Cystic fibrosis (CF) is the most common chronic lethal disease genetically determined. The current median of life has been estimated for 37 years, and the cause of death in most patients is respiratory failure. The disease is characterized by recurrent exacerbations that significantly worsen quality of life and 5-year survival rate.

Previous reports showed that about 25% of pulmonary exacerbations in CF result in permanent **irreversible changes in lung function** despite antibiotic treatment. These data suggest that the current **strategy based on clinical parameters may not be optimal to diagnosis and management of pulmonary exacerbations**. Despite the huge progress that has been made in the recent years in understanding the pathogenesis of pulmonary exacerbations and molecular factors that modify the course of disease, there is still lack of reliable biomarkers reflecting disease activity during exacerbations to improve patients care and prevent lung function decline. In the previous studies, search for molecular markers in pulmonary exacerbations in CF was performed mainly in blood and adult population of CF patients, but the **studies in CF children are lacking**. This is of particular importance to improve early diagnosis and therapy of exacerbations and to delay the irreversible changes in the airways, thus extending lifespan.

The choice of miRNAs as potential biomarkers of pulmonary exacerbations in CF results from several miRNA features such as high stability in different biological samples (e.g. sputum and exhaled breath condensates) and large potential in regulating gene expression, in particular those involved in inflammation. These features make them ideal candidates for biomarkers of respiratory diseases.

The scientific hypothesis of the project assumes that the key regulators of abnormal inflammatory response in pulmonary exacerbation in CF are miRNAs, and their expression profile either locally in the airways or in blood may reflect the severity of inflammation in the airways and, together with detailed clinical data, will enable to develop predictive panel of exacerbations and early diagnosis of patients that could benefit from the therapy.

The aim of this study is to **search for molecular markers (miRNAs) associated with pulmonary exacerbation in CF children**, both in the airways as well as in peripheral blood, and also analysis of possible utility of identified miRNAs in correlation with selected clinical parameters as a predictive panel for pulmonary exacerbation in pediatric population of CF patients.

Early diagnosis of pulmonary exacerbations or trial to predict them would much improve early therapy and prevention or delay of irreversible changes in the airways. This is of particular importance in children as they **could benefit from early therapy and extending their lifespan as well as life quality**. In this regard, identifying biomarkers that reflect disease activity during exacerbation is crucial for prevention of lung function decline, thus increasing chances to reach adulthood. This knowledge could also help to identify patients for **targeted therapy, based on miRNA modulation**.