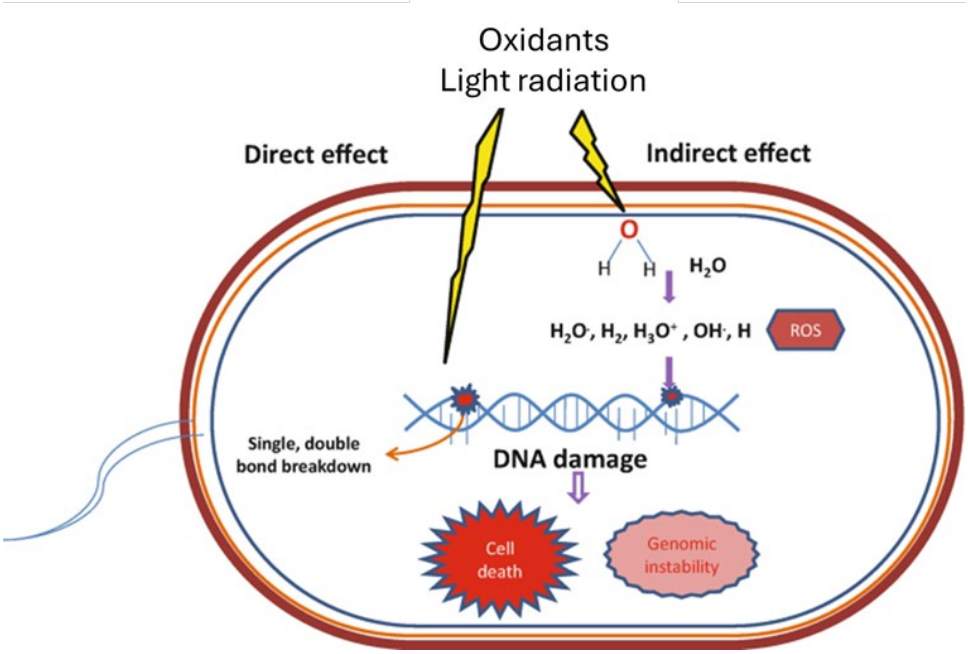
Project

Tracking DNA damage and mutation patterns in *E. coli* after disinfection using Nanopore Technology

Brief description

Inactivation of microorganisms by disinfectants such as oxidizing agents or UV radiation occurs, among other mechanisms, through the formation of lesions in their genomic DNA. Damage caused by reactive oxygen species (ROS) or UV irradiation disrupts normal DNA replication, ultimately leading to microbial death. Genomic approaches for **mutation detection** provide powerful tools to investigate these effects, allowing the identification of DNA lesions, point mutations and structural variations generated during disinfection. **Nanopore-based Third-Generation Sequencing** enables to obtain complete bacterial genomes by reading single, unamplified DNA molecules as they pass through protein nanopores. The portable Oxford Nanopore MinION device— comparable in size to a smartphone and powered via USB —can generate long reads exceeding 10 kb without compromising sequence quality, thereby facilitating complete genome assemblies.



Objectives

The aim of this study is to sequence the genomes of *E. coli* strains before and after disinfection, to analyze mutation patterns using third-generation Nanopore sequencing technology. These analyses will provide insights into the types and frequencies of DNA damage, as well as their effects on microbial survival, thereby enhancing our understanding of disinfection mechanisms and the potential emergence of resistance.

Methodology

Molecular biology (DNA extraction, library preparation), genomic sequencing and bioinformatic analysis.

Supervisors

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