An Innovative Non-Invasive Respiratory Stress Test Indicates Significant Coronary Artery Disease – From Feasibility to Validation

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Background: Respiratory maneuvers can uncover manifestations of myocardial ischemia. Some Pulse Wave characteristics are associated with significant coronary artery disease (S-CAD). An innovative test, using the Respiratory Stress Response (RSR), has been developed for the detection of S-CAD. It is based on spectral analysis of finger pulse wave oscillations measured by photoplethysmography (PPG) during deep, paced breathing at a rate of 6 breaths per minute (0.1Hz) over 70 seconds.We evaluated this noninvasive simple test (RSR) as an indicator of S- CAD

Methods: The study consisted of two phases; I – feasibility, II – validation, assessing RSR in patients referred for coronary angiography (CA). RSR was calculated by proprietary software analyzing the relative spectral power of the respiratory peak area at 0.1 Hz (not identically in both phases). The CAs were analyzed visually (Phase-I) and by Quantitative Corona angiography (phase-II) by a single cardiologist who was blinded to the RSR results .S-CAD was defined as luminal stenosis>70% of at least one coronary artery or LM stenosis>50%.

Results: Patient characteristics and the test results are presented in the table. S-CAD pts had significantly lower RSR compared to pts without S-CAD, $p<0.001$. Multivariate logistic regression analysis, adjusted risk factors, showed that RSR is a strong independent indicator of S-CAD (OR=18.9 [7.2-49.5], $p<0.001$)

Conclusion: The novel RSR test is a simple accurate non-invasive bedside tool for detection of S-CAD.

	Age (Y) Mean±Sd	Male N (%)	S-CAD N (%)	AUC (95%CI)	Sens % (95%CI)	Spec % (95%CI)	PPV % (95%CI)	NPV % (95%CI)
Phase I N=98	64.6+11.3	69 (73)	65 (66)	82 (73–91)	80 (68-89)	82 (65-93)	90 (79-96)	68 (51-81)
Phase II N=95	61.7+12.4	67 (68)	47 (49)	76 (66-85)	87 (74-95)	63 (47-76)	70 (56-81)	83 (67-94)
Total N=193	63.2+11.9	136 (70)	112 (58)	N/A	83 (75-90)	70 (59-80)	80 (71-86)	75 (64-84)