



# Introduction

David J. Jackson<sup>1,2</sup>, and Michael E. Wechsler<sup>3</sup>

 @ERSpublications

**This *Monograph* covers eosinophilic lung diseases, a long-standing challenge to clinicians. Recent research has increased understanding of eosinophil biology and has led to new therapeutic options, helping patients with these difficult-to-control diseases.** <https://bit.ly/3mcgc21>

While eosinophils were discovered in the late 1800s, it has really only been over the last 20 years that those who treat lung disease have gained an appreciation of their importance in both health and disease. It has long been recognised that eosinophils play a role in homeostasis, defence against helminths and other infections, and are even involved in tumour immunity. However, it is their role in a variety of different diseases of the lung and other systemic disorders that has challenged clinicians for several decades. It has long been recognised that eosinophilic conditions like eosinophilic asthma, CEP, EGPA and other HESs are associated with significant morbidity and are difficult to treat. Corticosteroids have long been the mainstay of therapy and, along with other immunosuppressants, have been associated with significant morbidity in and of themselves. As we have gained a better understanding of eosinophil biology, we have also gained a better understanding of eosinophilic disorders, and over the last decade, we have finally developed effective therapies that target the eosinophil, and for the first time, are approved for treatment of these entities, revolutionising the care of our patients.

It is in this context that we set out to develop this *ERS Monograph*. So much knowledge has been gained in the last few years but unanswered questions concerning eosinophil biology still remain, including whether there are any long-term consequences of blocking eosinophil activity.

The overarching goal of this *Monograph* is to take the reader on a journey through the different eosinophilic lung diseases so that the practicing clinician is better equipped to recognise and treat patients with eosinophilia. First, however, we step back and review eosinophil biology so that the underpinnings of eosinophilic diseases and their targets can be better understood [1].

While primary eosinophilic disorders of the lung are a major focus of this *Monograph*, we recognise that there are several eosinophilic disorders that need to be excluded. From infections through malignancies to drug reactions, the chapter on the differential diagnosis

---

<sup>1</sup>Guy's Severe Asthma Centre, Guy's and St Thomas' NHS Foundation Trust, London, UK. <sup>2</sup>Faculty of Life Sciences and Medicine, King's College London, London, UK. <sup>3</sup>National Jewish Health, Denver, CO, USA

Correspondence: David J. Jackson ([david.jackson@gstt.nhs.uk](mailto:david.jackson@gstt.nhs.uk))

Copyright ©ERS 2022. Print ISBN: 978-1-84984-142-9. Online ISBN: 978-1-84984-143-6. Print ISSN: 2312-508X. Online ISSN: 2312-5098.

of pulmonary eosinophilia will ensure that the physician will not miss a key common eosinophil-related diagnosis [2].

Characterising eosinophilic patients is also critical to identifying what type of specific eosinophilic lung disease the patient has. The chapters on biomarkers [3] and imaging [4] help guide the physician through the challenges of establishing specific diagnoses.

Once these key aspects of eosinophil biology, differential diagnosis and establishing a diagnosis are better appreciated, the reader is then ready to delve into the specifics of each of the eosinophilic disorders. From eosinophilic asthma [5] to eosinophilic COPD [6], from allergic fungal airway disease [7] to eosinophilic pneumonias [8], and from HESs [9] to EGPA [10], each chapter educates the reader about these specific disorders with regard to presentation, epidemiology, disease course and finally, treatment.

The *Monograph* concludes with several important chapters that highlight the evolving complexity of eosinophils in the lungs [11–13]. What are the effects of eosinophils on the nerves? What role do eosinophils play in modulating immunity to respiratory viruses? What role do eosinophils play in driving autoimmune diseases? And what role do autoantibodies against eosinophils play in regulating tissue injury?

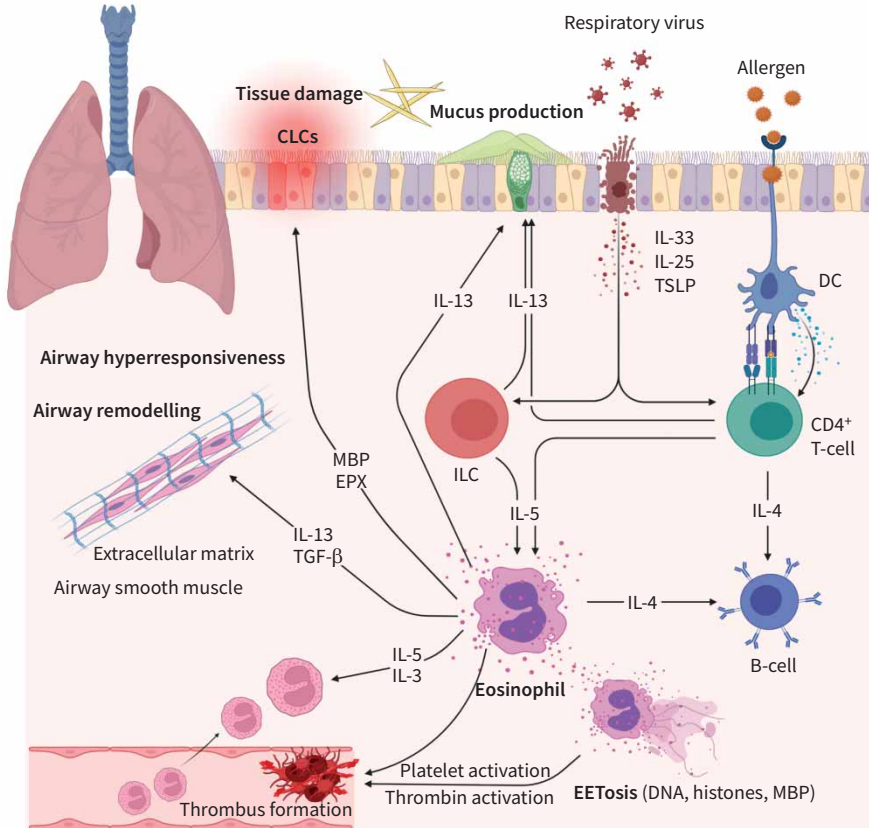


Figure 1. The multifaceted role of the eosinophil in eosinophilic lung diseases. DC: dendritic cell. Figure created using BioRender.com.

Lastly, given the increasing use of novel therapies that target IL-5 or its receptor, effectively reducing, or even eliminating blood eosinophils, we address the safety and impact of eosinophil depletion, particularly in the context of their purported important regulatory and homeostatic roles [14].

Our *Monograph* culminates with a final review of the future prospects of translational and clinical eosinophil research, including a review of eosinophil subsets and the impact of recent developments in spatial and single-cell transcriptomics [15].

Given the rapid advances in our understanding of eosinophil biology and the increased prevalence of eosinophilic lung diseases, as well as the appreciation of their morbidity, our goal is to provide an accessible one-stop compendium for those who want to engage in advanced learning about eosinophilic lung diseases. That being said, we recognise that our knowledge about eosinophils continues to evolve and that new therapies and treatment strategies will be developed. Our *Monograph* will provide the reader with the requisite background, knowledge and understanding to better appreciate the advances that will be coming in the near future, and how to apply them to all patients with eosinophilic lung diseases.

We extend our immense thanks to the authors of these chapters, who have done a stellar job. The authorship includes both world-leading authorities and up-and-coming stars in the field. We have convened a mixture of healthcare professionals and scientists, from around the world, and this has brought a diversity to the *Monograph* that is appropriate, given the global nature of the problems of eosinophilic lung diseases. We are grateful to the all the expert reviewers who gave up so much of their time to help us.

We are particularly grateful to our authors and reviewers as the *Monograph* was compiled during the COVID-19 pandemic – their efforts during such a challenging time are greatly appreciated. We would also like to thank the *ERS Monograph* team, and particularly John R. Hurst (Editor in Chief), Rachel Gozzard (ERS Monograph Managing Editor) and Caroline Ashford-Bentley (ERS Editorial and Library Services Coordinator). We have really enjoyed bringing this *Monograph* to together and we sincerely hope you will find the chapters as useful and interesting as we did.

## References

1. Ackerman SJ. An introduction to eosinophils and their biology. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph)*. Sheffield, European Respiratory Society, 2022; pp. 1–18.
2. Piggott LM, Gill CM, Kent BD. Differential diagnosis of pulmonary eosinophilia. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph)*. Sheffield, European Respiratory Society, 2022; pp. 19–36.
3. Porsbjerg C, Björnsdóttir U. Biomarkers of eosinophilic inflammation. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph)*. Sheffield, European Respiratory Society, 2022; pp. 37–50.
4. Bell A, Siddiqui S. Imaging. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph)*. Sheffield, European Respiratory Society, 2022; pp. 51–72.
5. Rupani H, Gates J, Kavanagh JE, *et al.* Eosinophilic asthma. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph)*. Sheffield, European Respiratory Society, 2022; pp. 73–99.
6. Karakioulaki M, Stolz D. Eosinophilic COPD. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph)*. Sheffield, European Respiratory Society, 2022; pp. 100–118.
7. Ueki S, Fukutomi Y, Miyabe Y, *et al.* Allergic fungal diseases in the upper and lower airways. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph)*. Sheffield, European Respiratory Society, 2022; pp. 119–140.
8. Gadre A, Akuthota P. Eosinophilic pneumonias. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph)*. Sheffield, European Respiratory Society, 2022; pp. 141–152.

9. Taton O, Bondue B, Roufosse F. Hypereosinophilic syndromes and lung involvement. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph). Sheffield, European Respiratory Society, 2022; pp. 153–176.*
10. Nanzer AM, Wechsler ME. Eosinophilic granulomatosis with polyangiitis. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph). Sheffield, European Respiratory Society, 2022; pp. 177–192.*
11. De La Torre U, Fryer AD, Jacoby DB, *et al.* Eosinophils and airway nerves in asthma. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph). Sheffield, European Respiratory Society, 2022; pp. 193–203.*
12. Dhariwal J, Padayachee Y, Johnston SL. Respiratory viruses and eosinophilic airway inflammation. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph). Sheffield, European Respiratory Society, 2022; pp. 204–218.*
13. Mukherjee M, Nair P. Eosinophils as potential mediators of autoimmunity. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph). Sheffield, European Respiratory Society, 2022; pp. 219–237.*
14. Jackson DJ, Munitz A. Safety of eosinophil depletion. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph). Sheffield, European Respiratory Society, 2022; pp. 238–252.*
15. Lambrecht BN, Aegerter H, Schettters S, *et al.* Future prospects of translational and clinical eosinophil research. *In: Jackson DJ, Wechsler ME, eds. Eosinophilic Lung Diseases (ERS Monograph). Sheffield, European Respiratory Society, 2022; pp. 253–262.*

---

**Disclosures:** D.J. Jackson reports receiving consulting and speaker honoraria/fees from GlaxoSmithKline, AstraZeneca, Sanofi, Boehringer Ingelheim, Teva and Chiesi. M.E. Wechsler reports receiving consulting honoraria/fees from GlaxoSmithKline, AstraZeneca, Sanofi, Regeneron, Boehringer Ingelheim, Teva, Sentien, Cohero, Genzyme, Novartis, Genentech, Restorbio, Equillium, Cytoreason, Cerecor, Sound Biologic, Incyte and Kinaset.