

# Beyond altitude: reevaluating microvascular adaptations through sexual dimorphism and ethnic diversity

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I am compelled to address the article “Micro- and macrovascular function in the highest city in the world: a cross-sectional study” reported by Yann Savina et al.<sup>1</sup> While the study provides insights into vascular adaptations at high altitudes, several critical considerations merit further scrutiny.

The exclusive focus on male participants raises important questions regarding the generalisability of the findings. Extensive literature indicates the existence of sex dimorphism in skin microcirculatory function, indicating that hormonal variations influence endothelial responsiveness and vascular reactivity. This suggests that the physiological implications of chronic hypoxia may differ significantly between sexes.<sup>2</sup> In addition, the study’s emphasis on a singular ethnic group, specifically Andean individuals, limits the applicability of its conclusions. Microvascular responses exhibit considerable inter-ethnic variability, shaped by both genetic predispositions and environmental factors.<sup>3</sup> Such a limited focus may inadvertently obscure the broader implications of high-altitude physiology, as adaptations may not be uniformly applicable across diverse genetic backgrounds. Furthermore, skin microcirculation is a multifaceted system governed by complex regulatory mechanisms. Current methodologies predominantly rely on isolated metrics, which may fail to capture the multifaceted nature of cutaneous microvascular health. Integrate multiple parameters (microhemodynamics, oxygen dynamics, and vasomotor responses),<sup>4</sup> to elucidate the complex interplay that governs microcirculatory function, which is particularly pertinent in chronic mountain sickness, where the interplay of cardia, respiratory, myogenic, neurogenic, nitric oxide-dependent and independent endothelial vasomotor may present a more detailed scenario than what isolated metrics can reveal.

Collectively, while this study contributes significantly to our understanding of high-altitude physiology, the

interpretations drawn from it should be approached with caution. The implications of sex and genetic diversity, along with the need for a holistic view of microvascular function, must be considered to fully appreciate the complexities of vascular adaptations in extreme environments.

## Contributors

YYW and MML conceived the idea of writing this correspondence. YYW, WQL, and BW performed a primary systematic search on PubMed and reported in the reference. WQL, BW, YL and MML reassessed and validated the content initially found by YYW for quality purposes. All authors edited and substantively reviewed the publication. All authors had full access to all the data and references in the study. All authors approved the final version of the publication. All authors had final responsibility for the decision to submit for publication. All authors agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work could be appropriately investigated and resolved.

## Declaration of interests

We declare no competing interests.

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