Fish Skin for Horse Healing: The Promise of Seaweed and Trout Collagen in Equine Wound Care

Franchi Jose Miguel[1], Dubruel Peter[2], Minsart Manon[2] and Declercq Annelies[1]

[1] Laboratory of Aquaculture & Artemia Reference Center, Ghent University, Coupure Links 653, Gent, Belgium
E-mail: josemiguel.franchi@ugent.be
[2] Polymer Chemistry and Biomaterials Research Group, Ghent University, Krijgslaan 281, Gent, Belgium

Exuberant granulation tissue (EGT) is a condition that commonly occurs in equine distal limb injuries which results in chronic non-closing wounds. The exact mechanisms that trigger the condition are still not completely understood. Recent tendencies focus on the use of novel wound dressings for the treatment of equine wounds to prevent this condition. Rainbow trout (*Oncorhynchus mykiss*) is one of the top produced species in European aquaculture, mostly commercialized in fillets. Its skin, traditionally discarded from the final product, has high collagen I fiber content, which has been described to possess chemotactic properties that are beneficial for wound healing. Another species, Japanese wireweed (*Sargassum muticum*), is a widespread invasive species in the Northern Sea, also present in the Belgian Spuikom. The weed could compete with local species and create fouling. On the positive side, Japanese wireweed contains alginate, a versatile biopolymer that can be processed into biocompatible hydrogels capable of high liquid absorption. The characteristics of both collagen and alginate make these biopolymers suitable candidates for the development of novel wound dressings to treat complicated wounds and could be beneficial in preventing EGT. Furthermore, acquiring these molecules from traditionally discarded resources (rainbow trout skin and Japanese wireweed) increases their value and contributes to a more sustainable circular economy. This research project aims to prepare collagen-alginate (CA) based hydrogels with the objective to treat equine wounds and prevent EGT development. To that end, collagen and alginate will be extracted from rainbow trout skin and Japanese wireweed respectively, chemically characterized and subsequently processed into (CA) blends. The developed materials will be subjected to in-depth characterization using state-of-the-art devices, antibacterial tests and *in vitro* biocompatibility assays. The wound healing efficacy of the blends will be explored *in vitro*, *ex vivo* and *in vivo* assays. The results of this research will provide useful data towards the development of wound-dressing to effectively treat EGT.

Keywords
Hydrogel Dressing; Blue Technology; Exuberant Granulation Tissue; Fish Skin; Alginate