



A frame of reference for assessing the intensity of exertional dyspnoea during incremental cycle ergometry

J. Alberto Neder ¹, Danilo C. Berton ², Luiz E. Nery³, Wan C. Tan⁴, Jean Bourbeau ⁵ and Denis E. O'Donnell ¹ the Canadian Cohort of Obstructive Lung Disease (CanCOLD) Collaborative Research Group and the Canadian Respiratory Research Network (CRRN)

Affiliations: ¹Laboratory of Clinical Exercise Physiology and Respiratory Investigation Unit, Queen's University and Kingston General Hospital, Kingston, ON, Canada. ²Division of Respiriology, Federal University of Rio Grande do Sul, Porto Alegre, Brazil. ³Pulmonary Function and Clinical Exercise Physiology Unit (SEFICE), Division of Respiriology, Federal University of Sao Paulo, Sao Paulo, Brazil. ⁴University of British Columbia, Vancouver, BC, Canada. ⁵Respiratory Epidemiology and Clinical Research Unit, Research Institute of the McGill, University Health Centre, McGill University, Montreal, QC, Canada.

Correspondence: J. Alberto Neder, 102 Stuart Street, Kingston, Ontario, Canada K7L 2V6. E-mail: alberto.neder@queensu.ca

@ERSpublications

Iso-power and iso-ventilation reference ranges for exertional dyspnoea were prospectively established in men and women aged 20 to 85. This is the first set of normative values to objectively assess the burden of dyspnoea during incremental cycle ergometry. <https://bit.ly/2yfftY6>

Cite this article as: Neder JA, Berton DC, Nery LE, *et al.* A frame of reference for assessing the intensity of exertional dyspnoea during incremental cycle ergometry. *Eur Respir J* 2020; 56: 2000191 [<https://doi.org/10.1183/13993003.00191-2020>].

This single-page version can be shared freely online.

ABSTRACT Assessment of dyspnoea severity during incremental cardiopulmonary exercise testing (CPET) has long been hampered by the lack of reference ranges as a function of work rate (WR) and ventilation (V_E). This is particularly relevant to cycling, a testing modality which overtaxes the leg muscles leading to a heightened sensation of leg discomfort.

Reference ranges based on dyspnoea percentiles (0–10 Borg scale) at standardised work rates and V_E were established in 275 apparently healthy subjects aged 20–85 years (131 men). They were compared with values recorded in a randomly selected “validation” sample (n=451; 224 men). Their usefulness in properly uncovering the severity of exertional dyspnoea were tested in 167 subjects under investigation for chronic dyspnoea (“testing sample”) who terminated CPET due to leg discomfort (86 men).

Iso-work rate and, to a lesser extent, iso- V_E reference ranges (5th–25th, 25th–50th, 50–75th and 75th–95th percentiles) increased as a function of age, being systematically higher in women ($p<0.01$). There were no significant differences in percentiles distribution between “reference” and “validation” samples ($p>0.05$). Submaximal dyspnoea-work rate scores fell within the 75th–95th or >95 th percentiles in 108 out of 118 (91.5%) subjects of the “testing” sample who showed physiological abnormalities known to elicit exertional dyspnoea, *i.e.* ventilatory inefficiency and/or critical inspiratory constraints. In contrast, dyspnoea scores typically fell in the 5th–50th range in subjects without those abnormalities ($p<0.001$).

This frame of reference might prove useful to uncover the severity of exertional dyspnoea in subjects who otherwise would be labelled as “non-dyspnoeic” while providing mechanistic insights into the genesis of this distressing symptom.