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Characterization of multi-modal silica nano-particles for nano-medicine

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Dual modality multifunctional ultra small silica nanoparticles, termed Cornell dots (i.e., C dots) may provide a highly versatile disease directed platform for diagnostic and therapeutic purposes. C dots encapsulate Cy5 dyes and are surface functionalized with methoxy-terminated polyethylene glycol (PEG) chains that bind small numbers of $\alpha\text{v}\beta\text{3}$ integrins-targeting cRGDY peptide ligands. *In vitro* binding studies revealed marked increases in cell surface uptake relative to control particles by flow cytometry after exposing $\alpha\text{v}\beta\text{3}$ integrin-expressing human melanoma (M21) and human umbilical vein endothelial (HUVEC) cells to cRGDY-PEG dots. In addition, *in vitro* migration rates of both HUVEC and M21 cells were observed to increase in a concentration and time dependant manner with the addition of cRGDY-PEG-C dots. Alterations in the adhesion and spreading properties of M21 cells, manifested as cellular morphologic changes in a competitive binding assay were also identified upon exposure to cRGDY-PEG-C. For both M21 and HUVEC cells, we found that the foregoing biological properties could be modulated over a range of surface bound cRGDY peptide ligands (~6-18 ligands per particle); the result of integrin signaling pathway activation following particle exposure. A detailed understanding of these findings for the diagnostic particle probe is being used to inform theranostic platform designs for cancer treatment.

Biography

Benezra M has completed her PhD and Pharmacy degree in the Hebrew University in Israel. She has obtained her Post-doctoral training at Mount Sinai Hospital in New York. Presently she is working at Memorial Sloan Kettering Cancer Center at the Department of Radiology in the area of developing nanoparticles for diagnostic and therapeutic purposes for medicine. She has published over 30 articles in peer reviewed journal. She is a permanent reviewer in several; cell biology and cancer journals. She has been serving as an Editorial Board Member of repute for Journal in Nanotechnology and Nanomedicine.

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