Protein Cage Helps Nanoparticles Target Tumors

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Researchers at Montana State University have used an engineered form of ferritin, a cage-like iron storage protein, to both synthesize and deliver iron oxide nanoparticles to tumors. The investigators, led by Trevor Douglas, Ph.D., and Mark Young, Ph.D., reported their findings in the Journal of the American Chemical Society.

Normally, human ferritin comprises two subunits that together create a protein that can store iron and ferry it throughout the body. For this work, however, the researchers used a genetically engineered form of the protein that contains only one subunit and that also contains a short peptide that binds to the blood vessels that surround cells.

This engineered ferritin protein self-assembles into a cage-like structure that catalyzes the conversion of soluble iron into nanoscale iron oxide particles. Those iron oxide nanoparticles, containing between 3,000 and 5,000 iron atoms among them, grow within each protein cage, creating a tumor-targeted protein nanostructure that can act as a magnetic resonance imaging (MRI) contrast agent.

Experiments with tumor cells growing in culture demonstrated that these engineered nanostructures were capable of binding to tumor cells expressing a protein known as ævß3. The researchers note that the use of other cage-like proteins, instead of ferritin, could provide a wide range of tools for targeting tumors and delivering imaging agents and drugs to malignant cells. They believe that their method for producing these proteins in a form engineered to display tumor-targeting peptides should

also prove to be a generally useful technique.

This work is detailed in a paper titled, “Targeting of cancer cells with ferrimagnetic ferritin cage nanoparticles.” An abstract of this paper is available through PubMed.

Source: National Cancer Institute