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Synthesis of novel Anticancer Ruthenium-Arene Pyridinylmethylene scaffolds *via* Three-Component reaction

Gajanan Raosaheb Jadhav,[†] Sohini Sinha,[†] Mohit Chhabra, Priyankar Paira*

Pharmaceutical Chemistry division, School of advanced sciences, VIT University, Vellore-632014
Email: priyankar.paira@vit.ac.in

Abstract: A novel three components approach for the synthesis of bioactive Ru–arene pyridinylmethylene complexes has been developed using pyridine carboxaldehyde, amino pyridine and dichloro (*p*-cymene) ruthenium (II) dimer as starting materials. These scaffolds were screened for their anticancer activity against breast cancer (MCF7) & human Epitheloid Cervix Carcinoma (HeLa) cell line. It was established that compounds [(η6-*p*cymene)RuCl(κ2-*N*,*N*-(3,5-dinitro-pyridin-2-yl)-pyridin-2-ylmethylene-amine)]PF_6 (**4o**), [(η6-*p*cymene)RuCl(κ2-*N*,*N*-N-(3,5-Dibromo-pyridin-2-yl)-pyridin-2-ylmethylene-amine)]PF_6 (**4c**), [(η6-*p*cymene)RuCl(κ2-*N*,*N*-(3,5-dibromo-6-methylpyridin-2-yl)-pyridin-2-ylmethylene-amine)]PF_6 (**4j**) & [(η6-*p*cymene)RuCl(κ2-*N*,*N*-3(3-Bromo-5-methyl-pyridin-2-yl)-pyridin-2-ylmethylene-amine)]PF_6 (**4b**) were significantly active against both the cell lines.

Keywords: *Ruthenium dimer, Ruthenium-Arene Pyridinylmethylene scaffolds, three component reactions, anticancer activity, fluorescence profile, toxicity study*

Usually, the research in drug discovery has been focused on the development of organic molecules as pharmacophores. However, their limited structural diversity makes it difficult for them to access other scaffolds to extent the whole biologically relevant chemical space,[1–3] Therefore, investigation of the structurally unique potentially valuable unexplored chemical spaces is highly warranted. Nowadays, transition-metal scaffolds have been developed as potential drug candidates. They can eagerly accommodate higher coordination number and consequently access different molecular geometries which are not possible with pure organic scaffolds[4].

The first successful transition metal scaffold, cisplatin, was discovered and approved by Food Drug and Administration (FDA) for the treatment of ovarian and testicular cancer.[5]

∗ Corresponding author. Tel.: +91-416-2243091; fax: 91-416-2243092; e-mail: priyankar.paira@vit.ac.in