The effect of gamma irradiation on the chemical structure and surface characteristics of dipalmitoylphosphatidylcholine (DPPC) [Kesan sinaran gama ke atas struktur kimia dan ciri permukaan dipalmitoilfosfatidilkolina (DPPC)]

Mohd H.M.K., Ahmad A.F., Mohamed F., Kamaruzaman N.S., Ling N.W., Jin P.R., Yasir M.S., Isa M.H.M., Ramli S., Radiman S., Rahman I.A.

Abstract: Dipalmitoylphosphatidylcholine (DPPC) is one of the most abundant lipids in the human body and carries out important physiological functions such as liver protection and fighting infections. This study was conducted to investigate the effect of ionising radiation on the chemical structure and surface characteristic of DPPC. Synthetic DPPC was dissolved in chloroform (1mg/ml) and irradiated with Cobalt-60 (dose range of 50 - 200 Gy). The change in surface characteristics due to gamma irradiation was determined by means of monolayer compression isotherms using a Langmuir trough. From the change in the isotherm features, the threshold dose that affected the surface characteristics of the DPPC monolayer was determined to be 60 Gy. With increasing dose value, the plateau feature in the DPPC isotherm became shorter and was shifted to higher surface pressures. Analysis using High Performance Liquid Chromatography (HPLC) and Mass Spectrometry (MS) suggested that gamma irradiation of DPPC destroyed the chemical structure of DPPC and produced two main radiolytic products, namely lisophosphatidylcholine, LPC (~495.3142 g/mol) and phosphatidic acid, PA (~718.916 g/mol) with an average percentage of LPC and PA of 23% and 74%, respectively.

Subject: Dipalmitoylphosphatidylcholine (DPPC); Gamma radiation; High Performance Liquid-Chromatography (HPLC); Langmuir monolayer; Mass-Spectrometer (MS)

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