

# Multidisciplinary modern scientific approaches for the discovery of natural products anticancer agent: From myth to science

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## Introduction:

From ancient time traditional medicinal plants based herbal formula has made countless contribution to the well-being of the human population. Currently, more and more evidence showing the efficacy and potential of medicinal plants through the multidisciplinary modern approaches for the discovery of natural products anticancer agent. The multidisciplinary modern scientific approaches will help to reveal and uncover the “mystery” of traditional medicinal plants properties to the modern science world.

## Objectives:

Therefore, the present study was conducted to investigate the anticancer effects and mechanism of *Calophyllum inophyllum* L. (Calophyllaceae) fruit extract against MCF-7 cells via multidisciplinary modern scientific approaches. *C. inophyllum* fruit extract was found to have markedly cytotoxic effect against MCF-7 cells in a dose-dependent manner with the IC<sub>50</sub> for 24 hours of 23.59 µg/mL. Flow cytometry analysis revealed that *C. inophyllum* fruit extract mediated cell cycle at G<sub>0</sub>/G<sub>1</sub> and G<sub>2</sub>/M phases and MCF-7 cells entered the early phase of apoptosis.

## Results:

The expression of anti-apoptotic proteins Bcl-2 was decreased whereas, the expression of the proapoptotic protein Bax, cytochrome C and p53 were increased after treatment. *C. inophyllum* fruit extract led to apoptosis in MCF-7 cells via the mitochondrial pathway in a dose dependent manner. This is evidenced by the elevation of intracellular ROS, the loss of mitochondria membrane potential (Δψ<sub>m</sub>) and activation of caspase-3. Meanwhile, dose-dependent genomic DNA fragmentation was observed after *C. inophyllum* fruits extract treatment by comet assay.

## Conclusion:

These studies show that *C. inophyllum* fruits extract-induced apoptosis are primarily p53 dependent and mediated through the activation of caspase-3. *C. inophyllum* fruit extract could be an excellent source of the chemopreventive agent in the treatment of breast cancer and has potential to be explored as a green anticancer agent. Consequently, scientist hopes that more evidence-based multidisciplinary modern scientific approaches to studying traditional medicinal plants will be provided to lifting the mysterious veil.