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CHAPTER 1

Recent Synthetic and Biological Advances in Anti-cancer Ferrocene-Analogues and Hybrids

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Abstract: Cancer is among the most severe risks to the global human population. The enduring crisis of drug-resistant cancer and the limited selectivity of anticancer drugs are significant roadblocks to its control and eradication, requiring the identification of new anticancer entities. The stable aromatic nature, reversible redox properties, and low toxicity of ferrocene revolutionized medicinal organometallic chemistry, providing us with bioferrocene compounds with excellent antiproliferative potential, which has been the focus of persistent efforts in recent years. Substituting the aryl/heteroaryl core for ferrocene in an organic molecule alters its molecular characteristics, including solubility, hydro-/lipophilicity, as well as bioactivities. Ferrocifen (ferrocene analogues of hydroxytamoxifen) has shown antiproliferative potential in both hormone-dependent (MCF-7) and hormone-independent (MDA-MB-231) breast cancer cells. It is now in pre-clinical trials against malignancies. These entities operate through various targets, some of which have been revealed and activated in response to product concentrations. They also react to the cancer cells by diverse mechanisms that can work in concert or in isolation, depending on signaling pathways that promote senescence or death. The behavior of ferrocene-containing hybrids with a range of anticancer targets is explained in this chapter.

Keywords: Anti-proliferative Potential, Azide-alkyne Cycloaddition, Biological Activities, Bio-organometallic, Bioferrocene Compounds, Cancer, Cytotoxicity, Ferrocene Compounds, Ferrocifen, Ferrociphenols.

1. INTRODUCTION

Organometallic chemistry and biochemistry have recently been combined to form a new subject known as bioorganometallic chemistry. This new research topic has piqued scientists' interest because of the unusual chemical structure and biological activity of organometallic compounds. These carbon-metal linkage compounds

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