

The Role of Chemistry in Evolution of Modern Medicine

Dr Mrs Anubha Sharma

Associate Professor, Department of Chemistry
Government Girls' Autonomous PG College of Excellence, Sagar (M.P.)

Abstract :

The base of modern medicine is pharmacotherapy and pharmaceutical chemistry is the backbone of pharmacology. Chemistry and its allied specialties e.g. biochemistry, nuclear chemistry, pharmaceutical chemistry are paving way for modern medicine in every possibility be it a therapeutic array or a diagnostic one.

Keywords : Pharmacotherapy, chemistry, medicine, diagnostic aids

In history and in modern times the fundamental foundation of "Medicine" has been stated to be "Chemistry". The development of a new drug requires interdisciplinary efforts of the fields of medicine, chemistry, chemical biology and structural biology. Aspirin can be stated as the first important therapeutic compound, the development of which in 1899 is credited to chemistry

In "Medicinal Chemistry" the compounds that serve as medicines can be broadly classified as:

1. Organic compounds

- a. Therapeutic Organic molecules: drugs like atorvastatin (used to lower "bad" cholesterol and fats such as LDL, triglycerides and raise "good" cholesterol such as HDL in the blood) and clopidogrel (an antiplatelet medicine, or blood thinner used to prevent blood clots).
- b. Biologics: Derivatives of proteins i.e natural and recombinant antibodies, hormones etc. eg. erythropoietin (used in kidney disease and anemia) and insulin glargine (used in management of diabetes).

2. Inorganic and organometallic compounds: Lithium and platinum based drugs i.e lithium carbonate (used in preventing and treating episodes of depression, mania, and other abnormal moods in bipolar disorder) and cisplatin (used in cancer therapy).

Development of new drug involves chemical analysis and synthesis of new

compounds. The chemistry of the disease occurrence and progression must be studied as well as mechanism with which the drug will affect the human body.

Evolving Role of Chemistry in Modern Medicine:

- ❖ Recognition of the disease and monitoring its course: Early identification of the disease is crucial for effective treatment. Better, less invasive and more sensitive chemical tools and new and improved biomarkers for prompt detection and monitoring the progress of the disease are being developed.
- ❖ Understanding infectious diseases: providing an insight into the molecular principles of infection and the chemistry of progression in diseases such as malaria and tuberculosis.
- ❖ Understanding the basis of non infectious diseases: By molecule based studies focused on improving the understanding of non infectious diseases like diabetes, hypertension and emphasizing the role of genetics in disease etiology and progression.
- ❖ Understanding brain and age related diseases: developing a better understanding of the molecular and genetic basis of the diseases like depression and schizophrenia. Chemists in association with scientists are trying to discover the role of protein folding in biological systems that leads to the development of diseases such as Alzheimer's disease.
- ❖ Better diagnostics and imaging of unique diseases: to detect unique abnormalities associated with cancer and Alzheimer's disease, at an early stage of disease development.
- ❖ Understanding the importance and clinical application of natural molecules: eg. lactams, statins, macrolides, taxanes, and anthracyclines have an important role in biological systems and are widely employed in management of an array of diseases including infectious diseases, cardiovascular diseases and cancer.
- ❖ Contribution in development of stem cell technology: for the principles involved in regeneration of diseased or damaged tissue by application of stem cells.

Conclusion

Chemistry and associated sciences form the foundation of innovations in modern medicine. In recent scenario of global pandemic of SARS-Cov-2 infection the complex interactive role of these branches has been demonstrated in all events that have lead to

the understanding of the structure of the causative virus, disease pathogenesis, treatment with drugs like Ramdesivir and monoclonal antibodies and development of vaccines after numerous clinical trials.

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