

HYDROGEL AND HYDROGEL FORMING COMPOSITIONS AS INJECTABLE DEPOT-SYSTEMS

Reference No. B76151

CHALLENGE

Hydrogels are particularly suitable as drug delivery and drug depot systems. They are composed of polymers, which cross-link through physical or chemical reactions. Physical cross-linking systems enable the preparation of *in situ* forming gels, which can be administered in liquid form and gelatinize after injection. However, these hydrogels are so far considered not to be stable enough for medicinal applications. For chemical crosslinking of hydrogels the Diels-Alder reaction was described to be particularly suitable, however, here the very slow cross-linking is a major drawback.

INNOVATION

As a novel approach here degradable hydrogels were generated that gelatinize by a dual mechanism based on a Diels-Alder reaction and physical cross-linking. Therefore thermoresponsive end-functionalized four- and eight-armed macromonomers were designed. The novel hydrogels are stable, *in situ* forming and particularly suitable for controlled release of e.g. therapeutic antibodies. Furthermore by varying the composition of the macromonomers physical properties like gel stability and stiffness can be varied and adapted to the therapeutic need.

Advantages:

- highly stable
- the stability and stiffness can be adjusted to the therapeutic need
- systems are degradable in water
- hydrogels gelate at body temperature
- gels are non toxic

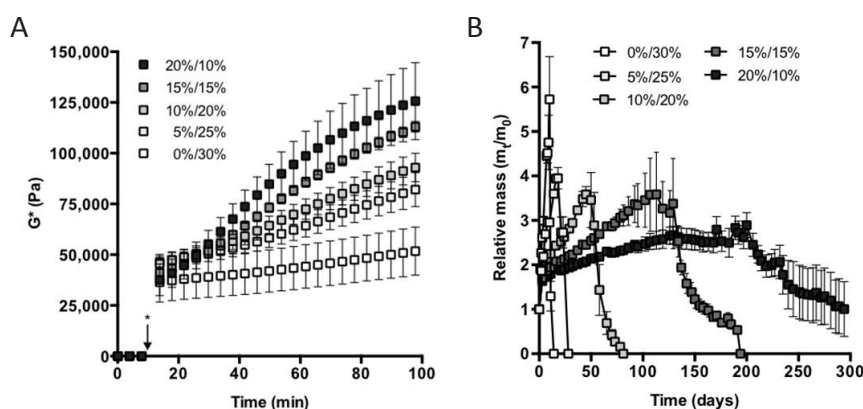


Figure (A) Initial thermal gelation and subsequent increase of stiffness for different 8arm-Poloxamine and 4arm-Poloxamine mixtures using an overall polymer concentration of 30 wt %. (B) Degradation of DA-Poloxamine hydrogels with different compositions in phosphate buffer, pH 7.4 at 37 °C (A). A higher number of functional end-groups correlated with an increase in stability.

COMMERCIAL OPPORTUNITIES

The novel hydrogels are an optimal drug delivery and depot system for controlled release of therapeutic substances and offer major advantages in comparison with the available systems so far. Here the drawbacks of the hydrogels generated by solely chemical or physical-crosslinking were avoided while the advantages of both were utilized, generating a highly flexible and customer oriented system.

DEVELOPMENT STATUS

Proof-of concept.



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