

Asthma is the most common chronic respiratory disease in children. In Poland, about 10% of children suffer from asthma. Asthma is manifested by shortness of breath, dry cough, and wheezing. In older children, i.e., over 5 years of age, and in adults, respiratory tests such as spirometry are performed to confirm asthma diagnosis. However, in children up to 5 years of age, it is not possible to conduct such tests due to the lack of cooperation. Correct diagnosis of asthma in children under the age of 5 is extremely difficult. In children under 5 years old, asthma is diagnosed primarily on the basis of the occurring clinical symptoms, the exclusion of other possible causes of bronchial obstruction, and the response to anti-inflammatory therapy. Thus, there is still no useful, objective diagnostic method that could be applied in the diagnosis of asthma in children aged 0-5 years. Early detection and prompt treatment offer the possibility of good disease control, which is especially important in the youngest patients when the disease begins at the child's intensive development.

The main goal of the planned project is to study metabolites and proteins (conducting metabolomics and proteomics research, respectively) in the blood of asthmatic children aged 6 months - 5 years, and then to combine the obtained data with data obtained using already available laboratory tests and the observed symptoms. This approach makes it possible to detect changes in the levels of metabolites and proteins in patients' blood, which are characteristic of preschool asthma. The study will include preschool children with asthma (the study group) and children without asthma who suffer from recurrent infections of the upper respiratory tract (the control group). Pediatric asthma is often associated with allergy. Therefore, a secondary aim of the project is to assess the differences between asthma subtypes (endotypes). During the project implementation, the levels of metabolites and proteins between patients with asthma and allergy (IgE-dependent allergy) and patients with asthma but without allergy will be compared.

The rationale for choosing children under 5 who suffer from asthma symptoms as the study group is as follows: a) asthma is the most common chronic respiratory disease in children; b) there are no available objective and easy-to-perform additional tests for asthma in this age group; c) recurrent respiratory symptoms are the most common cause of medical visits in young children; d) asthma and allergy are common early in life.

The project will use modern analytical systems based on mass spectrometry techniques that provide sensitive and accurate methods for the identification and determination of a wide range of metabolites and proteins. As part of the project, among others, metabolites and proteins associated with the inflammatory process, as well as post-translational modifications of proteins associated with the development of asthma will be studied.

We assume that the combination of clinical symptoms, data from laboratory tests, the results of metabolite assays and protein assays will broaden the knowledge about the pathomechanisms of preschool asthma and allow the selection of molecules with potential application in the diagnosis of this disease. The implementation of this project may lead to the acceleration of an accurate diagnosis of preschool asthma. Improving the detection of asthma in the pediatric population will facilitate appropriate treatment and improve the quality of life of young patients.

The project will be carried out by a multidisciplinary team consisting of pharmacutists-analysts with extensive experience in the analysis of metabolites and proteins in human body fluids and doctors with great experience in the diagnosis and treatment of the youngest children with asthma. The team of researchers involved in this project guarantees the correct selection of patients for the study, the correct performance of the planned experiments, and the appropriate interpretation of the obtained results.