The Effect of High Resolution Kernels, Iterative Reconstruction, and Acquisition Parameters on Quantitative Computed Tomography Measures of the Lung

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Respiratory diseases including chronic obstructive pulmonary disease (COPD), asthma, and bronchitis, collectively categorized as obstructive lung diseases (OLD), pose an immense burden on the health care community. Currently, OLD is among only a hand few of afflictions whose rates of mortality and morbidity have increased or remained constant, even with innovations in drug treatment and intervention. This may be due to current disease assessment which lack specificity of the mechanisms causing the regional obstruction within the lung. With the latest advancements in multislice detector computed tomography (MDCT), quantitative lung CT measurements has demonstrated potential for accurate characterization of regional lung disease, which may lead to better interventional procedures to treat OLD before lung function is severely compromised. Innovations in reconstruction algorithms and CT scanner design provide a myriad of imaging parameters which could provide better accuracy of qCT in the lung, but for most clinical personnel this may be an overwhelmingly daunting task to select which parameters would be optimal. The purpose of this work, then, is to determine the accuracy of quantitative lung CT measurements, including densitometry and airway measures, using typical clinical acquisition/reconstruction parameters, and from these results, determine acquisition/reconstruction parameters which improve qCT measures with the goal of reducing

overall dose to the patient. This will include assessment of strategies to improve spatial resolution using higher resolution kernels, dose mitigation via iterative reconstruction techniques, and reduced display field of view (DFOV) to improve sampling resolution. Additionally, automatic exposure control techniques, will be investigated for use in protocol design of lung imaging studies across vendor platforms.

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