

# PRESCRIPTION

Latest news and updates from the Faculty of Pharmacy

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## CHEMOPREVENTIVE ROLE OF LACTIC ACID BACTERIA: INSIGHTS FROM A UNIQUE STRAIN ISOLATED FROM FERMENTED SOYBEAN

Colorectal cancer (CRC), which is characterised by abnormal growth of normal cells in the colon lining or rectum, is currently ranked second in terms of mortality rate, accounting for approximately 881,000 deaths of all cancer patients worldwide with over 1.8 million new cases in 2018 (Baidoun et al., 2021). The majority of CRC cases are sporadic (Yamagishi et al., 2016). Sporadic CRC, being intrinsically non-hereditary, is associated with multi-factors such as high intake of red meat, being overweight and the lack of fibres in diet (Baena & Salinas, 2015; Hamza et al., 2017; Vipperla & O'Keefe, 2016). The actual cause of CRC hitherto remains poorly understood. Nevertheless, imbalanced gut microbiota and intestinal metabolome are increasingly linked to CRC (Ciernikova et al., 2015; Drewes et al., 2016). In fact, there is now growing evidence indicating that restoration of gut microbiota could potentially prevent CRC (Arkan, 2017; Lin et al., 2018; Seidel et al., 2017). Also, the limitations of conventional chemotherapy and targeted therapy raise the need for preventive strategies against CRC through diet modifications (Arkan, 2017).

In this regard, probiotics are increasingly recognised for their roles in preventing CRC in a strain-dependent manner (Chong, 2014; de Andrade Calaca et al., 2017; Dos Reis et al., 2017). Probiotics were reported to halt proliferation of cancer cells, promote apoptosis as well as inhibit angiogenesis (Khoury et al., 2014; Nada et al., 2020). As part of the effort in identifying superior probiotic strains with health promoting effects, the Collaborative Drug Discovery Research (CDDR) Group, Faculty of Pharmacy, Universiti Teknologi MARA (UiTM) has assessed the chemopreventive potential of locally isolated lactic acid bacteria (LAB) with probiotic characteristics (Fareez et al., 2022; Mohd Bajuri et al., 2023; Ramasamy et al., 2012). To this end, we tested the LAB-derived cell free supernatant against CT26, a mouse colon carcinoma cell line. Our in vitro findings indicated cytotoxic and anti-angiogenic potentials of *Lactiplantibacillus plantarum* (formerly known as *Lactobacillus plantarum*) LAB12 (isolated from fermented soybean). Immunocytostaining indicated LAB12-induced downregulation of vascular endothelial growth factor (VEGF) and upregulation of thrombospondin (TSP-1). High performance liquid chromatography (HPLC) found LAB12 to produce beneficial short chain fatty acids (SCFA). We also validated the chemopreventive potentials of microencapsulated *L. plantarum* LAB12 against NU/NU nude mice bearing orthotopic transplanted CT-26 CRC (female mice; 4–6 weeks old; 20–22 g; n = 6/group). Orthotopic mice pre-supplemented with microencapsulated *L. plantarum* LAB12 (10 log CFU kg<sup>-1</sup> BW for 11 weeks) were presented with significantly reduced tumour volume and weight when compared to control. In line with the in vitro findings, the in vivo chemopreventive effect was found to be attributed to apoptosis and anti-angiogenesis. Subsequent protein expression studies further indicated that the beneficial effects could be mediated, at least in part, through upregulation of tumour suppressor p53 and pro-apoptotic caspase-3 as well as downregulation of pro-inflammatory COX-2, pro-angiogenic VEGF and PECAM-1. Our present findings strongly implied the chemopreventive potential of LAB12, thus warranting further investigations at clinical settings. The significant output from our study has also yielded important insights into future efforts of incorporating natural probiotics into food and nutraceutical products that can be potentially used for prevention against CRC.

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## Questions

Let's dive deeper into the article and evaluate your comprehension. We have 3 questions for you [here](#).

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