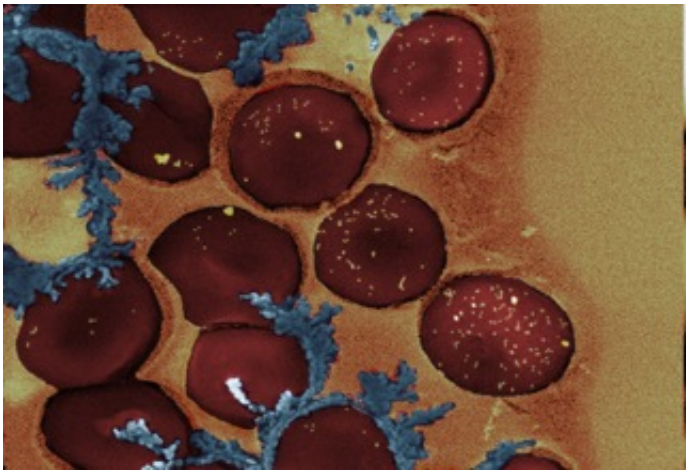
Laser-controlled molecular switch turns blood clotting on, off on command

July 24 2013



DNA-controlled nanoparticles work as a two-way switch for blood clotting. Credit: Helena de Puig

Researchers have designed tiny, light-controlled gold particles that can release DNA controls to switch blood clotting off and on. The results are reported July 24 in the open access journal *PLoS ONE* by Kimberly Hamad-Schifferli and colleagues from the Massachusetts Institute of Technology.

The two-way switch for blood clotting relies on the ability of two gold nanoparticles to selectively release different DNA molecules from their surface under different wavelengths of laser excitation. When stimulated by one wavelength, one nanorod releases a piece of DNA that binds the

blood protein thrombin and blocks clot formation. When the complementary DNA piece is released from the other nanorod, it acts as an antidote and releases thrombin, restoring clotting activity.

Natural blood clotting is precisely synchronized to occur at the right time and place. Wound healing, surgery and other conditions require manipulation of this process, typically through the use of anticoagulants like heparin or warfarin. However, these drugs are inherently one-sided as they can only block clotting, and reversing their effects depends on removing them from the bloodstream. The methods described in this research open up new possibilities for more precise, selective control of the blood clotting process during therapy.

More information: *PLoS ONE* 8(7): e68511. doi:10.1371/journal.pone.0068511