

# Introduction

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**COPD still causes substantial morbidity and mortality in millions of people around the world. This Monograph outlines our growing understanding of COPD and highlights the cutting edge of research and care for this common illness.** <https://bit.ly/ERSM103intro>

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COPD remains a major cause of ill health, disability, healthcare costs and premature mortality. This is not due to lack of effort on the part of clinicians and scientists. In 1950, 76 new papers were published that used the term chronic obstructive pulmonary disease, 76 that used the term emphysema and 13 that used the term chronic bronchitis. By 1980, the numbers had risen to 350, 255 and 32, respectively. In 2020, 6024 papers were published using the now preferred term, COPD. Even allowing for duplicate publication in different languages, this represents a significant effort across many countries to understand this important respiratory disease and it has yielded positive results. As we reach the “other side” of the COVID-19 pandemic and old concerns begin to reassert themselves in our clinical practice, it feels like an appropriate time to take stock of where we are in the long struggle against COPD and consider what the future might bring.

That is what we have tried to do in this issue of the *ERS Monograph*. We begin at the heart of the matter, with the patient’s perspective on COPD [1]. This may make for uncomfortable reading as it is clear that despite our best efforts, we are still falling short of our patients’ rightful expectations. Next we survey our progress up to the time just before the pandemic began, considering how our understanding of COPD has evolved and how it has been driven by prevailing medical concepts. The tools available to interrogate the illness and insight provided by the results of therapeutic trials, which were not always successful, are also considered [2].

Defining COPD has been a recurring problem, which has limited our understanding considerably. This topic is addressed in detail in chapter 3 [3]. A particular challenge for both patients with COPD and their carers is the long and variable time-course of this condition. With the advent of large datasets, in which spirometry data have been collected in population samples, multiple disease trajectories have been identified. This complex but important topic is reviewed in chapter 4 [4]. Changes in the incidence and prevalence of COPD, perhaps reflecting its multifactorial origins, are reviewed in chapter 5 [5]. Clinical COPD is characteristically accompanied by multimorbidity, with some conditions sharing common mechanistic pathways with COPD. One of the most frequent and important of these is cardiac disease, and this is the topic of chapter 6 [6].

The next chapters look at the mechanisms that underlie the lung damage that is present at all stages of COPD, examining new approaches to using simple biomarkers to understand the impact of the disease and identify endotypes that might respond to specific treatment. The cellular and signalling mechanisms that operate in COPD-related inflammation are addressed in chapter 7 [7]. New insights into the importance of the microbiome in COPD are offered in chapter 8 [8], while the recent studies that have led us to reappraise the importance of chronic bronchitis in the natural history of COPD are considered in chapter 9 [9]. The role of the eosinophil, a marker of T-helper cell 2-mediated inflammation, is reviewed in chapter 10 [10]. Chapter 11 addresses the rapidly changing role of imaging as a way to understand, stratify and identify COPD, not only when advanced disease is present but at a stage before spirometric abnormality is present [11]. Finally, advances in computing and bioengineering have led to the development of new tools that can evaluate lung mechanics and gas exchange noninvasively during tidal breathing. The potential of this approach as a diagnostic and descriptive tool is the topic of chapter 12 [12].

As knowledge about COPD and its management has grown, so too has the need to evaluate and understand this growing body of evidence. Of the resulting treatment strategies, the most influential has been the Global initiative for Chronic Obstructive Lung Disease (GOLD). In chapter 13, two of the leaders of this process review how this group operates and its priorities in decision-making [13]. In chapter 14, the evidence that underpins the use of bronchodilators and ICS in COPD is reviewed in detail [14], while in chapter 15 the possibility of new transformative therapies is considered [15]. COPD care is multimodal and there is abundant evidence that improving physical fitness and mental well-being allows patients with COPD to live better lives. The changing face of pulmonary rehabilitation and its application in different economic settings across the world is the topic of chapter 16 [16].

Exacerbations of COPD are crucial drivers of worse health status and deterioration in lung function. Our knowledge of these events has grown steadily in the last two decades. The latest understanding of the nature of these episodes and their impact on the patient is reviewed in chapter 17 [17], while their acute management is addressed in chapter 18 [18]. Patients with advanced COPD face severe difficulties but in selected cases, these can be alleviated by the use of noninvasive mechanical ventilation, the topic of chapter 19 [19]. For others, medical lung volume reduction using a variety of endoscopic approaches can improve their lung function and health status considerably. This exciting field is the focus of chapter 20 [20].

Our final chapter considers the topics not already addressed that we believe will be important research areas in the future, together with new trends that are likely to be important in the way we approach this condition [21].

We hope that taken together the chapters in this issue of the *Monograph* provide an up-to-date overview of what is happening in the wide field of COPD research, both at a basic and clinical level. We are very grateful to our many distinguished contributors for their help in creating what we hope you will find to be a useful addition to the *Monograph* series.

## References

- 1 Senek M, Badyda A, Barbaglia S, *et al.* The patients' perspective on living with COPD and their priorities for future research and care. *In:* Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 1–15.
- 2 Calverley PMA. COPD as the new millennium began. *In:* Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 16–29.

- 3 Halpin DMG. Defining COPD in the 21st century. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 30–44.*
- 4 Agusti A, Faner R. A new understanding of the natural history of COPD. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 45–62.*
- 5 Khan MI, Khan MMKS, Mannino DM. The new epidemiology of COPD. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 63–80.*
- 6 Maeda T, Dransfield MT. Cardiac comorbidity and COPD: chance or consequence? *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 81–99.*
- 7 Devulder JV, Donnelly LE. Mechanisms and mediators of disease. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 100–117.*
- 8 Tiew PY, Chotirmall SH. The microbiome and COPD. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 118–134.*
- 9 Allinson JP. Chronic bronchitis revisited. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 135–148.*
- 10 Beech A, Singh D. Eosinophils and COPD. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 149–167.*
- 11 Fortis S, Comellas AP, Hoffman EA. Advances in the characterisation of COPD using quantitative imaging. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 168–184.*
- 12 Milne S, Tonga KO, Eddy RL, *et al.* New physiological measurements in COPD. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 185–203.*
- 13 Vestbo J, Vogelmeier C. Guidelines and strategies of management. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 204–211.*
- 14 van den Berge M, Beghé B, Lahousse L, *et al.* Current pharmacotherapy of COPD. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 212–232.*
- 15 Flynn CA, Aung H, Greening NJ, *et al.* The future drug treatment of COPD. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 233–254.*
- 16 Singh SJ, Daynes E, Sooronbaev TM. The future of pulmonary rehabilitation in COPD. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 255–266.*
- 17 Finney LJ, MacLeod M, Wedzicha JA. New insights into the pathophysiology and epidemiology of COPD exacerbations. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 267–282.*
- 18 Baraldi F, Barrecheguren M, Papi A, *et al.* Managing exacerbations of COPD: how much progress have we made? *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 283–296.*
- 19 Herkenrath S, Matthes S, Randerath W. Noninvasive ventilation in COPD. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 297–312.*
- 20 Tonkin J, Conway FM, Shah PL. Lung volume reduction for emphysema. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 313–324.*
- 21 Wedzicha JA, Allinson JP, Calverley PMA. COPD at a tipping point. *In: Wedzicha JA, Allinson JP, Calverley PMA, eds. COPD in the 21st Century (ERS Monograph). Sheffield, European Respiratory Society, 2024; pp. 325–333.*

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Disclosures: J.A. Wedzicha reports receiving funding direct to Imperial College from Boehringer Ingelheim, AstraZeneca and GSK, outside the submitted work. J.A. Wedzicha is an advisor for the Global Initiative for Obstructive Lung Disease (GOLD). J.P. Allinson reports receiving the following, outside the submitted work: grants or contracts from Asthma UK and Lung UK; payment or honoraria for lectures, presentations, speakers' bureaus, manuscript writing or educational events from AstraZeneca; and support for attending meetings and/or travel from AstraZeneca. J.P. Allinson is an unpaid member of the ATS Publications Policy Committee. P.M.A. Calverley reports receiving grants, personal fees and non-financial support from pharmaceutical companies that make medicines to treat respiratory disease. This includes reimbursement for educational activities and advisory work, and support to attend meetings.