

Abstract 22

Prognostic Significance of PD2i in Heart Failure Patients

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Background: Heart rate variability and heart rate dynamics are useful in identifying heart failure patients at increased risk of mortality. A new nonlinear deterministic model, the automated point correlation dimension (PD2i), was evaluated regarding its prognostic significance for predicting cardiac events in chronic heart failure patients.

Methods: The study population consisted of chronic heart failure patients who were observed for 44 months on average with total mortality as the primary end point and cardiac mortality, sudden cardiac death, and heart failure death as secondary end points. The PD2i was computed based on 20-minute supine high-resolution Holter recording and was categorized as positive (PD2i ≤ 1.4) or negative (PD2i > 1.4) based on prespecified criteria.

Results: Among 651 chronic heart failure patients, 537 had successful PD2i analyses resulting in 144 (27%) patients showing positive results and 393 (73%) negative results (**Figure**). After adjustment for clinical covariates, PD2i was found predictive for total mortality (heart rate [HR] = 1.55; $P = .026$). Predictive value of PD2i was observed in heart failure patients with left ventricular ejection fraction of 35% or less (HR = 1.95; $P = .004$), but not in patients with ejection fraction greater than 35% (HR =

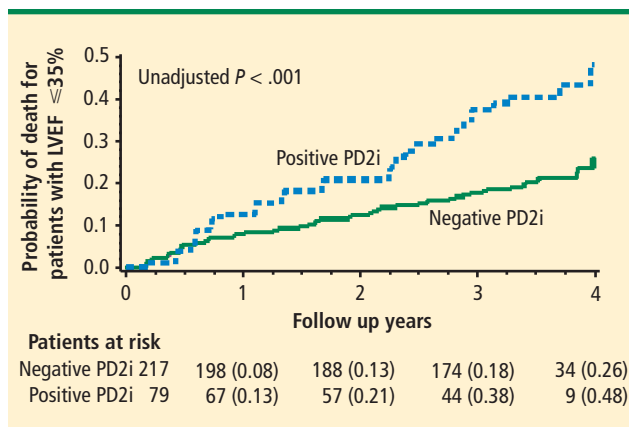


FIGURE. Predictive value of point correlation dimension (PD2i) in heart failure patients with left ventricular ejection fraction (LVEF) of 35% or less.

0.87; $P = .716$); P for interaction 0.072. Further analyses revealed that among patients with ejection fraction $\leq 35\%$, PD2i was also predictive for cardiac death and for heart failure death.

Conclusions: The PD2i, a novel nonlinear heart rate dynamics parameter, is predictive for total mortality, cardiac death, and heart failure death in heart failure patients with left ventricular ejection fraction of 35% or less. There was no predictive value of PD2i in heart failure patients with ejection fraction greater than 35%.