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The natural polymer of plant origin its synthetic monomer and their anticancer efficacy

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Caffeic acid-derived polyethers are a class of natural products isolated from the root extracts of comfrey and bugloss, which are endowed with intriguing pharmacological properties as anticancer agents. According to ¹³C, ¹H NMR, APT, 2D heteronuclear ¹H/¹³C HSQC, 1D NOE, and 2D DOSY experiment the polyoxyethylene chain is the backbone of the polymer molecule. 3,4-Dihydroxyphenyl and carboxyl groups are regular the chain. The repeating unit of this regular polymer is 3-(3,4-dihydroxyphenyl)-glyceric acid residue. Thus, the structure of natural polymer under study was found to be poly[oxy-1-carboxy-2-(3,4-dihydroxyphenyl)ethylene] or poly[3-(3,4-dihydroxyphenyl)glyceric acid] (PDPGA). Then basic monomeric moiety of this polymer 3-(3,4-dihydroxyphenyl)glyceric acid was synthesized via Sharpless asymmetric dihydroxylation osmium catalyst. Besides, it is well known that epoxides are valuable synthons in organic synthesis and have been introduced into several industrial, especially pharmaceutical applications, such as in the synthesis of antitumor drugs. Subsequently, the building blocks for the production of derivatives of such polyethers, methyl-3-(3,4-dimethoxyphenyl)glycidate and benzyl-3-(3,4-dibenzyloxyphenyl)glycidate, were synthesized based on the or by oxidation with ozone (Shi oxidation) in order to produce in future derivatives of a synthetic analog of a natural polymer. PDPGA and its synthetic monomer exerted anti-cancer efficacy in vitro and in human prostate cancer (PCA) cells. Overall, this study identifies PDPGA as a potent agent against PCA without any toxicity and supports its clinical application..

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