

Title : Anti-colon Cancer Activities of Chalcone and Its Derivatives on HCT 116 Cell Lines

Author(s) : Ms. Kittiyaporn Permpool **Student ID :** 640510006

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Advisor(s) : Associate Professor Dr. Padchane Sangthong

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ABSTRACT

Colorectal cancer is the fourth most common cancer in Thailand. Colorectal cancer is caused by abnormal cell divisions in the intestinal lining (polyps), which subsequently mutate into cancer that can spread to other organs. 5-fluorouracil (5-FU) is a widely used chemotherapeutic drug for colorectal cancer patients. Despite its potent anti-cancer properties, this drug must be combined with other chemotherapy drugs to effectively treat colon cancer. Currently, natural compounds have been reported to exhibit anti-cancer activity while demonstrating lower toxicity to normal cells compared to chemotherapy drugs. This research focuses on studying natural compounds that contain the inhibition potential of two compounds including 2,4-dihydroxy-6-methoxy-3,5-dimethyl chalcone (DMC) and gallic acid (GA). DMC is a phytochemical in the flavonoid group which were found in Ma-Kiang (*Syzygium nervosum* A. Cunn. Ex.DC.), GA is a phenolic compound which is found in garlic (*Allium sativum* L.). The aim of this study is to investigate the biological activity of DMC, GA, and the conjugated compound of DMC and gallic acid (DMC-GA) to enhance the anti-cancer in colon cancer cells (HCT116) The cytotoxicity on normal cells (Vero cells) is compared with 5-FU as positive control using the MTT assay. The results showed that the half-maximal inhibitory concentration (IC_{50}) values for DMC, DMC-GA, GA, and 5-FU were 14.56 ± 0.41 , 9.04 ± 1.52 , 305.83 ± 3.21 , and $28.21 \pm 1.98 \mu\text{M}$, respectively. The cytotoxicity on Vero cells were 14.32 ± 2.96 , 120.5 ± 2.26 , 5.49 ± 1.21 and $>80 \mu\text{M}$, respectively. As the result, DMC-GA demonstrated increased anti-colon cancer effects on colon cancer (HCT116) after structural modification. DMC-GA exhibits three-fold greater than 5-FU. However, DMC-GA also shows increasing in toxicity when compare to normal cells. To investigate the cell death mechanism by acridine orange (AO) and propidium iodide (PI) assay, it was found that DMC and GA were able to induce apoptosis in colon cancer cells. On the other hand, DMC-GA could not induce apoptosis in colon cancer cells. To determine the cell death pathway, cell cycles and apoptosis assay will be further performed.

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