compositions and densities close to those of adipose and glandular tissues as described by Hammerstein (1979). A polymethylmethacrylate (PMMA) plate derived from the linearity insert of AAPM report 15 contains two series of iodinated zones with surface densities determined from clinical images. The first series covers these densities. Two areas of different equivalent glandularities and constant thickness overlap each half of these iodinated zones. The second series of constant iodine density is partially overlapped with a glandularity step wedge (0-100%).

**Results:** Determined iodine densities are between 0.25 and 4 mg/cm². 1 cm glandular tissue is simulated with 0.09 cm HDPE and 0.94 cm water (error < 1%) and 1 cm adipose tissue with 0.64 cm HDPE and 0.31 cm water (error < 0.6%). Measurements in narrow beam conditions of image signal on a digital mammography system gave an average error of 5.8% vs. usual breast equivalent slabs (CIRS).

**Conclusion:** This method allows designing a phantom of iodine-injected breast adequate for image quality assessment of DE-CEDM. It is low cost and provides good flexibility for multiple thickness and glandularity configurations.

### B-822 14:36

**Application of monochromatic images in artery stent assessment using CT spectral imaging: A phantom study**

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**Purpose:** CT spectral imaging is capable of creating monochromatic images so that high keV images with small beam hardening artifacts can be used for artery stent assessment. In this study, we compare the measured in-stent luminal diameter (ISLA) using monochromatic images with the measured ISLA using 140 kVp image.

**Methods and Materials:** A coronary artery stent phantom (Cypher-2.5 mm) filled with contrast fluid and surrounded by water was scanned using a high definition CT in spectral imaging mode and the scan was repeated using 140 kVp in helical mode. Eleven monochromatic images (40 - 140 kV, 10 kV increment) and one 140 kVp image were reconstructed. The in-stent luminal diameter (ISLA) was measured as the full width half maximum (FWHM) of the attenuation profile across the stent at six different stent locations. The measured ISLA was then compared between the monochromatic images and the 140 kVp image using Mann-Whitney test.

**Results:** The accuracy of measured ISLA increased with the increase of keV in the monochromatic images. For monochromatic energy below 90 keV, the measured ISLA (40 keV: 46±2%; 50 keV: 47±2%; 60 keV: 48±2%; 70 keV: 48±2%; 80 keV: 43±2%) was found comparable to the measured value in the 140 kVp image (47±2%). For those at higher energies, statistical significantly (p < 0.05) better results were obtained (90 keV: 49±2%; 100 keV: 50±3%; 110 keV: 50±3%; 120 keV: 50±3%; 130 keV: 52±4%; 140 keV: 53±3%).

**Conclusion:** The accuracy of the artery stent assessment can be improved using high keV monochromatic images in CT spectral imaging.

### B-823 14:45

**Lesion detectability in digital mammography and digital breast tomosynthesis: A phantom study**

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**Purpose:** The complexity of anatomical structure within the breast represents the ultimate limit to signal detection in a mammogram. To increase lesion conspicuity Digital Breast Tomosynthesis (DBT) has been recently proposed and several manufacturers are currently performing clinical trials. In this study, we have compared lesion detectability performance of digital mammography and DBT by making use of a phantom in which details of interest are within a heterogeneous background.

**Methods and Materials:** The breast phantom, CIRS (USA) model no. 020 BR3D, consists of various slabs made of heterogeneous tissue-equivalent material that exhibits characteristics of real breast tissue. Between these slabs, we have inserted thin layers of homogeneous material containing details of mammographic interest to simulate lesions. A commercial digital mammography unit and a DBT prototype, both manufactured by IMS (Italy), have been used for our study. The 3D reconstruction software is provided by Dexela (UK). 2D and 3D images of the breast phantom have been obtained at various dose levels to compare performance of the two modalities.

**Results:** Comparison between 2D and 3D images recorded at similar dose levels shows superior performance of DBT over digital mammography. Indeed, whilst certain details of interest are not detectable for any dose level with digital mammography, DBT can reveal their signal by reducing complexity of tissue structures.

**Conclusion:** This preliminary investigation demonstrates that in terms of physical image quality, the inherent limitations of 2D mammography due to structure noise can be overcome by the introduction of 3D reconstruction via breast tomosynthesis.