AbstractID: 7772 Title: In Vivo PET Imaging of Angiogenesis in Tumor Mice Model with 64Cu Labeled Avastin

Purpose:
Using angiogenesis principle to develop a new PET contrast agent for tumor detection with higher tumor specificity and decrease the background spots shown in ^{18}FDG imaging.

Method and Materials:
Bevacizumab (Avastin; Genentech) is the antibody of the vascular endothelial growth factor (VEGF), an angiogenesis factor. Avastin was conjugated to a macrocyclic ligand (DOTA) and labeled with a positron emitter, ^{64}Cu. Briefly, 1,4,7,10-tetraazacyclododecane-N, N',N'',N'''-tetraacetic acid mono-N-hydroxysuccinimide ester (DOTA-NHS-ester) was reacted with Avastin in 0.1 M Na_2HPO_4 buffer of pH 7.5 at 4°C for 12 h. After conjugation, the reaction mixture was centrifuged repeatedly through an YM-30 centricon with 50 mM ammonium citrate buffer of pH 6.5 in order to remove small molecules. The Avastin-DOTA conjugate was labeled with ^{64}Cu at 43°C for 1h and purified with Bio-Spin 6 column. The microPET/CT imaging was conducted on xenograft models of pancreatic adenocarcinoma established from MiaPaca2 cell line. ^{64}Cu-Avastin was administered i.v. at a dose of 240μCi/40μg Ab into a xenograft pancreatic cancer model. The mouse was imaged with microPET/CT scanner (Gamma Medica Ideas, Inc.) at 1h, 4h and 24h post-injection.

Results:
The radiolabeling of Avastin was successfully carried out in our lab which gave a radiochemical purity of >92%. The serum challenge studies have demonstrated that 85% of radiolabeled antibody was still intact, even at 24 hour. The images confirmed high accumulation of radiolabeled ^{64}Cu-DOTA-Avastin conjugate in tumors located in the both left and right flank of animal as well as in the head and neck. The image also shows that the conventional hot spots of ^{18}FDG image such as, brain, kidneys and bladder do not appear on the image.

Conclusion:
^{64}Cu-DOTA-Avastin can be used as a tumor detection agent for PET scan and effectively decrease the background spots in image compared to ^{18}FDG image.