

Reply to the Letter to the Editor: "Stiffness or Reflection? A Critical Appraisal of Energy Drink Induced Vascular Changes"

To the Editor,

We sincerely thank the reader¹ for their careful evaluation of our article² and for their constructive comments.

We agree that the distinction between augmentation index (Alx) and direct measures of arterial stiffness, particularly pulse wave velocity (PWV), is important. Alx is influenced by wave reflection, vascular tone, and heart rate, and therefore, should not be interpreted as a pure measure of intrinsic arterial wall stiffness.^{3,4} In contrast, PWV is considered a more direct marker of arterial stiffness.⁵ In our study, we did not intend to suggest that a transient increase in Alx in the absence of a change in PWV proves fixed or structural arterial stiffening. Rather, our findings suggest an acute alteration in vascular function and wave-reflection-related indices following energy drink consumption.

As correctly noted, PWV did not change significantly, whereas Alx and Alx@75 increased at the 30th minute. We agree that these findings are more consistent with a short-term hemodynamic or functional vascular response than with persistent structural changes in the arterial wall. We appreciate the opportunity to clarify this point.

We also acknowledge the absence of a placebo or control beverage arm as an important limitation. Our study was designed as a single-arm, repeated-measures pilot study to assess the acute vascular response to energy drink consumption under standardized conditions in healthy young adults. Therefore, our findings should be interpreted with caution, and future placebo-controlled studies are needed to better distinguish the specific effects of energy drinks from non-specific time-dependent or volume-related influences.⁶

Regarding the decrease in total vascular resistance and diastolic blood pressure at the second hour, we believe this does not necessarily contradict the earlier increase in Alx. Rather, these findings may reflect the dynamic and time-dependent nature of the vascular and autonomic response after energy drink intake. Previous literature suggests that energy drinks and their constituents may produce complex and temporally variable cardiovascular responses rather than a single uniform physiological effect.⁷ The early increase in wave-reflection-related parameters and the later peripheral hemodynamic changes may represent different phases of the same transient physiological response.

In summary, we agree that our findings should not be interpreted as evidence of acute fixed arterial stiffening in the structural sense. However, the observed transient increase in Alx and Alx@75 still supports the presence of an acute vascular functional response following energy drink consumption.³⁻⁵ We believe these findings are physiologically meaningful and merit further investigation in larger, controlled studies.

We thank the authors once again for their valuable comments and for the opportunity to clarify the interpretation of our results.

LETTER TO THE EDITOR REPLY

Salim Yaşar¹ 

Muhammed Geneş² 

Özkan Eravcı¹ 

Ahmet Arslan³ 

Hülya Şirin³ 

Suat Görmel¹ 

Serdar Firtına¹ 

Mehmet Sadık Karpat¹ 

Cem Barçın¹ 

Murat Çelik¹ 

¹Department of Cardiology, Gülhane Training and Research Hospital, University of Health Sciences, Ankara, Türkiye

²Department of Cardiology, Sincan Training and Research Hospital, Ankara, Türkiye

³Department of Public Health, University of Health Sciences, Gülhane School of Medicine, Ankara, Türkiye

Corresponding author:

Salim Yaşar

✉ dr.salimyasar@hotmail.com

Available Online Date: May 11, 2026

Cite this article as: Yaşar S, Geneş M, Eravcı Ö, et al. Reply to the letter to the editor: "stiffness or reflection? A critical appraisal of energy drink induced vascular changes". *Anatol J Cardiol.* 2026;XX(X):1-2.

DOI: 10.14744/AnatolJCardiol.2026.6399



Declaration of Interests: The authors have no conflicts of interest to declare.

Funding: The authors declare that this study received no financial support.

REFERENCES

1. *Stiffness or Reflection? A Critical Appraisal of Energy Drink-Induced Vascular Changes.*
2. Yaşar S, Genç M, Eravcı Ö, et al. Evaluating the acute effects of energy drink consumption on arterial stiffness in healthy young adults. *Anatol J Cardiol.* 2025;29(10):564-570. [\[CrossRef\]](#)
3. Heusinkveld MHG, Delhaas T, Lumens J, et al. Augmentation index is not a proxy for wave reflection magnitude: mechanistic analysis using a computational model. *J Appl Physiol (1985).* 2019;127(2):491-500. [\[CrossRef\]](#)
4. Wilkinson IB, MacCallum H, Flint L, Cockcroft JR, Newby DE, Webb DJ. The influence of heart rate on augmentation index and central arterial pressure in humans. *J Physiol.* 2000;525(1):263-270. [\[CrossRef\]](#)
5. Townsend RR, Wilkinson IB, Schiffrin EL, et al. Recommendations for improving and standardizing vascular research on arterial stiffness: A scientific statement from the American Heart Association. *Hypertension.* 2015;66(3):698-722. [\[CrossRef\]](#)
6. Stopa M, Łobacz M, Niemczyk M, et al. Influence of energy drinks on acute hemodynamic parameters in young healthy adults: a randomized double-blind placebo-controlled crossover pilot study. *Kardiol Pol.* 2020;78(4):335-337. [\[CrossRef\]](#)
7. Grasser EK, Miles-Chan JL, Charrière N, Loonam CR, Dulloo AG, Montani JP. Energy drinks and their impact on the cardiovascular system: potential mechanisms. *Adv Nutr.* 2016;7(5):950-960. [\[CrossRef\]](#)