Ventilatory demand–capacity imbalance during incremental exercise in COPD: an *in silico* perspective

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The V'_E–V'_{CO_2} relationship during incremental exercise has a major impact on peak exercise capacity across the range of COPD severity. https://bit.ly/2RU1fCy

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To the Editor:

Exercise intolerance constitutes a key patient-oriented outcome in COPD [1]. There is mounting evidence that the so-called "ventilatory inefficiency" (as established by the linear minute ventilation (V'_E) to carbon dioxide output (V'_{CO_2}) relationship during incremental cardiopulmonary exercise testing (CPET)) [2] has an important role in setting the limits of exercise tolerance in this disease [3]. The rationale is straightforward: the faster V'_E increases (*i.e.* the steeper the V'_E–V'_{CO_2} slope), and the higher its resting value (~y-intercept) [2], the sooner V'_E is expected to reach a lower compared to a higher maximum breathing capacity (MBC) [4]. Recognising that V'_E close to MBC cannot be sustained for a prolonged period of time without intolerable dyspnoea [5], it can be hypothesised that peak work rate (WR) would change inversely with V'_E–V'_{CO_2} slope and intercept, but directly with MBC. Since the first two parameters are influenced by the fraction of V'_E "wasted" in the physiological dead space and the "set-point" for the arterial partial pressure for carbon dioxide [2], whereas MBC is linked to the resting ventilatory capacity [6], it is not surprising that the exertional ventilatory demand–capacity relationship varies markedly among patients with COPD [7].