

Subject: Abstract: PhD Scientific Days 2024

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From: K&M Congress

To: Dr. Száraz Lili (klinikai orvos)

Dear Dr. Lili Száraz!

You submitted an abstract to the following congress:

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Budapest

9-10 July 2024

Data you given:

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Title of the presentation:

Optimization of ultrahigh-resolution coronary CT angiographic images' reconstructions using ex vivo model

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Preferred type of the presentation:

poster

Language of the presentation:

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Preferred session:

Cardiovascular Medicine and Research

Text of the abstract:

Introduction: The latest photon-counting detector computed tomography (PCD-CT) technology offers the option of ultra-high-resolution (UHR) scan mode with increased diagnostic accuracy. However, the extent of this effect and post-processing optimizing protocols in the clinical coronary CT angiography (CCTA) routine remains unclear.

Aims: We aimed to investigate the feasibility of the helical and sequential CCTA scan modes directly with PCD-CT in an ex vivo study. We aimed to optimize image reconstruction in case of a high coronary calcium load.

Methods: Imaging in helical and sequential UHR scan modes were repeated on ex vivo human hearts. Eight different vascular kernels were used for reconstruction (Bv40 up to Bv89) with matrix sizes of 512X512 and 1024X1024. Image noise (IN), signal-to-noise ratio (SNR), contrast-to-noise ratio (CNR), vessel sharpness (VS), and blooming artifact were quantified. Subjective image quality (IQ) was assessed.

Results: Five ex vivo hearts were included, and eight calcified plaques were signed for analysis. The IN, SNR, CNR, VS, and blooming artifacts differed significantly ($p < 0,005$). Softer kernels showed the lowest IN, VS and highest SNR and CNR values in both acquisition modes (IN(Bv40)[hel]: $30,6 \pm 7,3$ HU; SNR(Bv40)[hel]: $12 \pm 6,9$ HU; CNR(Bv40)[hel]: $16,2 \pm 8,4$ HU; VS(Bv40)[hel]: $421,7 \pm 72,4$ Δ HU/mm versus IN(Bv40)[seq]: $26,7 \pm 11,8$ HU; SNR(Bv40)[seq]: $15,5 \pm 3,7$ HU; CNR(Bv40)[seq]: $17,1 \pm 6,2$ HU; VS(Bv40)[seq]: $443,3 \pm 22,6$ Δ HU/mm). Sharper kernels achieved the opposite results. Comparing quantitative parameters between helical and sequential modes, no significant difference existed for any kernel (all $p > 0.05$). Blooming artifacts reduced towards Bv64[seq] and Bv72[hel] ($35,2 \pm 10,2\%$ versus $33, \pm 8,4\%$). Subjective IQ, IN, and VS were rated excellent for kernels Bv40[seq/hel] up to Bv64[seq/hel].

Conclusions: UHR helical and sequential imaging modes of a PCD-CT do not differ significantly in IQ and quantitative parameters despite elevated radiation dose in helical scan mode. Optimal IQ and vessel delineation were achieved using vascular kernel Bv64 with matrix size 512X512 in both modes.

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University:

Semmelweis University

Other university, not listed above:

Supervisor:

Pál Maurovich-Horvat, MD, PhD, MPH, DSc

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Best regards

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