THE SYNERGISTIC EFFECT OF NIRS-DETECTED LIPID-RICH PLAQUE AND WALL SHEAR STRESS ON HUMAN CORONARY PLAQUE GROWTH

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Poster Contributions
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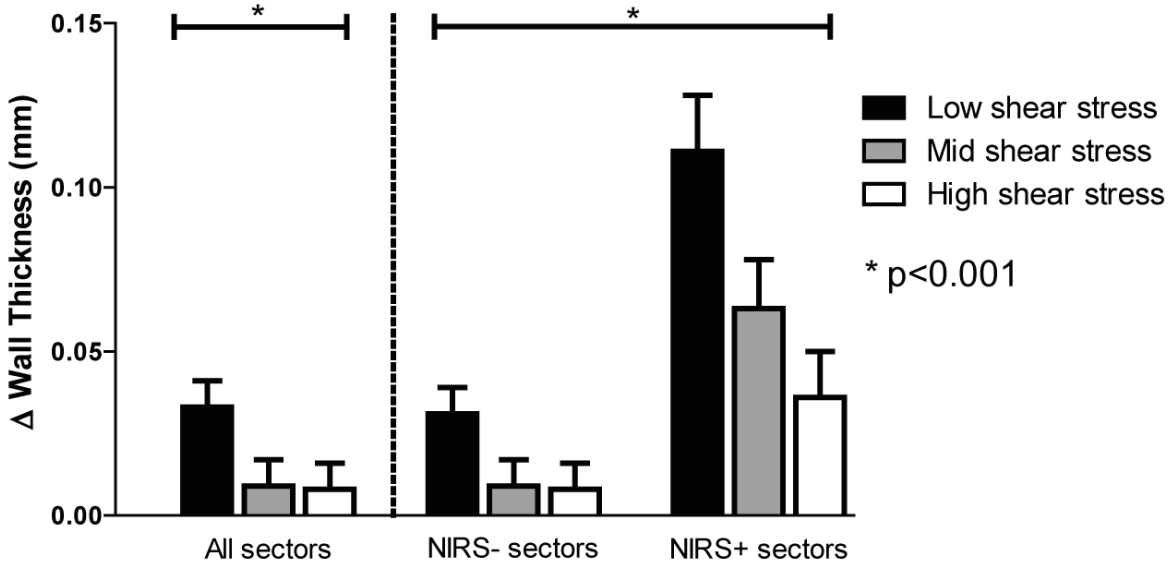
Background: Local wall shear stress (WSS) and high local lipid content (as detected by near-infrared spectroscopy (NIRS)) have been individually associated with atherosclerotic plaque progression. This study is the first that combines WSS with local lipid content to investigate the synergistic effect on plaque progression in human coronary arteries.

Methods: 41 non-culprit coronary arteries of acute coronary syndrome patients from the IMPACT study were imaged at baseline and 1 year FU using NIRS-intravascular ultrasound. Doppler flow measurements were performed to facilitate WSS profiling. The arteries were divided into 1.5mm/45° sectors and classified as NIRS-positive or NIRS-negative. Per sector plaque progression was determined using IVUS information. The WSS was divided in vessel specific tertiles (low, mid, high). Using mixed effects regression models the relationship between plaque progression, WSS and NIRS was studied, adjusting for baseline wall thickness.

Results: In total 555 NIRS+ and 11186 NIRS- segments were studied.The wall thickness of NIRS+ sectors (0.69±0.35mm) was significantly higher than NIRS- sectors (0.39±0.29 mm, p<0.001). Plaque growth was significantly related to WSS (Fig left panel). Sectors presenting with NIRS-detected lipid-rich plaque showed more progression when they were colocalized with low TAWSS (p<0.001) in contrast to NIRS negative sectors (Fig right panel).

Influence of NIRS on shear stress related plaque progression



Conclusion: Plaque progression is the highest in NIRS+ plaques exposed to low shear stress.