POSTER 82

EVALUATION OF [^{99m}TC(CO)$_3$]-LABELED ERBB-2-TARGETING PEPTIDES FOR BREAST CARCINOMA IMAGING

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Objectives: The purpose of this study was to radiolabel a novel ErbB-2-avid peptide, discovered from bacteriophage display, with [99mTc(H2 O)3 (CO)3]+ and evaluate the in vitro cellular targeting and in vivo tumor imaging properties of the peptide in a mouse model of human breast cancer.

Methods: The peptide, KCCYSL, synthesized with the chelates diaminopropionic acid (DAP) or Nα-histidinyl acetic acid [(NαHis)Ac] at its amino-terminus, was radiolabeled with [99mTc(H2 O)3 (CO)3]+ The radiochemical stabilities of the peptides were assessed and in vitro binding to MDA-MB-435 human breast carcinoma cells was analyzed. Biodistributions and SPECT imaging of the radiolabeled peptides were evaluated in SCID female mice bearing human MDA-MB-435 breast tumors.

Results: 99mTc(CO)3 -DAP-GSG-KCCYSL and 99mTc(CO)3 - (NαHis)Ac-GSG-KCCYSL were stable and bound to ErbB-2- expressing MDA-MB-435 cells. *In vivo* biodistribution studies revealed that tumor uptake of 99mTc(CO)3 -DAP-GSG- KCCYSL was 1.67 ±0.16, 1.25 ±0.61, 0.88 ±0.12, 0.30 ±0.06 %ID/g at 1, 2, 4, and 24 h post injection, respectively. Tumor uptake of 99mTc(CO)3 -(NαHis)Ac-GSG-KCCYSL was 0.76 ±0.13, 0.75 ±0.40, 0.33 ±0.08, 0.16 ±0.02 %ID/g at 1, 2, 4, and 24 h post injection, respectively. SPECT/CT studies showed tumor selective uptake of both the peptides in the tumor-bearing mice. Specific uptake was confirmed by competitive receptor blocking studies.

Conclusions: 99mTc(CO)3 -DAP-GSG-KCCYSL and 99mTc(CO)3 -(NαHis)Ac-GSG-KCCYSL have the potential to be used as tumor imaging probes.