Bacillus anthracis Spore Decontamination in Food Grease

Amoako KK, Santiago-Mateo K, Shields MJ, Rohonczy E.

ABSTRACT

Bioterrorist attacks involving *B. anthracis* require rigorous decontamination efforts with a sporicidal disinfectant. This study tested a number of such products against B. anthracis, covered by a layer of food grease to simulate real-world complications. AHP® was the only disinfectant to achieve efficacy against these spores in food grease, at a 24-hour contact time.

BAKGROUND

Bioterrorist attacks are devastating to the industries they affect – the 2001 *Bacillus anthracis* anthrax attacks costed an estimated $320 million in decontamination efforts. While several disinfectants are known to be effective against B. anthracis spores, their efficacy in the presence of food grease at lower temperatures is less clear. The objective of this study is to test a variety of disinfectant products against *B. anthracis* spores, challenged by the presence of food grease. The goal was to be able to use the data generated to strengthen decontamination protocols in the event of a bioterrorism event.

STUDY

B. anthracis cultures were grown on tryptic soy agar, and were incubated for 1-2 weeks to allow for spore formation. The following disinfectants were tested:

- Ultra Clorox disinfecting bleach (6.15% sodium hypochlorite) diluted at various concentrations
- Virkon, diluted at 5%
- Spor-Klenz Ready-to-Use Cold Sterilant
- Rescue Sporicidal Liquid (4.5% H_2O_2)
- Surface Decontamination Foam (SDF)

This study was broken down into two phases: first, the researchers tested the efficacy of each disinfectant against *B. anthracis* at contact times of 5, 10, 20 and 30 minutes using a quantitative carrier test.

Subsequently, the second phase of the carrier test involved preparing samples of the bacteria, and covering them with a film of melted lard, and allowing them to cool. The plates with the lard-covered bacteria were immersed in each disinfectant solution for contact times of 2, 8 and 24 hours at room temperature as well as at 4°C.

RESULTS

Efficacy Tests: Spor-Klenz, SDF, AHP® and 5 and 10% bleach consistently inactivated all the spores, whereas the use of Virkon and 2% beach led to recovery of some spores. Ten percent bleach and SDF consistently achieved a 6-log reduction in spores after 5 minutes at room temperature, AHP® consistently achieved a 6-log reduction after 10 minutes, and 5% bleach and Spor-Klenz required a 20-minute contact time to achieve a 6-log reduction with consistency.

Food Grease Challenge: None of the tested disinfectants consistently achieved a 6-log reduction in viable spores at either temperature after 2 or 8 hours. Only AHP® was able to consistently achieve a 6-log reduction after 24 hours, and it achieved efficacy at both room temperature and at 4° C.

CONCLUSION

These findings illustrate that AHP®, in the form of Rescue Sporicidal Liquid, had the greatest efficacy against *B. anthracis* spores overall. In addition, AHP® was the only disinfectant tested to achieve efficacy in the presence of food grease.

IMPLICATIONS FOR AHP®

These findings could go a long way in positioning AHP® as a novel decontamination solution in the event of an anthrax incident complicated by the presence of food grease. Future work should be done to see if efficacy can be achieved within a shorter contact time, to bolster the practical relevance of these findings.

REFERENCE

Amoako KK, Santiago-Mateo K, Shields MJ and Rohonczy E. (2013). *Bacillus anthrac*is spore decontamination in food grease. J. Food Protec. 76(4): 699-701.