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Commentary

Shrimp Heparinoids as a Treatment Proposal for Severe Respiratory Disease

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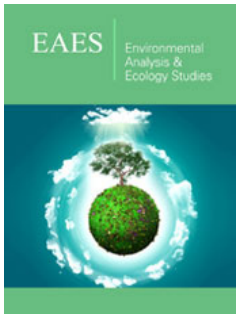

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Bioactive Effects

In addition to their wide use in anticoagulant and antithrombotic therapy, heparin and heparinoids are known to have antiviral effects. Trials are being conducted in order to evaluate their use in anticoagulant treatment for COVID-19 patients, especially those with coagulopathy [1]. The studies suggest that heparin may prevent intravascular coagulation and venous thromboembolism. Due to the potential of heparin to ameliorate severe cases of disease in patients with the novel coronavirus, shortage of heparin supply may provoke another public health issue. Some shrimp heparinoids that present novel structures and strong antithrombotic properties may be useful as alternatives without triggering hemorrhaging, a side effect of heparin, and neither thrombocytopenia, elevation of serum aminotransferases nor hyperkalemia.

Underestimated Value

Shrimp heparinoids can be extracted from industrial by-products and represent an important, but unexploited, bioproduct of the processing of this crustacea [2]. Production of cultivated and wild-caught shrimp amounts to approximately 350 thousand tons per year, of which about 100 thousand tons represent non-food by-products. Considering the yield of shrimp heparinoids is about 320mg/kg of shrimp heads, containing 100-200UI/mg of heparin-like anticoagulant activity, there is a large amount of resources still not being exploited.

Safety and Potential for Treatment Alternatives

Heparin production from porcine and bovine organs has the potential to carry impurities including viruses, endotoxins, prions and other agents, in addition to contaminants such as solvents and metals introduced during pharmaceutical-grade preparation. Heparin-like glycosaminoglycans from shrimp are noted to have lower but significant anticoagulant effects than mammalian heparin, but with negligible hemorrhagic activity [3]. With antithrombotic properties similar to heparin and inhibitory effects against viruses [4], possibly by binding to virus surface proteins [5], these molecules may represent potential treatments against severe pathogens like SARS-CoV-2.

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