INHIBITORY ACTIVITIES OF MICROALGAL EXTRACTS AGAINST EPSTEIN-BARR VIRUS (EBV) ANTIGEN EXPRESSION IN LYMPHOBLASTOID CELLS

YIH YIH KOK1*, WAN LOY CHU1, SIEW MOI PHANG2, SHAR MARIAM1 MOHAMED, NAIDU RAKESH3,4, PEY JIUN LAI3, SHUI NYUK LING1, JOON WAH MAK1, PATRICIA KIM CHOOI LIM1,5, BALRAJ PAULINE5 and ALAN SOO BENG KHOO5

1International Medical University, No. 126 Jalan Jalil Perkasa 19, Bukit Jalil, 57000 Kuala Lumpur, Malaysia
2Institute of Biological Sciences & Institute of Ocean and Earth Sciences (IOES), University of Malaya, 50603 Kuala Lumpur, Malaysia
3Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur, Malaysia
4School of Medicine and Health Sciences, Monash University, Sunway Campus, Malaysia
5Molecular Pathology Unit, Institute for Medical Research, Jalan Pahang, 50588 Kuala Lumpur, Malaysia

Corresponding author: yihyih_kok@imu.edu.my

Abstract – The inhibitory activities of microalgal extracts against the expression of three EBV antigens, latent membrane protein (LMP)1, Epstein-Barr nuclear antigen (EBNA)1 and Z Epstein-Barr reactivation activator (ZEBRA) were assessed by immunocytochemistry. The observation that the methanol extracts and their fractions from Ankistrodesmus convolutus, Synechococcus elongatus and Spirulina platensis exhibited inhibitory activity against EBV proteins in three Burkitt's lymphoma cell lines at concentrations as low as 20 µg/ml suggests that microalgae could be a potential source of antiviral compounds against EBV.

Keywords: microalgae; Epstein-Barr virus (EBV); Ankistrodesmus convolutus; Synechococcus elongatus

INTRODUCTION

Algae are a potential source of yet to be fully explored antiviral compounds. The sulfated polysaccharides from the red algae Porphyridium sp., and the blue green algae Spirulina platensis were found to inhibit the replication of herpes simplex virus-1 and -2 (HSV-1 and HSV-2), varicella zoster virus (VZV) and human immunodeficiency virus type 1 (HIV-1) (Hayashi et al., 1996; Huleihel et al. 2001; Huleihel et al., 2002; Barron et al., 2008). The compounds griffithsin and fucoidan isolated from the red seaweed Griffithsia sp. and brown algae, respectively, were found to inhibit the entry of human immuno-
nodeficiency virus-1 (HIV-1) into host cells (Wang and Ng 2001; Hayashi et al., 2008; Hidari et al., 2008; Micewicz et al., 2010). Despite many antiviral studies on algal compounds, there are few reports about the effects of these compounds against the Epstein-Barr virus (EBV).

The EBV is an etiological factor in Burkitt’s lymphoma (BL) and other EBV-related malignancies, such as nasopharyngeal carcinoma, Hodgkin’s disease and infectious mononucleosis (Rickinson and Kieff, 2006; Rezk and Weiss, 2007). During latent infection, several of the nine viral latent gene products, such as the Epstein-Barr nuclear antigen