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Tiny Medicine, Big World

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Tiny Medicine, Big World

Disguising nanoparticles inside blood fragments may be the key to evading the immune system



by Maggie Masterson

Nanoparticles have been investigated for years by scientists looking to revolutionize biotechnology, to little avail. The problem? Our immune system is incredibly effective at recognizing and destroying foreign particles, including medically-engineered nanotechnology. Nanoparticles could have fantastic effects on healthcare, such as transporting drugs on the molecular level, but they are frequently destroyed by our immune system, rendering them ineffective. As a solution to this problem, nanoparticles are now being cloaked in cell fragments so that the body does not attack them as foreign invaders, according to *Nature*. This new method of disguising nanoparticles may be the key to tricking the body's immune system.

“...nanoparticles are now being cloaked in cell fragments so that the body does not attack them as foreign invaders...”

Platelets are an essential component of blood that allow clotting. They are composed of cytoplasm fragments and lack a nucleus. Scientists at the University of San Diego determined that these platelets were ideal for concealing nanoparticles, since they are a natural part of blood circulation in the body. They are able to protect nanoparticles by avoiding macrophages, white blood cells that usually destroy the particles by engulfing them. Researchers have previously tried attaching nanoparticles to proteins, but had little success. These platelet experiments mark the first time that nanotechnology has shown success in tricking the body's defense system, because the platelets have a wide variety of membrane proteins, facilitating interactions with other cells. The platelets naturally interact with damaged tissue based on their tendency to clot wounds, which is where the nanoparticle medicine would need to be administered. Not only are these hidden particles able to elude the immune system, but they also take advantage of the ability of platelets to repair wounds. Therefore, these platelet-coated nanoparticles are doubly effective, healing damage and delivering drugs.

However, this method of nanoparticle cloaking is not without inaccuracy. Many scientists are questioning if the particles are healing at a truly effective level, because many platelets were found in test animals' liver and kidneys. This indicates that the particles were quickly being broken down in these organs and removed from the circulatory system. The team at University of San Diego says they will need to test the nanotechnology on larger animals before determining how to use it best on humans. Despite these drawbacks, Omid Farokhzad, a nanotechnologist at Brigham and Women's Hospital, embraces the technique with enthusiasm, saying, “I think the promise is huge.” The technology is developing quickly and gaining effectiveness, so next time you need drugs delivered through your bloodstream, nanoparticle treatment could be your best option! 🐾

