

Improper use of biocides in food production may endanger public health

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Biocides used in the food industry at sublethal doses may be endangering, rather than protecting, public health by increasing antibiotic resistance in bacteria and enhancing their ability to form harmful biofilms, according to a study published ahead of print in *Applied and Environmental Microbiology*. This is among the first studies to examine the latter phenomenon.

The study was designed to test whether exposing *Escherichia coli* bacteria to sub-lethal concentrations of each of three food-grade [biocides](#) could result in greater [antibiotic resistance](#), a greater ability to form damaging and potentially virulent biofilms and to survive normally lethal doses of biocides, says corresponding author Rosa Capita of the University of Leon, Spain.

"Recent scientific evidence suggests that the selective pressure exerted by the use of biocides at sub-lethal concentrations could contribute to the expression and dissemination of antibiotic resistance mechanisms," according to the report.

Exposures to the biocide sodium nitrite increased resistance to 14 out of 29 antibiotics tested. *E. coli* cells also acquired tolerance to the biocides, especially sodium nitrite and sodium hypochlorite, and these two biocides improved the microbes' ability to form biofilms.

Conversely, exposure to the biocide trisodium phosphate actually reduced *E. coli*'s ability to form biofilms, and boosted resistance only to

a single antibiotic.

"These findings are in agreement with reports of other authors, where adaptation of *E. coli* to both chemical and physical sub-lethal stresses has been demonstrated," write the researchers. "The increased tolerance observed suggests that the use in food environments of compounds which when used inappropriately may provide sub-lethal exposure represents a real risk for the development of adaptation to biocides."

Biofilms boost the risk of food contamination by providing a reservoir of microorganisms, and [biofilm formation](#) is a major virulence factor in human infections. Biofilm formation also boosts operation and maintenance costs in food production by interfering with heat exchangers, plugging filters and blocking tubes in water distribution systems.

The study's results are important in demonstrating the need to guide policies to prevent improper use of biocides, says Capita.

More information: [www.asm.org/images/Communicati ...
2014/0114biocide.pdf](http://www.asm.org/images/Communicati...2014/0114biocide.pdf)

Provided by American Society for Microbiology

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