

Anti-Bacterial Effectiveness of the BioZone Scientific System

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The BioZone Scientific system is designed to purify the air by reducing the number of microbial contaminants - bacteria, fungi and viruses from the air and surfaces found in washrooms. There are five different purification technologies employed by the BioZone Scientific system: photo catalytic oxidation, photoplasma, germicidal ultraviolet light, negative ions, and ozone. In experiments conducted in July 2010 in the Microbiology Laboratory of the Matei Bals Romanian National Institute for Infectious Disease (Institutul National de Boli Infectioase Prof. Dr. Matei Bals- NIBI), the effectiveness of the BioZone Scientific system was tested on a total of eight bacterial strains. Among the strains there were:

four reference bacterial species:

Staphylococcus aureus ATCC 25923

Escherichia coli ATCC 25922

Pseudomonas aeruginosa ATCC 27853

Enterococcus faecalis ATCC 29212

four wild bacterial strains resistant to antibiotics:

Acinetobacter baumannii 22325

Serratia marcescens 21191

Klebsiella pneumonia 26412

Staphylococcus aureus MRSA 26 695

Experiment I

This laboratory experiment was performed using two BioZone Scientific devices.

Bacterial strains cultured for 18-20h were suspended in 0.85% saline to obtain a 0.5 McFarland opacity. Each suspension was then diluted to 1/1000 and then seeded in each of the 8 Petri dishes containing TSA medium (BioMerieux triptych soy agar). Six seeded Petri dishes were exposed to open laboratory atmosphere for 1, 2 and 3 hours, after which they were incubated. Two Petri dishes of each bacterial species were used as controls, where the thermostat was put in immediately after sowing. After incubating at 37 ° C for 24-48 hours the bacteria cultures were analyzed. The BioZone Scientific devices did not reduce bacterial colony forming units on the Petri dishes in any of the bacteria species tested. The assumption is that the testing room is too large for the BioZone devices.

Experiment II

After replicating the same testing protocol, the experiment was repeated in a smaller room with a single BioZone Scientific device which was put into operation the day prior to testing. There was no reduction in the number of bacteria colony forming units. The assumption is that the bacteria inoculated into a culture medium cannot be destroyed by the BioZone Scientific devices.

Experiment III

Filter paper 6cmX6cm was used in addition to sterile Petri dishes. Paper filters were sterilized for 30 minutes at 120°C. 8 Petri dishes were used for each bacterial strain. Bacterial suspensions were calibrated to a 0.5 McFarland opacity and then further diluted to 1/2000. These diluted suspensions were then placed on one of the 8 filter paper in 500ul dispenses.



The filter papers containing the bacterial suspensions were then placed on the Petri dishes and left for 1, 2 and 3 hours respectively in the chamber where the BioZone Scientific device had been operating for previous 24 hours. After this the bacteria colony containing-filter papers were washed with TSA. The filter papers with bacterial suspensions, were then immediately placed in culture medium and incubated.

The *Klebsiella pneumonia* 26412 strain was not tested in this experiment.

The BioZone Scientific device was found to reduce the number of colonies developed after exposure to the atmosphere after 2 to 3 hours for most bacterial species used in the table.

The action is better on strains of *Escherichia coli*, *Pseudomonas aeruginosa* and *Serratia marcescens*. The effect on eel *Enterococcus faecalis* is lower.

Bacteria Strain		Exposure Time-hours (Number of colonies)				
		0	1 Hour	2 Hour	3 Hour	% Reduction
1	<i>Pseudomonas aeruginosa</i> - ATCC 27853	150	100	7	3	97.1%
		162	95	5	6	
2	<i>Klebsiella pneumonia</i> 26412	N/A	N/A	N/A	N/A	N/A
3	<i>Acinetobacter baumannii</i> - ATCC 22325	97	35	29	17	78.9%
		88	42	30	22	
4	<i>Enterococcus faecalis</i> - ATCC 29212	*	418 380	218 190	111 102	73.3%
5	<i>Staphylococcus aureus</i> -MRSA 26695	*	*	107 120	22 30	77.1%
6	<i>Staphylococcus aureus</i> - ATCC 25923	320	213	43	28	91.2%
		392	74	37	35	
7	<i>Serratia marcescens</i> 21191	*	*	63	14	76.7%
				53	13	
8	<i>Escherichia coli</i> ATCC 25922	381	23	3	0	100%
		360	45	0	0	

*none counted

Conclusions regarding the BioZone Scientific device:

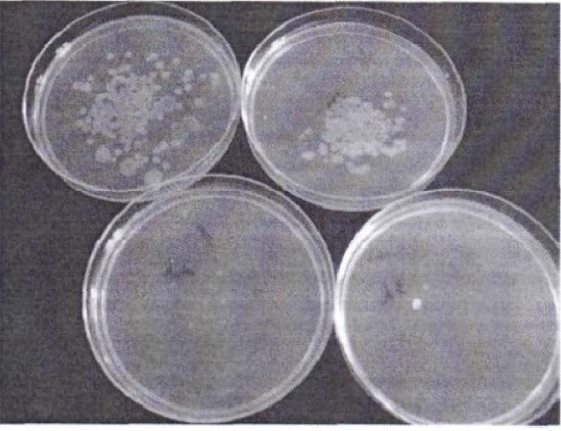
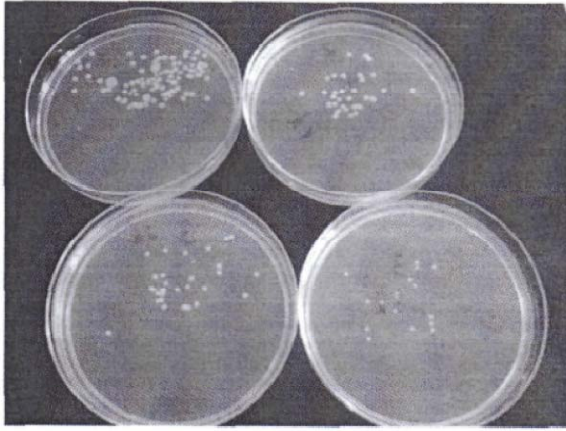


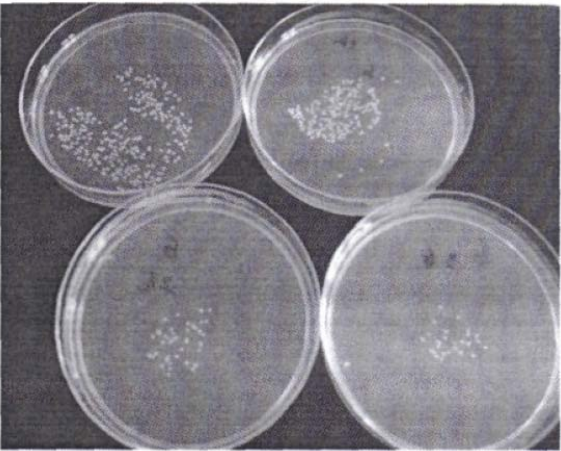
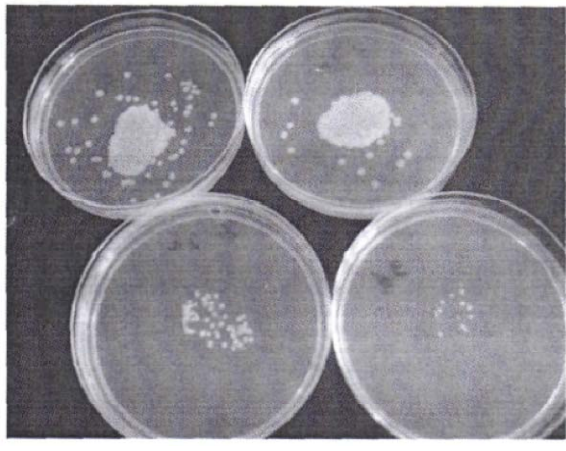
- Bacteria found on nutrient media cannot be destroyed
- Bacteria found on surfaces are destroyed after three hours in varying proportions depending on the bacteria species
- *Escherichia coli* is completely destroyed after three hours (100% reduction)
- Significant reduction in the colony forming units of *Pseudomonas aeruginosa* (97.1% reduction) and *Serratia marcescens* (76.7% reduction) strains
- *Enterococcus faecalis* was the most resistant bacteria species with (73.3% reduction)

Investigative Report Issued on August 11, 2010 by:

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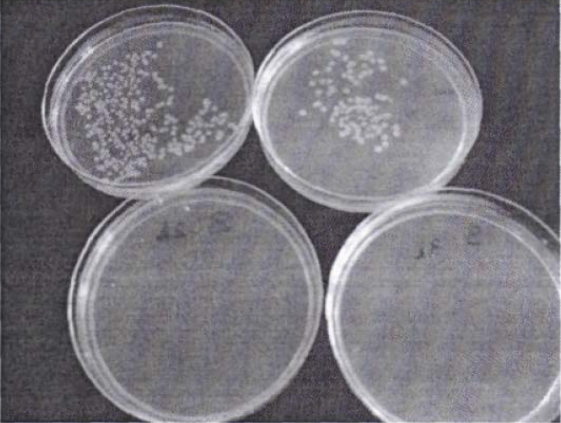
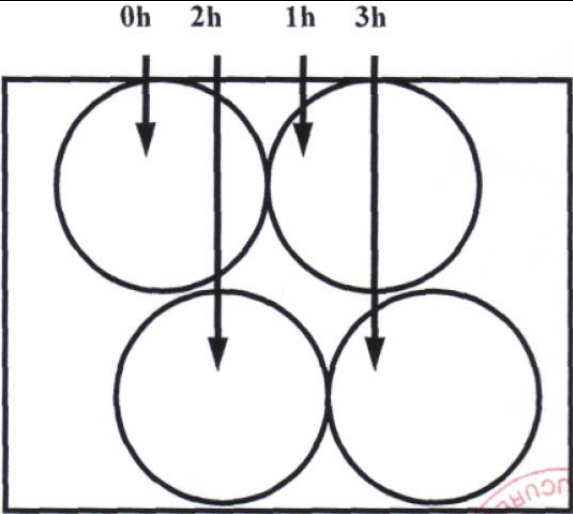


APPENDIX
Perti Dish Photographs

	
<i>Pseudomonas aeruginosa</i> - ATCC 27853	<i>Acinetobacter baumannii</i> - ATCC 22325
	
<i>Enterococcus faecalis</i> - ATCC 29212	<i>Staphylococcus aureus</i> -MRSA 26695
	
<i>Staphylococcus aureus</i> - ATCC 25923	<i>Serratia marcescens</i> 21191

APPENDIX

Petri Dish Photographs (continued)

	
<p><i>Escherichia coli</i> ATCC 25922</p>	<p>Legend - bacteria exposure time</p>