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Synergistic Anti-Proliferation Effect of PLK-1 Inhibitor and Livistona Chinensis Fruit Extracts on Lung Adenocarcinoma A549 Cells

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Abstract : Lung cancer is one of the clinically challenging malignant diseases worldwide. For efficient therapeutics in cancer, combination therapy has developed to acquire a better outcome. PLK-1 was one of the major factors affecting cell mitosis in cancer cells, its inhibitor Bi6727 was proven effective in treating several different cancers namely oral cancer, colon cancer and lung cancer. Despite its low toxicity toward normal cells compared to traditional chemotherapy, it is still yet to be evaluated in detail. Livistona Chinensis (LC) is a Chinese herb that used as a traditional prescription to treat lung cancer. Due to the uncertainty of the efficacy of LC, we utilized a water extraction method to extract the Livistona Chinensis and then lyophilized into powder for further study. In this study we investigated the antiproliferation activities of Bi6727 and LC extracts (LCE) on A549 non-small lung cancer cells. The IC50 of Bi6727 and LCE on A549 are 60 nM and 0.8 mg/mL, respectively. The fluorescent staining images shown nucleolus damage in cells treated with Bi6727 and mitochondrial damage after treated with LCE. A549 cells treated with Bi6727 and LCE showed increased expression of Bax, Caspase-3 and Caspase-9 proteins from Western blot assay. LCE also inhibited A549 cells growth keeping cells at G2-M phase from cell cycle assay. Apoptosis assay results showed that LCE induced late apoptosis of A549 cells. JC-1 assay showed that the mitochondria damaged at the LCE concentration of 0.4 mg/mL. In our preliminary anti-proliferation test of combined LCE and Bi-6727 on A549 cells, we found a dramatically decrease in proliferation after treated with LCE first for 24-h and then Bi-6727 for extra 24-h. This was an important finding regarding synergistic anti-proliferation effect of these drugs, However, the usage, the application sequence of LCE and Bi-6727 on A549 cells and their related mechanisms still need to be evaluated. In summary, the drugs exerted anti-proliferation effect on A549 cells independently. We hopefully combine the usage of these two drugs will bring a different and potential outcome in treating lung cancer.

Keywords : anti-proliferation, A549, Livistona Chinensis fruit extracts, PLK-1 inhibitor
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