Heterofucans from brown algae as alternative sources of antithrombotic and antiadhesive agents

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Since 1990, our group has been involved on studies of structural features and biological activities of fucans from brown algae. These polysaccharides constitute interesting models to study the requirements necessary to display certain pharmacological actions. The results have shown unequivocally the presence of three main fucans (fucan A, B and C) in all species analyzed. Several fucans A and B have shown anticoagulant and antithrombotic activities. However, The fucans A and B from *Spatoglossum schröederi* have neither anticoagulant activity "in vitro" nor hemorrhagic activity "in vivo". Nevertheless, it has a potent antithrombotic activity "in vivo". Furthermore, these fucans were able to stimulate the synthesis of an antithrombotic heparan sulfate (HS) from endothelial cells. These results led to suggest that the "in vivo" antithrombotic activity of these compounds is related to the increased production of the antithrombotic HS. In parallel studies, the anti-adhesive activity of fucan B from *S. schröederi* was analyzed using Chinese hamster ovary cells (CHO). Fucan B has shown a dose-dependent anti-adhesive effect, reaching saturation at around 400mg/mL when fibronectin was used as substrate. In addition fucan induced apoptosis in CHO cells. These fucans A and B were biotinylated and used as a probe to identify their action sites. Biotinylated fucans were detected in the extracellular matrix (ECM) environment by confocal microscopy and flow cytometric analysis, but not at the cell surface. The data on heterofucans have shown that the compounds do not necessarily have to interact with cell surface to have an effect. Overall, our results indicate that fucan have a promising field to search for new antithrombotic and antiadhesive drugs.