

# Investigating the Photochemical and Antimicrobial Properties of Methylene Blue on Perfusate Solutions for Organ Preservation

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**Objective:** According to the Global Observatory of Donation and Transplantation (GODT), in the year of 2022, the total amount of solid organ transplants corresponded to less than ten percent of the global needs. One of the main obstacles is the contamination of organs by microorganisms such as bacteria or viruses, leaving the organ unsuitable for transplantation. Antimicrobial photodynamic therapy (APDT) is an alternative that has been tested to decontaminate the organs and make them available for transplantation. Methylene blue (MB) is a well-known photosensitizer that has shown promising results for microbiological control in *in vitro* experiments, but has presented little to no antimicrobial response in organ graft *ex vivo* experiments. The objective of this research is to investigate the mechanisms of photodegradation and antimicrobial effects of methylene blue on the organ preservation solutions Steen and Custodiol, aiming to better understand the biochemical barriers of using MB as a photosensitizer for APDT in infected organs for transplantation. **Methodology:** UV-Visible spectroscopy, High Performance Liquid Chromatography (HPLC) and mass spectrometry were used to investigate the photodegradation and interactions of MB with the solvents after the irradiation with light at 660 nm. A strain of *Staphylococcus aureus* (*S. aureus*) was used to monitor the antimicrobial response of the photosensitizer at different concentrations of the perfusates. **Results:** The study provided significant insights into the physicochemical interactions between MB and Steen and Custodiol solution after the application of light which clarify the reason for the lack of antimicrobial response of the APDT treatment on *ex vivo* infected organs. This study is in progress and suggests that the interaction among molecules inhibits the photodynamic action of MB onto bacteria.

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