

Novel therapeutical platforms for the treatment of mucosal and skin lesions

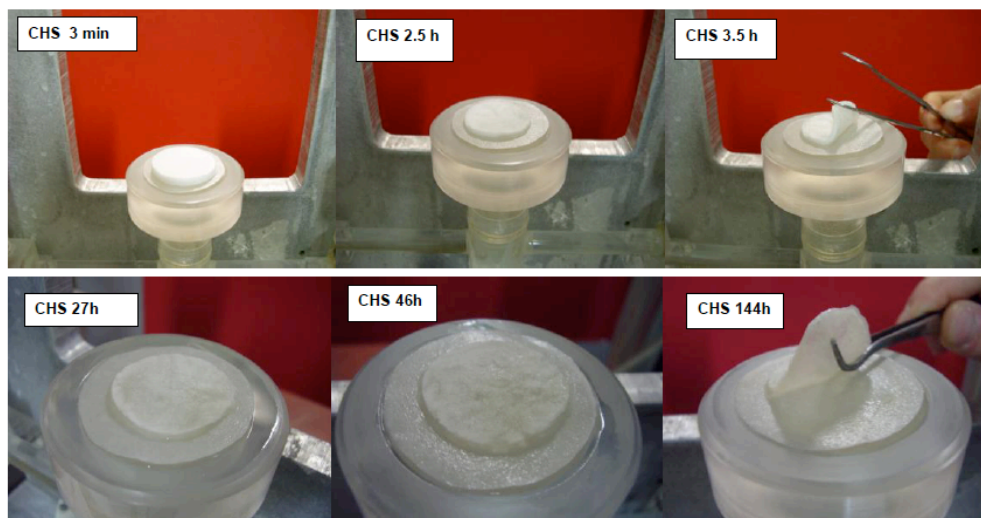
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There are still unmet needs in the treatment of mucosal and skin lesions. Mucositis induced by chemo- and radiotherapy in oncological patients, ocular lesions deriving from both surgery and neuro-dystrophy, skin chronic wounds like leg ulceration (trauma, diabetes,..) and decubitus sores are such examples. These pathologies do not yet afford a satisfactory treatment. As a consequence, cancer treatment induced mucositis are likely to lead to therapy discontinuation or turn out to be life threatening, whereas chronic wounds represent a major health care burden, likely to increase as the population ages.

The therapeutic idea is to combine the palliative conservative approach with a mechanistic one based on the use of growth factors. These play a complex role in tissue repair, which requires a synergy of mechanisms that can only be guaranteed by a pool of growth factors like those released by platelets. The project, in cooperation with the Center for Transplant Immunology and the Vascular Surgery Department of the S. Matteo Hospital in Pavia, is aimed at developing multifunctional platforms based on the association of platelet lysate, a hemoderivative rich in growth factors endowed with cicatrizing/repairing properties, with biopolymers having antimicrobial and wound healing properties. Such delivery systems should guarantee a controlled release of the loaded active ingredients.

Mucoadhesive formulations capable of gelifying in situ are being developed for the treatment of oral mucositis and ocular lesions whereas sponge-like dressings and cutaneous powders are more suited for skin ulcers therapy.

Hydration properties of sponge-like dressings based on chitosan glutammate



1. Description of the product

Following the positive results obtained in the treatment of oral mucosites using platelet lysate in a mucoadhesive gel formulation, in order to improve patient compliance and dosing accuracy, a thermo/iono-gelling buccal spray, based on poloxamer and sodium alginate and containing platelet lysate, has been developed. To further improve stability, platelet lysate can be freeze-dried without losing its bioactivity and used to reconstitute the formulation just before delivering the dose. Similarly thermo/iono-gelling eye-drops can be proposed for ocular delivery. For the treatment of skin ulcers, sponge-like systems are



proposed, made of biopolymers such as chitosan glutammate salt or sodium hyaluronate and freeze-dried. Platelet lysate can be either loaded during freeze-drying or imbibed as a solution just before the application. By playing on the composition, hydration properties can be tailored to allow the desired exudate absorption capacity (see example in figure). Moreover the synergistic effect of biocompatible bioactive polymers represents an added value

2. Innovative aspect of the product

Platelet lysate and the growth factors thereof are complex proteic drugs with stability problems. Medical doctors require suitable vehicles to assure their delivery to the site of action in a reproducible and reliable way. Requisites such as sterility, where relevant, ease of preparation and application, in use stability and patient compliance/convenience are addressed. The use of autologous lysate is also made possible by affording appropriate vehicles/bases for reconstitution of the finished product before use. The development of a cell proliferation test and an in vitro wound healing test, backed by ELISA assay, has been pivotal for obtaining a preliminary proof of concept.

3. Main advantages of the offer

Our preparation technology allows to preserve the biological activity of growth factors and to improve their stability. This is possible due to the availability of a stable freeze-dried powder of platelet lysate and to the mild conditions used when preparing the final formulation (low temperature, low mechanical stress). The mucoadhesive/in situ-gelling vehicles and the polymeric dressings provide suitable bases that can be sterilized and used to reconstitute the finished product. The vehicle/blank dressings themselves exhibit tissue repair properties and may be registered as medical devices.

4. Technology key words

Mucoadhesion vehicle; in situ gelification; mucositis; sponge-like dressings; skin ulcers; wound healing.

5. Current Stage of Development

Development phase; in vitro wound healing test and bioactivity test; in vivo exploratory trials; in vivo animal model available for preliminary screening of prototypes.

6. Intellectual Property Rights

Platelet lysate and bioadhesive compositions for the prevention and treatment of mucositis

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