A STUDY OF RELATIONSHIP BETWEEN DIABETIC RETINOPATHY AND HEART RATE VARIABILITY

Terry B J Kuo,[1] Ching-Yao Tsai,[2,4]
Shiow-Wen Liou,[4,6,7] Pesus Chou,[2]
Yin Chang,[3] Li-Lin Kuo,[2,4] Li-Shan Huang[5]

To explore whether diabetic retinopathy can be predicted by heart rate dynamics, 50 diabetic patients were enrolled in this study. They were classified into four groups according to the severity of retinopathy as diagnosed by fundus examination. The four groups did not differ in age, sex distribution, systolic and diastolic arterial pressure statistically. The participants had normal sinus rhythms, and five minutes of ECG signals were recorded in daytime while they were lying quietly. Computer analysis accomplished various linear and nonlinear estimations of heart rate variability (HRV), including mean (RR) and standard deviation (SD) of R-R intervals, low-frequency power (LF, 0.04-0.15 Hz), high frequency power (HF, 0.15-0.4 Hz), LF to HF ratio (LF/HF), correlation dimension (CD), approximate entropy (ApEn), and largest Lyapunov exponent (LLE). Compared with the no retinopathy group (group 1), the mild retinopathy group (group2) did not exhibit evident change in all parameters. However, the severe retinopathy group (group 4) had significantly lower RR, LF, HF, CD, ApEn, and LLE. It is noteworthy that only LLE altered significantly in the median retinopathy group (group 3). We concluded that severe retinopathy in diabetic patients can be indicated by various linear and nonlinear analyses of HRV, in which the nonlinear LLE has the best sensitivity.

Received: August, 24, 2006. Revised: September, 14,2006. Accepted: November, 17, 2006.
[1]*National Yang Ming University Institute of Brain Science*
[2]*National Yang Ming University Institute of Public Health Community Medicine Research Center*
[3]*National Yang Ming University Institute of Biomedical Engineering*
[4]*Taipei City Hospital Zhongxing Branch Department of Ophthalmology*
[5]*Taipei City Hospital Zhongxing Branch Department of Metabolism*
[6]*National Taiwan University* [7]*Taipei Medical University*
Correspondence and reprint requests to: Shiow-Wen Liou Department of Ophthalmology, Taipei City Hospital, 145, Cheng-Chou Road, Taipei 103, Taiwan
E-mail : DAE77@tpech.gov.tw