

Research Project

Name of Institution and department:

Erasmus Medical Center – Sophia Children's Hospital

Department of Radiology and Nuclear Medicine

Link to website:

[Radiology & Nuclear Medicine - Department - Erasmus MC](#)

City and Country of Institution: Rotterdam, The Netherlands

RESEARCH GROUP

The LungAnalysis imaging group is led by two principal investigators: Assistant Professor Dr Daan Caudri and Associate Professor Dr Pierluigi Ciet, who serve as Director and Vice-Director of the LungAnalysis laboratory ([LungAnalysis - Research group - Erasmus MC Sophia Children's Hospital](#)).

LungAnalysis specialises in the development of cutting-edge imaging techniques for paediatric and adult pulmonary diseases. The laboratory employs novel scoring systems and advanced artificial intelligence (AI) tools to quantify pulmonary abnormalities across a broad spectrum of conditions, including cystic fibrosis (CF), asthma, bronchopulmonary dysplasia (BPD), and non-CF bronchiectasis. The group also leads the standardisation and development of advanced chest MRI and chest CT acquisition protocols, including next-generation photon-counting CT technology.

TITLE OF PROPOSED RESEARCH PROJECT

Development of automatic scoring systems for chest MRI assessment of CF, asthma and BPD in the ADVanced imAging of chroNiC pEdiatric pulmonary diseases (ADVANCER) study

BACKGROUND AND SCIENTIFIC RATIONALE

Chronic paediatric pulmonary diseases, including cystic fibrosis (CF), asthma, and bronchopulmonary dysplasia (BPD), represent a major burden for patients, families, and healthcare systems worldwide. Accurate and reproducible monitoring of disease progression is essential for clinical decision-making and for evaluating the efficacy of novel therapies. Chest MRI is emerging as a radiation-free alternative to CT for the structural assessment of pulmonary diseases, offering particular promise in paediatric populations who are especially vulnerable to the long-term effects of ionising radiation. However, the absence of validated, standardised scoring systems for chest MRI has limited its widespread adoption in clinical practice and multicentre research.

The ADVANCER (ADVanced imAging of chroNiC pEdiatric pulmonary diseases) study is a prospective multicentre cohort that has collected longitudinal chest MRI data from paediatric patients with CF, asthma, and BPD. This rich dataset provides a unique opportunity to develop and validate automated scoring algorithms capable of objectively quantifying

disease-specific pulmonary abnormalities. Such tools would standardise MRI reporting, reduce inter-reader variability, and ultimately support the clinical translation of chest MRI as a routine monitoring modality in paediatric respiratory medicine.

OBJECTIVES

- **To develop and validate automatic scoring systems for the quantification of pulmonary abnormalities on chest MRI in paediatric patients with:**
 - CF
 - Asthma
 - BPD

APPLICANT'S DUTIES

- **To perform manual segmentation of chest MR images from the ADVANCER cohort, serving as ground-truth data for the development of automated algorithms**
- **To collaborate with the dedicated PhD student on the analysis and interpretation of ADVANCER study imaging data**
- **To attend the weekly paediatric pulmonary imaging meetings, acquiring expertise in the characteristic chest MRI and CT findings of CF, BPD, and asthma**

APPLICANT'S BENEFITS

- Full integration into the weekly PhD research meetings, with access to local webinars on biostatistics and advanced imaging analysis
 - Co-authorship in all articles deriving from the image analysis
 - At least two peer-reviewed publications are anticipated from the imaging analysis work
 - Opportunity to present research findings at national (Italian) and international (ECR) radiology conferences
 - Active participation in all paediatric pulmonology clinical and research activities, including:
 - Paediatric pulmonary multidisciplinary meeting (weekly)
 - Paediatric chest centre multidisciplinary meeting (weekly)
 - Paediatric interstitial lung disease multidisciplinary meeting (biweekly)
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- Project Leader: Associate Prof Dr Pierluigi Ciet
 - Members: Assistant Professor Daan Caudri, Ieva Aliukonyte (PhD student), Flaminia Frezza (ESOR candidate).