Newly Synthesized Benzimidazole based SCHIFF base Copper (II) Complexes: It's Anticancer Activity on A-549 Lung Cancer Cell Line

Meenu Bhatiya[1], Anup Paul[2], Armando J.L. Pombeiro[3] and Biplob Koch[4*]

[1,4]Genotoxicology and Cancer Biology Laboratory, Department of Zoology, Banaras Hindu University, Varanasi-221005, U.P., India
[2,3]Centro de Quimica Estrutural, Complexo Interdisciplinar Instituto Superior Técnico Av. Rovisco Pais, 1049-001 Lisboa, Portugal
*E-mail: *kochbiplob@gmail.com*

Abstract—*According to WHO report, cancer is the second leading cause of death in developing countries after cardiovascular diseases. Approximately 13% of death occurs due to cancer each year in which the majority is by lung cancer. In this study, three newly synthesized benzimidazole based Schiff base copper (II) complexes (with different N-alkyl chain length) are well characterised by elemental analysis ESI-MS, FT-IR, UV/vs and emission spectral studies and structures are authenticated by single X-ray analysis. Interaction of these complexes with DNA has been investigated by spectrophotometry and further proven by molecular docking studies. The complexes effectively bind with calf thymus DNA (CT-DNA) through intercalative interaction. After fulfillment of chemical criteria and In silco studies, compounds were further taken for in vitro studies and they showed potential anticancer activity against A-549 human lung cancer cell line. The effect of these compounds on cell viability and proliferation has been evaluated by MTT assay. Nuclear morphology was checked by Hoechst/PI staining and complexes were successfully able to induce nuclear fragmentation at concentrations near to their IC_{50} values. Nuclear fragmentation and apoptosis were further confirmed by DNA ladder assay. To investigate the cell death and cell cycle delay in A-549 lung cancer cell line, on the basis of DNA content, fluorescence activated cell sorting (FACS) was done with PI (Propidium Iodide) staining. The complexes induce cell death and also delay the cell cycle. The green fluorescence generated from DCFH-DA indicated that complexes induce elevated intracellular ROS which might be a possible mode of apoptotic pathway. In vitro results suggested that Cu (II) complex may be a potent antitumor agent for lung cancer cell line by inducing apoptosis via ROS mediated apoptotic pathway.*

Keywords*: A-549, Cell cycle, Reactive Oxygen Species, Apoptosis, Cytotoxicity*