

Synthesis and Characterization of Novel Selenated Hydrogels for the Treatment of Chronic Wounds

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A wound is a defect or break in the skin caused by physical or thermal damage. Depending on the area of skin affected, there may be a series of alterations in the organism such as blood loss, dehydration, difficulty in maintaining body temperature or infections. The wound healing process represents a complex series of biological events to restore the skin barrier function. Numerous studies have shown that low levels of reactive oxygen species (ROS) promote normal wound healing by stimulating cell migration and angiogenesis, but excessive ROS can derive in chronic wounds. In chronic wounds, a sustained inflammatory response leads to a large accumulation of ROS, which exceeds the physiological antioxidant capacity, impeding cell migration and proliferation and thus preventing tissue remodelling. It has been shown that antioxidants can accelerate wound healing, especially for chronic wounds. In this work we have developed a hydrogel based on a natural polymer and modified with selenium to add antioxidant and antimicrobial properties. The synthesis reaction has been confirmed with NMR and atomic absorption spectroscopy. The mechanical properties of the hydrogel have been characterized by rheological tests. Viability assays have been performed with human dermal fibroblast. Hence, we have developed an antioxidant and antimicrobial hydrogel with good biocompatible properties which seems to be a promising therapy for the treatment of chronic wounds.