The project focuses on the crucial topic of treating bacterial infections. A recent study by a team of researchers in *The Lancet* shows that **bacterial infections were the second leading cause of death in 2019 after ischemic heart disease and affected all age groups**. In addition, it is estimated that **up to 10 million people could die annually from antibiotic-resistant microorganisms by 2050**. Therefore, looking for new alternative treatments for bacterial infections is very important.

In combination with suitable photosensitizer, light can be effectively used to treat microbial infections. Such treatment is called antimicrobial photodynamic therapy and is especially suitable for localized infections such as wounds and skin infections. Unfortunately, classical photosensitizers can freely escape infected loci by uptake to host cells (even when embedded in polymers). It potentially leads to unwanted damage to healthy tissue and decreased concentration and effectivity against microorganisms.

This project aims to develop photoactive biopolymer materials (films, sponges, gels, nanoparticles) for wound dressing, where photosensitizers will be immobilized covalently and via supramolecular interactions and bioorthogonal reactions. Obtaining biomaterials in various forms will allow personalizing treatment to specific patient needs, which could significantly increase the effectiveness of treating bacterial infections. Such materials enable on-demand *in situ* modification with highly effective photosensitizers presenting innovative strategies to fight resistant microorganisms often found in infected wounds. Moreover, the polymer matrix will promote wound healing and protect the wound against further damage and infections.

We presuppose that the solution of this project will further push the knowledge in the field of photoactive materials for antimicrobial photodynamic therapy. Proposed novel materials are described and will combine biopolymers and photosensitizers in a novel and original way. The designed materials could provide an alternative to current methods, which can often cause unwanted secondary pain for patients. Lastly, using biodegradable biomaterials may encourage healthcare providers and patients to use environmentally neutral products.