J Biotechnol Biomater 2017, 7:6 (Suppl)
DOI: 10.4172/2155-952X-C1-086

2nd World Biotechnology Congress

December 04-05, 2017 | Sao Paulo, Brazil

Dihydroxyphenyl glyceric acid biopolyether of plant origin-prospective therapeutic agent

Vakhtang Barbakadze
Kutateladze Institute of Pharmacochemistry, Georgia

The structure elucidation of main structural element of high-molecular water-soluble fractions from different species of comfrey Symphytum asperum, S.caucasicum, S.officinale, S.grandiflorum and bugloss Anchusa italica (Boraginaceae) was carried out. According to ^{13}C, ^{1}H NMR, APT, 1D NOE, 2D heteronuclear $^{1}H/^{13}C$ HSQC and 2D DOSY experiments the main structural element of these preparations was found to be poly[oxy-1-carboxy-2-(3,4-dihydroxyphenyl)ethylene] or poly[3-(3,4-dihydroxyphenyl) glyceric acid] (PDPGA). Thus, 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. Most of the carboxylic groups of PDPGA from *Anchusa italica* and *Symphytum grandiflorum* unlike the polymer of *S.asperum*, *S.caucasicum* and *S.officinale* are methylated. The 2D DOSY experiment gave the similar diffusion coefficient for the methylated and non-methylated signals of PDPGA. Both sets of signals fell in the same horizontal. This would imply a similar molecular weight for methylated and non-methylated polymers. PDPGA is endowed with intriguing pharmacological properties as immunomodulatary (anticomplementary), antioxidant, anti-inflammatory, burn and wound healing properties. Then the basic monomeric moiety of this polymer, 3-(3,4-dihydroxyphenyl)glyceric acid (DPGA) was synthesized via Sharpless asymmetric dihydroxylation of *trans*-caffeic acid derivatives using a potassium osmate catalyst and a stoichiometric oxidant *N*-methylmorpholine-*N*-oxide. *S.caucasicum* PDPGA and synthetic DPGA exerted anti-cancer efficacy *in vitro* and *in vivo* against human prostate cancer (PCA) cells via targeting androgen receptor, cell cycle arrest and apoptosis without any toxicity, together with a strong decrease in prostate specific antigen level in plasma. However, our results showed that anticancer efficacy of PDPGA is more effective compared to its synthetic monomer. Overall, this study identifies *S.caucasicum* PDPGA as a potent agent agains.

v_barbakadze@hotmail.com