Dual-Enzyme Responsive Peptides

Tech ID: 29379 / UC Case 2017-446-0

SUMMARY

UCLA researchers in the Department of Chemistry & Biochemistry have developed a dual-enzyme responsive peptide system that requires sequential digestion by two separate enzymes for cleavage at the C-terminal position of lysine.

BACKGROUND

Due to their high selectivity and specificity, enzyme responsive systems are commonly used for diagnostic and drug delivery applications. Currently, most enzyme responsive technologies are sensitive to a single enzyme, or a single enzyme in combination with an environmental stimulus. For example, caspase-sensitive reporters, which respond to peroxide production or to cancer-related matrix metalloproteinases, have been designated to detect cell injury as well as to monitor reactivation of the apoptotic pathway after anti-cancer therapy delivery. Trypsin responsive sequences have been incorporated into abuse-deterrent opioid formulations, which allow drug release only at specific locations in vivo. Although many single-enzyme responsive systems show promise in specific targeting, response to more than one enzyme would allow for greater target selectivity and indirect enzyme detection, and provide information about cellular environments.

INNOVATION

Researchers at UCLA have designed a dual-enzyme responsive peptide system that requires sequential digestion by two enzymes for cargo release from the C-terminus. In this system, the peptide is first cleaved by an enzyme that unmasks the recognition site for a second enzyme, allowing for digestion and release of the final product. These peptides can be used in polymeric formulations, either as cross-linkers or incorporated into the backbone, installing dual-enzyme sensitivity. This method may also be useful for delayed release formulations/prodrugs, allowing degradation of abuse-deterrent opioid formulations to be better controlled when sequences that require digestions by multiple enzymes are installed.

APPLICATIONS

- Enzyme-responsive systems for diagnostic and drug delivery applications
- Selective biodegradation of materials for biomedical applications (i.e. location-specific degradation and drug release for abuse-deterrent opioid formulations)

ADVANTAGES

- Allows much greater selectivity and specificity
- Better-controlled degradation of opioid formulations

STATE OF DEVELOPMENT

Have demonstrated sequences that are responsive to trypsin/chymotrypsin, trypsin/papain, and trypsin/caspase 3.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,879,019	01/23/2024	2017-446
European Patent Office	Published Application	3555280	10/23/2019	2017-446

CONTACT

UCLA Technology Development Group
ncd@tdg.ucla.edu
tel: 310.794.0558.

INVENTORS

- Maynard, Heather D.

OTHER INFORMATION

KEYWORDS

Opioid, abuse-deterrent formulation, drug delivery, enzyme responsive system, biodegradation, trypsin, chymotrypsin, papain, caspase

CATEGORIZED AS

- **Medical**
  - Delivery Systems
  - Disease: Substance Abuse

RELATED CASES

2017-446-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- PolyProtek: Platform for Delivering and Stabilizing Therapeutic Biologics, Vaccines, and Industrial Enzymes
- A Novel Method for Synthesizing Hydrogels
- 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

UCLA Technology Development Group

10889 Wilshire Blvd., Suite 920,Los Angeles,CA 90095

https://tdg.ucla.edu

Tel: 310.794.0558 | Fax: 310.794.0638 | ncd@tdg.ucla.edu