APOPTOSIS PATHWAY OF GELAM (*Melaleuca* cajupati) HONEY ON HUMAN COLORECTAL CARCINOMA (HCT116)

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1. Letter of Report Submission

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FINAL REPORT SUBMISSION: EXCELLENT FUND ENTITLED APOPTOSIS PATHWAY OF GELAM HONEY ON HUMAN BREAST CANCER (MCF7) (600-RMI/ST/DANA 5/3/Dst (105/2010)

The above matter is referred.

2.   I would like to submit the final report for the above grant. We have made some changes compared to the proposal. We used colon cancer instead of breast cancer because we have problems in culturing the cells. In order to save time, we have to use available cells i.e. colon cancer cell lines. The rest, we managed to performed experiment using MTS assay, microscopic and Western blot analyses.

3.   I also would like to extend my appreciation to RMI in giving this opportunity to lead and receive my first own fund for my research. The scheme is very useful for young lecturer and researcher like me.

Thank you

Yours sincerely,

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5. Report

5.1 Proposed Executive Summary

Honey has been used for medical purposes since a long time ago. It had antimicrobial, antiviral and antiparasitic activities, and showed anti-inflammatory, antioxidant and antimutagenic effects. Previous studies demonstrated that honey may have potential as an anticancer agent as well. However, study of honey as anticancer agent is still at infancy level particularly in Malaysia. Several type of Malaysian honey such as *Gelam, Pineapple and Coconut* honey may have potential as an anticancer agent. Gelam honey showed better antimicrobial, antioxidant and wound healing activities, and therapeutic value than other honey and natural products. This was due to the difference in their phenolic contents which has a direct correlation to the antioxidant activity of honey. Antioxidant activity prevents oxidation reactions of free radical such as hydroxyl radical in cancer cell lines. High activity of antioxidant may provide a better anticancer agent. Thus, the honey will be chosen for the first time to analyse the possible mechanism pathway, in particular apoptosis pathway of human breast cancer (MCF7) using Western blot analysis. Understanding the molecular basis of Gelam honey to act against the cancer cell lines may shed new light on these honeys as a new anticancer agent in the future.

5.3 Introduction

Cancer is known as a killer that seriously threatens human health for many years. According to research reports by the World Health Organization (WHO), the incidence of cancer is increasing every year (Chen, 2006). This problem may be further compounded by world population aging, decrease in physical activity and unhealthy dietary habits, leading to a sharp increase in the number of cancer patients worldwide (Chen, 2006). Based on the report released in 2008, colon cancer i.e. large bowel cancer (11.9%) among the highest cancer during the period, followed by lung cancer (7.4%) (http://www.makna.org.my/research.asp).

Strengthening cancer prevention will be the most economical and effective way of controlling cancer. However, an effective treatment is still required to treat people with the disease. One of the treatment that has been widely used to treat cancer is chemotheraphy. Chemotherapy agents treat cancer cells by penetrating the tissues and organ via the bloodstream. These agents are not specifically toxic to the cancer cells only but also to the normal tissues. They may cause some undesired effects to patient body such as Tamoxifen may cause short of breath, abnormal vaginal bleeding, chest pain and leg swelling. Apart from that, the chemotherapeutic agents are not highly effective and may lose their efficacy due to the development of drug resistance (Fauzi et al., 2011).

In recent years, great interest in the application of antioxidants to medical treatment has been increasingly gaining attentions such as application of honey. Honey is believed to be relatively non-toxic and have been used as natural remedies since ancient times (Aljadi & Yusoff, 2004; Kassim et al., 2010; Fauzi et al., 2011). Honey contains chiefly of glucose (30-40%), fructose (40-50%) and small amounts of sucrose (0.1-10%), dextrin, formic acid, pollen grains and volatile oil. Other than that, honey also contains of enzymes traces, proteins, vitamins, maltose, pentosans, gums, trace elements, amino acid and colouring matter (Bogdanov et al.,, 2008). It has revealed that the presence of phenolic compounds in the honey can act as potent antioxidants compare to other constituents like vitamin C and E (Aljadi & Yusoff, 2004; Jaganathan & Mandal, 2009).

The use of honey has been tested and approved scientifically for its functional and biological properties, which can be observed in many previous studies (Kassim et al., 2010). Due to honey's great potential for example the antiproliferative and apoptotic activities of Malaysian Tualang honey, these have promoted extensive studies on other honeys such as Gelam honey (Ghashm et al., 2010). Gelam honey has the highest phenolic compounds as it

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