

**TITLE:** ROSE BENGAL AND GREEN LED LIGHT FOR *Listeria innocua* INACTIVATION

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**ABSTRACT**

The traditional thermal technologies used in the food sector for microbial control are linked to detrimental effects both in the organoleptic and nutritional features of food products. Thus, alternative methods, such as antimicrobial photodynamic inactivation (aPDI) has emerged as a promising method for microbial control in the food field. In aPDI, the combination of a non-toxic dye, light and oxygen leads to generation of reactive species responsible for microbial inactivation. Therefore, this study aimed to evaluate the efficacy of antimicrobial photodynamic inactivation mediated by rose bengal (RB) and green led against *Listeria innocua*. An overnight culture of *L. innocua* (10<sup>7</sup> CFU/mL) in phosphate-buffered saline was incubated in the dark (10 min) with different concentrations of RB. Afterward, the suspensions were irradiated by a green LED light source for 10 min. Cells exposed only to the light source or incubated only to the photosensitizer (in absence of light) were used as control. After treatments, cell viability was determined by plate counting method in Mueller Hinton Agar. In addition, the effect of aPDI on potassium leakage was determined by flame emission and atomic absorption spectroscopy. No antimicrobial activity was observed in the groups subjected only to the light source or only to rose bengal. On the other hand, the combination of irradiation with the photosensitizer reduced cell viability in a dose-dependent manner. It was observed bacterial population was reduced from 8.23 log CFU/mL to 7.89, 6.65, 5.15 and 3.0 when RB at 1, 10, 25 and 50 nmol/L was employed. No viable cells were recovered when the concentration of RB was increased to 75 nmol/L. Moreover, photoinitiation also induced intracellular potassium leakage, indicating that the antimicrobial mechanisms involved in aPDI could be related to cytoplasmic membrane damage. Our results suggest that aPDI mediated by rose bengal may be an interesting tool for controlling *L. innocua* in the food sector.

**Keywords:** antimicrobial photodynamic inactivation; foodborne; *Listeria innocua*; rose bengal.

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