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## Plant biopolymer with anticancer activity

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The structure elucidation of biopolymer main structural element of high-molecular water-soluble fractions from different species of comfrey *Symphytum asperum*, *S. caucasicum*, *S. officinale* (family *Boraginaceae*) was carried out. According to <sup>13</sup>C, <sup>1</sup>H NMR, APT, 1D NOE and 2D heteronuclear <sup>1</sup>H/<sup>13</sup>C HSQC experiments the polyoxyethylene chain is the backbone of the polymer molecule. 3,4-Dihydroxyphenyl and carboxyl groups are regular substituents at two carbon atoms in 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). PDPGA is endowed with intriguing pharmacological properties as anticomplementary, antioxidant, anti-inflammatory, burn and wound healing and anticancer properties. We examined the efficacy of PDPGA of *S. asperum* (PDGPA-SA) and *S. caucasicum* (PDGPA-SC) in androgen-dependent (LNCaP) and androgen-independent (22Rv1 and PC3) human prostate cancer (PCA) cells. PDPGA-SA treatment (100 mcg/ml for 48 h) decreases the live cell number by 65, 64 and 35% and increases the cell death by 16, 8 and 12 folds in LNCaP, 22Rv1 and PC3 cells, respectively. Similarly, PDPGA-SC treatment (100 mcg/ml for 48 h) decreased the live cell number by 87, 25 and 33% and increased the cell death by 19, 10 and 9 folds in LNCaP, 22Rv1 and PC3 cells, respectively. Our studies for the first time revealed that PDPGA inhibits the growth of androgen-dependent and androgen-independent PCA cells both *in vitro* and *in vivo*. Results also revealed the broad-spectrum effects of PDPGA on AR and PSA levels, cell cycle and apoptosis revealing some of the plausible underlying mechanisms. In conclusion, present study is significant as we identified a natural nontoxic compound with efficacy against PCA that supports its further pre-clinical and clinical testing as well as its translational applicability in future.

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