Abstract ID: 16655 Title: Evaluation of cone beam breast CT (CBCT) system: Detection of randomly distributed micro-calcification and the effect of beam hardening filter

Purpose:
Detectability of micro-calcification is very important for breast imaging. The purpose of this study is to evaluate the breast CBCT system through its detectability of randomly distributed micro-calcifications under different mean glandular dose (MGD) and with or without different thickness copper filters.

Methods:
Calcium carbonate grains of various sizes (Three size groups: 224-250μm, 250-280μm, 280-300μm) were used to simulate calcifications. A breast shaped plastic container filled with paraffin was used to simulate a fatty breast; the top half of the phantom was cylindrical with 12.5cm diameter and the total height of the phantom is 14.5cm. The phantom was imaged with a CBCT system in our lab. The system consists of a conventional tungsten target x-ray tube (G-1592) and an a-Si:H/CsI flat panel detector (Paxscan 4030CB). The source to image detector and source to iso-center distances were 152 and 100 cm, respectively, resulting in a magnification factor of 1.52 at the iso-center. All the scans were conducted at 80 kVp. The experiment was conducted under MGD equal to 2.5, 4, 6, 8 mGy. With each MGD setting, the scan was conducted without filter, with 0.002" copper filter or with 0.004" copper filter. Feldkamp algorithm with a ramp filter was used for image reconstruction of all scans.

Results:
Our CBCT system is capable of imaging calcifications as small as 224-250μm with 6mGy MGD or 250-280μm with 4mGy MGD if set 50% visibility as threshold. To all three size groups, filtering improves visibility of micro-calcification when the dose is between invisible and high visible settings.

Conclusions:
Filtering improves detectability of micro-calcification for low dose image.

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