

**COMMENTARY ON VIEWPOINT: TIME TO RECONSIDER
HOW VENTILATION IS REGULATED ABOVE THE
RESPIRATORY COMPENSATION POINT DURING
INCREMENTAL EXERCISE: DON'T BE FOOLED BY
RANDOMNESS**

TO THE EDITOR: We appreciate the Viewpoint of Nicolò et al. (2) that put forward the control of tidal volume (V_T) and breathing frequency (f_R) during exercise. Their interest in f_R during exercise comes from a simple correlation analysis, which we believe can be misleading. It is important to mention that the studies aiming to investigate the control of ventilation record ventilatory data breath-by-breath. This means that f_R is ob-

*B. N. Balmain and D. P. Wilhite contributed equally to the fourth Commentary on this Viewpoint.

tained from computing the inverse of the breath duration (T_{tot}). The scarce studies reporting T_{tot} during incremental exercise showed a linear decrease for this variable all along the trials (1). The nonlinear increase pointed out in the Viewpoint of Nicolò et al. (2) seems to be nothing more than a mathematical misunderstanding. Indeed, the rate of the workload increment during incremental exercise will influence the kinetic of decrease of T_{tot} (3) through the known controller (2). Thus, the higher the coefficient of the slope is, the higher the nonlinear increase is as the result of the reciprocal function properties.

Furthermore, why airway anesthesia studies (5) do not prevent f_R from increasing nonlinearly has been explained above. However, this manipulation highlights the fact that pulmonary stretch receptors (PSR) influence f_R even at high intensity. Indeed, V_T stabilization has no influence on f_R , but the velocity of lung inflation could be an important driver of f_R during exercise (4). This Commentary aimed to mention a few points omitted by the authors not rejected by experiments. These cannot be put aside when dealing with ventilatory control during exercise.

REFERENCES

1. Clark JM, Hagerman FC, Gelfand R. Breathing patterns during submaximal and maximal exercise in elite oarsmen. *J Appl Physiol* 55: 440–446, 1983. doi:10.1152/jappl.1983.55.2.440.
2. Nicolò A, Marcora SM, Sacchetti M. Time to reconsider how ventilation is regulated above the respiratory compensation point during incremental exercise. *J Appl Physiol* (1985). doi:10.1152/japplphysiol.00814.2019.
3. Prioux J, Ramonatxo M, Prefaut C. Effect of step duration during incremental exercise on breathing pattern and mouth occlusion pressure. *Int J Sports Med* 18: 401–407, 1997. doi:10.1055/s-2007-972669.
4. Smith JR, Kurti SP, Meskimen K, Harms CA. Expiratory flow limitation and operating lung volumes during exercise in older and younger adults. *Respir Physiol Neurobiol* 240: 26–31, 2017. doi:10.1016/j.resp.2016.12.016.
5. Winning AJ, Hamilton RD, Shea SA, Knott C, Guz A. The effect of airway anaesthesia on the control of breathing and the sensation of breathlessness in man. *Clin Sci (Lond)* 68: 215–225, 1985. doi:10.1042/cs0680215.

Guillaume Toffoli
Sforzo Sport Science, Aquitaine, France