INTRACORONARY SALBUTAMOL, SEGMENTAL PLAQUE BURDEN AND FOCAL CORONARY ENDOTHELIAL FUNCTION: NOVEL MECHANISTIC INSIGHTS FROM AN IN VIVO INTRAVASCULAR ULTRASOUND STUDY

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Authors: Rishi Puri, Gary Y. Liew, Stephen J. Nicholls, Adam J. Nelson, Darryl P. Leong, Angelo Carbone, Barbara Copus, Dennis T. Wong, John F. Beltrame, Stephen G. Worthley, Matthew I. Worthley, Department of Medicine, University of Adelaide, Adelaide, Australia

Background: The relationship between plaque burden and endothelial function in humans is poorly understood. IVUS was used to validate intracoronary (IC) salbutamol as a novel endothelium-dependent vasodilator, quantify plaque burden and assess determinants of coronary endothelial function.

Methods: In 25 patients with near-normal coronary angiograms, IC salbutamol was infused during IVUS-upon-Doppler Flowire imaging. Study 1: incremental IC salbutamol (0.15, 0.3, 0.6 μg/min) infusion (15 patients, 103 segments) and Study 2: salbutamol (0.3 μg/min) infusion pre and post IC administration of NG-monomethyl-L-arginine (L-NMMA) (10 patients, 82 segments). Vasomotor response [% change in segmental lumen volume (ΔSLV)] and plaque burden [percent atheroma volume (PAV)] was studied in 5-mm segments. Coronary blood flow (CBF) was calculated after each infusion.

Results: Significant salbutamol dose-response ΔSLV and ΔCBF was seen (Fig1A,B); ΔSLV was magnified in low vs high plaque burden groups. L-NMMA significantly abolished the salbutamol vasomotor responses supporting a nitric oxide dependent mechanism (Fig 1C,D). After multivariate analysis including cardiovascular risk factors, PAV, remodeling and eccentricity indices, PAV remained the only significant predictor of ΔSLV to IC salbutamol (coefficient -0.18, p=0.015).

Conclusions: IC salbutamol is a novel endothelium-dependent coronary vasodilator. PAV is a significant determinant of focal coronary endothelial function.