

Fall 2007

Bactericidal Effects of Cold Plasma Technology on *Geobacillus Stearothermophilus* and *Bacillus Cereus* Microorganisms

Angela D. Morris


Gayle B. McCombs
Old Dominion University, gmccombs@odu.edu

Susan L. Tolle
Old Dominion University, stolle@odu.edu

Mounir Laroussi
Old Dominion University, mlarouss@odu.edu

Wayne L. Hynes
Old Dominion University, whynes@odu.edu

Follow this and additional works at: https://digitalcommons.odu.edu/dentalhygiene_fac_pubs

 Part of the [Biomedical Engineering and Bioengineering Commons](#), [Dental Hygiene Commons](#), [Microbiology Commons](#), [Oral Biology and Oral Pathology Commons](#), and the [Plasma and Beam Physics Commons](#)

Repository Citation

Morris, Angela D.; McCombs, Gayle B.; Tolle, Susan L.; Laroussi, Mounir; and Hynes, Wayne L., "Bactericidal Effects of Cold Plasma Technology on *Geobacillus Stearothermophilus* and *Bacillus Cereus* Microorganisms" (2007). *Dental Hygiene Faculty Publications*. 21. https://digitalcommons.odu.edu/dentalhygiene_fac_pubs/21

Original Publication Citation

Morris, A.D., McCombs, G.B., Tolle, S.L., Laroussi, M., & Hynes, W.L. (2007). Bactericidal effects of cold plasma technology on *geobacillus stearothermophilus* and *bacillus cereus* microorganisms. *Journal of Dental Hygiene*, 81(4), 103-103.

An Electronic Reprint From

The Journal of Dental Hygiene



*Copyright © 2006 American Dental Hygienists' Association.
Electronic Reprint generated by Ingenta, www.ingenta.com.*

Source: Journal of Dental Hygiene, Vol. 81, No. 4, October 2007

Copyright by the American Dental Hygienists Association

Bactericidal Effects of Cold Plasma Technology on *Geobacillus Stearothermophilus* and *Bacillus Cereus* Microorganisms

Angela D Morris, RDH, MS, Gayle B McCombs, RDH, MS, Susan L Tolle, RDH, MS, Mounir Laroussi, PhD and Wayne L Hynes, PhD

*Cold plasma is a state of matter that contains a large number of particles that are electrically charged. Plasmas generate chemically reactive species and ultraviolet radiation making them useful in decontamination applications (Kong & Laroussi, 2003). Research regarding the inactivation of gram-positive bacteria by cold plasma has been studied by Laroussi et al (2003); however, there is limited research regarding the germicidal effectiveness of cold plasma on *Geobacillus stearothermophilus* and *Bacillus cereus* microorganisms. The purpose of this study was to determine if cold plasma technology inactivates *Geobacillus stearothermophilus* and *Bacillus cereus* vegetative cells and spores. This study consisted of 981 samples; 762 experimental samples exposed to cold plasma at various times and 291 controls. Experimental samples were inoculated and exposed either directly or indirectly/remotely to cold plasma. After exposure the samples were incubated for 12 to 16 hours and colony forming units (CFU) were quantified. The percentage kill and log concentration reductions were calculated from the CFU counts. Data was analyzed using one-way ANOVA, Kruskal Wallis and Tukey's tests at the .05 level. There was a statistically significant difference in the inactivation of *Geobacillus stearothermophilus* vegetative cells for indirect exposure ($p=.0001$), direct exposure ($p=.0013$), as well as for *Bacillus cereus* vegetative cells and spores ($p=.0001$). Exposure of *Geobacillus stearothermophilus* spores to cold plasma demonstrated no statistically significant differences in inactivation for indirect exposure ($p=.7208$) and direct exposure ($p=.0835$). Results indicate that cold plasma exposure significantly inactivated *Geobacillus stearothermophilus* (vegetative) and *Bacillus cereus*; however, *Geobacillus stearothermophilus* spores were not significantly inactivated. Funding for this project was provided by ADHA IOH.*

Copyright of Journal of Dental Hygiene is the property of American Dental Hygienists Association and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.