# AbstractID: 3855 Title: Quantification of coronary artery calcium using real time dual energy subtraction based on a flat panel detector

**Purpose:** To evaluate the feasibility of a real time dual-energy subtraction technique with dynamic filtration based on a flat panel detector for quantifying coronary arterial calcium.

**Method and Materials:** In this dual-energy subtraction technique, the beam energy and filtration were switched at 30 Hz between 60 kVp and 120 kVp + 0.8 mm additional silver filtration. The calcium contrast and contrast-to-noise ratio (CNR) were measured using a Lucide step phantom and a 3 mm thick bone equivalent material. The performance of the dynamic filtration technique was compared with a static filtration technique (4 mm Al + 0.2 mm Cu for both beams). Arterial vessel phantoms with calcium aerial densities in the range of 30-140 mg/cm$^2$ and a total calcium mass of 8-92 mg were imaged over a Lucite step phantom. The low and high energy images were corrected for scatter before subtraction. The total calcium mass was measured using a densitometry technique. The entrance exposure was measured and effective dose was estimated.

**Results**: The dynamic filtration technique produced 60% higher calcium CNR and required 25% higher x-ray tube loading as compared to the static filtration technique. A calcium aerial density of approximately 30 mg/cm$^2$ was detectable. The known (K) and measured (M) calcium mass were related by M=0.97K+0.028 (R=1.0). The calcium measurement precision was 4 mg, determined from 10 repeated dual energy images. The entrance exposure and effective dose were 7 mR and 5.2 μSv for each dual energy image, respectively.

**Conclusion:** Dual-energy subtraction can be a potentially useful technique for the quantification of coronary arterial calcium and provide a noninvasive technique for diagnosis of coronary artery disease.