Staphylococcus epidermidis is a coagulase-negative, Gram-positive coccus which occurs frequently on human skin and mucous membranes. Many reports have confirmed that this bacteria settle on the human skin in the first few hours of life and after a day, skin of 84% healthy newborns is colonized. *Staphylococcus epidermidis* is considered non-pathogenic to healthy individuals and up to the 1980s, was believed to be the contamination of swabs or lavage fluids collected from patients. However, it is already known that in individuals immunocompromised due to an underlying disease or injury it can cause infections. *Staphylococcus epidermidis* is capable of causing severe diseases in newborn babies who are highly vulnerable to infection. The most important predisposing factors include: preterm birth, low birth weight, immature or compromised immune system, damaged skin or mucous membranes, as well as major medical conditions that require procedures increasing the risk of infection, e.g. the use of vascular catheters, mechanical ventilation or parenteral nutrition. Adhesion of coagulase-negative staphylococci to the surface of biomaterials (i.e. surgical suture, implants, catheters) is the first step of infection, most often appearing in the area of contact between skin and biomaterial. Bacterial infections can be life-threatening for newborn babies so they require immediate treatment. The increasing resistance of *Staphylococcus epidermidis* clinical isolates to commonly prescribed antibiotics is a challenging therapeutic and epidemiological problem. Moreover, this bacterial species is capable of producing extracellular mucus and receptors for many proteins thus forming a complex structure called biofilm. The biofilm-forming microorganisms are more resistant to many chemicals, including disinfectants and antibiotics, than the planktonic cells. Biofilms act as efficient barriers against penetration of drugs into bacterial cells so antibiotic resistance occurring with the capacity to form biofilms can result in ineffective therapy. Therefore, development of new compounds with antimicrobial properties, which could be an alternative to less effective antibiotics, seems to be reasonable.

The aim of the project is to characterize both the mechanisms of resistance and the ability to produce biofilm by clinical strains of *Staphylococcus epidermidis* isolated from the blood of newborn babies. Moreover, the antimicrobial properties of the newly synthesized compounds and their ability to affect the biofilm structure will be evaluated. In this study, we will use modern methods, including genetic techniques to determine and confirm mechanisms of resistance and biofilm production (multiplex polymerase chain reaction), micro-dilution methods in a liquid medium to determine the activity of potential drug candidates and confocal microscopy techniques for visualization of biofilm architecture and the effect of tested compounds on their structure. The desired outcome of this project is to assess the suitability of the newly synthesized compounds with potential antimicrobial activity to be used to treat infections caused by antibiotic-resistant *Staphylococcus epidermidis* strains, a significant problem on neonatal units. These results will increase the knowledge in the field of pharmaceutical and clinical microbiology.