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A Novel Method for Synthesizing Hydrogels

Tech ID: 23569 / UC Case 2013-180-0

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Hydrogel, polymer chemistry, tissue engineering, stem cell transplantation, drug delivery, nanotechnology

CATEGORIZED AS

- **▶** Biotechnology
 - Other
- ► Materials & Chemicals
 - Nanomaterials
 - ▶ Polymers
- ▶ Medical
 - Delivery Systems
 - Devices
- ▶ Nanotechnology
 - Materials
 - ► Tools and Devices
- ▶ Research Tools
 - ▶ Other

RELATED CASES

2013-180-0

SUMMARY

UCLA researchers in the Department of Chemistry and Biochemistry have developed a novel and efficient method for synthesizing biocompatible hydrogels as scaffolding for tissue engineering and a vehicle for drug delivery.

BACKGROUND

Hydrogels – networks of crosslinked polymers – have received great commercial interest as materials for tissue engineering and drug delivery. The 3-D architecture of hydrogels allows for loading of therapeutic molecules or encapsulation of cells for tissue scaffolding purposes. The properties of hydrogels are largely determined by their crosslinking chemistry. For biomedical applications it is essential that the gelling reaction is biocompatible and can be formed in complex solutions near neutral pH. Methods utilized for chemically crosslinking hydrogels are fraught with limitations. Current methods require reagents which react with the encapsulated biomaterials, compromising their activity. In addition, crosslinking often involves toxic catalysts and/or byproducts that trigger immune responses and are toxic to target tissues. Thus, improved hydrogels may lead to better efficacy and safety of drug delivery and implant scaffold technology.

INNOVATION

UCLA researchers have developed a simple and efficient method for forming biocompatible hydrogels. This novel method utilizes oxime click chemistry and provides the ability to fine tune the desired hydrogel for specific applications thereby improving the biocompatibility, safety, and specificity for therapeutic application. This technology utilizes a simple reaction that occurs quickly under mild conditions around physiological pH. Furthermore, the reaction exhibits high yield in both organic solvents and biological fluids. The reaction is inert to the cargo and uses nontoxic reagents with water as the only byproduct. These properties result in biocompatible materials that are suitable for biomedical applications.

APPLICATIONS

- ▶ Drug and cell delivery device
- ▶ Scaffold for tissue engineering and stem cell transplantation
- ▶ Wound dressing and skin grafts
- ► Cosmetics, personal care products, and contact lenses
- ▶ General use for biomedical research

ADVANTAGES

- ▶ Reactions occur quickly in media, serum and in the presence of cells
- Polymers do not react with and compromise the biomaterials in the cargo
- ► Mild reaction conditions
- Nontoxic to biological tissues

STATE OF DEVELOPMENT

Researchers have synthesized hydrogel material with aminooxy poly(ethylene glycol) and glutaraldehyde. The hydrogel contained mesenchymal stem cells and a cell adhesive peptide. High cell viability and proliferation of the encapsulated cells demonstrated the biocompatibility of the material. Thus, the concept has been verified.

RELATED MATERIALS

▶ Biocompatible hydrogels by oxime Click chemistry. Biomacromolecules. (2012)

PATENT STATUS

Country	Туре	Number	Dated	Case
United States Of America	Issued Patent	10,201,613	02/12/2019	2013-180

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- PolyProtek: Platform for Delivering and Stabilizing Therapeutic Biologics, Vaccines, and Industrial Enzymes
- ▶ Dual-Enzyme Responsive Peptides
- ▶ A Novel Basic Fibroblast Growth Factor Conjugate for Broad Therapeutic Application
- ► Update To Degradable Trehalose Glycopolymers
- Noncrushable/Nonabusable Pill Formulations
- ► Trehalose Hydrogels For Stabilization And Delivery Of Proteins
- ▶ A Novel Glycopolymer to Enhance Protein Stability

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