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Test report - Antiviral Activity against SARS-CoV-2 of textiles for personal protection (face masks)

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Tested textile product

- reference textile (ITU lab code: H1): Polyester 97%, Elasthan 3%: non treated
- antiviral textile (ITU lab code: H2): Polyester 97%, Elasthan 3%, treated with: Dimethyltetradecyl(3-(trimethoxysilyl)propyl)ammonium chloride, CAS: 41591-87-1

Method

- modified according to ISO 18184 (First edition 2014-09-01)
 - washing of all tested textiles with deionized water 10 times at 40°C, drying
 - cutting pieces of approximately 20x20mm and making up a mass of 0.4g with several pieces
 - sterilization at 121°C for 15 min, drying

- before starting the test conditioning the textiles overnight in a humid environment (incubator 37°C)
- controls: verification of cytotoxic effect and cell sensitivity to virus/inactivation of antiviral activity
- test: inoculation of 0.4g textile with 1ml virus suspension (titer at least 10⁷ TCID₅₀/ml); test virus: SARS-CoV-2 München,
 - washing out using 19 ml cell culture medium (MEM Eagle EBSS + 10% fetal calf serum + 1% non-essential amino acids, +1 % penicillin (10.000 U/ml) / streptomycin (10 mg/ml)) after specific time points
 - titration of washing solution in 96-well plate and titer calculation with method of Spearman and Karber in TCID/ml
 - comparison of titer from untreated textile (reference) and treated textile for the specific time points

Results

ITU lab code	H1						H2					
sequential nr.	1	2	3	4	5	6	1	2	3	4	5	6
textile after 30 min in log(10) TCID ₅₀ /ml*			4.85	5.35	4.975	4.975			4.225	4.225	4.35	4.35
Antiviral Activity after 30min in log(10)									0.625	1.125	0.625	0.625
Reduction after 30min in %									76.29	92.50	76.29	76.29
textile after 1h in log(10) TCID ₅₀ /ml			4.85	5.475	5.475	4.975			3.85	3.725	2.85	2.6
Antiviral Activity after 1h in log(10)									1	1.75	2.625	2.375
reduction after 1h in %									90.00	98.22	99.76	99.58
textile after 2h in log(10) TCID ₅₀ /ml			5.1	4.85	4.975	5.35			3.475	2.85	3.225	2.35
Antiviral Activity after 2h in log(10)									1.625	2	1.75	3
reduction after 2h in %									97.63	99.00	98.22	99.90
textile after 6h in log(10) TCID ₅₀ /ml	5.1	5.225	5.225	4.6	4.725	4.725	2.475	2.1	2.475	1.725	1.35	1.725
Antiviral Activity after 6h in log(10)							2.625	3.125	2.75	2.875	3.375	3
reduction after 6h in %							99.76	99.93	99.82	99.87	99.96	99.90
textile after 12h in log(10) TCID ₅₀ /ml			4.35	4.85	4.6	4.6			1.6	1.725	1.475	1.475
Antiviral Activity after 12h in log(10)									2.75	3.125	3.125	3.125
reduction after 12h in %									99.82	99.93	99.93	99.93

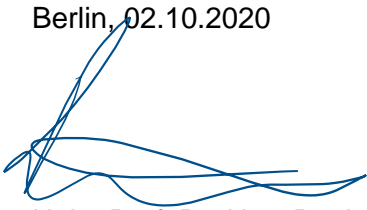
*TCID₅₀ per ml washing-out solution

Conclusion

The treated textile sample "H2" can efficiently inactivate SARS-CoV-2 over the time. The results show a reduction of infectious SARS-CoV-2 within 6 hours from 2.6 to 3.4 log-ranges in comparison to the untreated textile. This means a reduction rate up to 99.96 % after 6 hours. As a result of the inoculation of 0.4 g textile with 1 ml virus suspension, the whole textile was moistened. This allows the textile sample having the largest disinfectant effect, we assume.

The textile is able to absorb virus containing droplets and due to this textile treatment virus particles probably are continuously inactivated over the time. This improves the safety in handling of contaminated masks and may prevent smear infections.

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