
THE MARINE BACTERIAL INFERNAN EXOPOLYSACCHARIDE AS A PROMISING ANTICANCER AGENT

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Abstract

Marine microorganisms are a hopeful source of innovative compounds for medical applications. Bacterial anionic polysaccharides from different microorganisms can share some biological properties with glycosaminoglycans. An exopolysaccharide (EPS), recently named infernan and produced by a deep-sea hydrothermal bacterium assigned *Alteromonas infernus*, presenting a singular structure was investigated. After chemical modifications of infernan EPS, highly oversulfated low-molecular weight derivatives called OSIDs were isolated.(1)

In MAPACA project, OSIDs with different sulfate group contents and molecular weights were produced and evaluated in order to identify a lead for the cancer therapy. Their effect was first assessed *in vitro* in a large series of human and murine tumor cell lines. OSID4 was the most effective OSID, showing a significant dose-dependent inhibitory effect on the viability of cancer cells. Then, OSID4 was analyzed in immunocompetent tumor-bearing mouse models. Interestingly, OSID4 significantly slowed down progression of lung and melanoma tumor growth. In immunodeficient mice bearing a human lung carcinoma, OSID4 revealed a notable inhibitory effect, comparable to doxorubicin. Toxicity and pharmacokinetic parameters disclosed that OSID4 presented no toxicity and no bleeding risk.(2)

In conclusion, by combining its notable anticancer and moderate anticoagulant activities, OSID4 may be promising for treatment of cancers associated with a high risk of thromboembolic events.

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(1) Collic-Jouault S. *et al.* Biomacromolecules. 2023, *24*, 462-470. doi : 10.1021/acs.biomac.2c01277.

(2) Heymann D. *et al.* Int J Biol Macromol. 2025, *308(Pt 1)*,142074. doi: 10.1016/j.ijbiomac.2025.142074.

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