

Published peer-reviewed papers investigating Tristel's microbiocidal activity

Mycobactericidal activity of selected disinfectants using a quantitative suspension test

P. A. Griffiths, J. R. Babb and A. P. Fraise

Hospital Infection Research Laboratory, City Hospital NHS Trust, Dudley Road, Birmingham, B18 7QH

Published in the Journal of Hospital Infection (1999) **41**: 111-121

Summary: In this study, a quantitative suspension test carried out under both clean and dirty conditions was used to assess the activity of various instrument and environmental disinfectants against the type strain NCTC 946 and an endoscope washer disinfectant isolate of *Mycobacterium chelonae*, *Mycobacterium fortuitum* NCTC 10394, *Mycobacterium tuberculosis* H37 Rv NCTC 7416 and a clinical isolate of *Mycobacterium avium-intracellulare* (MAI).

The disinfectants tested were; a chlorine releasing agent, sodium dichloroisocyanurate (NaDCC) at 1000 ppm and 10 000 ppm av Cl; chlorine dioxide at 1100 ppm av Cl₂ (Tristel, Medichem International Limited); 70% industrial methylated spirits (IMS); 2% alkaline glutaraldehyde (Asep, Galen); 10% succinialdehyde and formaldehyde mixture (Gigasept, Schulke & Mayr); 0.35% peracetic acid (NuCidex, Johnson & Johnson); and a peroxygen compound at 1% and 3% (Virkon, Antec International).

Results showed that the clinical isolate of MAI was much more resistant than *M. tuberculosis* to all the disinfectants, while the type strains of *M. chelonae* and *M. fortuitum* were far more sensitive. The washer disinfectant isolate of *M. chelonae* was extremely resistant to 2% alkaline activated glutaraldehyde and appeared to be slightly more resistant than the type strain to Nu-Cidex®, Gigasept®, Virkon® and the power concentration of NaDCC.

This study has shown that peracetic acid (Nu-Cidex) chlorine dioxide (Tristel®), alcohol (IMS) and high concentrations of a chlorine releasing agent (NaDCC) are rapidly mycobactericidal. Glutaraldehyde, although effective, is a slow mycobactericide. Gigasept and Virkon are poor mycobactericidal agents and are not therefore recommended for instruments or spillage if mycobacteria are likely to be present.

Published peer-reviewed papers investigating Tristel's microbiocidal activity

Summary table: Time taken (mins) to achieve a log₁₀ reduction >5

Disinfectant	<i>M. chelonae</i> NCTC 946	<i>M. chelonae</i> Epping	<i>M. fortuitum</i> NCTC10394	<i>M. tuberculosis</i> H37 Rv	MAI (clinical isolate)
Clean conditions					
1000 ppm					
NaDCC	1	4	10	1	60
10 000 ppm					
NaDCC	1	1	1	1	1
2% v/v					
glutaraldehyde	1	>60	1	20	60
70% v/v IMS					
	1	1	1	1	4
1% w/v Virkon					
	20	>60	>60	>60	>60
3% w/v Virkon					
	>60	>60	>60	>60	>60
10% v/v					
Gigasept	10	>60	20	60	>60
Nu-Cidex					
	1	4	4	1	4
Tristel	1	1	1	1	1
Dirty conditions					
1000 ppm					
NaDCC	1	60	10	4	60
10 000 ppm					
NaDCC	1	1	1	1	10
2% v/v					
glutaraldehyde	1	>60	1	10	10
70% v/v IMS					
	1	1	1	1	4
1% w/v Virkon					
	>60	>60	>60	>60	>60
3% w/v Virkon					
	>60	>60	>60	>60	>60
10% v/v					
Gigasept	10	>60	10	20	>60
Nu-Cidex					
	1	4	4	4	4
Tristel	1	1	1	1	1

Published peer-reviewed papers investigating Tristel's microbiocidal activity

An evaluation of the use of chlorine dioxide (Tristel One-Shot) in an automated washer -disinfector (Medivator) fitted with a chlorine dioxide generator for decontamination of flexible endoscopes

D. Coates

Q Laboratories Ltd., Quayside, Navigation Way, Ashton-on-Ribble,
Preston, Lancs, PR2 2YP

Published in the Journal of Hospital Infection (2001) **48**: 55-65

Summary: Microbiological tests were carried out to evaluate a new chlorine dioxide sterilant: Tristel One-Shot. Preliminary in vitro suspension tests showed that solutions containing around 140 ppm chlorine dioxide achieved a reduction factor exceeding 10^6 of *Staphylococcus aureus* in 1 min and of *Bacillus subtilis* spores in 2.5 min in the presence of 3g/L bovine albumin. Subsequent tests evaluated the effectiveness of Tristel One-Shot in a Medivator washer/disinfector fitted with a Tristel Generator for processing flexible endoscopes. Each test run involved three stages.

In the first, the instrument and air-water channels of a gastroscope were inoculated with a suspension of *Pseudomonas aeruginosa* (10^8 cfu/ml) in 10% sodium glutamate and serum (0.5 or 10%) and then drained, partially dried, and saline flushed through for total viable counts (TVCs).

In the second stage, the channels were re-inoculated with test organisms; detergent was flushed through the channels which were then brushed; and saline was flushed through for TVCs.

In the third stage, the channels were re-inoculated; detergent was flushed through the channels which were then brushed; the endoscope was processed in the Medivator; and saline was flushed through for TVCs.

Carrying out all three stages enabled determination of (1) the contribution played by manual cleaning of channels prior to processing in the Medivator, and (2) the combined effect of manual cleaning followed by processing. Two series of test runs were done. In the first, cleaning followed by processing in the Medivator consistently achieved a $>10^6$ -fold reduction of test organisms, and in the second a $>10^5$ -fold reduction. Pre-cleaning of channels was very important – when done the initial concentration of serum in the inoculum (0-10%) had no effect on the results obtained after processing.

Published peer-reviewed papers investigating Tristel's microbiocidal activity

Effectiveness of cleaning alone, and cleaning followed by disinfection with Tristel One-Shot sterilant in a Medivator endoscope reprocessor fitted with a Tristel generator, in decontaminating the instrument and air-water channels of a gastroscope inoculated with *P. aeruginosa*

Test run	Chlorine Dioxide (ppm)	Horse serum (%)	Bacterial count/ml								Log ₁₀ reduction factor	
			Inoculum	After-inoculation*		After-flushing & brushing		After-processing		After-processing		
				Instrument Channel	Air-water Channel	Instrument Channel	Air-water Channel	Instrument Channel	Air-water Channel	Instrument Channel	Air-water Channel	
1	201	0	3.3 x10 ⁸	5.3x10 ⁷	7.8x10 ⁷	No cleaning	No cleaning	300	0	5-6	7-8	
2	243	0	3.2x10 ⁸	9.2x10 ⁷	8.0x10 ⁷	6.0x10 ⁶ †	7.8x10 ⁷ †	>300	9	5-6	6-7	
3	258	0	7.2 x10 ⁸	8.8x10 ⁷	7.2x10 ⁷	2.0x10 ⁵	2.1x10 ⁵	7	2	7-8	7-8	
4	231	0	3.4 x10 ⁸	6.2x10 ⁷	2.0x10 ⁷	1.4x10 ⁵	5.8x10 ²	0	0	7-8	7-8	
5	246	5	4.6 x10 ⁸	1.7x10 ⁷	3.1x10 ⁷	1.7x10 ⁴	3.4x10 ⁵	0	0	7-8	7-8	
6	238	5	2.7 x10 ⁸	5.2x10 ⁷	3.1x10 ⁷	1.6x10 ³	3.5x10 ⁴	0	0	7-8	7-8	
7	253	10	5.8 x10 ⁸	5.2x10 ⁷	3.7x10 ⁷	No cleaning	No cleaning	224	33	5-6	6-7	
8	250	10	4.2 x10 ⁸	6.2x10 ⁷	5.8x10 ⁷	4.2x10 ⁶ †	2.0x10 ³ †	110	11	5-6	7-8	
9	203	10	6.6 x10 ⁸	8.8x10 ⁷	7.8x10 ⁷	7.0x10 ³	6.0x10 ³	0	0	7-8	7-8	
10	152	10	5.6 x10 ⁸	2.9x10 ⁷	6.1x10 ⁷	3.5x10 ⁴	1.7x10 ⁵	71	55	5-6	6-7	
11	152	5	7.6 x10 ⁸	7.3x10 ⁷	9.2x10 ⁷	1.0x10 ⁵	5.3x10 ⁴	47	36	6-7	6-7	
12	149	5	4.2 x10 ⁸	3.2x10 ⁷	2.1x10 ⁷	1.7x10 ³	2.7x10 ⁴	79	3	5-6	6-7	
13	150	5	5.6 x10 ⁸	3.1x10 ⁷	5.8x10 ⁷	3.2x10 ⁴	2.6x10 ⁵	41	47	5-6	6-7	
14 ‡	236	5	4.8 x10 ⁸	3.5x10 ⁷	4.9x10 ⁷	5.2x10 ⁴	1.2x10 ⁴	35	3	6	7-8	
15 §	245	5	6.8 x10 ⁸	9.8x10 ⁷	7.8x10 ⁷	2.4x10 ⁵	3.5x10 ⁵	30	1	6-7	7-8	

* Microorganisms recovered without cleaning or decontamination

† Brushing only carried out

‡ Hospec used as detergent; 1% MediGene used in all other experiments

§ Flushing and brushing carried out by endoscopy Staff Nurse