AbstractID: 8013 Title: Functional CT with a conventional scanner to measure regional lung perfusion

Increasingly, functional imaging techniques such as functional CT (f-CT) are being employed in the management of cancer. Our interest is to obtain a better understanding of lung tissue tolerances to radiation and potentially use f-CT as a prognostic tool in the treatment of lung cancer. To date, measurements of regional lung perfusion have been limited only to those facilities with ultra-fast CT scanners. The intent of this paper is to present results from a series of experiments that examine the technical aspects involved if a conventional CT scanner is used to measure regional lung perfusion. We have found that a lower kVp (100 or 120) results in a greater signal-to-noise ratio than higher energies and that the use of Active Breathing Control reduces respiratory-motion artifacts to less than 3 mm. To estimate physiological parameters such as the mean tissue transit time, we have developed a robust non-model based deconvolution method to estimate the impulse response function. We demonstrate with a patient study that it is possible to measure regional lung perfusion with f-CT with only few modifications to the conventional CT. By performing f-CT before and after the course of radiation therapy, it should be possible to obtain a better understanding of the dose-volume relationships in organs like the lung.