



Dental Adhesive Hydrogels And Uses Thereof

Tech ID: 29628 / UC Case 2017-897-0

SUMMARY

Researchers at the UCLA School of Dentistry and the Department of Chemistry & Biochemistry have developed novel biodegradable, photocurable, and non-toxic hydrogel-based adhesives, which can be used for periodontal tissue regeneration and personalized precision oral care.

BACKGROUND

In the field of tissue engineering, biomaterials are often used as scaffolds to create a cellular microenvironment required for optimal tissue regeneration. Among different biomaterials, polymers are the most extensively used because they can be tailored to provide good interconnected porosity, large surface area, adequate mechanical strengths, varying surface characterization, and different geometries required for tissue regeneration. Current trends focus on designing biomaterials that will replicate the local extracellular environment of the native organ and enable cell-cell and cell-scaffold interactions necessary for functional tissue regeneration.

Hydrogels are three-dimensional, hydrophilic polymers that are capable of absorbing large amounts of water or biological fluids. Due to their high water content, porosity, and soft consistency, they closely simulate natural living tissue, more so than any other synthetic biomaterials. The biocompatibility of hydrogels offers the additional advantage when used for tissue engineering purpose, in which they can be applied as space filling agents or as three-dimensional scaffolds that organize cells and present stimuli to ensure the development of a required tissue.

INNOVATION

Researchers at UCLA have engineered biomimetic, visible light crosslinkable, and biodegradable hydrogel-based adhesives with tunable physical properties and the ability to direct encapsulate stem cells and regulate their differentiation toward osteogenic or periodontal ligament-like tissues, when used for periodontal tissue regeneration. These hydrogel-based adhesives are made of polysaccharide, can be crosslinked in less than 20 seconds after exposing to visible or ultraviolet light, and can adhere to both hard and soft tissues. When tested, the described adhesive hydrogel formation can strongly adhere to the native periodontal tissues (alveolar bone, gingival tissue, and root surfaces) with adhesion strength and mechanical properties greater than several commercially available adhesives. It also supported cellular viability promoting periodontal tissue regeneration.

APPLICATIONS

- Periodontal and bone tissue regeneration
- Sealing tissues or for treatment of peri-implantitis

ADVANTAGES

- Suitable mechanical characteristics to ensure the proliferation and infiltration of cells, and tissue formation
- Strong adhesion to surrounding tissues, especially in the presence of blood or saliva
- Biodegradability with degradation rate relative to tissue ingrowth
- Space maintainability
- Great biocompatibility

STATE OF DEVELOPMENT

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OTHER INFORMATION

KEYWORDS

Hydrogel, adhesive, biomaterial, biodegradable, biological adhesives, biocompatible, photocurable, dental, periodontal tissue regeneration, tissue engineering, polymer

CATEGORIZED AS

- **Engineering**
 - Engineering
- **Materials & Chemicals**
 - Polymers
- **Medical**
 - Disease: Dental

RELATED CASES

2017-897-0

The adhesive hydrogel formulation has been tested on human and rat gingival, calvarial bone and periosteum, as well as human tooth root surface and dentin.

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Reference for National Filings	2019/1738342019	09/12/2019	2017-897

Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Bioactive Adhesive Dental Restorative Cement](#)
- ▶ [Biomimetic Artificial Periodontal Membranes And Method Of Fabricating The Same](#)

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