

Study of the sensitivity of culture media after biodecontamination for use in an isolator

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Context

Our production of parenteral nutrition and chemotherapy mixtures has been carried out under isolator since the summer of 2018. In accordance with good preparation practices, we carry out microbiological controls of the environment regularly. In addition, the sterility of each batch of parenteral nutrition is controlled by seeding at least 4 pairs of blood cultures.

Objective

We want to determine the viability of culture media after bio decontamination with hydrogen peroxide, if there is a significant difference in microbiological growth after bio decontamination of contact agar plates, air agar plates and blood culture vials.

Material and method

For blood cultures we seeded 8 pairs (aerobic + anaerobic) of vials (type BactAlert®), with 10 CFU of *S. aureus* then 50 CFU, on control vials and vials subjected to hydrogen peroxide during 22min (> 100ppm), totaling 32 pairs. The vials were put in the incubator (Virtuo®) and the "positivity" delay was recorded. For air and contact agar plates, 8 pairs of agar plates of each type (control and peroxide, BioMérieux® brand, TSA plate, simple and without protection against the sterilizing agent) were inoculated with approximately 25 CFU of the following germs: *E. coli*, *S. aureus*, *P. aeruginosa*, *C. albicans*, *M. luteus*, 80 air and 80 contact. After 24 to 48 hours in a microbiological incubator at optimal temperatures for each medium, we counted the number of CFU of each agar plate.

Results

For blood cultures, the study did not show a significant difference (threshold of 5%) between control vials and vials bio-decontaminated at 2 concentrations of germs for the "positivity" delay ($p < 0.001$), 12.6h to 10 CFU and 10.6h to 50 CFU. For air agar, there is a decrease in sensitivity after bio-decontamination for all germs ($p < 0.001$) except *C. albicans*. For contact agar plates, there is a decrease in sensitivity after bio-decontamination for all germs ($p < 0.001$) except for *C. albicans* and *M. luteus*. Decreases in sensitivity are dependent on agar and germs.

Conclusion

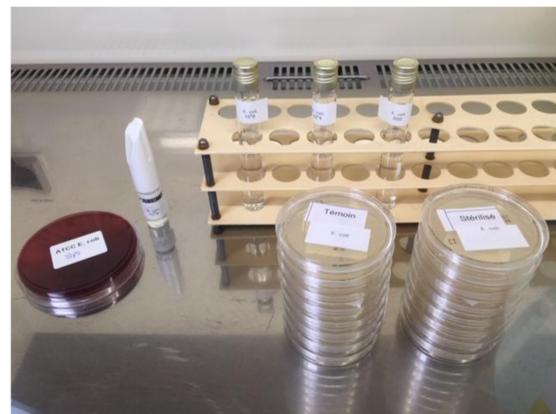
Air and contact agar plates are no longer usable after exposure to hydrogen peroxide. There is no impact for BactAlert® blood cultures vials. There are several alternatives marketed: triple-packaged agar, screw agar or agar with sterilizing agent inhibitor. These results show the importance of checking the conditions of use of the culture media.

Contact agar plate	Germ	Hydrogen peroxide	Average CFU	s ²	p	
	<i>E. coli</i>	no		32,3	6,2	<0,001
		yes		10,4	3,4	
	<i>S. aureus</i>	no		21,3	4,7	<0,001
		yes		3,6	2,4	
	<i>P. aeruginosa</i>	no		46,3	7,1	<0,001
		yes		19,5	4,5	
	<i>C. albicans</i>	no		1,6	0,5	NS
yes			1,0	0,9		
<i>M. luteus</i>	no		10,8	3,1	NS	
	yes		9,9	2,4		

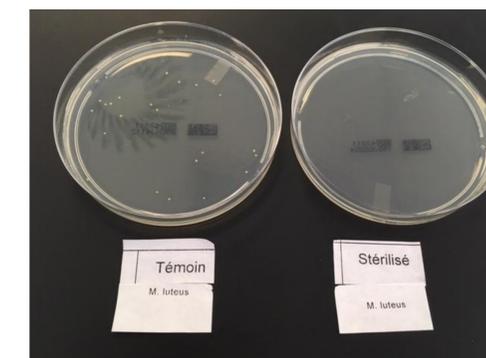
Air agar plate	Germ	Hydrogen peroxide	Average CFU	s ²	p	
	<i>E. coli</i>	no		68,4	8,7	<0,001
		yes		16,0	5,5	
	<i>S. aureus</i>	no		34,6	7,3	<0,001
		yes		0,0	0,0	
	<i>P. aeruginosa</i>	no		110,0	12,2	<0,001
		yes		8,8	6,0	
	<i>C. albicans</i>	no		1,3	1,7	NS
yes			2,4	1,4		
<i>M. luteus</i>	no		2,6	2,7	<0,001	
	yes		24,5	5,4		



2 pairs of vials before inoculation



Contact agar plates before inoculation



Results of exposure to hydrogen peroxide on the growth of *M. luteus*



Results of exposure to hydrogen peroxide on the growth of *S. aureus*