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Molecular mechanism investigation of a novel Ruthenium (II) complex inhibits proliferation of human esophageal squamous cell carcinoma

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High toxicity acquired resistance and serious side effects, prompting the search for novel compounds for cancer treatment. Recently, a Ruthenium (II) complex $[\text{Ru}(\text{p-cymene})(\text{L})\text{Cl}_2]$ (L = 1,3-bis(4-(tert-butyl)benzyl)-1H-imidazol-3-ium chloride), which name-4, has been synthesized and characterized. The purpose of this study was to investigate the effects of L-4 against human esophageal squamous carcinoma (ESCC) cell line EC109. Diethylstilbestrol (DES) (10⁻⁸ mol/L) and Tie3 (10⁻⁸ mol/L) were used as positive controls. The results showed that L-4 inhibited the proliferation of EC109 cells in a dose-dependent manner. The IC₅₀ of L-4 was 80.6 μg/ml. The results of Western blot analysis showed that L-4 treatment significantly increased the expression of p53 and p21, and decreased the expression of cyclin D1 and CDK2. These results suggest that L-4 inhibits the proliferation of EC109 cells through the p53/p21 pathway.