

**CULTIVATION, EVALUATION OF THE ANTICANCER ACTIVITIES  
AND ASSESSMENT OF THE PHYLOGENETIC SELECTED STRAIN  
OF *Chlorella vulgaris* AND *Spirulina platensis***

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## PROPOSED EXECUTIVE SUMMARY

Cyanobacteria are photosynthetic organisms with relatively simple requirements for growth, when compared to other sources of biomass. The carbon source necessary for the cultivation of cyanobacteria represents up to 60% of the costs with nutrients. The cyanobacteria also are one of the richest sources of biomedically relevant compounds with extensive therapeutic pharmaceutical applications (Gademann & Portman, 2008). Cyanobacteria metabolites show an interesting and exciting range of biological activities ranging from antimicrobial, immunosuppressant, anticancer and antiviral to proteinase-inhibiting activities which are striking targets of biomedical research (Luesch et al., 2002). Chemotherapy is one of the main treatments used to cure cancer. A great number of antitumor compounds are natural products or their derivatives, mainly produced by blue-green algae (Patterson et al, 1991, 1993). This study will be focus with an alternative treatment to produce new anticancer-type natural products from cyanobacteria. The proposed project will be focused on the isolation and purification of microalgae from natural habitat. Various culture media will be developed and modified such as AF6 medium (Watanabe *et al.*, 2000), AK medium (Barsanti & Gualtieri, 2006), COMBO medium (Kilham *et al.*, 1998) and Medium G (Blackburn *et al.*, 2001) for isolation and cultivation of microalgae. The molecular-based techniques will be developed in monitoring, identification and quantification of microalgae species in mixed phytoplankton samples. The targets cyanobacteria will be growing rapidly are further subcultured and grow to a density sufficient for inoculation of scale-up volume. After cell densities of the scaled-up cultures are harvested, the cell material is freeze dried. The biomass is extracted using pure chloroform to obtain a crude lipid extract. This extracts will be evaluated for anticancer-type activity by using MTT assay. The standard chemotherapeutic agent doxorubicin will be used as a positive control in MTT assay and normal cell line LO2 will be used to show whether cytotoxic activity was tumor-specific. The concentrations required to inhibit growth by 50% (IC<sub>50</sub>) will be calculated from survival curves using the Bliss method. This studies are to known the potential of cyanobacteria as anticancer and to screen cyanobacteria products for anticancer activity by MTT assay. It more to organic and new anticancer-type natural products which have no harmless to normal human cells.

## CHAPTER I

### INTRODUCTION

Unicellular (*Chlorella sp.*) and filamentous (*Spirulina sp.*) microalgae are photosynthetic organisms with relatively simple requirements for growth, when compared to other sources of biomass. The carbon source necessary for the cultivation of these microalgae represents up to 60% of the costs with nutrients. The microalgae also are one of the richest sources of biomedically relevant compounds with extensive therapeutic pharmaceutical applications (Tan, 2007). Microalgae metabolites show an interesting and exciting range of biological activities ranging from antimicrobial, immunosuppressant, anticancer and antiviral to proteinase-inhibiting activities which are striking targets of biomedical research (Luesch et al., 2001).

Chemotherapy is one of the main treatments used to cure cancer. Besides that, a group of drugs are used to kill or inhibit the growth of cancer cells. These drugs are associated with toxicity, which at best is unpleasant and at worst may threaten life. Many side effects of chemotherapeutic drugs include hair loss, mouth sores, diarrhea, nausea and vomiting, loss of appetite and fatigue. Hence new anticancer agents should be investigated from various resources. A great number of antitumor compounds are natural products or their derivatives, mainly produced by blue-green algae (Nianjun, 2004). A study will be focus with an alternative treatment to produce new anticancer-type natural products from microalgae. This research was accomplished to explore the ability of *Chlorella vulgaris* and *Spirulina platensis* as a potential anticancer agent on different types of cancer cells.

For culturing purposes to produce natural products from microalgae, it is important to know the level of genetic biodiversity among the culturing populations as well as the level of heterozygosity of each progeny. The level of genetic diversity of this species is required for purposes of management, quality control, conservation and mass alga production. Meanwhile, microalgae are highly adaptable to grow