Purpose: A pilot study is underway to assess the viability of perfusion CT as an imaging modality for patients with mesothelioma, and to investigate correlations between changes in perfusion metrics and tumor burden measurements.

Methods: Four patients were scanned with an IRB-approved protocol using a 256-slice CT scanner. Each perfusion scan consisted of time point data acquired for a 5.5cm axial extent at 120kVp and 100mAs every three seconds for one minute prior to the full-thorax diagnostic scan, followed by five additional scans every five seconds after the diagnostic scan. The dose for each perfusion scan was estimated at 165mGy [CTDI], and dose-length product was equivalent to approximately 1.5 chest CT scans. Perfusion CT scans were obtained at two sessions approximately six weeks apart. All timepoints from a single scan were co-registered using a demons deformable registration algorithm to remove the effects of motion prior to the calculation of perfusion maps. Perfusion, blood volume, time-to-peak, peak enhancement, and mean transit time data maps were calculated using the slope method. Data map spatial statistics were calculated over manually defined regions of interest (ROIs) within the tumor and changes in data map values were correlated with tumor burden changes measured according to the Modified RECIST technique.

Results: Tumor ROIs exhibited heterogeneous contrast uptake, ranging from no uptake to peak enhancement of 150HU. Median tumor perfusion and median tumor blood volume metrics were correlated with changes in tumor burden (rank correlation $p=0.0054$ and 0.0030, respectively), with "shrinking" tumors exhibiting decreased blood volume and perfusion metrics.

Conclusions: We believe that perfusion CT has potential to become an imaging biomarker of tumor response for mesothelioma patients. Data presented in this study indicate that perfusion CT is a viable imaging modality for mesothelioma, and that changes in perfusion metrics correlate with changes in measured tumor burden.