Targeted nanoparticles incorporating siRNA offer promise for cancer treatment

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The use of targeted nanoparticles offers promising techniques for cancer treatment. Researchers in the laboratory of Mark E. Davis at the California Institute of Technology have been using small interfering RNA (siRNA), sometimes known as silencing RNA, to "silence" specific genes that are implicated in certain malignancies.

One of the primary challenges associated with this type of therapy is delivering the therapeutic agent into the body and then to the tumor in a safe and effective manner. By using targeted nanoparticles, researchers have demonstrated that systemically delivered siRNA can slow the growth of tumors in mice without eliciting the toxicities often associated with cancer therapies. The results of this research are being presented this week at the NSTI Nanotech 2007 Conference in Santa Clara, CA.

The Caltech researchers have incorporated siRNA into nanoparticles that are formed completely by self-assembly, characterized the behavior of these nanoparticles and studied their safety and efficacy in mice.

Using extensive physicochemical and biological characterization, the investigators are able to estimate the composition of individual nanoparticles and to correlate the nanoparticle structure with its biological function. This quantitative approach provides unique insights into the design of more effective nanoparticle carriers.

According to the lead author of the study, Derek W. Bartlett, "Safe and effective delivery remains perhaps the greatest impediment to the

clinical realization of small interfering RNA (siRNA) in cancer therapy. Formation of siRNA nanoparticles using cyclodextrin-containing polycations is one of the most promising strategies for systemic siRNA delivery, and such nanoparticles are expected to enter Phase I clinical trials by late 2007. Our most recent work examines the impact of various dosing schedules and surface modifications on the efficacy of these siRNA nanoparticles in preclinical cancer models. By combining the experimental data with a mathematical model of siRNA-mediated gene silencing, we illustrate several practical considerations that we believe will be directly relevant to the clinical application of siRNA-based therapeutics in cancer therapy."

Source: Elsevier Health Sciences