

The Essential Function of Organic Chemistry In The Pharmaceutical Development of New Drugs

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Abstract- In the past 25 years, there have been significant changes to the function of the medicinal chemist in drug discovery, mostly as a result of the development of technologies like combinatorial chemistry and structure-based drug design. With more than 50 years of experience in medicinal chemistry, Small molecules continue to be the foundation of contemporary drug discovery. They are created and created by medicinal chemists, many of whom were trained as organic chemists in the beginning.

We address this evolving function using examples from our collective experience across the last four decades. By assisting the medicinal chemist in reclaiming the creative role that contributed to previous achievements, this historical viewpoint may offer suggestions on how to enhance the current model for drug development.

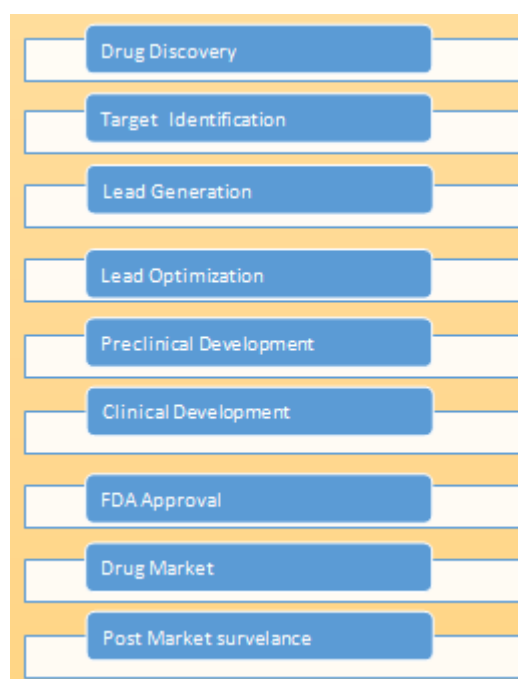
Keywords- drug discovery, AZT drug, discovery

I. INTRODUCTION

Organic molecules play important roles in biology, medicine, and technology. It functions as the primary tool for comprehending structure and responsiveness. This research has been used to synthesis complicated natural chemicals, produce molecules of commercial interest, create newer, more effective pharmacological therapeutic agents based on rational drug design, and identify creative ways to improve the effectiveness of chemical science. The bulk of novel chemical entities (NCEs) in use or being researched globally are small molecule medicines and therapeutic prospects. 1–3 These chemicals are made possible in part because to the talent and creativity of the medicinal and process chemists who create the substances. With the help of medications like atorvastatin (1), ledipasvir (2), imantinib (3), AZT (4), and linezolid (5), countless lives have been and continue to be extended and saved, providing enormous benefits to society, the families, and friends of those being treated [Figure 2]. Stereochemistry, functional groups, and structural complexity all vary depending on the target that each molecule is intended to reach. However, as chemists deal with the increasingly quick

turnaround of test results that affect their daily decisions, the precise nature of the role is clearly changing. This is due to the new resources available to synthetic and medicinal chemists as well as in several important areas, particularly in drug metabolism and chemical toxicology. Designing and producing substances that can be utilized in medicine for illness prevention, treatment, and cure in humans and animals is the goal of medicinal chemistry. When seen in a retrospective light, medicinal chemistry encompasses the study of already approved medications, as well as their pharmacological characteristics and structure-activity relationships (SAR).

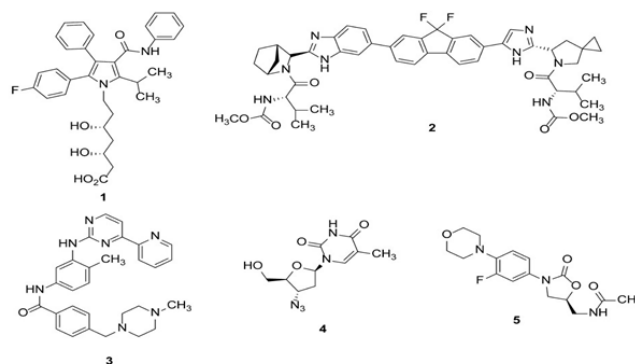
The synthesis of Each molecule was first created on a modest scale (likely milligrams) in the lab, and it took a long time to build safe, effective, and scalable processes to produce kilograms of active pharmaceutical ingredient (API), which was then put into dosage forms for patient administration. The synthesis of a molecule that tested a project team's hypothesis was a key early stage in the difficult process of drug discovery, it is crucial to note.



Throughout the process of finding new drugs, organic chemistry is crucial. Identification of prospective therapeutic targets, synthesis of compounds that might serve as drug leads, and optimization of those leads into drug candidates are all tasks carried out by organic chemists. Organic chemists are in charge of producing vast quantities of the drug candidate and its intermediates during preclinical and clinical research. They also create new synthetic methods for increased productivity and scalability. After the FDA has given its blessing and the drug has been released onto the market, organic chemists are also involved in the drug's manufacture.

Due to the utility inherent in offering a molecule for study, biologically active molecules will continue to provide a significant incentive for the discovery of new chemical processes. Many of us remember the enthusiasm around the synthesis of taxol, prostaglandins, leukotrienes, and asymmetric aldol methods in the 1970s and 1980s, to name a few examples. The faculty, graduate students, and postdoctoral researchers who produced answers to these concerns used their expertise to find novel medicines, some of which included the compounds shown in Figure 1. For easier access to complex compounds of therapeutic interest, organic chemists have more recently devised effective methods to activate C-H bonds and fluorinate organic molecules.

We may selectively obtain enantiomers that have intriguing biological activity thanks to new techniques for organocatalytic production. The difficulties that come with drug discovery necessitate ongoing governmental and private investments in the fundamental fields concerned. Applied research fields like translational medicine and the development of biomarkers have received more attention recently than organic chemistry, a key subject where this investment has been diminishing for some years. It's interesting to note that problems in each of these domains require molecules. Medicinal chemists who received their first training as organic chemists frequently supply those compounds. To promote the next generation of synthetic medicinal chemists, I believe it is time to correct this imbalance. There are major repercussions as a result of it falling to dangerously low levels.



Pharmaceutical Aspect of Organic Chemistry

1. Medical Research

The study of organic chemistry is vital to the development of new medicines. Many medicines are derived from natural sources, and when they are extracted properly, they are good for human health. Moreover, medication derived from organic molecules is typically safer than medication created in a lab.

The impact is also more thorough and longlasting. Garcinia Cambogia from mangos teen is an excellent example of an organic chemistry discovery that helps to treat cancer and prevent cell damage. In order to develop safer and more effective pharmaceuticals, organic chemistry is therefore crucial.

2. Support Disease Research

Here is how crucial organic chemistry is to the pharmaceutical sector. In addition to offering a remedy for illness, organic chemistry also allows researchers to identify the root of sickness. Many diseases have natural causes or origins, and scientists can understand some disease phenomena by conducting organic chemistry experiments.

Also, a thorough grasp of human organic chemistry is required to comprehend how diseases develop in the human body. For instance, organic substances present in the organs, such as acid and amino, as well as odd chemical intrusions, can teach scientists about digestive issues.

3. Identify a disease

A doctor can define and identify symptoms that arise on the human body as per the specified disorders once they have been made aware of by studying organic chemistry and understanding the origin of disease. As a result, those who

contract a sickness can start receiving the appropriate medication and care straight away.

To find any problem inside the brain, for instance, the research of brain chemicals will be helpful. Every unusual occurrence that is not on the study's list will aid in the diagnosis of the brain disease that is present. The importance of organic chemistry in pharmaceuticals is demonstrated by the vital role it plays in these fields.

4. Aid in controlling diet

In the pharmaceutical industry, it's crucial that the correct medication or therapy will improve human health. Humans can control their nutrition using organic chemistry by basing it on the chemical equilibrium in their bodies. People can locate the appropriate diet plan by determining the benefit and which chemical is more important for the body.

The amount of protein, carbohydrates, minerals, and acids in the body, as well as the interaction between two molecules, all play a role in determining the daily food intake. The quantity of food consumed and the nourishment it contains aid in maintaining human health.

5. Cleaning Agent Discovery

In the medical and pharmaceutical industries, it's crucial to maintain the cleanliness and integrity of all the products. People require chemical as a cleaning agent in order to preserve it. Cleaning solutions aid in disinfection and sterilization as well as the extraction of certain chemicals from the plant's roots. Cleaning agents assist in the modification of a wider variety of organic components for greater benefit.

Moreover, cleaning agents assist in dispersing solvent and separating compounds that support the development of more compassionate treatments and medications. Given how valuable it is, getting it requires that people first become familiar with it in order to have the desired outcome.

6. The Development of Novel Medicines

The majority of drugs come from natural sources like plant leaves, seeds, or roots. One can only learn about a drug's impact on living things through studies in organic chemistry. Drugs help with medical procedures including anesthesia and painkillers in addition to working as a cure for some diseases.

Without initially doing organic chemistry study, the effect of the raw material would not be either effective or even safe. Scientists can evaluate whether a new medicine has

significant effects on living things after conducting the necessary investigation. This unmistakably demonstrates the value of organic chemistry in the pharmaceutical industry.

7. Further Study Analyses

Human health is usually always based on the disturbance of organic processes because the human body is made up of organic compounds. This is why organic chemistry is significant because it is required for the study of novel diseases as well as their treatment.

Moreover, organic chemistry encompasses a broad field of compounds, many of which have a natural origin. Prior to diagnosing a patient and writing a prescription for medication, a doctor or pharmacist must have a solid understanding of organic chemistry. If not, it will have fatal consequences.

8. Improve Medical Research

Since the pharmaceutical industry is focused on drugs and other health-related substances, it significantly depends on the medical community. As the foundation for prescribing medications, a pharmacist should have appropriate knowledge of organic chemistry. Thus learning about organic chemistry is essential for medical students. Any job in the field should be comfortable with the science. Because information in this area is so important in medicine, one of organic chemistry's benefits is to enrich medical research.

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