Polymer Nanoparticles Create Potential Anticancer Vaccine

January 29 2007

Using a biodegradable nanoparticle as a means of delivering tumor cell debris and proteins to the immune system, investigators at Yale University have developed a promising new method for creating therapeutic anticancer vaccines. This work appears in the journal *Molecular Pharmaceutics*.

To test whether these nanoparticle delivery vehicles could stimulate a meaningful immune response to tumor antigens, the investigators encapsulated the melanoma-associated protein known as gp100 and administered this formulation to mice. The researchers found that the mice produced a robust immune response of the type known to be crucial for developing antitumor immunity.

Based on these experimental results, the Yale team then prepared nanoparticle formulations of a protein extract of melanoma B16 cells, which work by other researchers has shown do not normally produce much of an immune response.

The investigators then loaded these nanoparticles into mouse dendritic cells and injected this preparation into a group of mice. They then injected a normally lethal dose of B16 cells into the same mice. For purpose of comparison, the investigators treated additional groups of mice with dendritic cells loaded with unencapsulated B16 cell extracts or with nanoparticle/B16 formulations that were not first loaded into dendritic cells.

The results of this experiment provided some surprises. On the one hand, immunization with the nanoparticle/B16 formulation alone actually stimulated tumor growth. But on the other hand, immunization with the nanoparticle-loaded dendritic cells produced a robust immune response that provided the greatest protection against developing B16 tumors. These results suggest that a combination of nanoparticle encapsulation and dendritic cell loading could prove to be a widely applicable method of creating antitumor vaccines.

This work is detailed in a paper titled, “Polymer nanoparticles for immunotherapy from encapsulated tumor-associated antigens and whole tumor cells.” This paper was published online in advance of print publication. An abstract of this paper is available at the journal’s website.

Source: National Cancer Institute