AbstractID: 1342 Title: Multi-Slit Multi-Slice photon counting CT for 3D volume imaging

Photon counting computer tomography (CT) has a number of potential advantages over the currently used charge integration technique. The advantages include rejection of the electronics noise, no Swank noise, optimal photon energy weighting, energy resolved CT acquisition, no afterglow effect, scatter rejection by energy thresholding, and partial compensation of the beam hardening due to optimal energy weighting. A photon counting CT system based on a Microchannel Plate (MCP) detector is being investigated. The MCP detector has the capabilities of direct conversion, high spatial and temporal resolution, high count rate, physical charge amplification, and virtually noise free operation. The initial CT images acquired with this detector indicate that it is possible to generate good quality images with reduced dose. A new Multi-Slit Multi-Slice (MSMS) helical CT acquisition geometry is proposed. This acquisition geometry is appropriate for utilization of linear arrays of MCP detectors and provides efficient scatter rejection. It is possible to provide clinically acceptable count rates using chip level pulse counting readout electronics. The basic design of the CT modality with MCP detector and MSMS acquisition for 3D breast imaging is presented. Application of CT for early breast cancer detection is of particular importance; however, the high patient dose of the current CT systems is one of the major limitations. The proposed CT system can potentially provide a low dose and scatter free 3D CT imaging of the breast.