

# Introduction

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The last 50 years have seen a constant decline in approval rates for new therapeutic compounds with respect to the money spent in research and development across all medicine subspecialties. Almost 50% of the costs of developing new drugs are incurred during the clinical stages of the development, particularly in phase II and III trials. Therefore, many pharmaceutical companies aim to reduce expenses for these costly steps in drug development. One method of attempting this is to focus on proof-of-concept studies, which allow them to obtain either “quick wins” or “fast fails” of new products. When “wins” are only achievable over a prolonged period of time, rapid failures are much more cost effective. For some of the chronic lung disease areas, e.g. idiopathic pulmonary fibrosis and pulmonary hypertension, the newer clinical trials involve large phase II trials that have enrolled sufficiently high numbers of patients to allow a meaningful efficacy analysis. They also use the design of two parallel arms in one phase III trial to get independent study results for faster regulatory approval. In order for these new strategies in clinical research and drug development to be successful, the outcomes used for clinical trials are increasingly critical.

While the traditional end-points for clinical studies of lung diseases have been based on functional parameters, there are concerns that this method may oversimplify the complexity of diseases, particularly in the context of chronic lung disease. The value of functional outcomes as surrogate markers for disease activity and progression has been increasingly questioned by scientists, carers, regulatory agencies and funding bodies. Novel tools and methods to measure and quantify biomarkers and patient-reported outcomes have allowed these parameters to emerge from their status as interesting secondary end-points and become potential primary outcomes for clinical trials. Wireless technology and advances in electronic devices make electronic patient-reported outcomes and e-health an option, not only for improved management of patients, but also for better clinical research. Nevertheless, the relevance and validity of these novel outcomes and tools still need to be proven.

This issue of the *European Respiratory Monograph* describes the current status of commonly used as well as investigational end-points in all relevant areas of pulmonary medicine. It includes comprehensive chapters on the most prevalent respiratory disorders, from asthma to chronic obstructive pulmonary disease, lung fibrosis, cystic fibrosis and critical care problems. In the second half of this book, we provide a detailed description of specific outcomes, their value, their limitations and the future promise they might hold. We have gathered a high-profile group of authors from the international societies who are all experts in their respective fields and provide an up-to-date presentation of outcomes in clinical trials in pulmonary medicine. As editors, we hope that this issue will provide a useful summary of the state of the art to the interested reader, and form the basis for seeking additional information from the extensive literature cited in each chapter.