Nanosponges harvest rare cancer marker from blood

January 19 2011

Cancer researchers have long hypothesized that tumors release small amounts of proteins that could serve as earlier diagnostic indicators of cancer, but the search for such biomarkers has been hampered by the presence of large quantities of other proteins, such albumin, found in the blood and by the fact that these trace proteins are often unstable in blood. Now, an international research team from the United States and Italy has shown that it can use a new type of nanoparticle to selectively trap specific families of proteins from blood and protect them from degradation by enzymes in blood.

Lance Liotta of George Mason University and Caterina Longo from the University of Moderna and Regio Emilia led this investigation. The U.S. and Italian team published its findings in the journal *Experimental Dermatology*.

Previously, this research team had developed a set of highly porous nanoparticles whose interiors were decorated with different types of "bait" molecules that could selectively harvest large families of low-abundance proteins from blood. These nanoparticles were designed to exclude the relatively large protein-degrading enzymes prevalent in blood, and hence, could protect the trapped proteins from being broken down before they could be analyzed. In this set of experiments, the investigators used the particles to collect potential biomarkers for melanoma from the blood of human patients with this aggressive form of skin cancer. The researchers obtained blood from 29 patients with primary and metastatic melanoma as well as 26 patients with strange-

looking moles that had not developed into melanomas.

The researchers found that levels of one particular protein, known as Bak, correlated highly with the development of moles into melanomas. These results were confirmed by histological examination of moles and melanoma tumors. The investigators note that although more patients need to be tested to confirm these results, it appears that serum Bak levels, measured after capture using these nanoparticles, could serve as a prognostic indicator for melanoma. The broader impact of this study lies with the demonstration that these baited nanoparticles can trap and protect rare proteins in human clinical blood samples and release those proteins for subsequent analysis for disease biomarkers.

This work, which was supported in part by the National Cancer Institute, is detailed in a paper titled, "A novel biomarker harvesting nanotechnology identifies Bak as a candidate melanoma biomarker in serum." An abstract of this paper is available through PubMed.

More information: View the complete abstract here: www.ncbi.nlm.nih.gov/pubmed/21158936

Provided by National Cancer Institute