Title The role of pulsed light spectral distribution in the inactivation of *Escherichia coli* and *Listeria innocua* on fresh-cut mushrooms

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Citation Food Control, Volume 24, Issues 1-2, March-April 2012, Pages 206-213

Keywords Fresh-cut mushroom; Pulsed light treatments; *Listeria innocua*; *Escherichia coli*; Quality parameters

Abstract

Pulsed light (PL) treatments have emerged as a non-thermal method for microbial decontamination on foods surfaces. The aim of this work was to evaluate the bactericidal effect of PL by identifying the spectral range with antimicrobial activity and its effect on the quality of fresh-cut mushrooms (*Agaricus bisporus*). The mechanism responsible for their action on bacterial cells was also studied using Transmission Electron Microscopy (TEM). Results show that the effectiveness of PL-treatment decreases when the UV (ultraviolet) spectral region is blocked (particularly UV-C). PL treatments of full wavelength spectrum (180–1100 nm) and a fluence of 12 J/cm^2 caused 3 and 2 log reductions in the initial counts of inoculated *Escherichia coli* and *Listeria innocua,* respectively. TEM showed significant damage in cell cytoplasm and cytoplasmic membrane after treatments with full spectrum pulses and a total fluence of 12 J/cm^2. In contrast, mushroom cells treated with 6 J/cm^2 did not exhibit apparent changes in their cytoplasmic membrane. Full spectrum treatments had a more pronounced impact on color, texture and headspace gas composition than treatments without UV spectrum profile. This work contributes with new information regarding the effects of the spectral range of PL treatments that the whole UV–Vis range of the spectrum accounts for the lethal effect against microorganisms. On the other hand, it also provides increased knowledge regarding the antimicrobial action of this technology, showing that a photophysical effect exists, leading to changes in the bacterial cytoplasmic membrane and cell content.