Ideal nanoparticle cancer therapies surf the bloodstream

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Eric Shaqfeh studies blood at Stanford University, using computer models that simulate how the fluid and the cells it contains move around. On November 11 at a meeting of the scientific society AVS, he will present his latest unpublished findings from two studies. One shows how components in blood line up to prepare for healing; the other demonstrates the best shape to use for man-made nanoparticles that target cancers -- a surfboard.

The different components that move through our blood stream are not evenly distributed. For years, scientists have known that platelets -- which help blood to clot -- stay close to the walls of blood vessels as they circulate.

"When somebody cuts himself, the fact that the platelets are sitting seven times more frequently at the edges of the little blood vessels is critical," says Shaqfeh.

His models suggest that when a new platelet is made, it takes longer than expected to migrate to and line up at the edge -- as much as ten or fifteen minutes to establish "hemostatis," in which blood cells are properly distributed in the body. The research, funded by the Army, suggests that current techniques for blood transfusions may not be ideal. Freezing platelets, which is common practice, may change their shape and disrupt their movements, and there may be better ways to give transfusions that establish the proper blood arrangement faster, says Shaqfeh.

In related work, Shaqfeh added tiny nanoparticles of various sizes and shapes into his blood models. Such particles are of interest to the cancer researchers, who hope to use nanoparticles to target the walls of blood vessels that feed tumors. Shaqfeh found that surfboard-shaped particles stayed closest to the walls of blood vessels. He will soon be working with another group to test fluorescent surfboard-shaped particles in actual blood vessels to see how they behave.

Source: American Institute of Physics