



OPTIM Blue Surface Cleaning Investigation

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Objectives:

- Ability to clean environmental surfaces coated with dried organic debris,
- Ability to remove protein from environmental surfaces as a more stringent cleaning parameter, and
- Cleaning capability compared to that observed for competitor surface disinfectants

Materials and Methods:

Freshly collected heparinized human blood was diluted using sterile saline to yield 5%, 25%, 50%, and whole blood served as the 100% blood suspension. These 4 bioburden dilution samples were then used to coat experimental environmental surfaces (6 tiles; 1 control tile and 5 test tiles) by adding 0.2 mL of fluid onto 2x2 in. laminated countertop tiles. The material was spread over the surface using sterile cotton swabs, and allowed 1-2 hours to dry at room temperature.

Test disinfectant wipes [*OPTIM Blue* (SciCan), *FD 312* (Dürr Dental), *SteriMax Sporicide* (Aseptix), and *Minuten Wipes* (Alpro)] were applied on to tiles with consistent mechanical force and wiped 3-5 times. Tiles treated with disinfectants were then allowed to remain in contact with applied liquid for the manufacturers' recommended intermediate-level disinfection (i.e. tuberculocidal contact time) interval (Table 1). Positive, control blood tiles were left untreated, test for protein contamination and photographed.

Protein Removal

Following each cleaning/disinfectant treatment, Hemastix test strips (*Siemens*) were immersed in sterile saline and rubbed across the lowest dilution of treated test tiles (5% blood) to detect the presence of hemoglobin (protein). Traditionally these strips are used in medicine to detect trace amounts of blood (hemoglobin) in urine but has made its way into forensics as a way to detect the presence of blood on surfaces. Results are qualitative distinguishing between an absence of hemoglobin and the presence of small, moderate, and large amounts.

Table 1. Test surface disinfectants, tuberculocidal contact time, and active ingredients

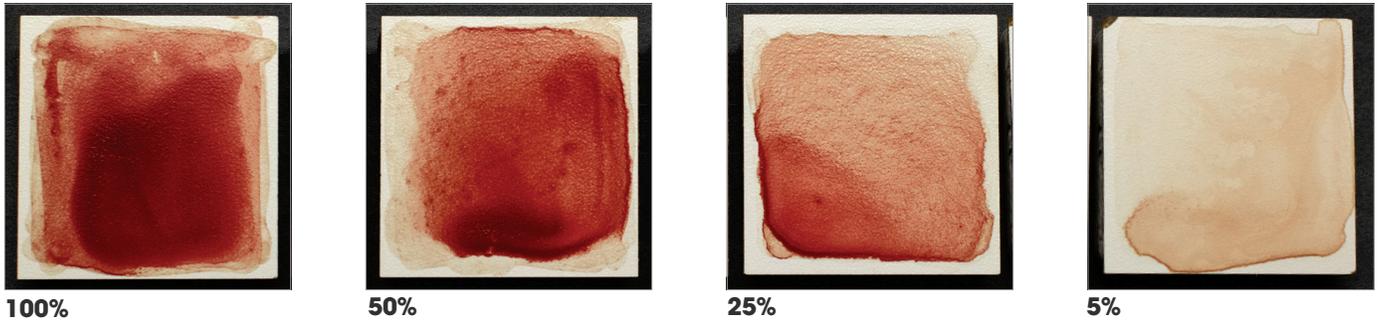
Surface Disinfectant	TB Contact Time	Active Ingredients
<i>OPTIM Blue</i> (SciCan)	6 min	0.5% Hydrogen peroxide
<i>FD312</i> (Dürr Dental)	15 min	0.07% Alkyl-benzyl-dimethyl-ammonium chloride
<i>SteriMax Sporicide</i> (Aseptix)	5 min	15mg/g Hydrogen peroxide
<i>Minuten Wipes</i> (Alpro)	1 min	30-50% Ethanol, 5-15% Propan-2-ol

Results:

Cleaning

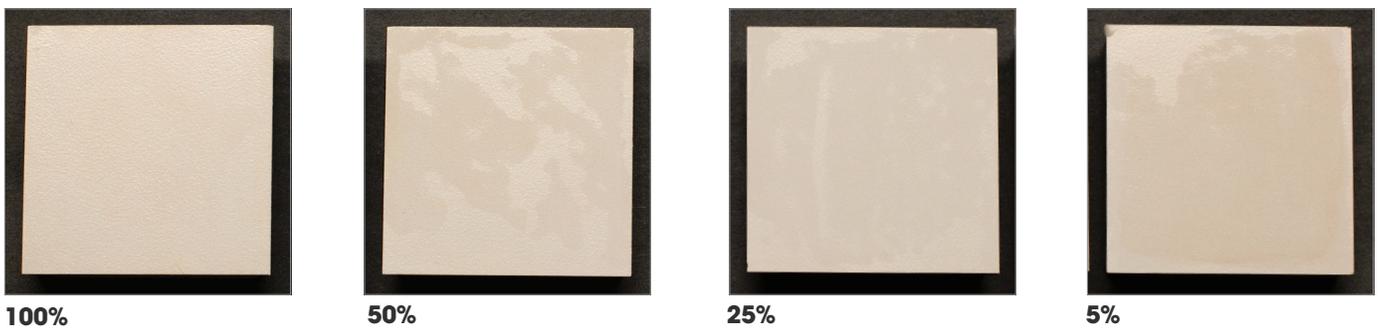
Following treatment, *OPTIM Blue* and the other water-based surface disinfectant, *FD312* and *SteriMax Sporicide*, successfully removed all visible debris for all tested blood dilutions (Figure 2a-c). In contrast, a considerable amount of organic debris remained on the 100% and 50% blood contaminated tiles when treated with a high-alcohol surface disinfectant (Figure 3). Little to no debris remained on the 25% and 5% blood tiles after treatment with any of the high-alcohol surface disinfectant solutions.

Figure 1. Untreated blood tiles (100%, 50%, 25% and 5%)

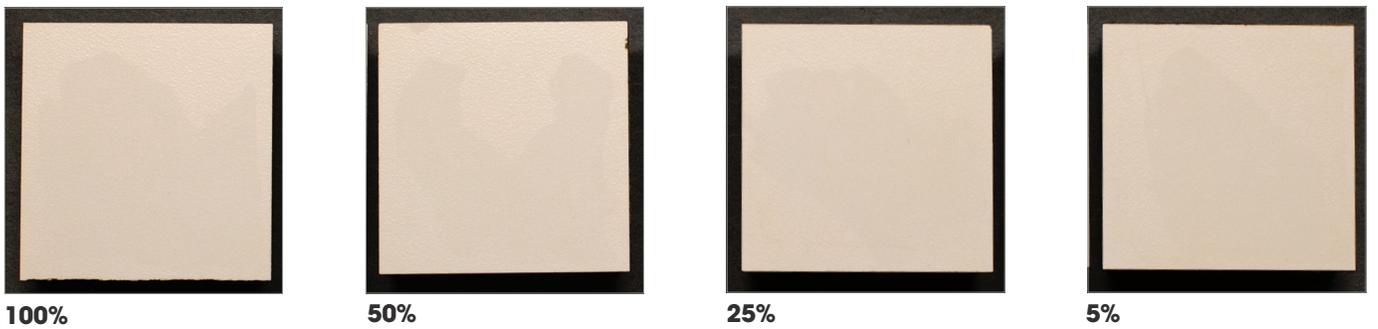


Figures 2a-c. Blood tiles treated with a) *OPTIM Blue*, b) *FD312* and c) *SteriMax Sporicide* (100%, 50%, 25% and 5%)

a) *Optim 1*



b) *FD312*



c) *SteriMax Sporicide*

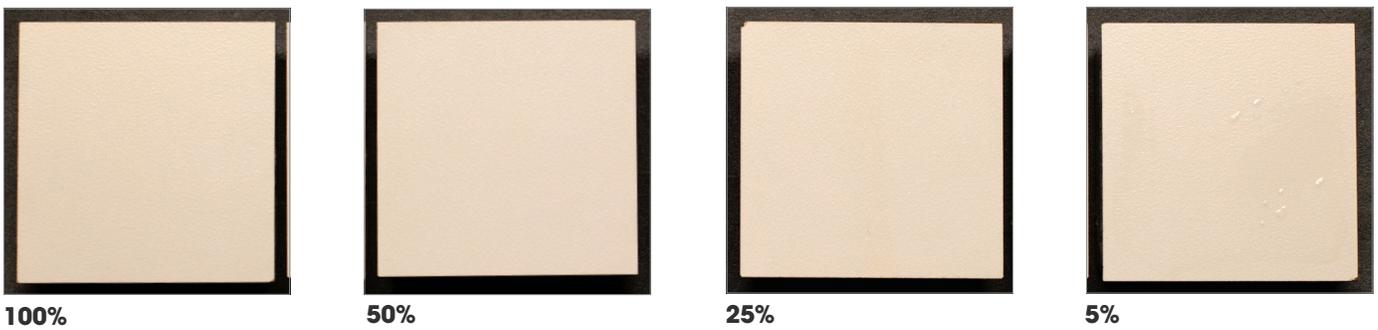


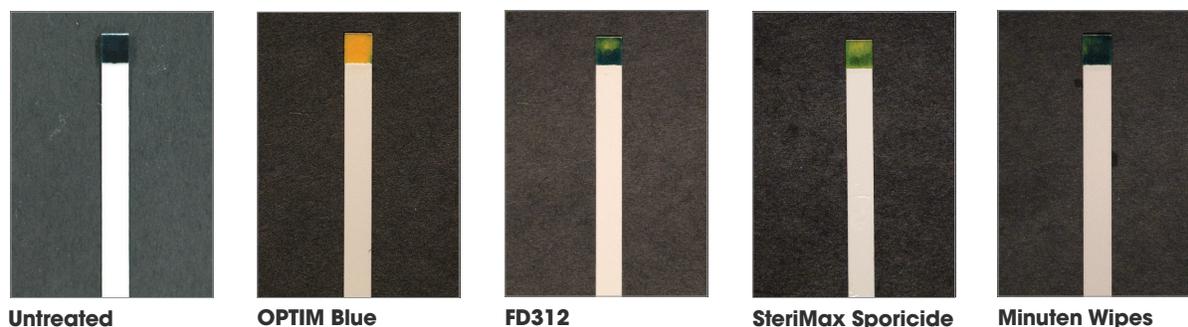
Figure 3. Blood tiles treated with high-alcohol surface disinfectant *Minuten Wipes* (100%, 50%, 25% and 5%)



Protein Detection

When looking at protein (hemoglobin) removal as a measurement of cleaning, *OPTIM Blue* was the only surface disinfectant to almost completely remove proteins from the tiles covered with 100% blood (Figure 4a-e). *SteriMax Sporicide*, although proficient at cleaning visible, organic debris, was unable to remove proteins down to an undetectable level, however, it did out-perform *Minuten Wipes* or *FD312* disinfectants. Lastly, high levels of protein were detected on the tiles treated with either *Minuten Wipes* or *FD312*.

Figure 4a-e. Hemastix protein removal (hemoglobin) test strips collected after cleaning/disinfectant a) Untreated, b) *OPTIM Blue*, c) *FD312*, d) *SteriMax Sporicide*, and e) *Minuten Wipes* (yellow = undetectable, green = some protein, dark green/blue = a lot of protein)



Conclusion:

In the present investigation, intermediate-level disinfectants containing chemical antimicrobials were evaluated for their cleaning capabilities. *OPTIM Blue* was the only disinfectant to successfully clean and remove proteins with a single application.