The number of healthcare-associated infections (HAI) is steadily increasing and is estimated to amount to 4.5 million yearly cases in Europe. An increasing proportion of HAI is attributed to new emerging antibiotic resistant XDR (extended drug resistant) bacteria, that are difficult or utterly impossible to treat using antibiotics as acknowledged by the actual "WHO Priority pathogen list". Multidrug-resistant (MDR) strains of *Enterococcus spp.*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumanii*, *Pseudomonas aeruginosa* and *Enterobacter spp.* are still the most commonly identified antimicrobial-resistant pathogens. These microorganisms are part of the so-called "ESKAPE" pathogens to emphasize that they currently cause the majority of hospital acquired infections and effectively „escape" the effects of antibacterial drugs. Thus, alternative safer and more efficient antimicrobial strategies are urgently needed especially against "ESKAPE" superbugs. These emerging pathogens call urgently for new strategies for the effective elimination that can only be attained by new treatment technologies. Antimicrobial Photodynamic Inactivation (aPDI) is a therapeutic option used in the treatment of infectious diseases. It is based on a combination of a photosensitizer, light and oxygen to remove highly metabolically active cells. These cells may be microorganisms such as fungi, viruses or bacteria. In comparison with other methods of treatment, aPDI has several advantages. Photo-activation allows the local treatment, which reduces the side effects of photodynamic therapy. In addition, aPDI has several cellular targets and therefore it is not biased by development of resistance to the treatment.

The realisation of the project involves: **i)** development of new molecules for photodynamic therapy with high antimicrobial efficacy against XDR ESKAPE bacteria, **ii)** *in vitro* evaluation of the tested molecules involving both the mechanistic studies as well as photo-, cyto- and genotoxicity assessment, and **iii)** *in vivo* evaluation of the efficiency and advantages of new molecules employing 2-3 animal infection models (such as wound infections and dental implants).

The project outcomes will enable the development of complementary therapeutic option to improve antimicrobial treatments and provide alternative methodology against multidrug resistant pathogens. Hopefully, with improved antimicrobial methods the risk of pathogen propagation and HAI will be reduced. In our opinion presenting the successful applications of aPDI against ESKAPE pathogens and evaluation of underlying mechanisms is indispensable for the dissemination of its effective clinical use and extending current knowledge concerning aPDI treatment. It would finally lead to the development of aPDI related science.

The proposed research project is clearly multi-disciplinary as it spans from photo-biology to photo-chemistry, photo-physics and medical application. To meet this challenge, a group of partners with recognized skills and background in the various areas of research has been gathered. The benefit of this international team cooperation is that each research group holds expertise in complementary fields, all being essential for the development and success of the project. The researchers involved provide their knowledge and internationally recognized long term proficiency in specific domains.