

AbstractID: 8929 Title: Inhomogeneities of intratumoral FDG uptake in human colon adenocarcinoma HT29 tumor model

Purpose: It has been shown previously that in rat prostate carcinoma tumor R3327-AT the highest uptake of 18-FDG in tumors was observed in the areas of hypoxia rather than the areas of increased blood flow or active cell proliferation. In the present study we investigated the pattern of intratumoral FDG uptake in human colon adenocarcinoma cell line HT29.

Method and Materials: Three nude rats were inoculated with HT29 cells. When the tumors reached 25mm in diameter, the animals were injected with 18-FDG, pimonidazole, and bromodeoxyuridine (BrdU). 1hr later injection animals were injected with Hoechst33342 and sacrificed. Tumors were immediately dissected, frozen and sectioned. One section from each tumor was placed onto a phosphor plate for autoradiography. The images of the fluorescence produced by Hoechst33342 and by fluorescent antibodies raised against pimonidazole and BrdU were acquired from the adjacent sections and co-registered.

Results: All tumors in the study had extensive necrosis well intermixed with viable tumor tissue. Typically, hypoxia was forming bands about 100 μ m wide at the interface between viable tissue and necrosis. Analysis of the autoradiography data demonstrated associations between 18F-FDG uptake and all of the markers studied. However, when analysis is done on the viable tumor tissue only by carefully masking out the necrotic areas, FDG uptake was positively correlated with staining intensity of pimonidazole and negatively correlated with Hoechst and BrdU

Conclusion: In larger tumors with complicated morphology it is necrotic fraction that plays crucial role in forming FDG uptake variations rather than any of the microenvironmental parameters considered. However, in the viable tumor tissue FDG uptake was positively correlated with staining intensity of pimonidazole and negatively correlated with Hoechst and BrdU, thus demonstrating association of increased FDG uptake with hypoxia.