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Letter to the editor

Growing relevance of cardiovascular risk biomarkers in guidelines

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In a recent editorial, we provided an overview on the 2026 guidelines on hypertension published by the International Society of Hypertension [1]. Metabolic biomarkers involved in cardiovascular risk determination have been mentioned in the document and their relevance will become more and more important in the next future. In particular, two metabolic biomarkers, the triglyceride-glucose (TyG) index, derived from fasting triglyceride and glucose levels, and the atherogenic index of plasma (AIP), derived from triglyceride and high-density lipoprotein cholesterol (HDL-C) levels, have received growing interest in clinical practice. This was due to the evidence collected over the years on their relevance in determining global cardiovascular risk profile as well as in favouring the pathogenesis of organ damage and cardiovascular events [2,3]. Mechanisms underlying the prognostic relevance of these biomarkers include their pro-inflammatory and proatherogenic role as well as their participation at the endothelial dysfunction development [2–4]. The hypothesis has been advanced that they should also include the sympathetic nervous system, which is is involved in the regulation of glucose and triglycerides [5], i.e. the major determinants of TyG and AIP. By performing a sub-analysis of data collected in two previous studies [6,7], we found that in 76 middle age overweight subjects characterized by a dysmetabolic profile (Table 1) a significant association links the microneurographic indices of sympathetic nerve traffic, abnormally elevated in these subjects due to the dysmetabolic profile, and TyG and AIP values (Fig. 1). The statistical significance of the association remained after data adjustment for confounders.

These data provide evidence that both TyG and AIP, particularly when abnormally elevated, are associated with a remarkable cardiovascular sympathetic activation. Given the evidence that sympathetic overactivity is strongly associated with an increased risk of cardiovascular and all-cause mortality in variety of disease, such as chronic heart failure, renal insufficiency, post-myocardial infarction and post-stroke [8], these findings suggest that sympathetic neural mechanisms may participate at determining the unfavorable effects on cardiovascular prognosis of the two above mentioned biomarkers.

Table 1
Descriptive characteristics of the population included in the analysis.

Variable	Mean Value± SD
Number	76
Gender (M/F, n°)	51/25
Age (years)	54 ± 14.6
Body Mass Index (kg/m^2)	26.8 ± 2.8
Systolic Blood Pressure (mmHg)	137.8.8 ± 9.3
Diastolic Blood Pressure (mmHg)	79.3 ± 9.1
Heart Rate (beats/minute)	72.2 ± 12.8
Plasma Triglycerides (mg/dl)	117.4 ± 65.7
Plasma Glucose (mg/dl)	103.1 ± 24.4
HDL-Cholesterol (mg/dl)	59.1 ± 15.1
Plasma Creatinine (mg/dl)	0.95 ± 0.7
Sympathetic Nerve Traffic (bursts/minute)	39.6 ± 14.6
Sympathetic Nerve Traffic (bursts/100 heartbeats)	56.3 ± 21.3
Triglyceride-Glucose Index (TyG)	8.55 ± 0.62
Atherogenic Index of Plasma (AIP)	-0.10 ± 0.29

SD: standard deviation; M: males; F: females

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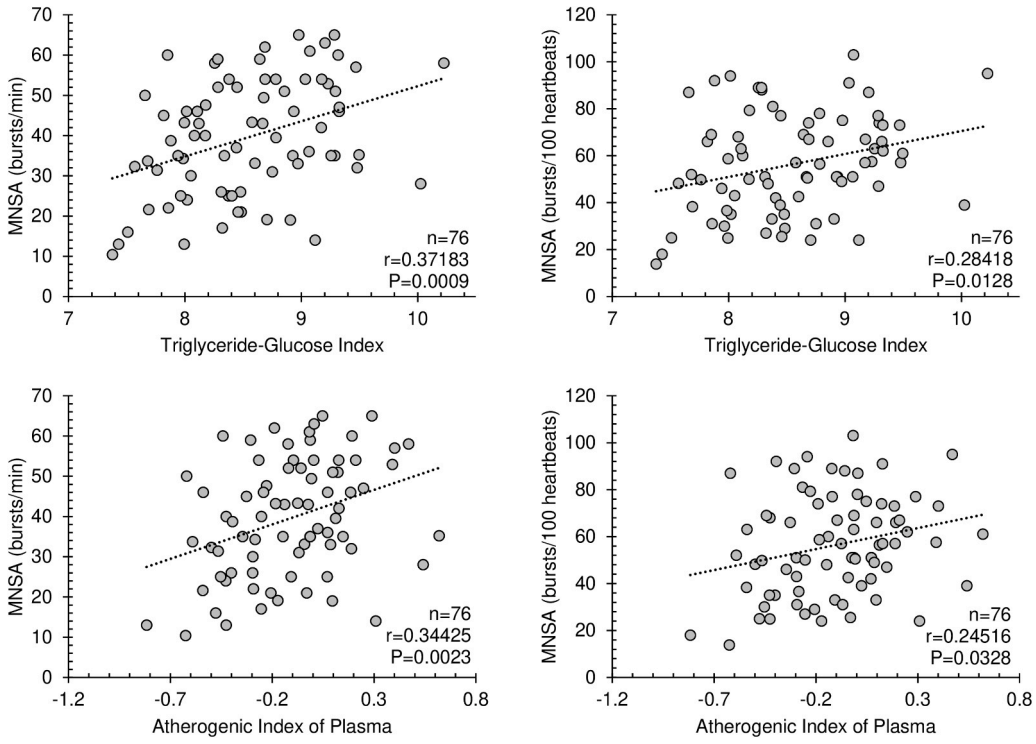

Fig. 1. Regressing muscle sympathetic nerve traffic (MSNA), expressed either as bursts incidence over time (bursts/min, left panels) or corrected for heart rate (bursts/100 heart beats, right panels), triglyceride plasma index (upper panels) and atherogenic index of plasma (lower panels) in 76 subjects. Correlation coefficients (r) and P values are shown.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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