AbstractID: 4698 Title: Volume-of-interest (VOI) cone beam CTwith dual resolution image acquisition

In this study, we investigate the feasibility of using VOI projection data acquired at high resolution in conjunction with full width projection data acquired at low resolution to reconstruct cone beam CT images for the VOI.

To simulate cone beam CT with dual resolution image acquisition, flat panel images of a mastectomy specimen, acquired in the non-binning mode, were converted into low resolution full width projection data. High resolution VOI projection data were directly extracted from the original data. To prepare for reconstruction, the low resolution projection data were first interpolated, re-sampled to fill in the truncated space outside the VOI. The dual resolution full width projection data, consisting of true high resolution data in the VOI and interpolated data outside the VOI, were then used to reconstruct the 3-D image for the VOI. Reconstructed images obtained with dual resolution projection data were compared with those obtained with low resolution data and those obtained with high resolution data for the visibility of small calcifications.

We have successfully demonstrated the use of dual resolution projection data for VOI cone beam CT imaging. While the low resolution full width projection data did not allow smaller calcifications to be seen in the reconstructed images, addition of high resolution projection data for the VOI only could make them visible. The use of interpolated low resolution projection data to pad the truncated space outside the VOI did not affect the spatial resolution of reconstructed images inside the VOI. With the dual resolution technique, it would be possible to selectively image a VOI at very high resolution without requiring excessively long acquisition and reconstruction or unnecessarily overexposing the patient outside the VOI.