Investigation of the effects of new potential drugs on leukaemia cells in vitro

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Abstract

Background

Leukaemia is a deadly clonal blood cancer originated from a single mutant progenitor blood cell, with wide prognosis and multifactorial aetiology. Mutations are needed to induce uncontrolled cell proliferation and avoid apoptosis. The tumour-suppressor gene p53 has been linked to inhibition of abnormal cell growth; while the chaperone molecule Heat Shock Protein-90 (HSP90) to cell proliferation. This project aimed to investigate the responses regarding cell viability and apoptosis of human Leukemic T-lymphoblasts cells (Jurkat E6.1) when exposed in vitro to new potential drugs.

Method

Jurkat E6.1 cells were incubated with different synthesized compounds (C1 to C4, C6 to C8, at concentrations of 50µM, 500µM and 1000µM) for 24 and 48 hours. Phosphate buffered saline was the negative control and hydroxyurea 500µM the positive. Cell viability and proliferation were determined using Trypan Blue exclusion assay and confirmed using FITC Annexin-V assay through flow cytometry. Gene expression of p53 and HSP90 was assessed by real time reverse transcriptase polymerase chain reaction.

Results

C2 at 500µM and C6 at 1000µM produced a significant reduction of cell viability (20% and 58% at 24 hours; 35% and 64% at 48 hours respectively; $p<0.05$). There is a significant increase of cells undergoing early and late apoptosis post-treatment with C2 and C6 (p-value<0.001). HSP90 gene was downregulated (24 hours) and p53 upregulated after treatment with C6. C2 induced downregulation of p53 and upregulation of HSP90.

Conclusion

C2 and C6 induced apoptosis in Jurkat E6.1 cells in vitro, also, C6 modified the gene expression of p53 and HSP90, thus suppressing cell proliferation and displaying promising anti-cancer activity. However, further investigation is required to verify results, assess cytotoxicity and evaluated other gene targets.