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Fortune from the red carrageenan: A discovery for photoprotection

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Photo protection against ultraviolet radiation is a major concern worldwide and the best protection agent has yet to be found. Carrageenan is a polysaccharide extracted from the red seaweed mostly of the genera *Chondrus, Eucheuma, Gigartina* and *Iridae* is used as a gelling and thickening agent in the food industry, medicines and as an excipient in cosmetics. Considerably, carrageenan is believed to have prospective photo protective properties. In the current study the cytotoxicity, photo protection and Rat Sarcoma (RAS)-Rapidly Accelerated Fibrosarcoma (RAF) gene mutation of iota, kappa carrageenan and their synergism with vitamin E was evaluated against UVB induced immortalized normal human keratinocyte (HaCaT) cells. MTT results for cytotoxicity and photo protection indicated that carrageenan was not toxic to cells if used in concentration lower that 200 µg/ml with CD50 values of 80 and 90 µg/ml for iota and its synergism with vitamin E and 132 and 155 µg/ml for kappa and its combination with vitamin E respectively. Cells pre-treated with carrageenan exhibited significantly ($p<0.05$) higher cell viability compared to the cells without treatment by 3.53-27.73% after 100 mJ/cm^2 and 11.08-45.17% after 300 mJ/cm^2 UVB fluence. The incident of RAS mutation using the RAS-RAF pathway somatic mutation assay was lower in cells treated with carrageenan compared to those without. Collectively results suggest the potential use of carrageenan as a photo protective agent. An added value of carrageenan rather than being only an excipient could be deduced from this study which is worthwhile for further exploration on its other mechanisms that promises photo protection.

Biography

Shar Mariam Mohamed is currently the Head of Human Biology Department under the School of Medicine. She is one of the pioneer team members who developed the Medical Biotechnology Programme dated back in 2005-2006. She has been extensively involved in curriculum design and reviewed the programme. She has introduced and developed the Enterprise Management module which has now become the unique feature of IMU's Medical Biotechnology Program. Her area of expertise includes cell and human physiology. Her research career has focused on natural products and their anti-cancer potential and properties. The two main areas of her research interest are the studies on the effects of carrageenan, a polysaccharides from red seaweed on human keratinocytes and on the anticancer activities of gram positive bacterium *Bacillus thuringiensis* (BT18 strain) against leukaemic cell line CEM-SS. The study on carrageenan revealed its role as a photoprotective agent against UVB-induced cell killing, hence indicating its potential in minimizing skin cancer. The study has won an international recognition (Dr Martin Baker Memorial Prize, SCCANZ Skin Cancer Conference, Australia) in 2011. She has been a member of the Working Group for setting Malaysian Standards on Safety in Laboratories (SIRIM) – Microbiological since 2008. She is an Invited speaker at the 4th World Congress of Marine Biotechnology, Dalian China during 16-18 October 2014; Panel member of drafting the National Act On "Biorisks/ Biothreats: Bridging Science and Security" held in Penang Malaysia (2014) and; Career coach at the Biocareer 2014 in Conjunction With Biomalaysia & Bioeconomy Asia Pacific 2014 held at the University of Malaya, organized by the Malaysian Biotechnology Corporation.

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