

# 18<sup>th</sup> Biotechnology Congress

October 19-20, 2017 | New York, USA



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### Biopolyether of medicinal plants with anticancer efficacy

According to IR, <sup>13</sup>C, <sup>1</sup>H NMR, APT, 1D NOE, 2D heteronuclear <sup>1</sup>H/<sup>13</sup>C HSQC and 2D DOSY experiments the main chemical constituent of high-molecular water-soluble fractions from different species of comfrey and bugloss (family Boraginaceae) was found to be poly[oxy-1-carboxy-2-(3,4-dihydroxyphenyl) ethylene] or poly[3-(3,4-dihydroxyphenyl) glyceric acid] (PDPGA). The regular polyoxyethylene chain is the backbone of this polymer molecule. 3,4-Dihydroxyphenyl and carboxyl groups are regular substituents at two carbon atoms in the chain. Such biopolymer has not been known and has been identified for the first time. This compound is a representative of a new class of natural polyethers with a residue of 3-(3,4-dihydroxyphenyl) glyceric acid as the repeating unit. PDPGA exhibited anticomplementary, antioxidant, anti-inflammatory and wound healing properties. PDPGA exerted anti-cancer efficacy *in-vitro* and *in-vivo* against human prostate cancer (PCA) cells via targeting androgen receptor (AR), cell cycle arrest and apoptosis without any toxicity, together with a strong decrease in prostate specific antigen (PSA) level in plasma. PDPGA suppressed the growth and induced death in androgen-dependent (LNCaP) and -independent (22Rv1) PCA cells, with comparatively lesser cytotoxicity towards non-neoplastic human prostate epithelial cells PWR-1E. PDPGA caused G1 phase arrest of cell cycle progression in PCA cells through modulating the expression of cell cycle regulators, especially an increase in cyclin-dependent kinase inhibitors (p21 and p27). PDPGA induced apoptotic death by activating caspases, and also strongly decreased AR and PSA expression revealing some of the plausible underlying mechanisms. In 22Rv1 xenograft model male athymic nude mice with 22Rv1 xenografts was administered orally 5.0 mg/kg dose of PDPGA for five weeks. The tumor volume per mouse was decreased by 88%. Plasma analyses revealed that PDPGA administration caused a strong dose-dependent decrease in PSA levels by 87%. Overall, this study identifies PDPGA as a potent agent against PCA without any toxicity, and supports its pre-clinical and clinical testing

### Biography

Vakhtang Barbakadze has his expertise in isolation and structure elucidation of a new series of plant polyethers, which are endowed with pharmacological properties as anti-cancer agents. Besides, he is interested in enantioselective synthesis and biological activities of basic monomeric moiety of these biopolyethers, synthesis of enantiomerically pure epoxides as chiral building blocks for the production of synthetic analogues of natural polyethers. He has completed his PhD and DSci from Institute of Organic Chemistry, Moscow, Russia and Institute of Biochemistry and Biotechnology, Tbilisi, Georgia, respectively. He is the Head of laboratory of plant biopolymers at the Tbilisi State Medical University Institute of Pharmacochimistry. He has been a Visiting Scientist at Utrecht University (faculty of pharmacy), The Netherlands, by university scholarship and The Netherlands organization for scientific research Scholarship Scientific Program, respectively. He has published more than 81 papers in reputed journals

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