

The Respiratory Muscles in Chronic Obstructive Pulmonary Disease

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Introducing the Highlighted-Topic series, “The Respiratory Muscles in Chronic Obstructive Pulmonary Disease”

Chronic obstructive pulmonary disease (COPD) is estimated to affect more than 200 million people worldwide, and is now the fourth most common cause of death. Although Rahn, Otis, and Fenn (2) described the drastic effects of hyperinflation on inspiratory pressure generation in the 1940s, and Moran Campbell (1) outlined the means to calculate individual components of work of breathing in the 1950s, few researchers built on these seminal studies. Instead, investigators conducting research on COPD concentrated mostly on emphysematous destruction of lung tissue, mechanisms of airway narrowing, and abnormalities of gas exchange. It was not until the early 1980s that investigators paid significant attention to the impact of COPD on the respiratory muscles. This shift in focus has led to the important conclusion that many of the clinical manifestations of COPD and much of the morbidity are, in fact, the result of impaired function of the respiratory muscle pump.

We are pleased to introduce eight articles in the *Highlighted-Topic* series of the *Journal of Applied Physiology*, which provide a comprehensive overview of respiratory-muscle dysfunction in COPD. The review articles cover a broad spectrum, ranging from integrative organ physiology to studies employing the more reductionist techniques of molecular biology. The series commences with an article by Drs Loring, Garcia-Jacques and Malhotra on “Pulmonary characteristics in COPD and mechanisms of increased work of breathing”. In this article, the authors describe the major components of work of breathing and how these are affected by COPD. This review is followed by an article by Drs De Troyer and Wilson on “Effect of acute inflation on the mechanics of the inspiratory muscles”, in which the authors analyze the major mechanisms whereby acute inflation impairs the function of the inspiratory muscles. The third article in the July issue is that by Drs Clanton and Levine on “Respiratory muscle fiber remodeling in chronic hyperinflation: dysfunction or adaptation?”, in which the authors critically examine the mechanisms whereby chronic inflation leads to remodeling of the muscles.

The August issue contains a review by Drs McKenzie, Butler and Gandevia on “Muscle function and activation in chronic obstructive pulmonary disease”, in which the authors discuss the response of the respiratory control system to COPD and how this response affects respiratory muscle function. This review is followed by an article by Drs Tobin, Laghi and Brochard on “Role of the respiratory muscles in acute respiratory failure of COPD: lessons from weaning failure”, which reviews how respiratory-muscle dysfunction contributes to the development of acute respiratory failure in COPD.

The September issue contains a review by Drs Caron, Debigare, Deckhuijzen, and Maltais on “Comparative assessment of the quadriceps and the diaphragm in patients with COPD”, in which the authors analyze the impact of COPD on a non-respiratory muscle (namely, the quadriceps) and compare it to that on the diaphragm. This review is followed by an article by Dr Decramer, “Response of the respiratory muscles to rehabilitation in COPD”, who reviews evidence for the effect of rehabilitation on the

respiratory muscles in patients. The final article in the series is that by Dr Estenne on “Effect of lung transplant and volume reduction surgery on respiratory muscle function”, who reviews how the performance of the respiratory muscles is altered following the two surgical procedures currently performed in patients with severe emphysema.

The primary mission of the *Journal of Applied Physiology* is to publish original research reports, but the *Journal* also recognizes the need to include high-quality review articles. A series of review articles on a highlighted topic helps to map the contours of knowledge in a discipline, and gives a glimpse of vistas where the field may advance in the future. We hope that readers will enjoy this *Highlighted-Topic* series, and, more importantly, that reading the articles will give researchers the impetus to investigate the questions that remain unanswered on this common disease.

Andre De Troyer, Associate Editor

Martin J. Tobin, Guest Editor

References

1. Campbell EJM. The respiratory muscles and the mechanics of breathing. Lloyd-Luke, Ltd. London 1958.
2. Rahn H, Otis AB, Chadwick LE, Fenn WO. The pressure-volume diagram of the thorax and lung. *Am J Physiol* 1946;146:161-178).