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Analysis of Apoptosis-inducing Effect of Free Fucoxanthin and Fucoxanthin-loaded PLGA Microsphere on Human Lung Cancer H1299 Cell Lines

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Abstract

Fucoxanthin (FX) has anticancer activity in many different human cell lines. However, this compound was sensitive to light, temperature, poor solubility in water, and low bioavailability. One way to protect FX from rapid degradation was to encapsulate it with PLGA. This study aimed to fabricate FX-loaded microspheres (FX-LMs) using PLGA and to analyze the effects of free FX and FX-

LM on the induction of apoptosis in H1299 cells. The results of this study, FX-LM were successfully prepared. The particle size of FX-LM is about 9 μm , and it dissolves completely in water. Free FX showed a high cytotoxic effect on H1299 cells by giving an IC_{50} value of 163.40 $\mu\text{g/mL}$. However, FX-LM showed a low cytotoxic effect on H1299 cells. The concentration of FX-LM used to test the cytotoxic effect was 1482.50 $\mu\text{g/mL}$, and the IC_{50} value was not detected. Then, observation of the morphology using a fluorescent microscope showed that H1299 cells treated with free FX and FX-LM appeared irregularly shaped and exhibited several core features of apoptosis. After that, morphological observation by scanning electron microscope showed that H1299 cells treated with free FX and FX-LM showed shrinkage of cells, blebbing of the cell membranes, and formation of apoptosis bodies. Free FX and FX-LM induced caspase-3/7 activation on H1299 cells. Their induced apoptosis was thought to be played by cell mitochondria. In conclusion, free FX was more effective than FX-LM in cytotoxic effects and inducing apoptosis in H1299 cells. These two materials show their potential to prevent lung cancer. © 2024 Friends Science Publishers

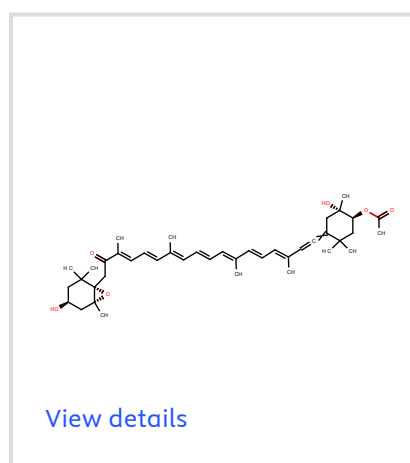
Author keywords

Apoptosis; Fucoxanthin; H1299 cells; Lung cancer; PLGA

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Abstract

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