Hematology-2013
OMICS Group Conferences
Accelerating Scientific Discovery
International Conference on
Hematology & Blood Disorders
September 23-25, 2013 Raleigh, USA

Galactanomics: Marine glycans with differential actions in coagulation and thrombosis

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Abstract

Glycomics is a current international project interested in the comprehensive analysis of carbohydrates, not only physiologically active but also medically relevant. Galactanomics is a subdivision of this project whose target glycans are named galactans (galactose-composing sugars). They are basically of marine origin and highly sulfated. This latter feature enables molecular interactions with cationic proteins such as those involved in the coagulation system. Sulfated galactans (SGs) from marine organisms may exhibit differential chemical structures which allow advanced structure-function relationship studies, especially those of beneficial effects in hemostasis. In this work, SGs isolated from two species of red alga were comparatively examined with regard to their structures and functions in anticoagulation, antithrombosis and bleeding. In comparison with heparin, a potent anticoagulant and antithrombotic agent with extensive bleeding side-effects, the SG from *Botryocladia occidentalis* was also highly anticoagulant and antithrombotic in the venous models (just in lower doses), aside from showing no additional bleeding effect. This algal SG is composed of a simple disaccharide repeating unit with heterogeneous sulfation distribution. Conversely, the structurally complex and heterogeneous SG from *Acanthophora muscoides* exhibited a significant antithrombotic effect only on the arterial model, even showing no anticoagulant action and no bleeding effect. Unlike heparin, both red algal SGs have shown a serpin-independent anticoagulant mechanism. This work clearly dissociate the biochemical mechanisms involved in anticoagulation, arterial and venous antithrombosis, and bleeding, and suggests that the mechanisms of action of novel therapeutic agents in controlling the blood clot might include serpin-unrelated pathways.

Biography

Vitor H. Pomin, adjunct professor at the Institute of Medical Biochemistry (IBqM) in Federal University of Rio de Janeiro since 2011, conducts research on glycobiology, NMR spectroscopy, and biomedical uses of marine carbohydrates. He is author of 9 book chapters, main editor of 3 books, and has over 20 peer-reviewed published articles, besides serving as editorial board member and reviewer of innumerous reputed journals. After obtaining his Ph.D. in Biological Chemistry (2008) at IBqM, he had a 3-year post-doctoral experience at Complex Carbohydrate Research Center, UGA, USA.