

Studying diabetes duration and autonomic dysfunction

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Introduction

All diabetic patients are potentially concerned by autonomic dysfunction. Differences in autonomic neuropathy severity may or may not depend on the duration of diabetes.

Methodology

95 type-2 diabetic patients were subdivided into three groups (respectively made of, 23; 40, 32 patients), according to their diabetes history (1 year or less (age: 48+/-10); 2 to 9 years (age: 50+/-9); more than 10 years (age: 57+/-10)). A fourth group of 34 non-diabetic volunteers (age: 45+/-13) was added for control. Supine assessment of autonomic dysfunction was obtained using the ANSiscope (Dyansys Inc., USA). Such an evaluation is based on a beat-to-beat decomposition of heart rate changes into sympathetic and parasympathetic activities. The proportion (over time) of lack of interaction between the two systems is understood to describe the amount of autonomic dysfunction. It is expressed as a percentage over a 571-beats period of time (5-7 minutes). We here propose to study the statistical significance of autonomic dysfunction assessments between the 4 populations.

Results

A Welch *t*-test was applied in order to test if the difference in autonomic dysfunction means is null between the various couples of population. The control group proved to be significantly differentiated from any group of diabetic patients, with *p*-values < 10⁻², <10⁻⁵ and ~10⁻⁸ respectively, for the 1st (less than 1 year), 2nd (2 to 9 years) and 3rd (more than 10 years of diabetes) populations of diabetics. The statistical test gave the following results among the populations: *p*-value= 0.07; 0.0009; 0.02 respectively, for the 1st & 2nd, the 1st & 3rd, the 2nd & 3rd. Hence, the three populations of patients were found to be unrelated in levels of autonomic dysfunction, with exception of the 1st as compared to the 2nd. The autonomic function of diabetics is here characterized differently depending on the duration of the chronic disease, with unlikely ambiguity between newly diagnosed patients and those with more than 10 years of diabetes, and between this latter group and those with 2 to 9 years of diabetes. Furthermore, even the population of newly diagnosed patients significantly differed from a population of non-diabetic volunteers, suggesting that the autonomic nervous system may have presented functional disorders already at the onset of the disease.

$P \sim 10^{-3}$
 $P < 0.05$ $P > 0.05$

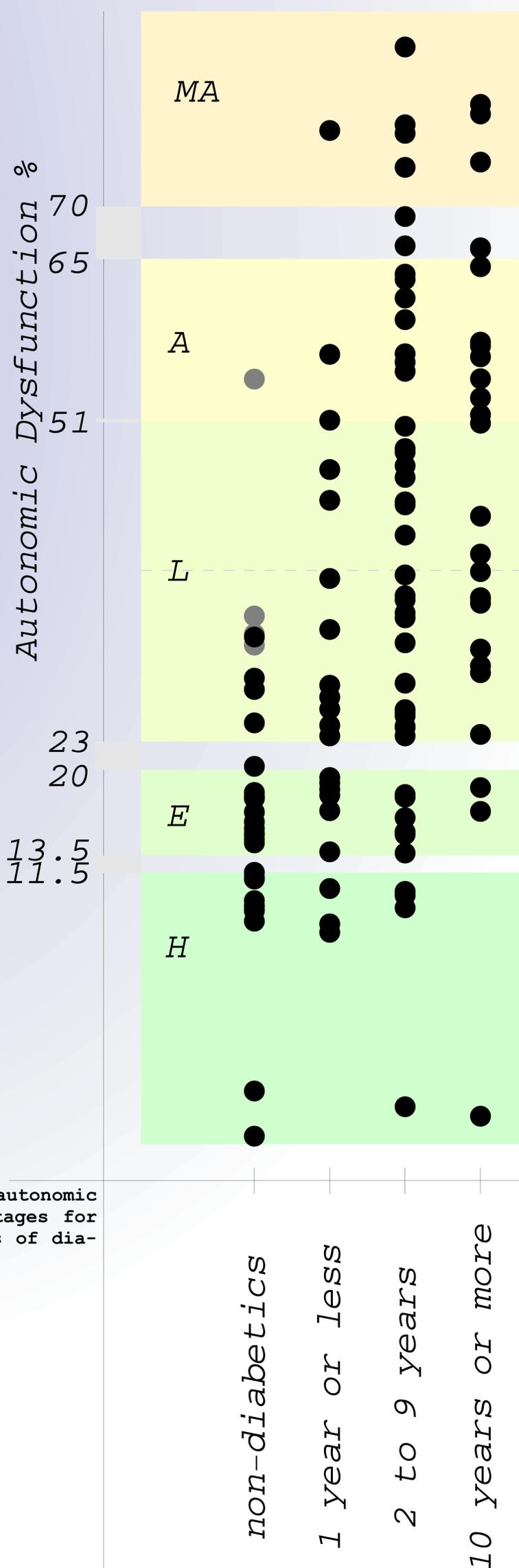


Figure 2: Comparing sets of autonomic dysfunction percentages for different durations of diabetes.

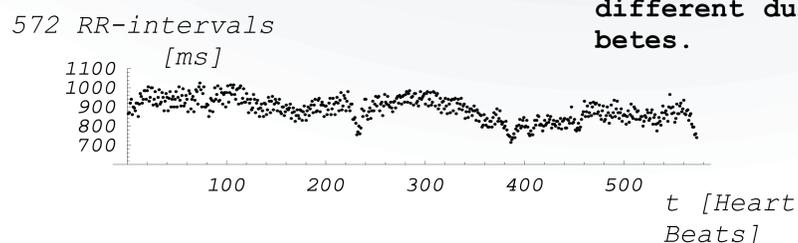
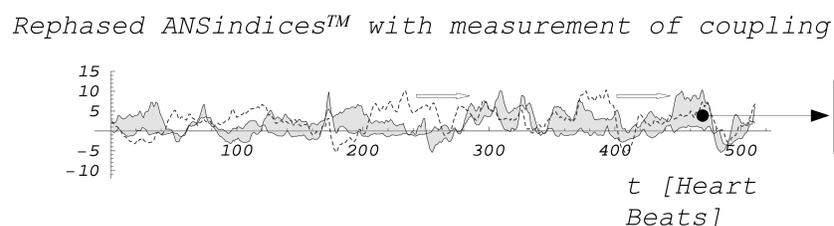
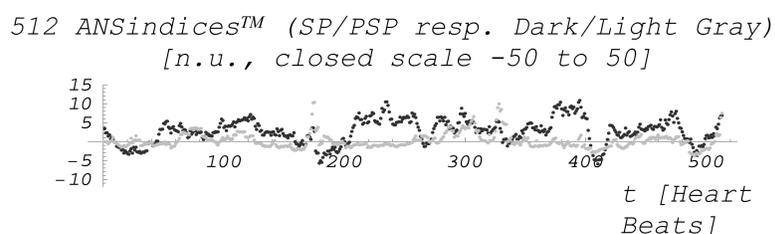


Figure 1: From the time intervals between Heart Beats to the measure of Autonomic Dysfunction, via synchronization of ANS-indices. Particular diabetic case with no DAN.



$P < 10^{-2}$
 $P < 10^{-6}$
 $P \sim 10^{-7}$