UCLA Inventors Create Platform Technology to Create Customizable Nanoscale Drug Delivery Materials

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BRIEF DESCRIPTION

UCLA researchers in the Departments of Chemistry, Physics, and Bioengineering, led by Dr. Tim Deming of the Bioengineering department, have developed a platform to create and modify nanoscale drug delivery particles. The poly-peptide based platforms created by the Deming group are customizable in nearly all physical characteristics, can be tailored in size, loaded with hydrophobic and hydrophilic payloads, adaptable to specific delivery locations, low toxicity, are fully synthetic, possess highly reproducible properties, and are inexpensive to prepare compared to solid-phase peptide synthesis.The platform can be used to create novel, need-based nanoscale vesicles or injectable hydrogels, and can also be used to augment existing nanoparticle systems.

ADVANTAGES

- Able to load vesicles and hydrogels with hydrophilic and/or hydrophobic payloads
- Vesicles can penetrate cell membranes to intracellularly deliver payloads
- Potential low toxicity and biodegradability due to synthetic polymerized peptide building block
- Surface chemistry is readily modified for specific cell and tissue type targeting
- Stable at high temperature (up to 80°C in water) and vesicles can be engineered to various sizes (50 to 1000nm)
- Able to encapsulate macromolecules and other particles
- Hydrogel version is thermoresponsive – an injectable liquid at room temp, solid at body temp
- Inexpensive starting materials and process chemistry used to synthesize peptidic polymers

INNOVATION

With the rise of healthcare costs, the global pharmaceutical and biopharmaceutical industries have begun investing in alternative drug delivery technologies. In an effort to identify new and additional treatments, biologics and large molecules are becoming more important to pharmaceutical companies. For this reason, nanotechnology-enabled drug delivery mechanisms have received significant research and development over the past few years. These nanoscale systems offer the promise of minimizing toxicity, maximizing bioavailability, allowing for precise drug delivery, and controlled release of the payload.

OTHER INFORMATION

References: UCLA Cases 1998-072, 2001-307, 2007-014, 2008-767, 2012-598, 2013-315, 2015-124, 2015-452, 2015-612

Deming Group: http://deming.seas.ucla.edu/

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OTHER INFORMATION

KEYWORDS

Drug delivery vehicle, cargo, polypeptide vesicles, polymer, nanotechnology/nanomaterial, cell-permeable

CATEGORIZED AS

- **Materials & Chemicals**
  - Biological
  - Nanomaterials
  - Polymers
- **Medical**
  - Delivery Systems
- **Nanotechnology**
  - NanoBio

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