

In the last 3 decades in the pediatric population, there has been a trend in the increasing incidence of allergic diseases, particularly bronchial asthma, allergic rhinitis, food allergies and atopic dermatitis. Atopic dermatitis and food allergy are the most common atopic diseases in the first 2 years of a child's life. According to some studies, it is believed that these are related diseases that may be the basis for the development of asthma and allergic rhinitis. This phenomenon of transition of one atopic disease to another is known as "allergic march". The development of asthma seems to depend on age; exposure to environmental factors in the first year of life is more important than exposure in later years. However, there is no consistent data on the impact of various factors such as home pets, breastfeeding, environmental exposure, and unhygienic conditions in the populations of pregnant women and young children to promote allergies in children. In addition, early respiratory tract infections, coexisting allergic diseases and active smoking at adolescence can contribute to the increased risk of allergic diseases. The mechanisms by which the immune response to antigens leads to allergy or tolerance includes complex interactions between the genetic background and the environmental exposure. Recent research has highlighted the role of bronchial epithelium in the development of bronchial asthma. The epithelium, due to numerous chemical and immunological properties, is a barrier between the external environment and the respiratory system. It has been shown that in children with asthma, bronchial epithelial activity is much more damaged than in healthy and atopic patients without asthma. Abnormal epithelial activity occurs both in children with asthma before and after age 6, which demonstrates the importance of bronchial epithelium in the history of natural asthma. Thrombotic interleukins 33, 25 and thymic stromal lymphopoietin (TSLP) are excreted in response to epithelial damage by pathogens, such as infections, to toll-like receptors, TLR3 or TLR5.

The scientific objective of the project is to assess the influence of factors related to mother's lifestyle during pregnancy, mother and child exposure to environmental factors and immunological factors influencing the development of bronchial asthma and new sensitivities in 12-year-old children during the observation of the Polish Mother and Child Cohort (REPRO_PL).

The present project is a continuation of the cohort study. Survey data and results of biological material analysis (pre-natal and first 2 years post-birth and 7 years) will be used to achieve the goals planned in the project submitted. Patient observation will last 3 years. The launch of the project is planned for 9 year old cohorts. In the group of about 400 children from Lodz and Legnica, a thorough medical examination and biological material (urine, blood, dust) will be carried out. In the group of 500 children from the remaining 8 regions of Poland, further questionnaire surveys are planned. Health and somatic development will be assessed on the basis of questionnaire data. The interview will include information about the illness (frequency, duration, medication), allergy symptoms and asthma (including confirmation of medical diagnosis), weight and height of the child. During this time, children will undergo annual screening tests evaluating the development of new sensitizations (skin tests / specific serum IgE), the development of bronchial asthma (new diagnoses, pulmonary function, reversibility of bronchial obstruction, bronchial hyperresponsiveness), and course of bronchial asthma (number of exacerbations, degree of control, severity of airway inflammation, ACT test, lung function, measurement of FENO concentration in exhaled air); measurement of cotinine and phthalates in urine will be performed. In addition, in the third year of follow-up, children with bronchial asthma and in the control group (approximately 40 healthy children) will be tested for respiratory tract inflammatory markers for evaluation of respiratory tract epithelial and peripheral blood parameters that imply the development of immune tolerance as well as concentration of microelements and vitamin D will be measured.

Chronic pulmonary diseases in children are seen as a serious health, social and economic problem. In recent years, special attention has been paid to assessing the effects of exposure in fetal and early postnatal life, lifestyle, and development of bronchial asthma in children. The proposed project provides a unique opportunity to continue the REPRO_PL cohort. It will allow comprehensive analysis of the effects of maternal lifestyle factors during pregnancy and child exposure on environmental factors, as well as the impact of immune factors on health and development of bronchial asthma and new allergies in children from birth to 12 years, which is a unique study not only on the scale of our country but also on the international stage. There are no direct studies in the literature based on cohort of the effects of the above on respiratory and allergies in children. The results of the project will allow to develop effective methods of asthma prevention in the Polish children population whose implementation will reduce the costs associated with the treatment of bronchial asthma.