



## Peroxide in nanoparticles is an effective method to disinfect areas contaminated with B-agents

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### Abstract

**Introduction:** The traditional disinfection techniques using wet sprays and wipes do not eliminate the main cause of contamination by bacteria, spores, fungi or even viruses identified as: ?the recurrent cycle of contamination?. Although the contamination risks in relation to external agents have been clearly identified and treated, it is certainly not the case for the surfaces and their environment: the air. There is a permanent exchange between both the surface and the air, which can be the origin of an important contamination. Especially contamination, which was a result of a bioterror attack

**Study Design:** Over a period of two years studies were carried out by Dutch hospitals to disinfect MRSA (multi-resistant *Staphylococcus aureus*) infected areas, like operation theatres, in the hospital with an innovative H<sub>2</sub>O<sub>2</sub> (hydrogen peroxide) ultra mist generator, the IC-4?. The IC-4? unit operates on basis of liquid spraying by aid of ultrasonic elements. A special generator operates the ultrasonic elements, an array of ceramic discs. This generator is a kind of electronic switch, generating electronic pulses activating these ceramic discs. These pulses are given with a frequency of ca. 1.7 MHz (1.700.000 Hertz). The ultra sonic elements are placed in a container with the detergent. The detergent (liquid) cannot follow the frequency of the ultrasonic plates and the cavitation phenomenon is seen in the dispersion. A spray containing hydrogen peroxide with ultra small particles is created.

**Results and Discussion:** The size of these particles is very small (ca. 1?); its weight very low, followed by an excellent absorption of these particles in the air. No condensate is formed. These particles are attractive for micro-organisms and they absorb them resulting in their own death by the peroxide. The nanoparticle shields the active peroxide towards surfaces and this prevents that surfaces in the treated area are damaged by oxidation. Another feature of the peroxide containing nanoparticles is the fact that no droplets are formed, so it does not show not the so-called “umbrella” phenomena. As a consequence the nanoparticles will also be active behind a barrier and in small holes. Tests were done with bacteria-, spores- and virus-contaminated areas. Reduction rates were above log 5 and these results were also obtained in ?hidden? areas.

**Conclusion:** The hydrogen peroxide nanoparticles are very effective in the disinfection of MRSA infected hospitals. The system has shown that it can be applied for effective disinfection of contaminated areas with other bacteria, viruses and spores as well. It is to be expected that it will be also effective in contaminated areas after a bioterror attack.

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