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Method For Preparation Of Micellar Hybrid Nanoparticles For Combined Therapeutic And Diagnostic Medical Applications

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BACKGROUND

Multifunctional nanoparticles have the potential to deliver both therapeutics and diagnostics to tissues simultaneously using a single nanodevice. To date, several types of hybrid nanosystems have been developed and used *in vitro* for magnetic cell separation and targeting. However, the *in vivo* utility of these nanocomposites may be limited due to poor stability or short systemic circulation times. Furthermore, existing technologies do not adequately allow for co-delivery of a therapeutic and an agent enabling advanced diagnostic imaging.

TECHNOLOGY DESCRIPTION

This invention provides both the composition and a novel method for creating micellar hybrid nanoparticles that exhibit substantial *in vivo* circulation times, allowing them to contain a diverse payload for periods of time sufficient for delivery and subsequent release to a desired tissue. In addition, this technology readily facilitates the simultaneous targeted delivery of both therapeutic and imaging agents to diseased tissue *in vitro* or *in vivo*.

ADVANTAGES

- In-vivo stability allows for prolonged integrity in systemic circulation.
- Micellar structure allows delivery of a broad array of payloads, including, magnetic particles, quantum dots, or a therapeutic agent.
- Reduced cytotoxicity of both hydrophobic drugs and nanoparticle itself.
- Enables co-delivery of therapeutic agents and diagnostic agents that enable imaging.

APPLICATIONS

- Medical imaging
- Cancer diagnostics and therapeutics
- Diagnostic and therapeutics for various diseases
- Vaccines

STATE OF DEVELOPMENT

This technology is offered exclusively or nonexclusively for U.S. and/or worldwide territories. A commercial sponsor for potential future research is sought.

This technology has been used *in vitro* and *in vivo* to deliver an anti-cancer agent and two types of nanoparticles that aid in fluorescence and magnetic resonance imaging to diseased tissue (see reference below).

RELATED MATERIALS

Park JH, von Maltzahn G, Ruoslahti E, Bhatia SN, Sailor MJ (2008). Micellar hybrid nanoparticles for simultaneous magnetofluorescent imaging and drug delivery. Angew Chem Int Ed Engl. 47(38):7284-8. - 08/11/2008

CONTACT

University of California, San Diego Office of Innovation and Commercialization innovation@ucsd.edu tel: 858.534.5815.



OTHER INFORMATION

KEYWORDS

drug delivery, biological imaging, cancer, diagnostics, nanotechnology,

nanoparticles, micelle

CATEGORIZED AS

Medical

Delivery Systems

Diagnostics

Disease: Cancer

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University of California, San Diego

Office of Innovation and Commercialization

9500 Gilman Drive, MC 0910, ,

Tel: 858.534.5815

innovation@ucsd.edu https://innovation.ucsd.edu

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La Jolla,CA 92093-0910

Fax: 858.534.7345