

TITLE OF THE PROPOSAL

STUDY ON RESISTANT STARCH TYPE 3 DERIVED FROM RICE AND SAGO, AS FUNCTIONAL FOOD INGREDIENT WITH CAPABILITY TO PREVENT COLORECTAL CANCER (CRC) DISEASE

ABSTRACT

Global cancer data showed that colon and rectum cancers (also known as colorectal cancer/CRC) accounted for about 1 million new cases in 2002 (9.4% of the world total). In terms of incidence, colorectal cancers rank fourth in frequency in men and third in women. Around 15% of CRC is inherited (direct and indirect), the others is acquired. Up to 80% of CRC cases have been attributed to diet. It suggests that CRC is preventable disease. The above condition leads us to pursue basic research on the development of resistant starch type 3 (RS3) as one of the functional food ingredient with cancer prevention ability. RS type 3 is retrograded starch, which is not digested by human starch degrading enzyme and will thus undergo bacterial degradation in the colon. The main fermentation products are the short chain fatty acid (SCFA) acetate, propionate and butyrate. Butyrate has been implicated in providing protection against **cancer**; it is also preferred energy substrate of the colonocytes. RS type 3 derived from different origin of sources and processing conditions have different structures and a wide range of physical and chemical properties. Thus, it can be assumed that molecular properties of RS may influence the SCFA production by colonic butyrate producing bacteria. The increasing of SCFA would inhibit the proliferation of cancer cell.

The objectives of the proposed research are: (a) to characterize RS3 derived from rice and sago starch. The effect of starch characteristics and retrogradation on molecular size of RS type 3 will be intensively investigated. Rice and sago starch are selected due to their great potential to be developed into high value-added RS as food ingredient in Indonesia, (b) to study the SFCA profile and starch degrading enzymes produced by colonic butyrate bacteria grown in medium containing RS3 and (c) to study the effect of SCFA produced by colonic butyrate on the proliferation of cancer cell.

Two phase of research are planned (2009-2010). Phase I is designed to produce RS type 3 (from rice and sago starch) and to examine their functionality. RS type 3 will be produced from retrograded starch followed by enzyme hydrolysis. Individual colonic butyrate producing bacteria will be anaerobically grown in the medium containing RS type 3. The ability of the bacteria strain to utilize RS will be investigated. Phase II is designed to investigate the effect of RS type 3 on colorectal carcinogenesis. Cancer cell of human colon (SW480) will be grown in the cell free supernatant of medium containing SCFA (produced as described in Phase I). The level of apoptotic cell will be observed. Normal cell line (MRC5) will be included as control.