Abstract 41

Short-Term Heart Rate Complexity Determined by the PD2i Algorithm Is Reduced in Patients With Type 1 Diabetes Mellitus

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Background: Diabetic autonomic dysfunction is one of the least understood complications of diabetes mellitus (DM). Using the *P* value as a measure of discriminability between the means of DM patients and young age-matched controls, various traditional and complexity algorithmic assessments of heart rate variability (HRV) were considered, and it was found that multiscale entropy (MSE) at scale 3 had the smallest-order *P* value.[1] A new measure of HRV complexity, the point correlation dimension (PD2i), has similarly been found superior in comparison with various traditional and complexity algorithmic assessments of HRV.[2]

Objective: The objective is to test the ability of PD2i to discriminate between young DM patients without neuropathy and age- and gender-matched controls.

Methods: Seventeen DM patients with known autonomic dysfunction and 17 age- and gender-matched controls were studied. The same R-R interval data (3,200 heartbeats per subject) in the Javorka study[1] were analyzed (blinded) to determine the PD2i values.

Results: PD2i was able to detect autonomic nervous system (ANS) dysfunction **(Figure)** with *P* = .0006, similar to the best

		Disease		
		Positive	Negative	
Test	Positive	True positive (TP) 16	False positive (FP) 5	TP + FP 21
	Negative	False negative (FN) 1	True negative (TN) 12	FN + TN 13
		TP + FN 17	FP + TN 17	

FIGURE. Sensitivity = TP/(TP + FN) = 94%, specificity = TN/(TN + FP) = 71%, negative predictive value = TN/(TN +FN) = 92%, positive predictive value = TP/(TP + FP) = 76%, relative risk = TP/FN × (TP + FN)/(TN + FP) = 16

discriminating MSE scale, with *P*= .0002.

Conclusion: The performance of PD2i to discriminate asymptomatic DM patients and controls is similar to the best discriminative power of previously published complexity measures. PD2i is able to discriminate among asymptomatic DM patients and controls for the presence of ANS dysfunction and may prove to be useful clinical tool.

1. Javorka M, Trunkvalterova Z, Tonhajzerova I, Javorkova J, Javorka K, Baumert M. Short-term heart rate complexity is reduced in patients with type 1 diabetes mellitus. Clin Neurophysiol 2008; 119:1071–1081.
2. Skinner JE, Meyer M, Nester BA, et al. Comparison of linear-stochastic and nonlinear-deterministic algorithms in the analysis of 15-minute clinical ECGs to predict risk of arrhythmic death. Ther Clin Risk Manag 2009; 5:671–682.