Heart Rate Recovery Immediately after Exercise is a Predictor of Pre-clinical Coronary Atheroma in Asymptomatic Type 2 Diabetics

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Background: Impaired heart rate recovery (HRR) after exercise is a function of vagal reactivation and an independent predictor of long-term mortality and in type 2 diabetics a marker of autonomic dysfunction. We examined the hypothesis that prevalence of pre-clinical coronary atheroma will be increased in diabetics with impaired HRR by analyzing data from a cohort of asymptomatic diabetics undergoing 64 channel contrast enhanced coronary CT angiography (CCTA) in the context of an ongoing prospective outcomes trial**.**

Methods: Symptom limited treadmill exercise was performed in 496 pts with DM and no history of CAD (age 63.2±5.4 yr, 55.8% women, duration of DM 9.9±7.6 yr, 25.5% insulin treated). HRR at 1 minute (HRR1) was calculated as peak HR - HR at 1 minute and chronotropic response as ratio of peak HR - resting HR to HR reserve [(220-age)-HR at rest].

Results: HRR1 predicted multi-vessel coronary atheroma on CCTA (Table). Findings were similar after adjustment for chronotropic response and were independent of Framingham but not of UK Prospective Diabetic Study (UKPDS) risk score (Table). Unadjusted findings were similar for prediction of significant luminal stenosis (>50%) (OR 0.8, 95%CI .67-.96, p=0.02) but were not independent of Framingham or UKPDS risk scores.

Heart rate recovery & multivessel plaque

	Odds ratio*	95% CI*	p
Univariate			
HRR1	0.8	.71-.92	.002
Adjusted for chronotropic response (CR)			
HRR1	.78	.68-.89	.001
CR	1.7	.72-3.6	.2
Adjusted for Framingham risk			
HRR1	.82	.72-.95	.01
Framingham	1.4	1.2-1.6	<0.0001
Adjusted for UKPDS risk			
HRR1	.86	.75-1.01	0.057
UKPDS	1.6	1.3-1.8	<0.0001

* Per 10 beats HRR1, 10% Framingham or 10% UKPDS 10 year risk

Conclusions: In asymptomatic type 2 diabetics 1. Autonomic dysfunction, as exemplified by impaired HRR post exercise, predicted presence of multi-vessel coronary atheroma on 64 slice CCTA independently of Framingham risk score. 2. UKPDS risk score was strongest predictor of multi-vessel coronary atheroma and of coronary luminal stenosis.