The role and the composition of the human microbiome have been intensively investigated throughout recent years. It has all started, when researchers observed that some bacteria can exhibit beneficial effects on the host. This led to the development of the probiotic concept, in which probiotics, as defined by WHO, are „live microorganisms that, when administered in adequate amounts, confer a health benefit on the host". In the case of probiotic bacteria, *Lactobacillus*, *Bacillus* and *Bifidobacterium* strains are widely studied. However, not only the whole bacteria but also bacterial compounds e.g. lipoteichoic acids (LTA) are able to beneficially impact the host. Since they don't meet the definition of probiotics, a new term "parabiotics" was proposed. After 2013, publications regarding parabiotics started to gain interest, and many studies focused on the bacterial compounds underlined their function in e.g. the modulation of the immune system, while pointing out their potential therapeutic roles. **In my research, I want to comprehensively study the LTA from two *Bifidobacterium* strains and consider the potential parabiotic role of these compounds. The research will focus not only on the structure of the LTA but also on their modulatory properties as well as on their impact on the signaling pathways of the scavenger receptors.** Even though there isn't many research regarding bifidobacterial LTA, the pro-health properties of these compounds were studied in other lactic acid bacteria. For this reason, it is known that they are involved in e.g. pro- and anti-inflammatory responses and interaction between host and microbe. What is important, is that due to the negative charge of the LTA, they are recognized by scavenger receptors (SRs). SRs cover a wide variety of receptors present e.g. on the macrophages that, similarly to the LTA, can influence the immune response of the host, thus they are widely studied in asthma or chronic obstructive pulmonary disease (COPD).

The described project involves conducting a comprehensive research of the previously not studied LTA isolated from *Bifidobacterium adolescentis* CCDM 368 and *Bifidobacterium longum* ssp. *longum* CCDM 367. First, the structure of these compounds will be determined, additionally the LTA components will be prepared in order to check the crucial, functional elements of the LTA. Next, the role of the LTA and its components will be evaluated in macrophage cell lines and the production of anti- and pro-inflammatory molecules will be investigated. Additionally, with the use of flow cytometry, the influence of the studied compounds on the presence of SRs on the cells will be examined. The obtained results will allow to choose the SRs that cooperate with the LTA. In the next step, the obtained results will allow to study the signaling pathways induced by these molecules, with the use of SRs and SRs signaling pathways inhibitors. Finally, since SRs composition on the macrophages indicate the polarization of those cells and therefore their pro- or anti-inflammatory abilities, impact of the LTA and its components on the isolated mouse bone marrow macrophages (BMDM) will be studied.

This research will be a source of new knowledge, mainly in the fields of structural chemistry and immunobiology. Final effect of the project will be a detailed characterization of the previously not studied LTA from two *Bifidobacterium* strains. The obtained result will allow to intensively evaluate the potential role of the studied molecules in the treatment of various diseases since their pro- and anti-inflammatory effects as well as cooperation with SRs will be defined. Last but not least, the obtained result will be the subject of future publications and international conference presentations.