A Method to Reversibly Control Blood Clotting Using Laser Light

Technology #16966

Applications

The methodology can be applied in surgeries, where temporary suspension of blood coagulation is necessary, such as transplants, or on demand for externally controlled rapid halting of bleeding.

Problem Addressed

Treatment of bleeding disorders and surgery blood clotting must be controlled for patient safety. This invention allows reversible control of blood coagulation, using nanoparticles and laser light. It enables on demand, remote control of blood clotting without the side-effects of commonly used anticoagulants.

Technology

The invention utilizes nanoparticles, which can be introduces into the blood and excited by using laser irradiation to control blood clotting. Nanoparticles, due to their unique properties, can be excited by laser light in a mutually exclusive manner, enabling selective release of a thrombin binding aptamer (TBA), which acts as an anticoagulant to stop blood clotting, or its antidote to revers the effect.

Once the nanoparticles are introduced into the blood stream, a laser at a certain wavelength triggers the release of a TBA from a corresponding nanoparticle when needed. At another wavelength, the laser triggers the release of the TBA antidote, restoring normal blood clotting to the system.

The technology can be usezd to control thrombolysis (clot dissolution) in a similar manner.

Advantages

- Enables on-demand, reversible, remote control of blood clotting
- Acts as a substitute for commonly used anticoagulants, often referred to as blood-thinners, without causing negative side-effects due to slow clearance from system and nonspecific targeting
- Antidote is specific to the anticoagulant

Categories For This Invention:

Photonics
Other (Photonics)
Life Sciences
Biomaterials

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Micro/nanoparticles (Biomaterials)
Clinical Applications
General & Plastic Surgery
Research Tools
Micro/nanoparticles (Research Tools)

Intellectual Property:

Blood clotting control
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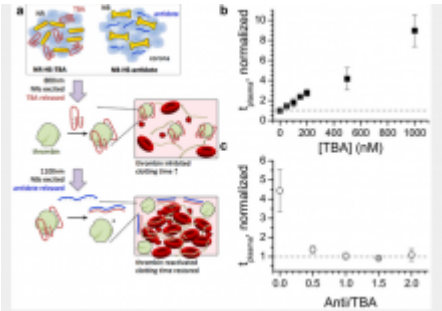
Publications:

Selective Light-Triggered Release of DNA from Gold Nanorods Switches Blood Clotting On and Off
PLOS ONE
2013

External Links:

Lincoln Laboratory
https://www.ll.mit.edu/

Image Gallery:



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