pH Sensitive Nanoparticles for Drug Delivery

Inventor
Dr. I-Wei Chen

Technology Overview
Many agents used for oncology are either vulnerable to enzymatic attack or are poorly water-soluble, making them difficult to deliver to a tumor site.

This invention describes a novel pH-sensitive peptide-based nanoparticle which can provide a precisely targeted method for drug delivery. Rather than relying on uptake of the nanoparticle into the tumor, this invention exploits the weakly acidic (pH ~ 7) microenvironment near a tumor to dissolve a pH-sensitive peptide and release the agent directly at the tumor site. Materials prone to enzymatic attack and poorly water soluble agents can be protected until they reach the target location. The peptide then releases the agent at the tumor location where the pH is ≤ 7.

This formulation provides much greater pH sensitivity than other currently available drug-delivery nanoparticles, which all require a much more acidic transition pH (4-5). In-vivo tests on mice have demonstrated non-toxicity and effectiveness at slowing tumor growth. Animal subjects treated with the pH-sensitive nanoparticles showed slower tumor growth when compared to control treatment methods, even at 1/10th the control dosage. The particle formulation is highly adaptable, can carry a variety of drugs as well as RNA/DNA, and can be “tuned” to dissolve at a specific pH.

Advantages
• High sensitivity to incremental pH-changes allows more precise targeting of tumors
• Hydrophobic barriers protect agents until they are delivered to the target site
• Wide adaptability of method means that a variety of agents can be carried and protected, including RNA/DNA and poorly water-soluble drugs
• Shown in-vivo to be more effective than control treatments, even at 1/10th the dosage