# CADSET (CHRONIC AIRWAY DISEASE EARLY STRATIFICATION): A NEW ERS CLINICAL RESEARCH COLLABORATION

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ERJ Invited Editorial

January-February 130, 2019

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on behalf of the CADSET Clinical Research Collaboration (listed in the Appendix)

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Keywords: asthma, chronic obstructive pulmonary disease, smoking, lung development, lung ageing, precision medicine, biomarkers

Words: 1.45044; References: 37; Tables: 0; Figures: 2.
Introduction

A recent publication in the ERJ highlighted the strategic importance of the Clinical Research Collaborations (CRC) launched in 2013 by the European Respiratory Society (ERS). These have the aim of (1) promoting the exchange of research ideas among clinicians and affiliated scientists in Europe and/or globally; (2) building an infrastructure for prospective clinical research; (3) securing additional funding through national and European Union funding streams and (4) facilitating the planning, implementation, evaluation and publication of clinical and translational studies at pan-European level and beyond [1]. So far, there are currently 17 ongoing CRCs that cover eight major respiratory disease domains (airway diseases [2-4], interstitial lung diseases, pulmonary vascular diseases, sleep and breathing disorders [5], respiratory critical care, paediatric respiratory diseases, respiratory infections and thoracic oncology), all of them linked to one or more ERS assemblies [1]. CADSET, an acronym that stands for “Chronic Airway Disease Early Stratification”, is the latest addition to the list of ongoing CRCs (https://www.ersnet.org/research/clinical-research-collaborations). This Editorial sought to present the rationale, goals and research methodology strategy for CADSET.

Scientific rationale

Asthma and Chronic Obstructive Pulmonary Disease (COPD) are the two most prevalent chronic respiratory diseases and neither has a curative therapy [6, 7]. A third of the population will develop asthma at some point in their lives [6], and COPD affects 10% of the adult population, currently being the third leading cause of non-communicable deaths cause of death globally [8]. Both asthma and COPD are complex
and heterogeneous diseases, and their differential diagnosis is often not straightforward [9-13]. Indeed, it is suggested that asthma and COPD might actually represent a continuum of chronic airway diseases with shared clinical, functional, imaging and/or biological features [14]. Yet, asthma is still considered a disease of infancy or early adulthood, often related to some form of allergy [15], whereas COPD has been traditionally considered a disease of late adulthood induced by smoking generally and causing associated with an accelerated decline in lung function with age [16]. As a result, asthma is the most likely diagnosis that a child, adolescent or young adult will receive if they complain of respiratory symptoms, whereas a COPD diagnosis would be most likely in an older male adult-smoker presenting with similar respiratory symptoms.

On the other hand, recent evidence argues a paramount role for abnormal lung development \textit{in utero} or after birth in the pathogenesis of both asthma and COPD [17-23]. It is very likely that abnormal lung development and accelerated lung function decline (that also occurs in asthma) are associated with different biological mechanisms (i.e. endotypes) requiring different therapeutic interventions [11]. Of note, some children with impaired lung function early in life may exhibit “lung function catch-up” before adulthood [24-33] (Figure 1), although the precise factors and mechanisms involved are currently unknown. A better understanding of the pathophysiology of this “catch-up” (or its absence) may prove extremely important in helping us to optimise lung growth, discern the reasons why particular individuals develop disease and, eventually, provide a novel therapeutic approach in adults with COPD [34, 35]. In any case, the available evidence indicates that to better understand the pathobiology of asthma and COPD, increase the specificity of their diagnosis and improve both the
efficacy and safety of their treatment, we need to adopt a better understanding of the lung function trajectory of the patient throughout life (Figure 1) [34].

Working hypothesis

From the evidence summarized above, CADSET hypothesizes that a multi-level (clinical, functional, imaging and molecular) profiling of well-characterized patients with chronic airways disease spanning the spectrum of asthma and COPD, that considers both peak lung function achieved in early adulthood and the rate of lung function decline, may lead to the identification of distinct mechanisms (endotypes) and appropriate biomarkers. These biomarkers may in turn inform a mechanism-based disease classification, identify interventional targets and thus favour a more personalized treatment of patients with chronic airways diseases.

Objectives

The strategic objective of CADSET is to create a consortium on in which investigators with access to population cohorts, birth cohorts and cohorts of patients with asthma, COPD can work together to better understand how lung function trajectories influence the clinical presentation of chronic airway diseases, asthma and COPD in particular. A second important strategic objective of CADSET is to help young investigators to develop their academic careers as reflected by their management role as work package (WP) leads in CADSET.

The specific objectives of CADSET are to:
(1) Provide a multi-centre, multi-disciplinary platform to investigate lung function trajectories on the clinical presentation of chronic airway diseases.

(2) Create a registry of currently available cohorts (and associated meta-data and/or existing bio-banks) in order to launch joint meta-analyses and targeted laboratory studies.

(3) Share expertise and resources, creating common research protocols in order to enable the comparison and integration of data across different types of cohorts;

(4) Promote the exchange of research ideas among participants.

(5) Find distinct biological mechanisms and endotypes, and associated biomarkers, that identify underlying different lung function trajectories in order to move COPD and asthma assessment and therapy towards a precision medicine framework.

(6) Gain eligibility for public and private funding.

Research strategy

Under the auspices of ERS, CADSET is based on a collaborative partnership model between the different stakeholder groups e.g. clinician researchers, scientific experts, funding partners and patient advisors where the project proposals and results are openly discussed. The collaboration of all stakeholders aims to drive the research strategy of CADSET which is organized on the basis of five different Working Groups (WG), each of them with a clear focus.

WG1: Registry (leaders: Rosa Faner, Robab Breyer-Kohansal, Gavin Donaldson)

WG1 aims to develop a registry of sharable consortium resources on existing cohorts (including environmental, clinical, physiological, -omic and imaging data, and bio-
banked blood, sputum, tissue samples) and to collate and share best practices from research protocols and standard operating procedures (SOPs). The aim of WG1 is not to physically centralize data and samples in a single place but to assess the feasibility of assembling such resources for further studies as identified in the other WGs, and for commissioned projects from external groups and industry partners. So far, 33 cohorts have been registered and available in CADSET (Figure 2). Data and sample sharing will always require the respective cohort Principal Investigators and the Governance Committee agreement and be undertaken according to the General Data Protection Regulation (GDPR).

WG2: From conception to 25 years (leaders: Anke-Hilse Maitland van der Zee, Erik Melén)

WG2 will investigate the phenotypes and endotypes of suboptimal peak lung function at early adulthood (<25 years). In particular, it will first investigate the existence of different early life lung function trajectories (linked to e.g. early bronchial obstruction (“asthma”), wheezing or symptoms due to other conditions, or suboptimal lung development) and the mechanisms underlying potential lung function catch-up [29, 34]. Stratified analyses according to sex will be performed (since females obtain their peak lung function at an earlier age than males [36]).

WG3: From 25 years to 50 years (leaders: Lowie Vanfleteren, James Allinson, Jørgen Vestbo)

WG3 will investigate the clinical and underlying biological heterogeneity and related biomarkers of lung function decline in early adulthood. This will focus particularly in
relation to the presence and severity of emphysema, chronic mucus hypersecretion, concomitant asthma, eosinophilic inflammation, concomitant comorbidity and response to specific pharmacological treatment (precision medicine [37]). Like in WG3, stratified analyses according to sex will be performed [36].

**WG4:** From 50 years onwards (leaders: Maarten van den Berge, Lies Lahousse, Ian Adcock)

WG4 will integrate multilevel data such as genetics, genomics, methylation and proteomics on similar biological samples from well-defined populations with “asthma” or “COPD” in order to understand molecular phenotypes that may be common or distinct to chronic airway diseases in this age range. This will be linked to readily accessible physiologic, blood or breath biomarkers.

**WG5:** Understanding long-life lung function trajectories (leaders: Wisia Wedzicha, Alvar Agusti)

The long-term goal of WG5 is to integrate the age-related results of WG2, WG3 and WG4, so the strategic goals of CADSET can be fulfilled. CADSET will collaborate with other established CRC’s such as SHARP [3] and The Global Lung function Initiative (GLI) network (https://www.ers-education.org/guidelines/global-lung-function-initiative.aspx).

**Financial support**

Like in other CRCs, the ERS provides some economic support to mainly allow the organization of face to face meetings, such as the one hold in Barcelona in December
Besides, ERS acts as an independent broker between the industry and the academic researchers. It is hoped that several companies may be interested in supporting CADSET financially. Likewise, it is envisaged that CADSET investigators will be able to raise additional funds from national and international competitive calls.

**Participation**

If you want/can contribute CADSET with a cohort that helps achieving the objectives outlined above, please contact the WG members or ERS through the CADSET webpage (https://www.ersnet.org/research/cadset-chronic-airway-diseases-early-stratification).

**Acknowledgments**

We thank the support from the ERS Office in Lausanne in logistics and organization of CADSET.

Current members of the CADSET CRC are: Alvar Agusti (CRC co-chair), Jadwiga A. Wedzicha (CRC co-chair), Gavin Donaldson (WG1 co-lead), Rosa Faner (WG1 co-lead), Robab Breyer-Kohansal (WG1 co-lead), Anke-Hilse Maitland van der Zee (WG2 co-lead), Erik Melén (WG2 co-lead), James P Allinson (WG3 co-lead), Lowie E. G.W Vanfleteren (WG3 co-lead), Jørgen Vestbo (WG3 co-lead), Ian M. Adcock (WG4 co-lead), Lies Lahousse (WG4 co-lead), Maarten van den Berge (WG4 co-lead), Peter Alter, Ferran Barbe, Christopher E. Brightling, Marie-Kathrin Breyer, Otto C. Burghuber, Maribel Casas, Kian Fan Chung, Borja G. Cosio, Fatima Crispi, Jordi de Batle, Jean-William Fitting, Judith Garcia, Jenny Hallberg, Sylvia Hartl, Deborah Jarvis, Alexander Mathioudakis, Laurent Nicod, Alberto Papi, Andrew Ritchie, Torben
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**FIGURE LEGENDS**

**Figure 1.** Schematic representation of different potential lung function trajectories through life. The term “catch-up” refers to the potential lung function recovery that may occur (for still unclear reasons) in some children. Reproduced with permission from reference [34].

**Figure 2.** Cohorts and research groups currently participating in CADSET. Red symbols indicate countries with available cohorts and investigators, whereas purple symbols indicate countries with available cohorts but not investigators (yet).
Figure 1
February 1, 2019

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Ian M. Adcock12, Lies Lahousse13, Guy Brusselle13, Jadwiga A. Wedzicha3

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Figure 1. Schematic representation of different potential lung function trajectories through life. The term “catch-up” refers to the potential lung function recovery that may occur (for still unclear reasons) in some children. Reproduced with permission from reference [34].

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