Poster #: 18

Title of Abstract: **Tumor heterogeneity in perfusion image for monitoring response to antiangiogenic therapy in hepatocellular carcinoma**

Institution: Massachusetts General Hospita

Authors: Koichi Hayano, MD. Sang Ho Lee, PhD. Jorge M. Fuentes, MD. Hiroyuki Yoshida, PhD. Dushyant V. Sahani, MD.

Modality: CT

Organ System: GI

Intro: Noninvasive imaging biomarkers that can quantitatively monitor physiologic changes in tumor microenvironment in response to antiangiogenic therapies are desirable. Tumor vascular heterogeneity is a recognized biomarker for cancer progression and aggressiveness.

Purpose: To evaluate the change in heterogeneity of CT perfusion images after antiangiogenic therapy in hepatocellular carcinoma (HCC) treated with bevacizumab.

Methods Used: Nineteen patients (12 M / 7W; mean age: 64.3) with advanced HCC underwent CT perfusion (CTP) at baseline and 2 weeks after administration of bevacizumab. Perfusion color maps of blood flow (BF) were calculated by the adiabatic approximation to the tissue homogeneity (AATH) model with a motion registration, and fractal analyses were applied to grayscale perfusion maps using a plugin software (FracLac, version 2.5) on ImageJ (NIH). Differential box count method was applied, and fractal dimension (FD) was calculated as a heterogeneity parameter. PFS at 6 months served as clinical endpoint, and tumor heterogeneity parameters at baseline and after therapy were compared with PFS.

Results of Abstract: 9 patients had unfavorable PFS (≤ 6 months), and the other 10 had favorable PFS (> 6 months). Baseline BF and FD showed no significant correlations with PFS. After therapy, substantial change in BF was observed (from 27.5 to 22.1 ml/100g/min, P = 0.004) without any correlation with PFS (P = 0.2). Tumors with more substantial reduction in FD after therapy correlated with better survival (P = 0.02).

Discussion: Improvement in tumor vascular heterogeneity correlated with a favorable PFS. Homogenization of blood physiology may reflect an important process in normalization of tumor vasculature during antiangiogenic treatment.

Scientific and/or Clinical Significance? Tumor vascular heterogeneity measured by fractal analysis can be a biomarker with providing an important process in normalization of tumor vasculature during antiangiogenic treatment.

Relationship to existing work This in vivo imaging study demonstrated that antiangiogenic agent may have an effect on tumor vascular heterogeneity.

N/A