Effect of sulfated galactans from red alga *Gracilaria fisheri* on migration and matrix synthesis by cultured normal human dermal fibroblast

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ABSTRACT

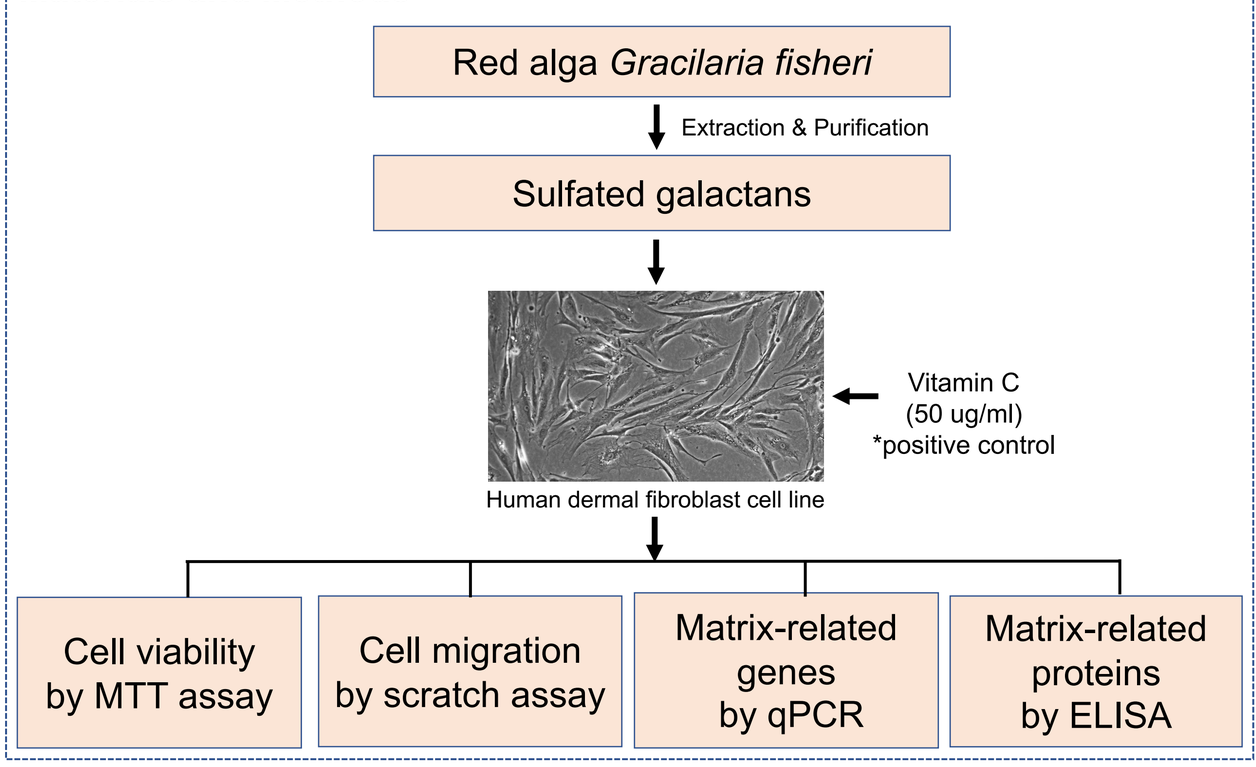
Sulfated galactans is a natural product extracted from red alga *Gracilaria fisheri*, as previously reported that it had the various properties on anti-microbial, anti-cancer, anti-oxidant, anti-melanogenesis, and anti-bacteria. Therefore, the aim of this *in vitro* study is to investigate the effects of sulfated galactans on migration and matrix synthesis of normal human dermal fibroblast. In this study, cytotoxicity was tested following cell migration assay, collagen determination assay, and determination of matrix-related gene and protein expression by quantitative RT-PCR and enzyme-linked immunosorbent assay (ELISA), respectively. The result showed that sulfated galactans had no effect on cytotoxicity in normal human dermal fibroblast. Additionally, we found that sulfated galactans was able to increase cell migration and modulate matrix synthesis by regulating the collagen-1, elastin, and hyaluronic acid production. The present results demonstrating the effects of a natural compound on fibroblast function and show potential as starting material for pharmaceutical preparations targeted against various disorders centered around disturbed matrix production.

Keywords: Sulfated galactans; *Gracilaria fisheri*; Fibroblast; Cell migration; Matrix

Introduction

Dermal fibroblast is a primary cellular population in the dermis of skin, they have an important role in produce and maintain the matrix. The matrix creates a tissue microenvironment for regulation of cell signaling. A variety of proteins are the component of the matrix including collagens, elastin, and hyaluronic acid (HA). The loss of the matrix plasticity is associated with several pathologies, especially those involving chronic inflammation, therefore, the matrix represents a potential therapeutic target for certain conditions. Sulfated galactans was extracted from red seaweed *Gracilaria fisheri* that previous studies have been reported about its activities on anti-oxidant, anti-tumor, anti-melanogenesis, and anti-bacteria. Therefore, the aim of this study was to investigate the potential effect of sulfated galactans from red seaweed *G. fisheri* on migration and the matrix production in human dermal fibroblast cells.

Materials and Methods



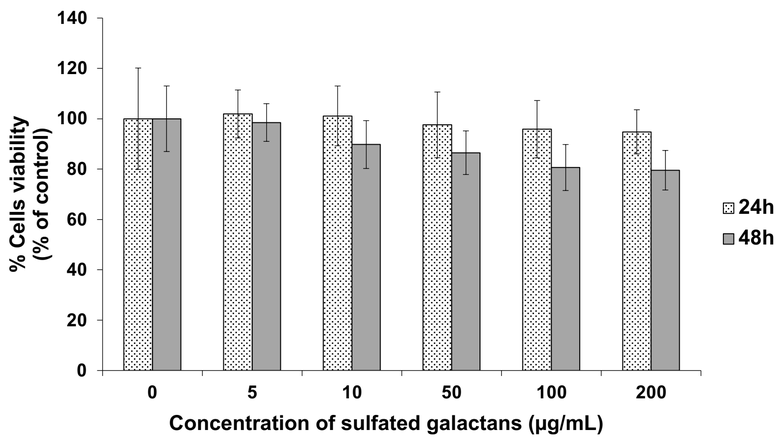


Figure 1 Effect of sulfated galactans on cell viability in human dermal fibroblast cells. Cells were incubated with different concentrations of for 24 and 48 h following which cell viability was measured. Baseline cell viability in control wells not exposed to sulfated galactans was set at 100%. Data were expressed as percentage of control.

Acknowledgement

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References

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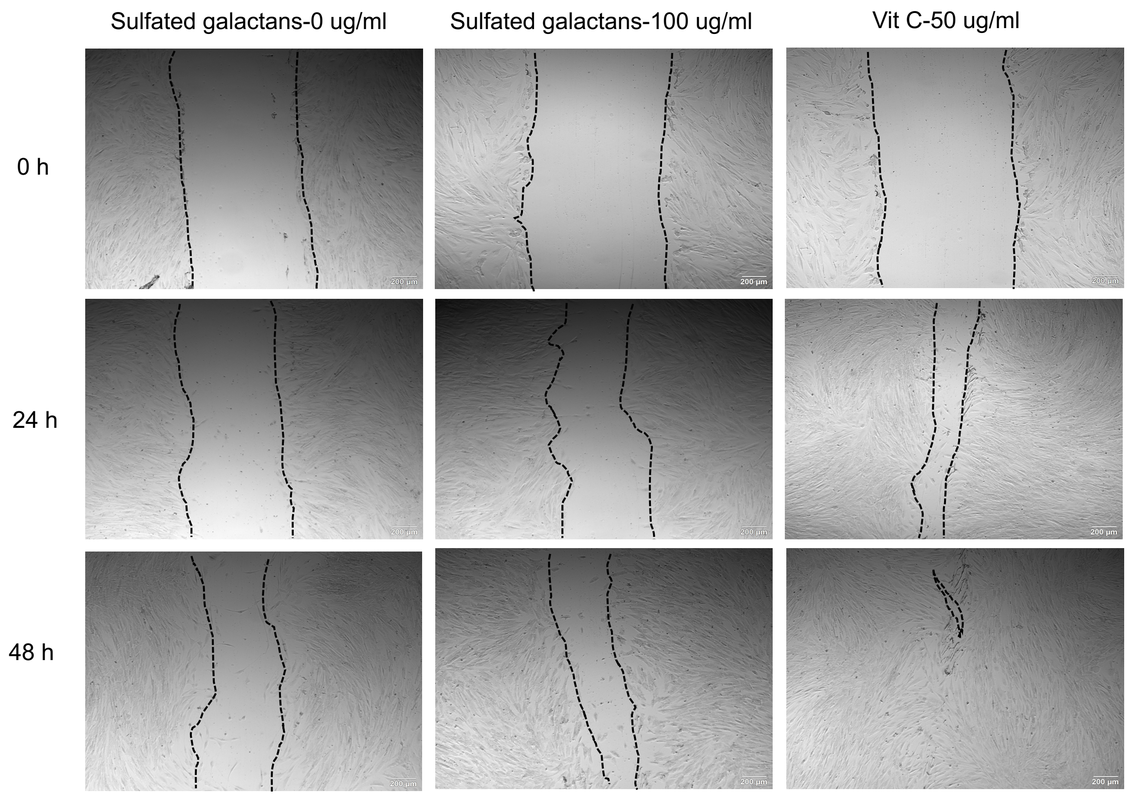

Figure 2 Effect of sulfated galactans on migration of human dermal fibroblast cells by scratch assay. Photomicrograph by phase contrast microscope showing the distance of cell migration after sulfated galactans (100 mg/ml) and vitamin C (50 ug/ml) treatment. Dashed line indicates cell migration at 0, 24, and 48 h after scratching.

Results, Discussion, and Conclusion

The result showed that sulfated galactans had no effect on cytotoxicity in normal human dermal fibroblast (Figure 1). Additionally, we found that sulfated galactans was able to increase cell migration (Figure 2) and modulate matrix synthesis by regulating the collagen-1, elastin, and hyaluronic acid production (Figure 3) . The present results demonstrating the effects of a natural compound on fibroblast function and show potential as starting material for pharmaceutical preparations targeted against various disorders centered around disturbed matrix production.

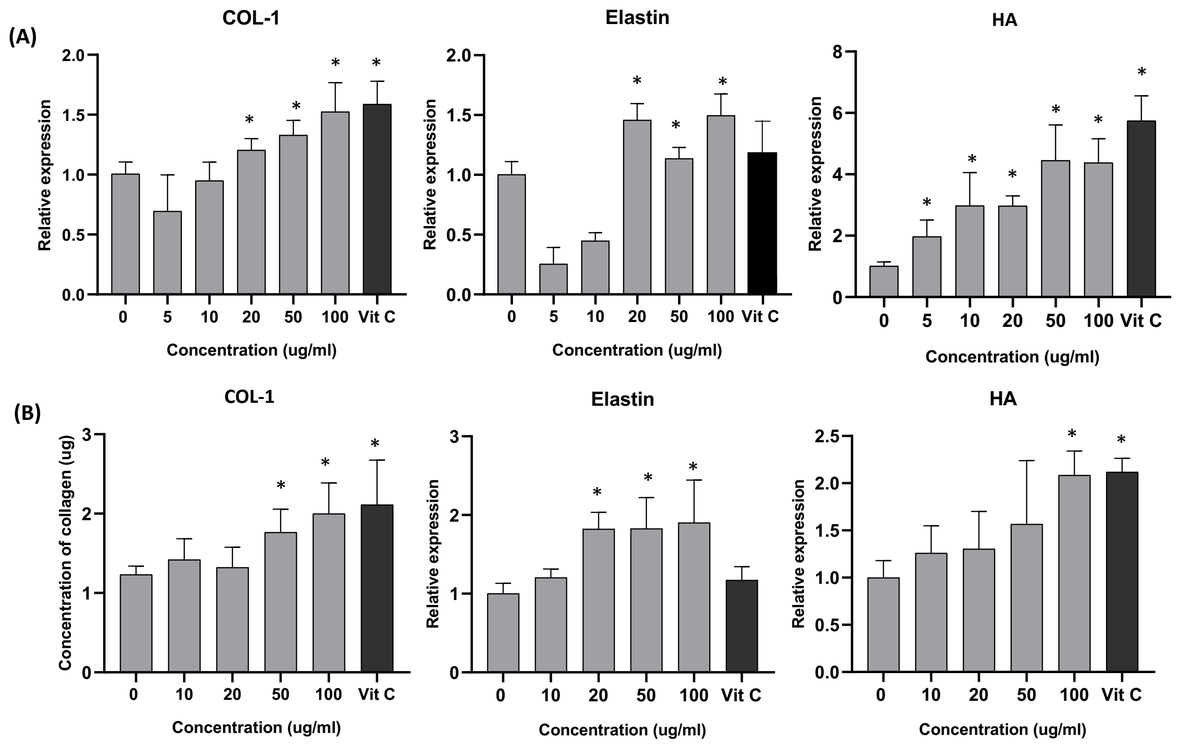

Figure 3 (A) Effect of sulfated galactans on mRNA levels of type 1 collagen (COL-1), elastin, and hyaluronic acid (HA) in human dermal fibroblast cells. GADPH mRNA level was used as an internal control. (B) Effect of sulfated galactans on protein levels of COL-1, elastin, and HA in human dermal fibroblast cells. Data were analyzed and expressed as a percentage of the control value. Vitamin C (Vit C) was used as positive control. * indicates value significantly different from the control group ($P < 0.05$).