

Development of bioactive hydrogel formulations and devices for regenerative medicine



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Advanced hydrogel wound dressing

Concept (max 1000 characters)

In chronic wounds, an excessive inflammatory response prevents the proliferation of the healthy tissue, causing a serious infection that might even be life-threatening. Although their use encourages and improves the wound healing process, in the last decades antibiotics have been overused in several different fields, which has led antibiotic resistance to become a real threat to modern health care. Antibiotic resistance occurs when a drug loses its ability to inhibit bacterial growth effectively and bacteria continue to multiply in the presence of therapeutic levels of the antibiotics. There is a growing interest towards egg proteins and peptides because of their antibacterial, healing, antihypertensive and anti-inflammatory activities. Within the RADOV (RADIation harvesting of bioactive peptides from egg prOteins and their integration in adVanced functional products) project, the possibility of producing bioactive peptides from egg proteins by irradiation with ionising radiation is being explored. The application of those peptides in an innovative wound dressing to improve the healing process will also be assessed.

Scientific approach (max 1000 characters)

To treat severe skin damages, a proper dressing is needed to heal the wound rapidly and aesthetically. Because of their general biocompatibility, soft consistency and conformability, skin adhesiveness, non-traumatic removal and possible stimuli-responsiveness, hydrogels have been used as wound dressings of different type of wounds and ulcers, including drug-laden wound dressings to treat infected wounds.

Ionizing radiation is a well-established method among the chemically crosslinking techniques used to produce hydrogels. The simplicity of the process, the possibility of combining sterilization and crosslinking in a simultaneous operation when the formulation is its final packaging are at the base of the successful development and commercialisation of hydrogel wound dressing produced by irradiation.

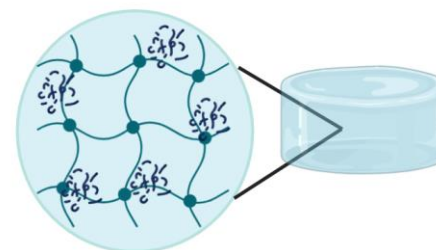
Research objectives (max 500 characters)

This project aims at the production of radiation-crosslinkable hydrogel wound dressings incorporating egg proteins and/or peptides with antibacterial and antioxidant properties that would improve the wound healing process.

Identification of biopolymers that can be used in combination with synthetic polymers and can undergo physical crosslinking



Incorporation of egg proteins /peptides into selected hydrogel formulations and evaluation of their impact on the rheological properties of the formulations



Irradiation of selected peptide/ protein-laden formulations to induce chemical crosslinking and simultaneous sterilisation

