

## Medicinal Chemistry and its Application in Combating Diseases

Ganney P\*

Wyzant Inc, Hope Springs lane, Morrisville, North Carolina

### Introduction

Chemistry is the base for the branches of medicinal chemistry, biological chemistry and pharmaceutical chemistry. Chemistry is a basic broad science, embracing the concepts of creation of molecules and the manipulation of atoms. The role of chemistry in present day life is vast. It helps in the science of medicine. Chemical research goes hand in hand with medical research. Chemistry is an aid to agriculture. It covers interactions with plants, animals and humans through agriculture, biology and medicine and with the physical world through electronics, new building materials and new sources of energy. Applications of chemical science have contributed significantly to the advancement of human civilization. With a growing understanding and ability to manipulate chemical molecules, the chemist is considered a societal problem solver. They play a significant role in the eradication of deadly diseases by developing life-saving pharmaceuticals and chemical pesticides. The chemical industry has been a vital sector of the modern industrialized economy and for the development in the Medicinal chemistry. Development of chemistry has revolutionized the basis of modern medicine. Application of chemistry from dyes to therapeutics has brought about incalculable benefits to humanity. Chemist is the magician who can turn waste products into things both beautiful and useful. Waste products like saw dust can be made to yield oil and acids. Marvelous indeed are the achievements of modern chemistry.

Advances in Medicinal chemistry in recent decades are increasing enormously due to pathogenesis of diseases [1]. Medicinal Chemistry helps in collaboration with scientific people in researching and developing new drugs. As a result drug discovery and drug research became predominant in role of controlling diseases with the discovery of powerful medicines like cytotoxic drugs, hypertensive drugs, antipyretic, anti-analgesic, anti HIV drugs, etc. Synthetic organic chemistry especially is involved in design, synthesis and development of drugs which are bio-active molecules. Synthesis and development is only the part of drug discovery, but the efficacy of that drug and target to the particular site is important for the treatment of diseases like cancer, Cardiovascular, pulmonary diseases, and these involve many factors [2]. The world is getting better due to pharmaceutical industry. Today's life expectancy is the highest in human history. The quality of life is better than it was hundred years ago. In western countries, people no longer die of measles at the age of five, nor do we run of succumbing to pneumonia at age of 28. All these came along as a result of tremendous progress in medical sciences and pharmacology.

Medicinal chemistry is the interdisciplinary science, with one having strong background in Organic chemistry coupled with the knowledge of biological concepts to deliver the required cellular targets. Medicinal chemistry in combating the diseases starts from pre-clinical studies, i.e., identification, drug design and development till the appropriate drug formulation is obtained. Then comes to clinical studies tested for efficacy of the compound and then comes into the treatment for combating the particular disease. Phytochemicals which are natural bioactive compounds found in various parts of plant vegetables, fruits possess wide range of potential chemical entities such as flavonoids, organo-sulphurs, polyphenols, catechin, isoflavones, carotenoids [3]. Some of them were proved to reduce the risk of cardiovascular disease

and considered as the lead structures for the cardiovascular drug design. Drugs were classified based on their antagonist properties of that particular disease. Serendipitous discovery sometimes led to the discovery of various prophylactic and therapeutic agents to combat diseases.

We can say that evolution of science as exponential rate. Medical research became prominent and found treatment even for most of the lethal diseases. Scientific community with the drug discovery was able to synthesize: (a) new drugs to cure Malaria by cutting down the supply of proteins to the malarial parasite (b) Discovery of Imatinib, an eminent drug paved the way for the treatment of cancer. Drugs or chemical compounds prepared based on new strategies by finding the impact of the cells on proteins, enzymes and there was a breakthrough in combating different disease associated with heart, lung, and every part of the human body.

### Pyrrole Analogues as Novel Organic Molecules to Combat Tuberculosis

TB which is a communicable disease that spreads through air and caused by different strains of mycobacterium. Pyrrole found in hemin, B12 of animal cells and in chlorophyll of plant cells. Pyrrole and its derivatives were found that they show antitubercular activity, but research effects are still going on. Our team tried to prepare these pyrrole derivatives effectively [4-6].

### Nucleosides and Nucleotides in Combating Diseases

Ribofuranosyl and arabinofuranosyl nucleosides are potential anticancer chemotherapeutic agents and antiviral agents. Nucleosides are the most prominent family of organic compounds in use for biological studies of all types notably in drug development, clinical therapeutics and pharmacology. Nucleosides are components of oligonucleotides. Ara-C used in treatment of leukemia. Several nucleoside analogues are used as antiviral and anticancer agents. Therefore research was done to increase the synthesis of nucleosides and nucleotides in low cost, economically useful, user friendly procedures to synthesize these nucleosides [7]. Not only pyrrole analogues, nucleosides and nucleotides there were many chemical compounds which act as antimicrobial, antibiotic, antiviral, anticancer, antiparkinsons drugs etc.

### Conclusion

From all the above, Medicinal chemistry is concerned with the

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\*Corresponding author: Ganney P, Wyzant Inc., 1005 Hope Springs lane, Morrisville, NC-27560, E-mail: [ganneyparimala@yahoo.com](mailto:ganneyparimala@yahoo.com)

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chemistry together the design, discovery and development of new pharmaceuticals. The discovery of new drugs is one of the most exciting and rapidly developing fields in science, and there is a growing need for safer, more effective pharmaceuticals against old diseases (like cancer), new ones (such as HIV/AIDS) and diseases that are becoming more widespread (such as malaria and tuberculosis). Medicinal chemistry looks at how to find drugs to combat these diseases, and how to make those drugs.

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