UV light assisted antibiotics for eradication of in vitro biofilms

The overuse of antibiotics is accelerating the bacterial resistance, and therefore there is a need to reduce the amount of antibiotics used for treatment. Here, we demonstrate in vitro that specific wavelengths in a narrow range around 296 nm are able to eradicate bacteria in the biofilm state (grown for 24 hours) more effectively, than antibiotics and the combination of irradiation and antibiotics is even better, introducing a novel concept light assisted antibiotics. The investigated wavelength range was 249 nm to 338 nm with an approximate step of 5 nm. The novel concept that consists of a UV irradiation treatment followed by a tobramycin treatment can significantly reduce the amount of antibiotics needed for eradicating mature bacterial biofilms. The efficiency of the proposed light assisted antibiotics method was compared to combinatory antibiotic treatment and highly concentrated antibiotic monotherapy. The eradication efficacies, on mature biofilms, achieved by light assisted antibiotic and by the antibiotic monotherapy at approximately 10-fold higher concentration, were equivalent. The present achievement could motivate the development of light assisted antibiotic treatments for treating infections.