

CHITOSAN BASED HYDROGELS AND APPLICATIONS

École de Technologie Supérieure, ETS-092



BACKGROUND

Chitosan thermosensitive hydrogels have been used for multiple biomedical applications during the last decades. However, the simultaneous optimization of gelation time, porosity, mechanical resistance and biocompatibility of such hydrogels is still a challenge.

Yet, for many applications, such as drug delivery, prevention of adhesion or embolization of blood vessels, injectable and biocompatible hydrogels with high mechanical resistance are needed. Moreover, the increasing use of cell therapy and tissue engineering calls for highly resistant scaffolds that are compatible with cell seeding and injectable by catheter or small needles.

TECHNOLOGY

The invention entails a new chitosan based thermosensitive injectable hydrogel which provides a solution to these challenges.

COMPETITIVE ADVANTAGES

- i) Thermosensitive properties
- ii) High mechanical properties and tunable gelation rate
- iii) Excellent cell compatibility
- iv) Controlled biodegradability: depending on molecular weight and degree of deacetylation
- v) Macroporous
- vi) Muco-adhesive, which limits its risks of migration
- vii) Can be formulated in *in situ* gelling solutions.
- viii) Depending upon their state, they can be administered through ocular, pulmonary, nasal, oral, topical, IM and IV routes

APPLICATIONS

Provides interesting alternatives for use alone or in combination with cells, bioactive agents or drugs for the treatment of pathologies or for the repair or engineering of new tissues, in particular for:

- i) Injectable scaffolds for drug and/or cell delivery for cell therapy and tissue engineering.
- ii) Cancer treatment in which immune cells could be contained in the gel, which is injected by needle or catheter at a targeted treatment site.
- iii) Prevention of post-surgery adhesences.
- iv) The gel may also contain bioactive agents and can then be applied on the skin or mucous surfaces.
- v) Potential for bioprinting technologies, where complex 3D constructs containing specific cells are created.
- vi) Embolizing agents of blood vessels.

TECHNOLOGY DEVELOPMENTAL STAGE

In vitro demonstration of the gel as a vehicle able to localize and concentrate T-lymphocytes at tumor site and at the same time providing a scaffold allowing their proliferation and release.

PATENT STATUS

Title: Chitosan-based hydrogel and applications thereof

CAN: 2,887,749 (04/2015)

US: 15,536,491 (06/2017)

EU: 15,869,451.3 (07/2017)

BUSINESS OPPORTUNITY

Partnering/licensing opportunities

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