence the functioning of all living organisms.

The history of biochemistry is dated back to 1903 when Carl Neuberg studied the transportation of soluble chemicals within cells and daily cellular processes. Biochemistry provides the scientific world with topics such as nutrition, medicine, and microbiology, which aid in understanding the governing processes within a living cell. In other words, biochemistry helps in explaining the processes of life in relevance to how chemical interactions are used in supporting life. Over the last decades, scientists have been able to study the complexity of life and successfully explain living processes included in life sciences through biochemical research. Subsequently, the main focus of pure biochemistry is to provide information that relates to the understanding and study of organs, tissues as well as whole organisms. In general, biochemistry is an instrumental subject in defining the complexity of living organisms and chemical processes within an organism.

Biochemistry attempts to gain an understanding of the molecular levels of the chemical processes linked to living cells. In achieving these objectives, biochemists have isolated various molecules located within cells with the aim of determining and analyzing their general functions as well as structures. In reference to these efforts, most features and characteristics of molecular levels and combinations have been revealed. For instance, biochemists’ efforts to ascertain the molecular basis of the muscle cells have led to the identification of multiple molecules which are either complex or simple together with their detailed structure and whole functioning. Further, biochemistry attempts to develop an understanding of how life began. According to biochemistry ideologies, the beginning of life incorporates chemical processes. Through this, chemical processes in human beings, birds, plants, and microorganisms have been studied to grasp the complex forms of life in relation to human biochemistry.

Historically, biochemistry is associated with organic chemistry, which studies the chemical properties of a compound that takes part in living matter and the functioning of living organisms. The facts and concepts in biochemistry are generated from various contiguous disciplines, which are intimately related to the study of animate nature. Nonetheless, it has been widely termed as an independent branch of science whose main goal is to analyze and investigate the functional and structural interrelationship as well as the transmission of chemical compounds in a living cell. Additionally, biochemistry aims at identifying the roots taken during energy transformation, the regulation mechanisms of chemical conversions as well as the physio-chemical processes that take place in

organs, tissues, and body cells. Moreover, biochemistry seeks to identify the molecular mechanisms that are applied during the transmission of genetic information in living organisms.

Major categories in biochemistry

Biochemistry incorporates numerous topics that are aimed at explaining, defining, and studying the composition and components of living organisms. In biochemistry, the general topics include molecular biology, nutrition, medicine, animal and plant biology, genetics, and cell biology. All these branches incorporate biochemistry discoveries that are instrumental in solving and understanding living organisms (Buchanan et al.). In this essence, nutrition is a branch of biochemistry that references essential requirements of life. This category highlights the need for a specific amount of proteins, lipids, carbohydrates, fats, and amino acids for any organism to survive. The mentioned compounds are either fabricated or consumed by the organism in order to generate energy, cell structure, as well as other chemicals for survival.

Subsequently, medicine is another topic studied in biochemistry and incorporates the effects of drugs and how they alter the chemical functioning of the human system. Doctors and nurses relate biochemistry when administering drugs to patients in order to help prevent or cure the disease. When vaccines are administered to the human body, diseases are prevented because, biochemically, the body perceives the presence of a disease and responds to it. Pharmacy and pharmacology rely on the basis and knowledge of biochemistry. The metabolization of drugs through enzyme-catalyzed reactions as well as the complex reactions that take place after administering of drugs, can be best explained biochemically. Additionally, biochemical approaches have been widely applied in studying diseases such as cell injury, inflammation, and cancer with the aim of determining the appropriate and correct medicine to apply. In this essence, biochemical approaches have been exclusively employed in the production of effective medicines used in treating various types of diseases. In other words, life entirely depends on the biochemical processes that take place in a living cell. Biochemistry enormously impacts major medical concerns. The relationship between medicine and biochemistry is far, much wider as biochemistry studies illuminate multiple diseases and health aspects.

Molecular biology is another topic that forms the root of biochemistry. Molecular Biology plays the role of instructing the living cells and systems on how to function effectively and support the entire body's function. Molecular biology is widely termed as genetics. Biochemistry-molecular biology incorporates a link between chemists and biology in their concerns for the composition of living cells. Molecular Biology involves understanding the significant process that takes place at the molecular level. This includes the transfer and storage of genetic information as well as the association of cells and viruses that infect them. The link between chemistry and biology is aimed at building factual and conceptual understanding as well as intellectual skills in addressing current and future biochemical and biological challenges. In molecular biology, the molecular and biological activities among bio-molecules situated in cell systems are studied to ascertain the relationship between proteins, DNA, and RNA and as well determine their biosynthesis and how these desired interactions are regulated. In genetics, the

genetic variations between organisms are studied, as well as the translation and transcription.

Cell biology is a branch of biochemistry that majorly concerns itself with the identification of the chemical basis of cells. The cell, which is the structural unit of living cells, is widely analyzed in the biochemistry field (Nelson et al). In biochemistry, chemical constituents in living cells, such as enzymes, amino acids, and nucleic acids, are explicitly examined to define their functioning and structure. In cell biology, cells are termed as the store for the fundamental life molecules that make living organisms. Through the study of cell biology in biochemistry, the role of chemical compounds such as enzymes, amino acids, and nucleic acids are explicitly analyzed to determine their functioning within the cells. Biochemically, cells metabolize their own nutrients, generate their own energy, synthesize various forms of molecules, and eventually replicate in order to give rise to new cells. All these processes and reactions are linked to biochemistry, in which chemical processes and reactions occur simultaneously. Biochemists have had a strong emphasis on determining the biochemistry of plants and animal cells as well as the chemical events that take place within the cell of a living organism.

Application of biochemistry

Biochemistry is widely applied in the pharmaceutical industry. This industry depends on biochemistry as the chemical composition of cells and the body has to be evaluated in relationship to the chemical. A lot of medicines have been developed in relation to biochemistry research which provide underlying medication assumptions and are significant in developing drugs. Biochemistry provides a base through which chemicals composed in drugs and medications are studied, as well as the effects of drugs on the body. Additionally, biochemistry topics such as cell biology and molecular biology play a significant role in knowing the type of chemicals needed to correct imbalances when they occur in the body of a living organism.

Biochemistry expertise thrives in the biotechnology field. This includes the utilization of living things in making and modifying products. Plant cultivation has been termed as the initial sample of biotechnology as well as a precursor to the current [genetic engineering](#), tissue, and cell technologies. In other words, biotech products are a result of organic chemistry. In this essence, the food industry has greatly applied biochemistry concepts in developing foods that have nutritional value when consumed (Renu et al.). Biotechnology has been applied in food and crop production, agriculture, and healthcare. On the other hand, brewers and wineries have applied biochemistry approaches and theories in evaluating acids and yeasts, which are used in manufacturing alcohol.

Biochemistry has been widely applied in veterinary, dentistry, and human medicine in studying the chemical composition of medicines and the fundamental changes that take place when drugs are administered. Additionally, biochemistry spreads to physiology, toxicology, and microbiology, through which research is conducted to investigate drug action mechanisms. Subsequently, biochemistry knowledge and skills have applications in the production of chemical products such as herbicides and

pesticides. With the help of biochemistry concepts, various materials and aspects of parasitic contamination have been used in parasitology.

Another application of biochemistry is in gene therapy in the medical setting through which experimental techniques which utilize genes in preventing diseases are carried out. Gene therapy corrects defective genes, which cause the onset of various diseases. Biochemistry approaches are, in turn, applicable in correcting these faulty genes and ensuring the prevention of various infections such as cancer, viral infection, and inherited disorders. With the help of biochemistry, gene therapies have been tested to come up with cures for diseases widely termed as careless. Gene therapy has incorporated clinical biochemistry to monitor and ensure its efficacy in disease progression.

Importance of biochemistry

Biochemistry is deemed to be a valuable subject that has greatly contributed to the advancement in the field of medicine. Firstly, biochemistry aids in understanding one's biochemical changes, which are in relation to the physiological alteration of a person. This is associated with the fact that the pathology of any disease is examined through biochemical changes. In pathology, the study helps physicians to have a clue of a disorder that is associated with their patients based on the symptoms described. This subject is essential in treating nutrition deficiency scenarios through which the functions and roles of vitamins are only described by biochemistry. Subsequently, physicians are able to understand the role and formation of hormones in a normal body function through biochemistry and, hence are able to understand many disorders in relation to hormonal imbalance.

According to Kaneko et al., "Clinical biochemistry is important in nursing as it allows nurses to observe the progress of the patient's condition." Also, through biochemical estimation, nurses are able to perform several clinical tests such as kidney function tests, blood tests, and serum and liver function tests. The significance of clinical biochemistry is to aid nurses in monitoring the condition of the patients during treatment on a regular basis. Also, Biochemistry is important in the study of plants as it provides a breakthrough on how plants synthesize food and do not rely on living organisms for food. Biochemistry in plants evaluates plant processes such as respiration, photosynthesis, germination, and the plant's secondary metabolism.

In nutrition, biochemistry plays a significant role in health maintenance, regulating the intake of biochemical such as water, minerals, fatty acids, and vitamins and describing the food chemistry. Due to biochemistry, the significance and contribution of nutrients are well known hence enabling the diet recommended by a physician. Additionally, the nutrient value of different food materials has also been defined through biochemical tests. In other words, the adverse effects of certain food products have been determined on the basis of the food chemistry idea.

In conclusion, the underlined principles of biochemistry are to develop knowledge of the structure of living systems and cells, their roles and functions as well as the forms of controlling them.

Biochemistry concepts have been widely adopted and applied in various industries as a source of knowledge and skills. The major topics in this branch include cell biology, molecular biology, medicine, plant and animal biology, and nutrition. The demand for biochemistry knowledge in the scientific world is the desire to understand the medical and microbiology fields and also to understand the life processes of living organisms. Biochemistry aims at providing underlying knowledge on the chemical molecules found within the body, their structures, function, and interaction in a living organism. Biochemical techniques and approaches have been applied in research and diagnostic labs. In general, biochemistry provides insight into the processes of life and how chemical processes and interactions help in supporting human life.

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