Medical Physics Seminar

Monday, April 4th, 2016

1345 HSLC ~ 4:00 P.M.

Hector Valdovinos

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Production, Labeling and in vivo Studies with the Theranostic Pair ^{55}Co and ^{58m}Co for Immuno-PET and Auger Electron-Based Targeted Radioimmunotherapy

^{58m}Co ($t_{1/2}$=9.10 h, 99.96% IC) is an attractive radionuclide for localized delivery of radiation dose due to its emission of Auger and conversion electrons with high LET in water (2-18 keV/µm). It decays to a positron-emitting daughter, ^{58g}Co ($t_{1/2}$=70.86 d, 14.9% β^+), which can be readily detected by Positron Emission Tomography (PET) and hence can be employed to verify the biodistribution of the parent isotope post-treatment in vivo. Furthermore, the positron emitter ^{55}Co ($t_{1/2}$=17.53h, 76% β^+) can be used as a surrogate to assess the agent's biodistribution and calculate patient's dosimetry pre-therapy. Cobalt is an intermediate hard-soft acid metal, just like copper, which means that both metals can be labeled to the same chelator-based tracers. In this work, we will describe 1) the targetry and radiochemistry involved in the production of high radionuclidic purity and high specific activity ^{55}Co and ^{58m}Co; 2) a comparison of the biodistribution in 4T1 tumor-bearing mice of weakly chelated ^{55}Co and ^{64}Cu ($t_{1/2}$=12.7h, 18% β^+, 39% β^-) injected in citrate buffer solution and of ^{55}Co- and ^{64}Cu-labeled anti-CD105 antibody (TRC105); and 3) the results of a pilot radiotherapy study using ^{58m}Co-labeled TRC105 in a mouse model of mammary carcinoma (4T1).

Reinier Hernandez

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Molecular Imaging of Brain Cancer

Brain cancer remains one of the most lethal types of cancer. Due to inaccessible tumor location, diffusive character, chemo-resistance, radio-resistance, and the extreme genotypic/phenotypic heterogeneity, convectional interventions fail to significantly improve patient survival. This presses a need for finding cancer-specific biomarkers that allow for earlier diagnosis and more effective treatment paradigms. In this seminar, I will discuss two strategies devised in our laboratory to target brain-cancer specific markers for noninvasive PET imaging in a mouse model of the disease. An anti-CD146 monoclonal antibody and a bispecific antibody fragment targeting CD105/EGFR were generate with excellent affinity and target-specificity allowing for the acquisition of high-contrast PET images of brain malignancies. Our targeting strategies has great potential to influence future cancer diagnosis, targeted therapy, and to monitor early response to therapy.

1345 Health Sciences Learning Center (HSLC) 4:00 - 5:00 P.M.