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Abstract 40: Method for Determining Optimal CT Reconstruction Parameters for Quantitative Anatomic Modeling Compared to an Invasive Standard

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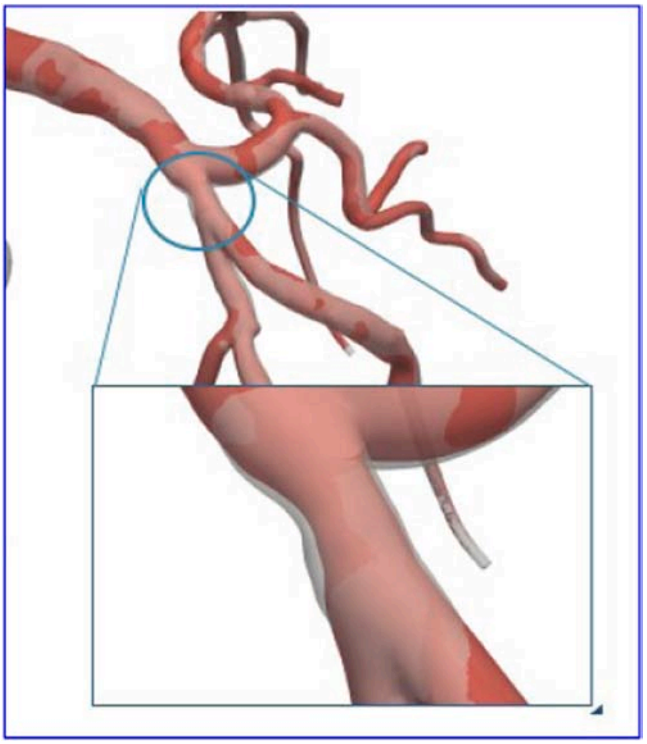
Introduction: FFR_{CT} combines image data (CCTA) with computational fluid dynamics to calculate blood flow and pressure under simulated conditions of maximal hyperemia. In order to maximize the accuracy of FFR_{CT} , it is necessary to optimize the anatomic fidelity of the CCTA input. We propose a method to identify the CT protocols that create the best anatomic models for FFR_{CT}.

Methods: Five patients who had undergone CCTA on the Revolution CT (GE Healthcare, Waukesha WI, US) and Invasive Coronary Angiography (ICA) within 90 days were included in this pilot study. The anonymized raw projection CT scan data was reconstructed with different combinations of reconstruction parameters, including kernel, iterative reconstruction method(s), as well as motion correction techniques. From each reconstruction, an anatomical model was created using the HeartFlow segmentation process. For each of the three main coronary arteries, the CT derived anatomic model was projected at the same angle as the reference QCA, and Minimum Lumen Diameters (MLD) were extracted for each stenosis > 30%. The CT-derived MLD was then compared against the corresponding QCA-derived MLD.

Results: This pilot study demonstrates the feasibility of the methods. The example image shows superimposed anatomic models created with two different sets of CCTA reconstruction parameters and illustrates a difference in MLD of 0.25 mm at a stenotic plaque. Results for this pilot study are not reported due to the small sample size. The proposed method could be applied to a larger sample of cases from multiple CT manufacturers and models. The comparison of the CT-derived and QCA-derived MLD, as a function of reconstruction and acquisition parameters, could be used to determine the optimal combination of reconstruction parameters for anatomic modeling.

Conclusions: This study proposes a method for determining the optimal CT protocols for quantitative imaging of the coronary arteries. This method was piloted on 5 cases, and could be extended to a larger population.

Figure 1: Superimposed models created with different sets of reconstruction parameters. (**This work was funded in part by a grant from the Research and Education Fund of Scripps Clinic Medical Group, La Jolla, CA.)**



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