CANDIDATE: **NOYEL GHOSH** INDEX No: **71/19/Life Sc./26**

TITLE: "Insights into the molecular mechanisms involved in the effective therapeutic potentialities of natural and synthetic compounds against breast cancer"

Abstract

In recent times, breast cancer has been a continuous reason for mortality and morbidity among the current female population. Several breakthrough researches in the field of cancer therapeutics have led to enormous advancements in current therapeutic strategies which cumulatively have made disease prognosis better day by day. Still, from a clinical viewpoint, breast cancer therapeutics remain confined to the usage of chemotherapy, radiotherapy, hormone replacement therapy, surgical resection, or a combination of any two or three modalities of these. Such practices, even though remain effective in killing cancer cells, often generate collateral systemic damage to healthy body cells or completely remain unresponsive due to the emergence of resistance. To avoid such treatment-related anomalies, we have focused on studying the anticancer effectivities of certain synthetic metallic compounds and a selective natural compound, chrysin which are safe to be used in vivo when used within the recommended dosage.

Chapter 1 outlines a brief discussion related to general concepts associated with breast carcinoma, present modalities of therapeutic strategies, their limitation, and hence, describing emerging objectives of present studies in this thesis.

Chapter 2 outlines detailed experimental methodological protocols performed during the overall studies.

Chapter 3 describes molecular aspects of anticancer efficacies exhibited by dipicolinic acid passivated 1-allyl imidazole substituted oxidovanadium complex (IV), i.e., VOL, against breast carcinoma in contrast to known metallodrug cisplatin both *in vitro* and *in vivo*.

Chapter 4 describes the utility of another variability of dipicolinic acid passivated oxidovanadium complex (IV) with 1-methylimidazole substitution (OVMI) against triple-negative breast carcinoma and secondary pulmonary metastasis as an alternative option against side effect-causing conventional metallodrug usage both *in vitro* and *in vivo*. The anticancer efficacy of OVMI has been enlightened from the viewpoint of molecular mechanistic approaches.

Chapter 5 describes the folic acid-guided targeted delivery of chrysin and its pH-dependent release from polyacrylic acid-coated mesoporous silica nanocarrier specifically to breast cancer cells limiting chances of off-target toxicity caused by conventional chemotherapy. Additionally, this chapter highlights molecular aspects of enhanced antineoplastic effectivity of chrysin delivered through silica nanocarrier.

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