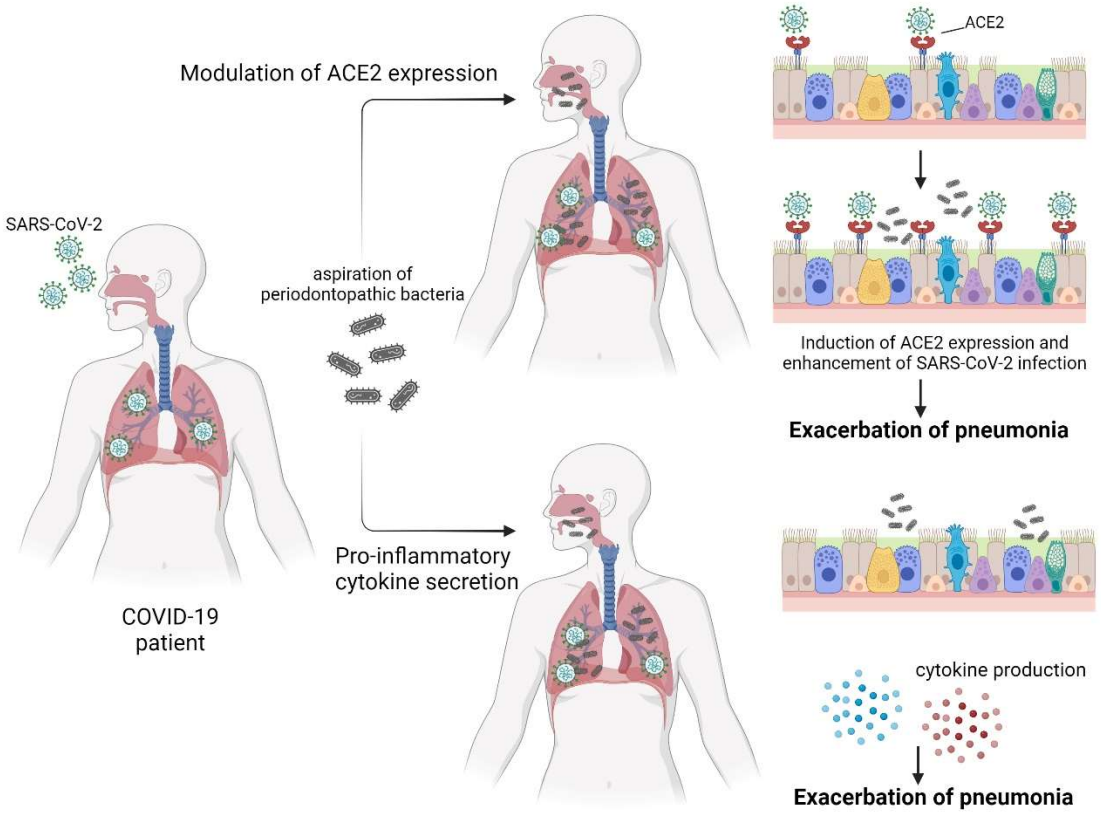
The role of periodontopathic bacteria in the aggravation of COVID-19

Periodontitis is the most common disease leading to tooth loss, and is caused by infection with periodontal bacteria. It is also a risk factor for pneumonia and the exacerbation of chronic obstructive pulmonary disease, presumably because of the aspiration of saliva contaminated with periodontopathic bacteria in the lower respiratory tract. Studies have shown that individuals with periodontitis are threefold more likely to develop nosocomial pneumonia than those who are periodontally healthy.

SARS-CoV-2 is responsible for a severe acute respiratory distress syndrome, known as coronavirus disease 19 (COVID-19). Periodontitis and COVID-19 share risk factors and activate similar immunopathological pathways, intensifying systemic inflammation.Moreover, clinical data have shown the presence of periodontal bacteria in the bronchoalveolar fluid of patients with COVID-19. Therefore, there is a strong hypothesis that periodontal bacteria have a negative impact on SARS-CoV-2 infection and that periodontitis may be an important risk factor for COVID-19 aggravation. However, the molecular links between periodontitis and COVID-19 have not been clarified. This project, therefore, intends to answer the following biological questions: which periodontopathic bacteria are able to modify SARS-CoV-2 infection? How do periodontal bacteria influence SARS-CoV-2 infection, i.e. what is the mechanism of this modulation?



As an experimental model, we will use highly relevant human airway epithelium cultures (HAEs), which mimic the natural environment of coronavirus infection. The proposed research will be performed in two laboratories, which have extensive experience in the field of virology (Laboratory of Virology; Malopolska Centre of Biotechnology) and bacteriology with special focus on periodontopathic bacteria (Department of Microbiology; Faculty of Biochemistry, Biophysics and Biotechnology). By bridging two important areas of microbiology – bacteriology and virology, we will significantly broaden the current knowledge on SARS-CoV-2 pathogenesis in patients suffering from periodontal disease.