## The Project Goal

The project aims to understand the role of gut bacteria in Type 1 Diabetes (T1D). T1D is an autoimmune disease in which the immune system attacks the insulin-producing cells in the pancreas. T1D develops in early childhood, with a key role in this process played by good bacteria which pretend they are human insulin. This camouflage protects beneficial bacteria from the immune system, which does not want to attack human insulin. However, when insulin-mimicking bacteria grow excessively early, their high numbers can provoke an immune response. This may happen if good bacteria consume plant fibers, such as pectin. Our earlier investigations suggest this process happens in the gut of a child who was weaned too early from breast milk to solid foods containing plant pectins. The goal of this project is to identify which exact bacterial strains mimic the human insulin.

## Description of Research

The research will use advanced methods, such as cultivating bacteria in laboratory conditions on pectin, single-cell microbial analysis, and studying the proteins produced by bacteria that are similar to human insulin. Particular focus will be placed on bacteria that thrive on pectins as their diet as they have mastered the ability to mimic human insulin.

## Reasons for the Research

Type 1 Diabetes is a disease that develops in early childhood, and its causes are not yet fully understood. Understanding the mechanism triggered by gut bacteria could allow for earlier detection of the disease risk before the immune system begins attacking the pancreas. This knowledge would also enable the development of better prevention strategies.

## Expected Results

The project could lead to the development of new diagnostic tests enabling early detection of Type 1 Diabetes risk. Additionally, the findings may help design preventive dietary strategies that influence gut microbiota composition, protecting children from developing Type 1 Diabetes.