



Editorial

Variability of metabolic parameters and risk of heart failure: Can it be a marker of incident heart failure?



Leonardo Roever^{a,*}, Gary Tse^b, Giuseppe Biondi-Zoccai^{c,d}

^a Federal University of Uberlândia, Department of Clinical Research, Brazil

^b Shenzhen Research Institute, The Chinese University of Hong Kong, China

^c Department of Medico-Surgical Sciences and Biotechnologies, Sapienza University of Rome, Latina, Italy

^d Mediterranea Cardiocentro, Napoli, Italy

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Heart Failure (HF) is the leading cause of death globally, despite recent declines in cardiovascular mortality, and its contemporary burden remains to be adequately addressed [1–5].

In this issue of the Journal, Kwon and colleagues investigated the association between the variability in selected metabolic parameters (systolic blood pressure [SBP], body mass index [BMI], fasting blood glucose [FBG], and total cholesterol [TC]) and the risk of HF in the general Korean population using a nationwide population-based data from the National Health Insurance Service. Variability of each of the above parameters was carefully and ingeniously analyzed using the variability independent of the mean (VIM) method. VIMs were categorized into four groups according to quartiles. A unifying index of consistency of care, the metabolic variability (MV) score, was defined for each subject as the number of VIMs in the highest quartile [6]. Such MV proved particularly useful in characterizing patients and predicting new-onset HF.

While these results are important and unprecedented, several explaining hypotheses can be envisioned. Indeed, the mechanism linking the risk of HF to fluctuations in biological parameters still remains under investigation, but several plausible explanations could be suggested, as TC variability may increase the risk of HF by aggravating subclinical coronary artery disease. In particular, several studies have suggested that crystals of cholesterol can induce mechanical damage to plaques [7,8].

Variability of BMI can affect the risk of HF developing relevant unfavorable conditions. Moreover, a negative association between the

degree of weight fluctuation and atrial fibrillation was observed. Studies have suggested that high body weight variation negatively affects lipid metabolism by lowering high density lipoprotein cholesterol and increasing the proportion of visceral abdominal fat [9]. However, no significant association between incident heart failure and variability of metabolic syndrome risk factors, waist circumference and low HDL-C was detected.

In conclusion, the article by Kwon and colleagues provides us the important finding that variability in metabolic parameters is also associated with incident heart failure in healthy adults. Public health interventions to improve HF mortality in the vulnerable young adult population can indeed play a key role in closing this gap. Further research is however needed to determine the economic implications of implementing such programmes.

Declaration of conflicting interests

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References

- [1] G.A. Roth, C.O. Johnson, K.H. Abate, et al., The burden of cardiovascular diseases among US states, 1990–2016, *JAMA Cardiol.* 3 (5) (2018) 375–389.
- [2] G.B.F. Oliveira, A. Avezum, L. Roever, Cardiovascular disease burden: evolving knowledge of risk factors in myocardial infarction and stroke through population-based research and perspectives in global prevention, *Front Cardiovasc Med.* 2 (2015) 00032.
- [3] L. Roever, G. Biondi-Zoccai, A.C.P. Chagas, Non-HDL-C vs. LDL-C in predicting the severity of coronary atherosclerosis, *Heart Lung Circ.* 25 (2016) 953–954.
- [4] L. Roever, E.S. Resende, F.C. Veloso, et al., Abdominal obesity and association with atherosclerosis risk factors, *Medicine (Baltimore)* 95 (2016), e1357.
- [5] L. Roever, E.S. Resende, A.L.D. Diniz, et al., Ectopic adiposity and association with cardiovascular disease risk factors: the Uberlândia Heart Study, *Int. J. Cardiol.* 190 (2015) 140–142.
- [6] S. Kwon, S.-R. Lee, E.-K. Choi, et al., Visit-to-visit variability of metabolic parameters and risk of heart failure: a nationwide population-based study, *Int. J. Cardiol.* 293 (2019) 153–158.

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* Corresponding author.

E-mail address: leonardoroever@hotmail.com (L. Roever).

- [7] G.S. Abela, K. Aziz, Cholesterol crystals cause mechanical damage to biological membranes: a proposed mechanism of plaque rupture and erosion leading to arterial thrombosis, *Clin. Cardiol.* 28 (2005) 413–420 (18).
- [8] G.S. Abela, K. Aziz, A. Vedre, D.R. Pathak, J.D. Talbott, J. Dejong, Effect of cholesterol crystals on plaques and intima in arteries of patients with acute coronary and cerebrovascular syndromes, *Am. J. Cardiol.* 103 (2009) 959–968.
- [9] Y.H. Kim, S.M. Kim, K.D. Han, et al., Change in weight and body mass index associated with all-cause mortality in Korea: a nationwide longitudinal study, *J. Clin. Endocrinol. Metab.* 102 (2017) 4041–4050.