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ISOLATION AND LIPOSOMAL ENCAPSULATION OF LYCOPENE FROM TOMATO

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Lycopene, a natural source of antioxidant, is an acyclic unsaturated carotenoid responsible for the deep red in tomato, watermelon and pink grapefruit. It is a hydrocarbon $C_{40}H_{56}$ with molecular weight 536.89. In this study lycopene was extracted using a homogenized tomato sample into a mixture of hexane: acetone: ethanol (2:1:1 v/v%). The amount of lycopene extracted was 43.9 mg/kg (90% purity on HPLC). Lycopene was encapsulated in liposomes using lipid film hydration method. The liposomes were formulated with L-α-phosphatidylcholine (from egg yolk): cholesterol: lycopene (9:1:1 w/w%). Antioxidant activity of both lycopene and encapsulated lycopene was determined using 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay. The IC_{50} value was determined over a time period of 1 month. The IC_{50} values of lycopene were 58.5 ppm, 66.9 ppm and 120.7 ppm for initial, 1 week and 1 month respectively. The antioxidant activity reduced approximately two fold from the initial value after 1 month indicating that free lycopene has a considerable degree of degradation. The IC_{50} values obtained for encapsulated lycopene were 54.2 ppm, 66.6 ppm and 84.2 ppm for initial, 1 week and 1 month respectively. The antioxidant activity of encapsulated lycopene did not show a significant change during one week ($p>0.05$). However the increase in IC_{50} value after 1 month is significantly lower ($p<0.05$) compared to the free lycopene sample. Therefore the encapsulation has influenced the stability of lycopene. Releasing of lycopene was determined using a pH 8 buffer. Only 4% of lycopene was released to the pH 8 buffer solution during 6 h. Since lycopene is a nonpolar compound it has a higher affinity towards the liposomal lipid bilayer and is less soluble in the aqueous buffer decreasing its release. Therefore the encapsulation of lycopene is favorable for food applications where stability over time is important.