Title: Liposomal nanocarriers in preclinical imaging and beyond?

Tue Oct 31, 2006 2:50
FCIEMAS Auditorium B

ABSTRACT

The typical molecular probe has a complex biochemical construct, and generates limited signal due to the usual 1:1 molecular ratio between ligand and reporter. We propose to develop a “platform” technology approach to molecular probe design utilizing nanoscale liposomes. Liposomes are vesicles consisting of a lipid “envelope” surrounding an aqueous “core”. A variety of “payloads” such as imaging readout molecules can be encapsulated within liposomes at very high ratios (e.g. >1,000,000:1) thereby providing adequate signal amplification for facilitating detection with CT. Target specificity is “engineered” by tethering surface ligands on the liposomal envelope with linker arms for the purpose of presentation to target cell surface receptors.

The liposomal-based iodinated contrast agent demonstrated long residence time in the blood pool, very high attenuation within sub-millimeter vessels, and no significant renal clearance. The successful sequestration of iodinated contrast within the carrier nanoparticles was evidenced by the lack of renal clearance and the high sustained attenuation within the bloodpool, as free iodinated contrast would be rapidly cleared by the kidneys resulting in renal enhancement and decreased attenuation within the bloodpool over time. The MR study demonstrates the potential benefit of long circulating liposomal-Gd as a MR contrast agent for high-resolution vascular imaging applications. Demonstrating in vivo stability of encapsulation is a critical first step towards achieving adequate signal amplification required to facilitate imaging of active receptor targeting in which relatively few nanoparticles will localize in the target tissue.