

NOISE IN CT IMAGES OF THE HEART RECONSTRUCTED WITH ADAPTED ITERATIVE DOSE REDUCTION(AIDR) VERSUS FILTERED BACK PROJECTION (FBP)

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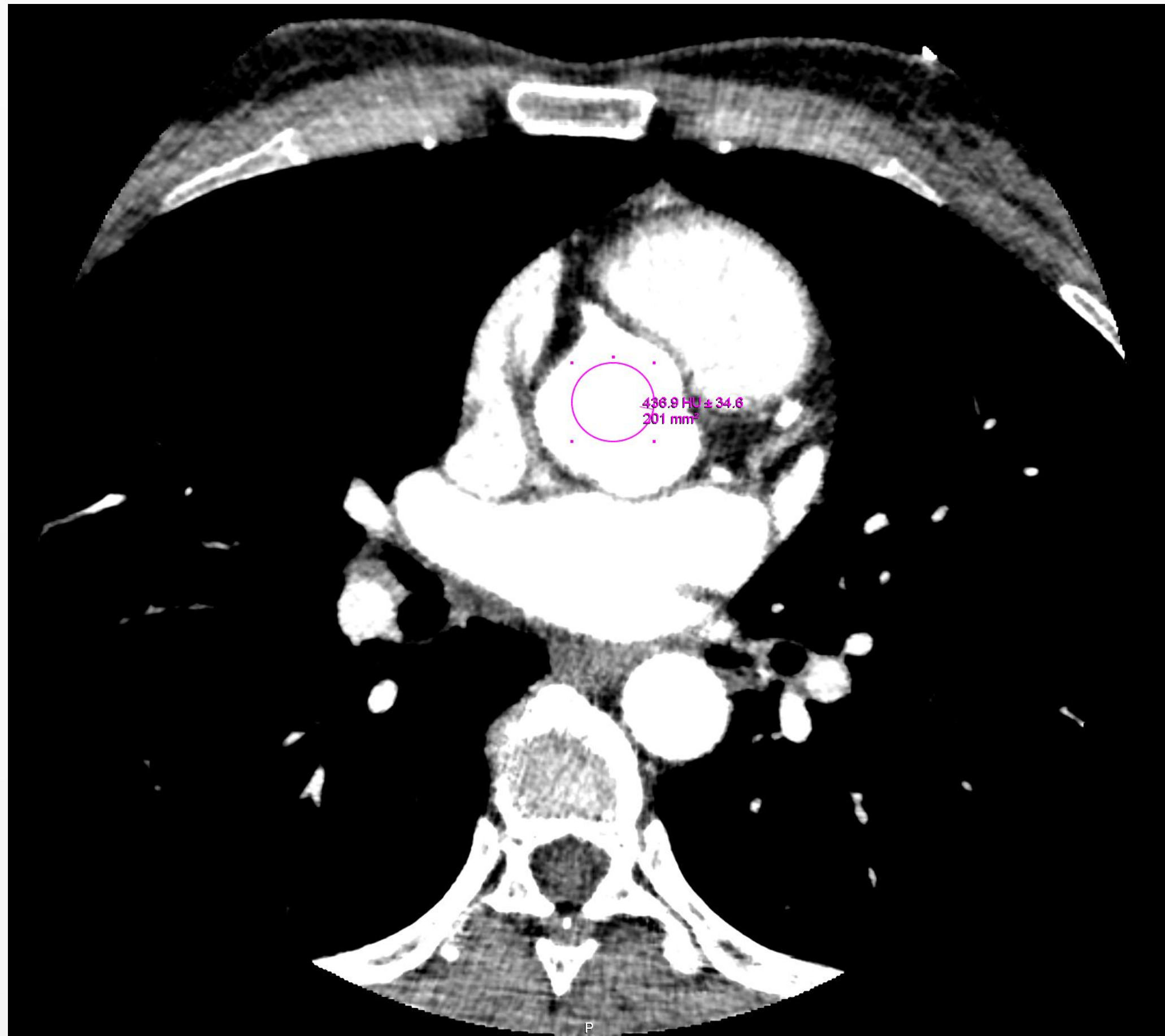


Figure 1 Image reconstructed with FBP and QDS+

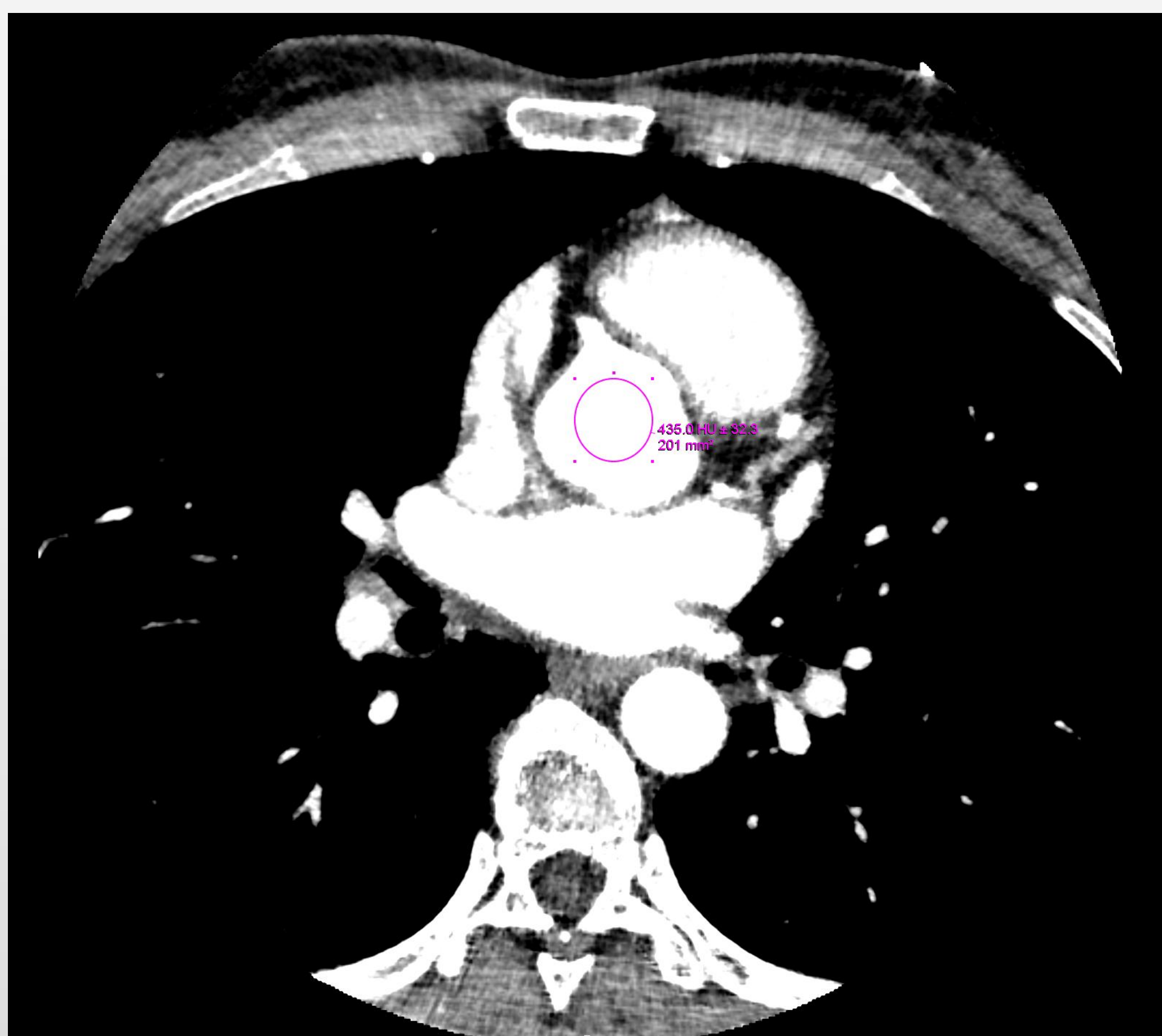


Figure 2 Image reconstructed with AIDR

Introduction

AIDR is Toshiba's iterative reconstruction algorithm. Iterative reconstruction algorithms can produce a more accurate set of data than Filtered Back Projection (FBP) and, therefore, reduce the noise level in the Computed tomography (CT) image without losing spatial resolution. But AIDR requires a high computer power to calculate the Hounsfield units (HU) in modern high-matrix CT images and has, therefore, just recently reappeared as a reconstruction method.

We wanted to compare the image noise in CT scans of the heart which we reconstructed in retrospect with respectively AIDR and FBP with QDS+ filter.

Method

As a sub study of the Copenhagen general population study we selected 148 patients already scanned on a Toshiba Aquilion One 320 slice CT scanner. We selected a group of underweight patients (BMI 14,9 – 19,9) and a group of obese patients (BMI 30,1-39,8) to see if there were a difference between underweight and obese patients. All patients were scanned with ECG gated prospective Target volume scan protocol fixed to scan in the diastole keeping the dose lower than 5,6 mSv. The scan ranges were from 120mm – 160mm I the Z axis and the SFOV was 320 mm. The parameters were chosen from patient body mass index (BMI) and ranged from 100 kV, 230 mA, 0.35 s. rotation to 120 kV, 480 mA, 0.35 s. rotation. All patients were given a bolus of 80 ml Visipaque 320 mgI/ml contrast media and 100 ml of saline.

Each scan was then reconstructed as paired images with FBP with QDS+ filter (Figure 1) and AIDR (Figure 2) respectively. The noise level was measured on a Vitrea 6.1 Vital Images Inc. workstation as the standard deviation (SD) from a ROI of 200 mm² set in aorta ascendans by the attachment of the Right coronary artery (RCA).

Results

We Included 148 patients in the study. 46 patients had a BMI <25 and 102 patients had a BMI >25. Figure 3 below shows the mean SD values. In Patients with BMI <25 the mean SD without AIDR was 28 and 25 with AIDR. In patients with BMI >25 the mean SD was 32 without AIDR and 29 with AIDR. There was a slight difference in the noise levels between underweight and obese patients but the noise reduction from AIDR was the same. The mean SD value of the total patient group was 31 SD without AIDR and 28 SD with AIDR.

There was a significant difference between the noise levels in scans with AIDR compared to scans without, p-value < 0.0001

Conclusion

There is a significant quantitative difference of noise levels of images reconstructed with AIDR compared to images reconstructed with FBP and QDS+ filter.

If this difference has an impact on diagnostic analysis is yet to be explored.

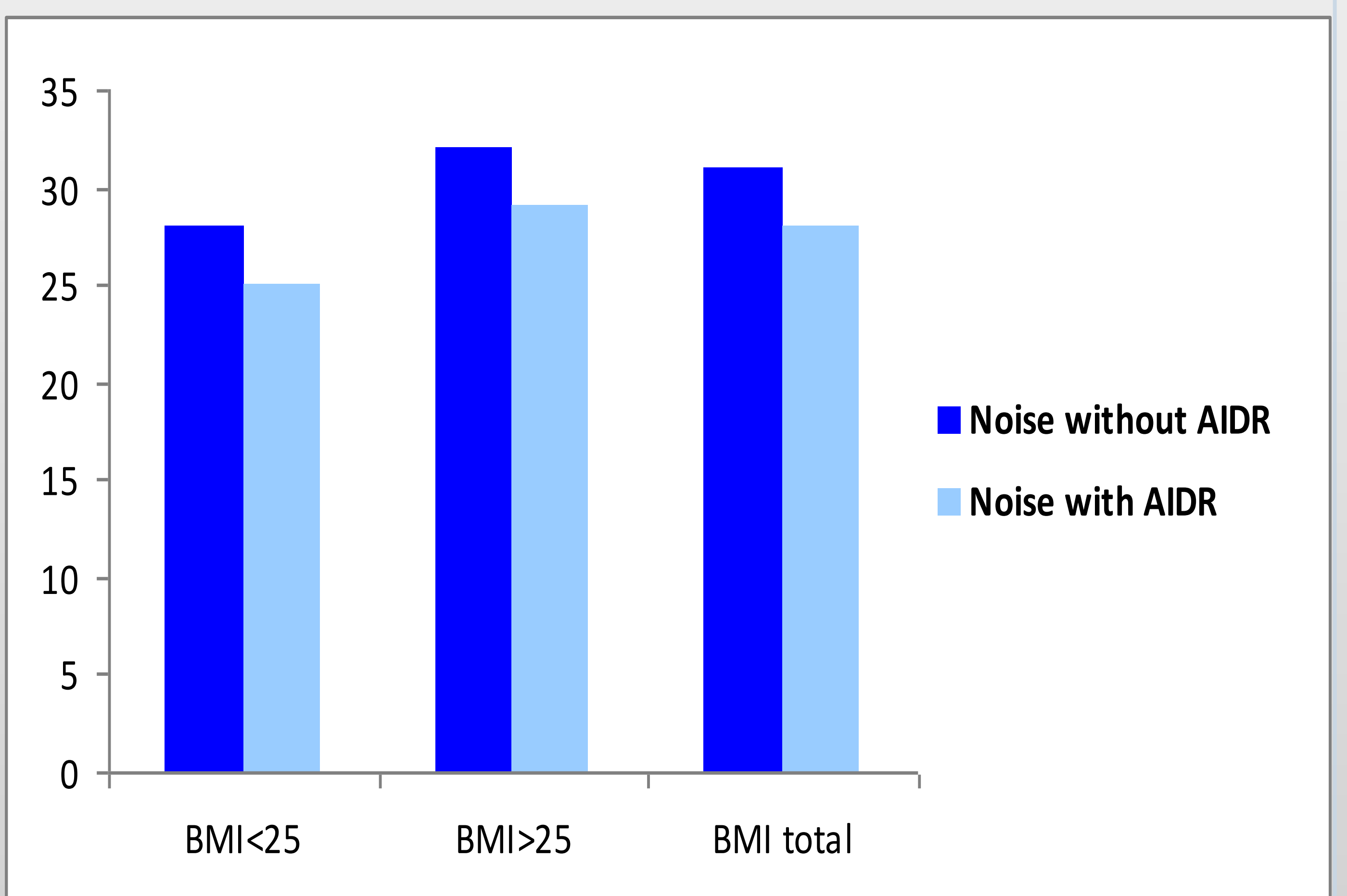


Figure 3 Graph of mean SD levels