

## The bactericidal effect of antimicrobial blue light against foodborne pathogens and the underlying mechanism

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### Abstract

The bactericidal effect of antimicrobial blue light against foodborne pathogens and the underlying mechanism: The alarming emergence of antibiotic resistance has necessitated the development of novel antimicrobial approaches. Antimicrobial blue light (aBL), in 405-470 nm, has attracted increasing attention as a safe and environmentally friendly technology. Compared with ultraviolet light, aBL has proven to be much less detrimental to mammalian cells and can penetrate deeper into tissue. aBL illumination showed broad-spectrum bactericidal effects against both clinical pathogens and foodborne pathogens such as *Escherichia coli*, *Staphylococcus aureus*, *Cronobacter sakazakii* and *Salmonella typhimurium* in our previous work. Up to now, aBL had been successfully applied in disinfection of some food, including cantaloupe rinds, fresh-cut papaya, milk, cucumbers, processed meat products and packaged sliced cheese, and we also employed aBL in the freshness maintaining of egg and beef. aBL dose at 54.6 J/cm<sup>2</sup> caused a 3.73 log CFU reduction per eggshell surface and 109.44 J/cm<sup>2</sup> inactivated 90% of inoculated cells on beef ( $P < 0.05$ ). Furthermore, aBL had a negligible impact on their quality. Up to now, the antimicrobial mechanism of BL is still not fully understood. aBL excited the endogenous intracellular porphyrins, leading to the production of highly cytotoxic reactive oxygen species and the following oxidative damage of various biomolecules, such as DNA, proteins and lipids that resulting in cell death. We recently discovered by comparative lipidomics that most lipids of *E. coli* and *S. typhimurium* upon aBL irradiation had changed significantly and thereby damaged cell membrane.

### Biography

Xiaoqing Hu has completed his PhD at the age of 29 years from East China University of Science and Technology and postdoctoral studies from Harvard Medical School. He is the China-based collaborator of New Zealand-China Food Protection Network (Program RM19169). He has published more than 41 papers in reputed journals and has been serving as an editorial board member of *Frontiers in Microbiology*.



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