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Electrospun nanofibers from the sulfated polysaccharides of chaetoceros muelleri and polyvinyl alcohol: Fabrication and characterization.

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Due to their functional and bioactive properties, sulfated polysaccharides from seaweed are promising candidates for fabricating wound-healing materials such as nanofibers with enhanced assets. Likewise, sulfated polysaccharides (PS) from microalgae have great potential for application in health and the development of biomedical materials. Also, having a microalgae source cultivated under controlled culture conditions could benefit a more comprehensive understanding of the structure-function relationship of these macromolecules. Chaetoceros muelleri is a cosmopolitan diatom present in the Sea of Cortes, and their sulfated polysaccharides have been little studied, and there are no reports on electrospun fibers of these macromolecules. Herein, this study aimed to evaluate macromolecular characteristics and chain conformation of Chaetoceros muelleri sulfated polysaccharides (CMSP) to subsequently fabricate and characterize electrospun nanofibers using a mixture of Polyvinyl alcohol (PVA): CMSP. The molecular weight, intrinsic viscosity, and polydispersity index of CMSP were 2587, 575 mL/g, and 1.1, respectively; other macromolecular characteristics of CMSP were also described for the first time. The α values suggest a globular arrangement, and with 44% fucose content, we infer these polysaccharides display a fucoidan-like structure. The mixture of sulfated polysaccharides with PVA favored the mechanical properties and the formation of uniform fibers. Atomic force microscopy (AFM) of the electrospun fibers confirmed a well-defined topography of fiber-like structures in a random arrangement. An average diameter of 315 nm was determined by scanning electron microscopy (SEM). Additionally, these nanofibers did not present cytotoxic effects through the MTT assay evaluated in an L929 fibroblast cell line. Therefore, the nanofibers fabricated in this research have potential applications as wound dressings. This research allows us to advance the frontier of knowledge of the relationship structure-function in PSCM and its possible application in the design of advanced biomaterials for the biomedical area.

Biography

Valeria Miranda Arizmendi graduated with a bachelor's degree in biology with a specialty in biotechnology from the University of Sonora, México and obtained a Master of Science degree from the Food and Development Research Center (CIAD A.C.). Has participated in several research stays and participated as a collaborator in the project that won first place in the "Gastón Madrid Sánchez, in the area of biomedicine and chemistry of the health research awards of the state of Sonora." Currently studying the Doctorate in Sciences at CIAD with a focus on extraction and characterization of biopolymers, as well as the manufacture of biomaterials from polysaccharides.

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