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Research Article

Synthesis, characterization, and antitumor evaluation of a kaempferol–cobalt(II) complex targeting *TMPRSS2* gene in lung cancer cells

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Abstract

Background: Transmembrane serine protease 2 (*TMPRSS2*) has been distinguished as a tumor suppressor in lung adenocarcinoma, and its reduced expression has been associated with disease progression.

Aim: To estimate the effects of a kaempferol–metal complex on lung cancer cells and assess its influence on *TMPRSS2* gene expression in comparison with standard kaempferol.

Materials and methods: A kaempferol–cobalt(II) complex was synthesized, and the cytotoxicity of the complex against A549 lung cancer cells was estimated using an MTT assay. The mRNA expression of the *TMPRSS2* gene was assessed using quantitative real-time PCR analysis.

Results: A molecular docking study revealed that the kaempferol–cobalt(II) complex displays better binding affinity toward *TMPRSS2* compared with free kaempferol and selective cytotoxicity, with an IC_{50} value of 58.21 µg/mL. Quantitative real-time PCR analysis revealed that treatment with the kaempferol–cobalt(II) complex significantly elevated *TMPRSS2* gene expression (7.3-fold).

Conclusion: Cobalt(II) complexation may be considered a promising candidate for further anticancer investigation.

Keywords

A549 cells, docking study, kaempferol–Co(II) complex, *TMPRSS2* gene

Introduction

One of the leading causes of death is lung cancer. Despite the progress in cancer treatment over the past few decades, the five-year survival average is only 19% (Siegel et al. 2020). Lung adenocarcinoma (LUAD), a subtype of non-small cell lung cancer (NSCLC), accounts for more than 40% of all lung cancers. EGFR and KRAS are heterogenic mutations that play a role in the biological variation of LUAD patients, which in turn plays a role in treating them more effectively. Cancer immunotherapy, which uses antibodies such as anti-CTLA4 and anti-PD1, has proven effective in treating LUAD and has significantly improved chemotherapy. This has prompted further exploration of the relationship between tumor