



Microfibre Decontamination By Ozone January 2009

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1. Introduction

JLA Ltd submitted an application to the NHS Rapid Review Panel in 2008 for OTEX an ozone disinfection laundry process. Together with a recommendation of 2 the panel requested that further work should be carried out in relation to the efficacy of microfibrils following laundering. A question was raised as to whether, following the laundry process microfibrils were left with residual organic matter, which, could impact upon the efficacy of the microfibre material.

In conjunction with Microsearch Laboratories Ltd, Geneius Laboratories Ltd and the Infection Control team at Calderdale Royal Hospital (CRH) a study was set up to investigate the hypothesis of whether the decontamination process, which is vital in allowing microfibre cloths and mops to be reused, could result in embedded residual organic matter from bacterial cells. The purpose of this study was to provide data in the form of bacteriological analysis and electron microscope imaging of microfibre material following decontamination with OTEX ozone laundry process.

2. Methodology

Under the control and supervision of the Infection Control team at CRH a new laundered microfibre cloth was used to wipe over surfaces within the isolation ward at CRH. The cloth was used moistened with water and in accordance with manufacturers recommendations utilising the 16-fold method. After use the cloth was cut into quarters and 2 pieces were laundered with ozone at ambient temperatures. Half of the cloths; laundered and soiled were then submitted to Microsearch Laboratories Ltd for bacteriological analysis the remaining pieces again laundered and soiled were submitted to Geneius Laboratories Ltd for Environmental Scanning Electron Microscope (ESEM) imaging. All samples were handled in an aseptic manner and were analysed by both parties on the same day.

3. Microsearch Laboratories Ltd Bacteriological Report

Analysis of the cloth followed standard laboratory procedures as follows:

Quantitative recovery of Clostridium difficile.

20 grams of sample is extracted in 180 ml of Universal Quenching agent by pulsification for 30 seconds. A serial decimal dilution series is created and each solution is surface plated onto fastidious anaerobe agar (250 mg/l Cycloserine 8 mg/l Cefoxitin). All plates are incubated for 48, 72 and 96 hours anaerobically in 10 % CO₂ at 37°C. All growth is proportionately screened employing Oxoid Clostridium difficile test kit CODE: DR1107

Presence or absence in 1 gram of material

1g of sample is extracted in 50 ml by pulsification for 30 seconds. The resulting solution is incubated for 48 in 10 % CO₂ at 37°C. After incubation the sample is cultured onto fastidious anaerobe agar (250 mg/l Cycloserine 8 mg/l Cefoxitin). All plates are incubated for 48, 72 and 96 hours anaerobically in 10 % CO₂ at 37°C. All growth is screened employing Oxoid Clostridium difficile test kit CODE: DR1107.



3. Microsearch Laboratories Ltd Bacteriological Reports

Microbiological Analysis of Cloths Sent for ESEM at Newcastle University December 2008.

<i>Microbiological Test Results Pre/Post OTEX Laundry Process (Cfu/g)</i>										
Sample	Lab Ref No:	State	TVC	E.coli	Salmonella	S. Aureus	C.diff	MRSA	Yeasts	Moulds
Red Microfibre Cloth	379	Soiled	3.10E+07	90	N/D	4.00E+06	500	1.70E+03	7.10E+05	5.10E+04
Red Microfibre Cloth	380	Post Laundered	12	<1	N/D	<1	<1	<1	<1	<1

Legend: < = Less than. **NEG = Test Negative** **Pos = Test Positive**



Soiled



Post Laundered

Note: Samples processed through a standard OTEX Microfibre Wash Program at ambient water temperature (14 °C) with 3mls/k detergent dosed within the main wash. No tumble drying. Dissolved ozone levels of 0.6ppm determined in the rinse water.

4. Geneius Laboratories Ltd Report

Ian Singleton

Head of Research and Development

Our reference : 12/JLA/1

Work description : Environmental scanning electron microscope work : microfibre cloths examined pre-otex wash and post-otex wash treatment.

Date : 17.12.08

Laboratory Report :

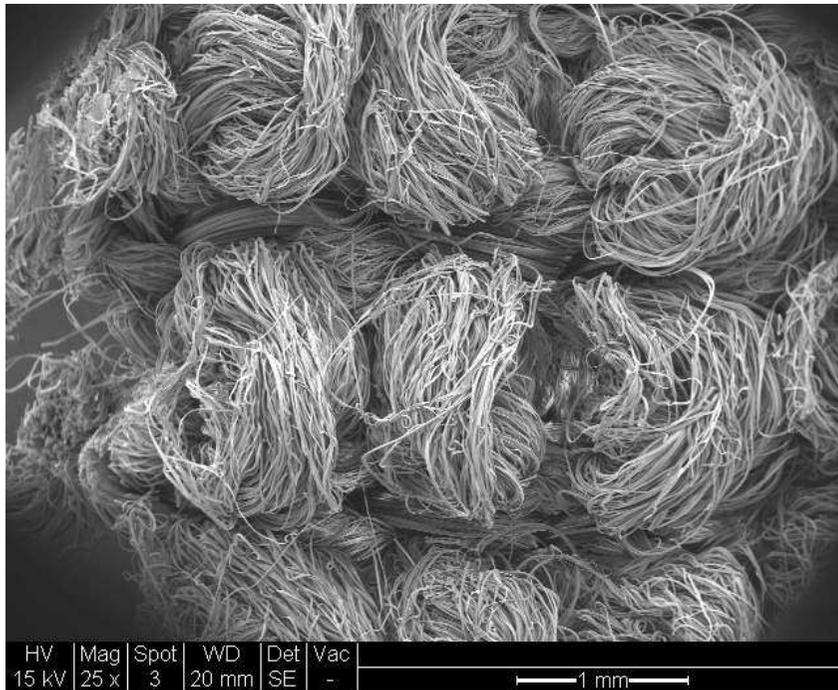
Samples were received on 16th December (am), 2008 and processed the same day.

A series of digital images were captured and incorporated into a PowerPoint presentation (sent by e-mail to Jackie Hook and Dick Cardis at JLA) for ease of viewing. The images show the microfibre cloths at increasing levels of magnification (from x 25 to x 2000). A number of areas of the cloth samples were examined and the images supplied are representative of the overall areas viewed.

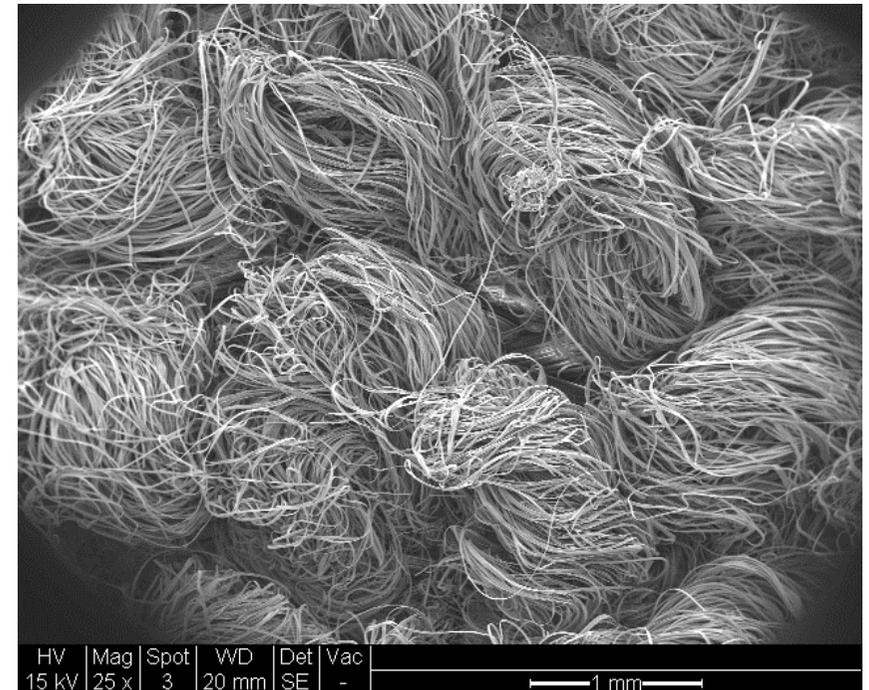
The x 25 images give an overview of the microfibre cloth structure pre and post otex wash. No obvious differences can be observed at this magnification. As magnification increases the presence of 'particles' on the pre-otex microfibres becomes obvious, while the post-otex microfibres appear very clean. At the highest magnification used the presence of very small spherical particles (smaller than bacterial cells) can be seen on the surface of pre-otex microfibres. These particles are completely absent from the post-otex microfibres. The make-up of these particles is unknown.

ESEM Microfibre Cloths: x 25 magnification

Pre-OTEX

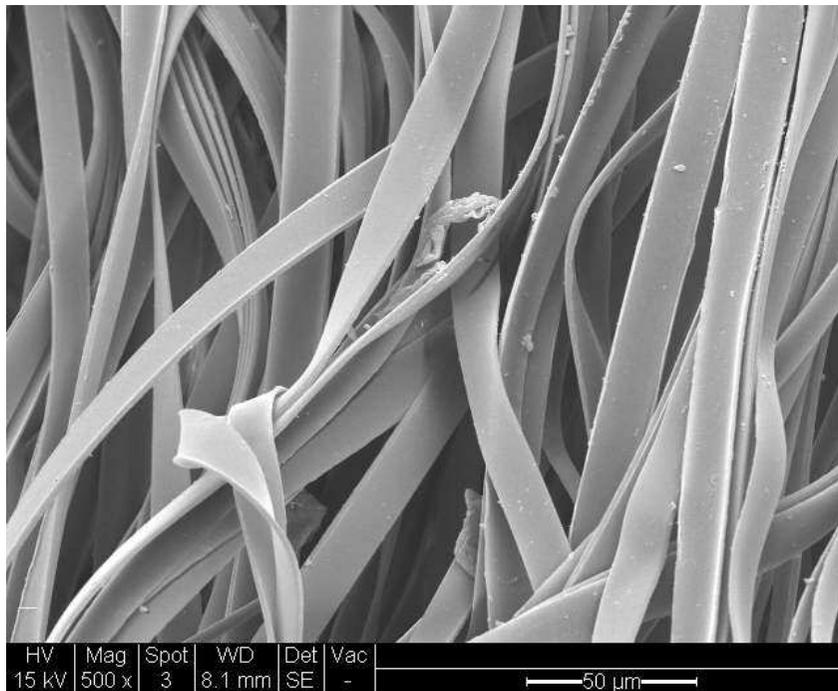


Post-OTEX

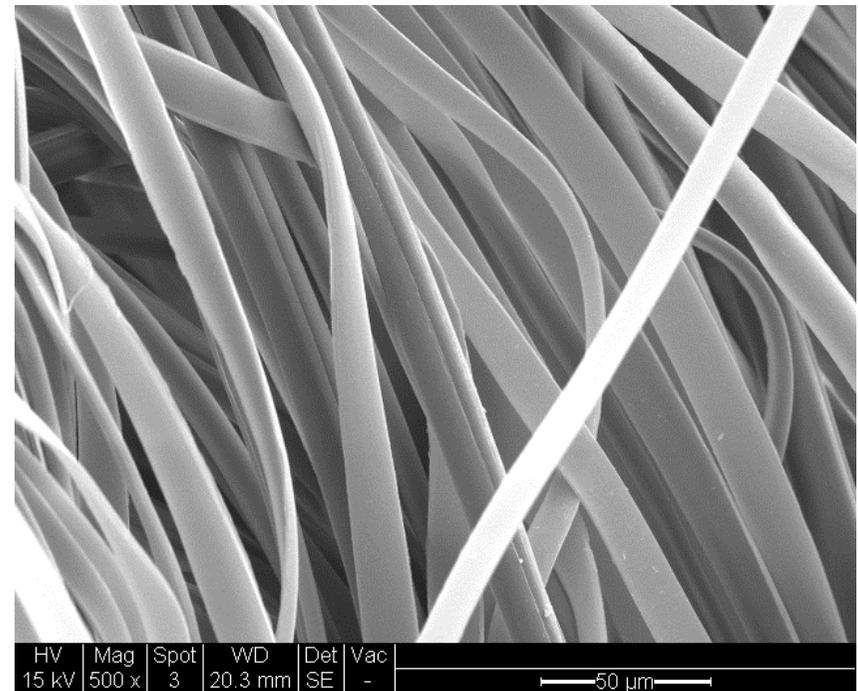


ESEM Microfibre Cloths: x 500 magnification

Pre-OTEX

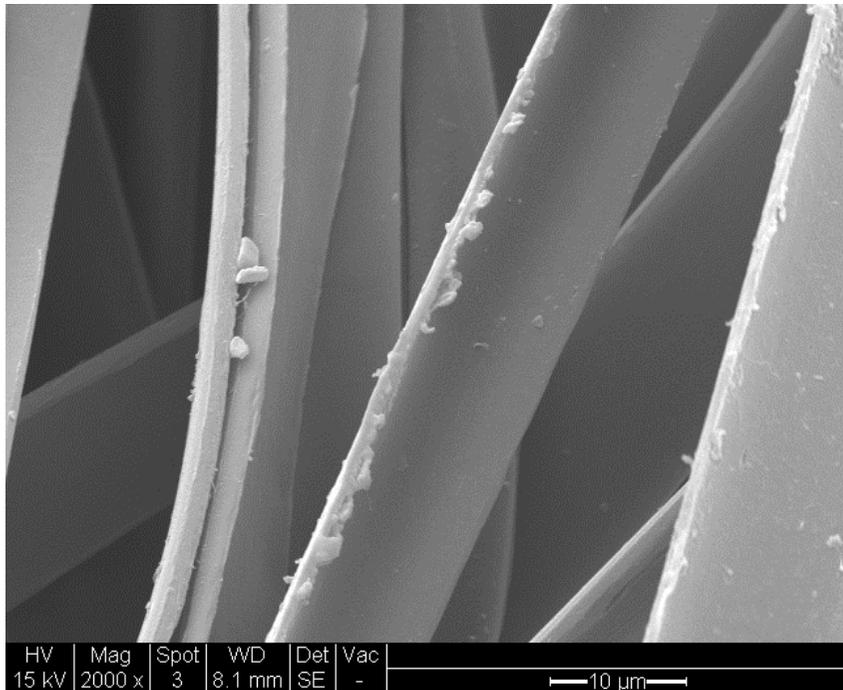


Post-OTEX

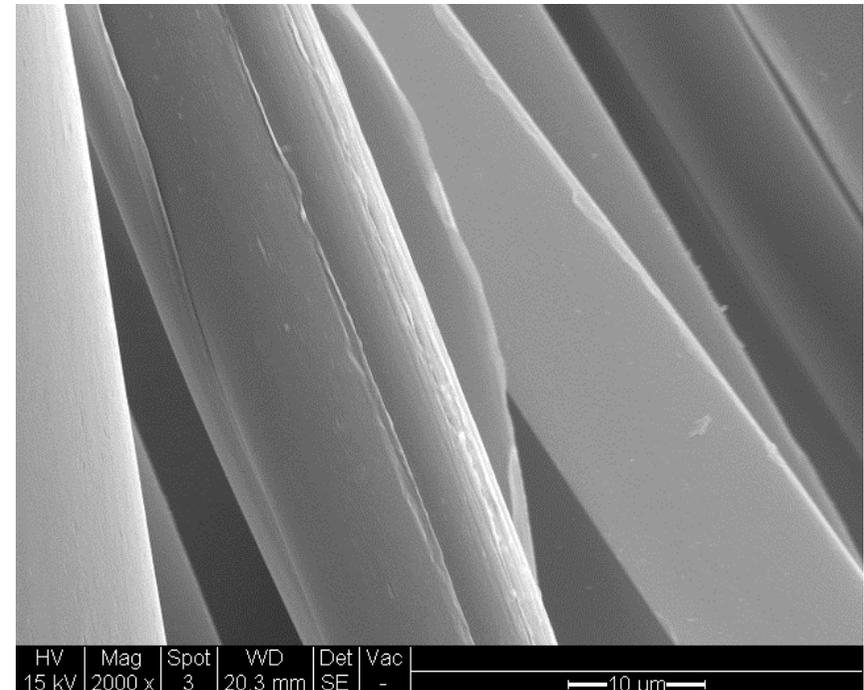


ESEM Microfibre Cloths: x 2000 magnification

Pre-OTEX



Post-OTEX



5. Conclusion

This study was carried out in conjunction with CRH Infection Control team, Microsearch Laboratories Ltd and Geneius Laboratories Ltd. The purpose of the study was to investigate whether the decontamination laundry process, which is a vital part of the microfibres reuse cycle, resulted in the embedding of organic matter from bacterial cells. The bacteriological analysis of the test cloth showed contamination of the cloth following wiping of surfaces within an isolation ward at CRH and the elimination after the ozone laundry process. This was supported by the images produced by Geneius Laboratories Ltd, which confirmed the presence of small particles prior to laundering and the absence of any residual matter after ozone laundering. The condition of the fibres following ozone disinfection can be clearly seen as been intact and open leading to the conclusion that the process has not caused any detrimental chemical effect to the fibre and that the process has not left any residual organic matter.