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Ellagic acid as a potent anticancer drug: A comprehensive review on in vitro, in vivo, in silico, and drug delivery studies

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Abstract

Ellagic acid as a polyphenol or micronutrient, which can be naturally found in different vegetables and fruits, has gained considerable attention for cancer therapy due to considerable biological activities and different molecular targets. Ellagic acid with low hydrolysis and lipophilic and hydrophobic nature is not able to be absorbed in circulation. So, accumulation inside the intestinal epithelial cells or metabolism to other urolithins leads to the limitation of direct evaluation of EA effects in clinical studies. This review focuses on the studies which supported anticancer activity of pure or fruit-extracted ellagic acid through in vitro, in vivo, in silico, and drug delivery methods. The results demonstrate ellagic acid modulates the expression of various genes incorporated in the cancer-related process of apoptosis and proliferation, inflammation related-genes, and oxidative-related genes. Moreover, the ellagic acid formulation in carriers composed of lipid, silica, chitosan, iron-bovine serum albumin nanoparticles obviously enhanced the stable release and confident delivery with minimum loss. Also, in silico analysis proved that ellagic acid was able to be placed at a position of cocrystal ADP, in the deep cavity of the protein target, and tightly interact with binding pocket residues leading to suppression of substrate availability of protein and its activation inhibition.

Keywords: anticancer activity; drug delivery; ellagic acid; in silico; in vitro; in vivo.

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