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Abstract

# Poly(sugar acids): 3,4-dihydroxyphenyl derivative of acidic polysaccharide poly(2,3-glyceric acid ether) from medicinal plants of Boraginaceous family, its synthetic analogues and their therapeutic efficacy

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## Abstract:

The main chemical constit¬uent of high molecular (>1000 kDa) water-soluble preparations from medicinal plants of Symphytum asperum, S.caucasicum, S.officinale, S.grandiflorum, Anchusa italica, Cynoglossum officinale and Borago officinalis (Boraginaceae). According to data of liquid-state 1H, 13C NMR, 2D 1H/13C HSQC, 2D DOSY and solid-state 13C NMR spectra this biopolymer was found to be poly[oxy-1-carboxy-2-(3,4-dihydroxyphenyl) ethylene] or poly[3-(3,4-dihydroxyphenyl)-glyceric acid] (PDPGA). The polyoxyethylene chain is the backbone of this biopolymer. 3,4-Dihydroxyphenyl and carboxyl groups are regular substituents at two carbon atoms in the chain. The repeating unit of this regular caffeic acid-derived polyether, is 3-(3,4-dihydroxyphenyl)glyceric acid residue. This compound represents a new class of natural polyethers. PDPGA as a 3,4-dihydroxyphenyl derivative of poly(2,3-glyceric acid ether) belongs to a class of an acidic polysaccharides [poly(sugar acids)] as well. Its basic monomeric moiety glyceric acid is oxidative form of aldotriose glyceraldehyde. In this case poly(2,3-glyceric acid ether) chain is the backbone of this polymer molecule and 3,4-dihydroxyphenyl groups are regular substituents at 3C carbon atoms in the poly(2,3-glyceric acid ether) chain. PDPGA as a unique natural polyether contains aliphatic ether groups in its polymer backbone. Naturally occurring ethers include small molecules such as antibiotics, or aromatic polymer such as lignin. Lignin contains ether links between two aromatic rings or between an aromatic ring and an aliphatic moiety. However, reports on the synthesis of polymers that contain aliphatic ethers as repeating unit are sparse. Every repeating structural unit of PDPGA contains three reactive functional groups, two phenolic hydroxyl groups in ortho-position and one carboxyl group. The structural unit of synthetic polymers poly(1,2-glyceric acid carbonate) and poly(1,2-glycerol carbonate) contain only one reactive carboxyl and one reactive –CH2OH groups, respectively. Multifunctionality of PDPGA should be a reason of its wide spectrum of biological activities.

## 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 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 Ph.D and D.Sci. in 1978 and 1999, respectively. He is the Head of Department of Plant Biopolymers and Chemical Modification of Natural Compounds at the Tbilisi State Medical University I.Kutateladze Institute of Pharmacochemistry. In 1996 and 2002 he has been a visiting scientist at Utrecht University, The Netherlands, by University Scholarship and The Netherlands organization for scientific research (NWO) Scholarship Scientific Program, respectively. He has published more than 100 papers in reputed journals. In 2004 he was Georgian State Prize Winner in Science and Technology.

## Publication of speakers:

1. Gogilashvili, Lali & Amiranashvili, Lela & Merlani, Maia & Salgado, Antonio & Chankvetadze, Bezhan & Barbakadze, Vakhtang. (2020). Poly[3-(3,4-Dihydroxyphenyl) Glyceric Acid] from Cynoglossum officinale L. (Boraginaceae). Bulletin of the Georgian National Academy of Sciences. 14. 108-113.



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