Serpins (serine protease inhibitors) are present in all multicellular organisms analysed to date and are very well characterized on biochemical and structural level. Moreover, the biological role of eukaryotic serpins is very well described. In contrast to eukaryotes, serpins are rarely found in prokaryotes and our knowledge about prokaryotic serpins is still very limited. What is more perplexing, the precise role of bacterial serpins still remains unknown. Therefore it is extremely interesting that genes encoding serpins are present in human commensal bacteria isolated from gut and oral cavity, and in one pathogen, *Tannerella forsythia*. *T. forsythia* is one of major etiologic factors of periodontitis, which affects in severe forms, which untreated can lead to tooth loss, even 15% of adults. Periodontitis is also a significant risk factor in development of more serious diseases such as rheumatoid arthritis, pneumonia, premature low-weight birth, diabetes and atherosclerosis. Taking it into account, it could be speculated that miropin is a virulence factor of T. forsythia. Therefore the main goal of the project is biochemical, structural and biological characterization of miropin.

During realisation of the project we will solve the structure and determine the inhibitory repertoire of the miropin and serpins from commensal bacteria. Next based on obtained results we will try to identify change(s) introduced during evolution and responsible for the fact that miropin is the only serpin found in human pathogen. Then we will try to describe biological functions of miropin. To achieve it we will check if miropin is responsible for survival of *T. forsythia* in the site of infection in oral cavity, where pathogen is exposed to the destructive action of both proteases secreted by other bacteria and killing by human immune cells. The obtained results will enable us to say whether miropin is a virulence factor of *T. forsythia*.

The proposed project will be carried out, because miropin is the only one known serpin from human pathogen and thus it could be involved in pathogenicity of *T. forsythia*. Based on comparison of miropin and serpins from commensal bacteria we want to shed more light on biochemistry, evolution and biology of bacterial serpins, which significantly increased our knowledge in such fields as biochemistry and microbiology. Moreover we want to show that miropin is a virulence factor of *T. forsythia* and thus is involved in aetiology of periodontitis. As a result miropin may be used in the future as a target for development of a drug, which may be used not only in treatment, but especially for prevention of periodontitis. Now such drug is not available, because our knowledge about molecular mechanisms of development and progression of the diseases is still insufficient.