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ANTICANCER AND ANTIMICROBIAL ACTIVITIES OF SUPERNATANT FERMENTED WITH *PEDIOCOCCUS ACIDILACTICI* LAB5 OR *P. PENTOSACEUS* LAB6

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TABLE OF CONTENTS

ABSTRACT

Imbalanced composition of gut microbiota (i.e. dysbiosis) is associated with increased susceptibility to colorectal cancer (CRC) and infectious diseases. In spite of the advancement of modern therapy, CRC and infectious diseases continue to represent a major health problem. The issues of side effects and drug resistance are amongst the major problems that impede effective treatments against CRC and infectious diseases. This has given rise to the need for safer and more effective alternatives. The present study assessed the anticancer and antimicrobial potential of *Pediococcus acidilactici* LAB5- and *P. pentosaceus* LAB6-fermented supernatant. For anticancer assay, HCT116 (human colorectal cancer cells) were seeded at 2,500 cells/well and incubated overnight to allow attachment. The cells were treated with LAB-fermented supernatant (0.1-4%) for 72 hours. SRB assay was performed and data generated was used to plot the dose-response curve. For antimicrobial assay, Gram positive *Staphylooccus aureus* and Gram negative *Escherichia coli* were standardised to 0.5 McFarland Standard. The pathogens were exposed to LAB-fermented supernatant (3.125-50%) overnight. The minimal inhibitory concentration (MIC) was determined by observing for the lowest concentration whereby visible growth of pathogens was inhibited. The present study had uncovered the potential anticancer and antimicrobial effects of both LAB5 and LAB6-fermented supernatant. It was found that cell kill of HCT116 by LAB6-fermented supernatant at the highest concentration tested was about 12-fold greater to that of its counterpart. Both LAB5- and LAB6-fermented supernatant showed similar antimicrobial activity (MIC=25%) and thus did not show any selectivity towards Gram positive or negative pathogens.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

In the human body, there are microorganisms that practically colonise surface exposed to external and internal environments. These microorganisms can be found on the skin, respiratory and urogenital membranes as well as gastrointestinal tract (GIT) (de Almada, Nunes de Almada, Martinez, & Sant'Ana Ade, 2015). Microorganisms that colonise the GIT are collectively termed gut microbiota (Frohlich, Farzi, Mayerhofer et al., 2016). When they are in a balanced state, they confer benefits to the host by acting as a defensive barrier against pathogens and modulating immune system development and regulation as well as metabolic functions (Chang & Lin, 2016). When there is an imbalance in the composition of gut microbiota (i.e. dysbiosis), however,the host then will be increasingly susceptible to chronic diseases like cancer and infectious diseases (Shin, Whon, & Bae, 2015; Sun, Grimm, & Riedel, 2015).

In spite of the advancement of modern therapy, cancers of the GIT continue to represent a major health problem, accounting for 25% of all cancers and 9% of all causes of cancer deaths worldwide (Serban, 2014). Colorectal cancer (CRC), in particular, is the third most commonly diagnosed cancer globally, accounting for 10% of the estimated 14.1 million new cancer cases registered in 2012 (Tamas, Walenkamp, de Vries et al., 2015). Age and consumption of NSAIDs appear to affect