X-Ray-Triggered Release of Drugs from Nanoscale Drug Carriers

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ABSTRACT

Researchers at the University of California, Davis have identified a means by which large quantities of inactive drugs (particularly chemotherapeutics) can be delivered by nanoscale drug carriers to a target location where they can be rendered active by X-rays.

FULL DESCRIPTION

Small molecule chemotherapeutics have been employed in cancer therapy. However, their effectiveness is often hampered by systemic toxicity. Although prodrugs have decreased systemic toxicity, they have met with limited success. External triggering by microwaves, ultrasound, light, and magnetic fields, as well as natural triggering have been explored as a mechanism of drug molecule release, but all fall short due to lack of targeting precision or shallow penetration depths. Thus, there exists a need for a drug delivery approach that can deliver a prodrug to a target cellular location and controllably release the drug at that target cellular location.

Researchers at the University of California, Davis have identified a means by which large quantities of inactive drugs (particularly chemotherapeutics) can be delivered by nanoscale drug carriers to a target location where they can be rendered active by X-rays. Because X-rays are highly penetrating and have been used clinically in diagnosis and treatment of tumors, x-rays can potentially become a successful external triggering tool by cleaving the chemical bonds of the molecules linking the drug molecules to the nanoscale drug carriers for cell-specific delivery. The technology also allows for several variations of the nanosystem that make it amenable to a wide array of delivery targets and drugs.

APPLICATIONS

- Targeted delivery of small molecule therapeutics

FEATURES/BENEFITS

- Nanoparticles can be modified to suit drug
- Drug delivery can target specific cellular locations
- Ability to activate release of drug in target cell
- X-ray triggering method is already common component of clinical procedures
- Lower systemic toxicity
- Applicable to wide variety of drugs

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,993,553	06/12/2018	2013-449

INVENTORS

- Guo, Ting
- Starkewolfe, Zane B.

OTHER INFORMATION

KEYWORDS

nanoparticles, nanoscale drug carrier, small molecule delivery, chemotherapeutic delivery, X-ray triggered drug release, X-ray activated drug release, cancer treatment, cell-specific delivery, targeted delivery of therapeutics

CATEGORIZED AS

- **Biotechnology**
  - Health
- **Materials & Chemicals**
  - Nanomaterials
- **Medical**
  - Disease: Cancer
  - Therapeutics
- **Nanotechnology**
  - Materials
  - NanoBio

RELATED CASES

2013-449-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Formation of Polymers on Nanostructures Under X-ray Irradiation
- Nanoparticle Capsules for Magnetically Controlled Color-Changing Materials
- Enhancement of X-Ray Radiation Using Nanomaterials
- Measurement of Nanoscale Physical Enhancement by Materials under X-ray Irradiation
- Combined Individual Nanomaterial Enhancements for Total X-Ray Enhancement

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