# JBBC175

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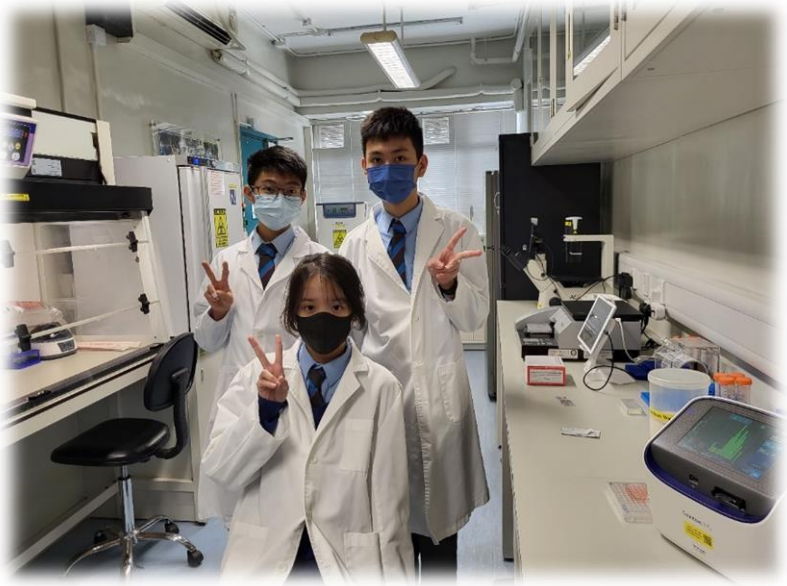

# Leukemia: Enough Ginger to Combat?

# 血癌：夠薑同我鬥？

## PROJECT ABSTRACT


By Ko Pak Kiu
Leung Sin Hang
Wong Cho Yan

# Abstract

Anticancer effect of ginger and turmeric remain as folk belief. Though some biochemical analysis of their ingredient has been conducted by scientists, cell study research on ginger and turmeric is still limited therefore our group would like to work on it. Our group studied the growth inhibitory effect and killing effect of fresh ginger and turmeric samples, turmeric powders and curcumin on human leukemia HL-60 cells. Viable Cell Count was performed to evaluate the growth inhibitory effect of ginger/turmeric extracts with a wide range of concentrations. Our studies revealed the significant role of fresh ginger and turmeric extracts in inhibiting cell proliferation of HL-60 cells in dose-dependent manner. Results in Viable Cell Count showed that all ginger and turmeric extracts had promising cell inhibitory effect dose-dependently, reducing to 50 - 55% of the control at high sample concentrations. Mechanistic & morphological study revealed that the samples induced formation of shrunken cells and cell fragments, which were the signs of apoptosis.

Turmeric powder had much greater cell inhibitory effect dose-dependently than fresh ginger and turmeric extracts. Death cell count also increased dose-dependently with increasing concentration of turmeric powder. Comparing with fresh ginger/turmeric extracts, turmeric powder also killed HL-60 cells through forming of shrunken cells and apoptotic bodies. There was a certain proportion of dead cells underwent necrosis as well (with swollen morphologies and increased cell sizes). All these indicated that turmeric powder induced both apoptosis (majority) and necrosis (minority) on HL-60.

To explore the potential of curcumin, HL-60 cells were treated with much lower concentrations of curcumin (from 0.5mg/ml down to 0.0156 mg/ml). Results showed that curcumin had extraordinary cell inhibitory effect dose-dependently. With 24 h treatment, 0.0156mg/ml (16 μg/ml) of curcumin had reduced number of HL-60 cells by more than 50% of the control. The number of cells was reduced to less than 10% of the control when HL-60 cells were treated with curcumin at the concentration at or higher than 0.125mg/ml. Besides the prominent inhibitory effect imposed by curcumin, curcumin induced drastically great killing effect on HL-60 cells at very low concentration of curcumin, at 0.0156mg/ml (16 μg/ml). To explore further potential of curcumin on its inhibitory and killing effect towards HL-60 cells, the treatment period was greatly shortened to 4 hours. The inhibitory and killing effect of curcumin on HL-60 cells were still prominent at 4-hour treatment. Both 4-h and 24-h treatment echoed that curcumin induced apoptosis (majority) and necrosis (minority) on HL-60 cells.

All in all, our studies have paved a path to elucidate the significant role and brief pathway of fresh ginger and turmeric samples, turmeric powders and curcumin to exhibit growth inhibition and programmed cell death on HL-60 leukemia cells. Further investigation even enables us to unveil the detailed mechanistic pathways of such growth inhibition and killing actions by apoptosis for clinical trials in the future.

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