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Heterocyclic Compounds as Anticancer Agents

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Cancer is a class of diseases in which a cell, or a group of cells display uncontrolled growth, invasion and sometimes metastasis.. These three malignant properties of cancers differentiate them from benign tumors, which are self-limited, and do not invade or metastasize. Most cancers form a tumor [1]. The branch of medicine concerned with the study, diagnosis, treatment, and prevention of cancer is oncology. In 2004, worldwide cancer caused 13% of all deaths. The leading causes were lung cancer, stomach cancer, colo-rectal cancer, liver cancer and breast cancer [2,3].

Cancers are primarily an environmental disease with 90-95% of cases due to lifestyle and environmental factors and 5-10% due to genetics. Common environmental factors leading to cancer death include: tobacco, diet, obesity, infections, radon exposure, radiation,stress, lack of physical activity and environmental pollutants [4]. These environmental factors cause abnormalities in the genetic material of cells [5].

Cancer affects people at all ages with the risk for most types increasing with age. The traditional anticancer drugs are the basis for the new drug development for cancer in which imidazole is an important moiety. Imidazole is a heterocyclic ring containing basically 3C and 2N atom present in 1st and 3rd positions [6]. The substitution on different positions gives a number of compounds of interest. It has been found that there are a variety of heterocyclic compounds were used as anticancer agents. Among the heterocyclic compounds the thiophene, pyridine, thiazole derivatives [7-12] showed high cytotoxicity towards the cancer cell lines. Structure activity relationship were reduced from biological results and will be used in further design of new active compound. Presently a number of drugs are used in the treatment of the cancer, but majority of them were produced controlled effect on the cancer cell. By application of these drugs the disease can be controlled.

The derivation of structure activity relationships (SARs) is central to molecular modelling. SARs are widely used in the systematic design and refinement of pharmaceutical agents and in the identification of structural alerts of toxicity and mutagenicity. Because of their widespread importance both in fundamental and commercial research, many methodologies have been developed [13].

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Rafat M. Mohareb was born in 1955, Professor of Pharmaceutical Organic Chemistry. Awarded the Fullbright fellowship, USA in 1999, Alexander von Humboldt fellowships, Germany, in 1987-1989. Published more than 160 scientific publications. Research interest including the Synthesis and SAR of newly synthesized heterocyclic compounds.