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DISINFECTION EFFICIENCY OF IQ MOB 8 ON STAPHYLOCOCCUS AUREUS SSP.
AUREUS ATCC BAA-44 CONTAMINATED MOBILE PHONE

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Test material

Samples and their arrival dates are shown in Table 1.

Table 1. Samples for disinfection efficiency studies

Sample (Product)	Arrival date
IQ MOB 8	30.10.2015
IQ MOB 8	30.10.2015
Nokia Lumia 530	30.10.2015
Nokia Lumia 530	30.10.2015
<i>Staphylococcus aureus</i> ssp. <i>aureus</i> ATCC BAA-44	9.11.2015

Methods

Pretreatment of the mobile phones

Nokia Lumia 530 mobile phones were marked on the side of the phone to achieve 9 regular segments for the sample collection from both frontside and backside of the phone. Due to the different shape of the phone front and backside, the sample areas were 4.5 cm² and 2.76 cm², respectively (Figure 1).

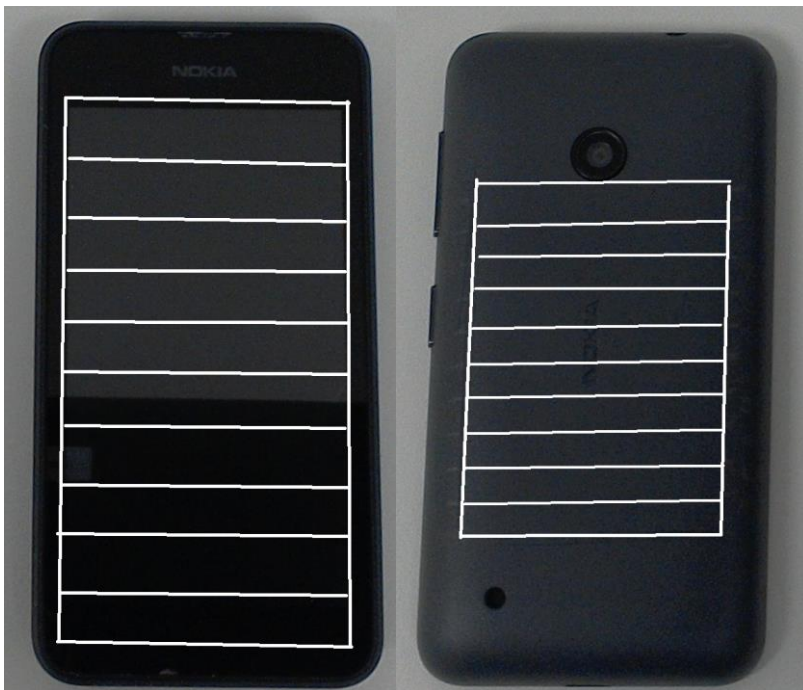


Figure 1. The sample area of the frontside and backside of Nokia Lumia 530. The bacteria were collected from one rectangular segment at each time point.

Both sides of the mobile phones were carefully wiped with 70% ethanol to remove all bacteria before the trials.

Trial 1.

Methicillin resistant *Staphylococcus aureus* ssp. *aureus* ATCC BAA-44 (type strain) colonies were transferred from Tryptic soy agar (TSA) plate into 10 ml of Tryptone soya broth and incubated at +37 °C overnight. Turbidity of the sample was adjusted to 0.5 McFarland with 0.9% sterile NaCl, and supplemented with 0.5% Tween 20. The sample was serially diluted and plated on TSA-plates.

Aliquotes of 100 µl (undiluted sample) were spread evenly on both sides of mobile phones, and were allowed to dry for 7.5 minutes and 5.5 minutes, respectively. The surface sample was taken with cotton swab from sample area (timepoint 0 minutes). The cotton part of the swab was cut with sterile scissors into 5 ml of 0.9% NaCl. The mobile phone was placed into IQ MOB 8 device and the lid was closed. With controls the device was not turned on while UV- treatment group was illuminated. Surface samples were taken from both sides of the phones at 2, 4, 6, 10, 15, 20, 25 or 30 minutes.

All surface samples were serially diluted, plated on TSA plates and incubated at +37 °C for 24h.

Trial 2.

Trial 2. was performed as trial 1, except that turbidity of bacterial sample was adjusted into 5 McFarland units and only 0, 2, 4, 6, 10 and 15 minute treatment times were tested

Trial 3.

Trial 3 was performed as trial 2, except that only 0, 2 and 4 minute treatments were tested.

Results

In trial 1, the 2 minute treatment with IQ MOB 8 was enough to reduce the *S. aureus* ssp *aureus* ATCC BAA-44 levels below the detection limit on both sides of mobile phone (Table 2). No bacteria were detected in controls on backside of the phone after 2 minutes and 30 minutes, but in all other timepoints low amounts of *S. aureus* ssp. *aureus* ATCC BAA-44 were detected.

In trial 2, higher *S. aureus* ssp. *aureus* ATCC BAA-44 levels were used for contamination of the mobile phones. The bacterial counts in control samples were roughly 100 times higher than in trial 1. Two minute treatment of the mobile phone frontside with IQ MOB 8 reduced the bacteria counts log 2,5 colony forming units (CFU)/cm². After four minutes, no bacteria were detected in the frontside of the mobile phone. Two minute treatment with IQ MOB 8 reduced the bacterial counts below the detection limit on the backside of the mobile phone. The bacterial counts in control samples varied between log 3,91-5.4 CFU/cm² (frontside) and log 4.76-5.06 CFU/cm² (backside).

In trial 3, two minute treatment with IQ MOB 8 reduced the *Staphylococcus aureus* ssp *aureus* ATCC BAA-44 levels below the detection limit on both sides of the mobile phone. The bacterial counts in control samples varied between log 4.58-4.95 CFU/cm² (frontside) and log 4.45-4.92 CFU/cm² (backside).

Table 2. Bacterial counts (log CFU/cm²) of *Staphylococcus aureus* ssp *aureus* ATCC BAA-44 contaminated mobile phone frontside and backside with and without treatment with IQ MOB 8 disinfection device, three separate trials.

	Time of treatment, minutes	log CFU/cm ² , trial 1	log CFU/cm ² , trial 2	log CFU/cm ² , trial 3
Frontside of mobile phone (control) _a	0	2,51	5,4	4,78
	2	2,38	4,66	4,58
	4	2,23	4,8	4,95
	6	2,58	4,79	ND
	10	2,35	3,91	ND
	15	2,04	4,18	ND
	20	1,84	ND	ND
	25	2,52	ND	ND
	30	1,96	ND	ND
Frontside of mobile phone (UV-treatment)	0	2,51	5,37	4,46
	2	<1,35*	2,8	<1,35*
	4	<1,35*	<1,35*	<1,35*
	6	<1,35*	<1,35*	ND
	10	<1,35*	<1,35*	ND
	15	<1,35*	<1,35*	ND
	20	<1,35*	ND	ND
	25	<1,35*	ND	ND
	30	<1,35*	ND	ND
Backside of the mobile phone (control) _b	0	2,33	4,98	4,92
	2	<1,56*	5,06	4,52
	4	2,38	4,84	4,45
	6	2,17	4,84	ND
	10	2,06	4,76	ND
	15	2,8	5,03	ND
	20	2,65	ND	ND
	25	2,22	ND	ND
	30	<1,56*	ND	ND
Backside of the mobile phone (UV-treatment)	0	2,33	4,57	4,79
	2	<1,56*	<1,56*	<1,56*
	4	<1,56*	<1,56*	<1,56*
	6	<1,56*	<1,56*	ND
	10	<1,56*	<1,56*	ND
	15	<1,56*	<1,56*	ND
	20	<1,56*	ND	ND
	25	<1,56*	ND	ND
	30	<1,56*	ND	ND

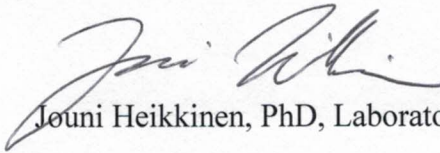
* Below the detection limit

ND Not determined

Conclusions

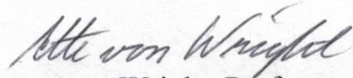
The IQ MOB 8-illumination reduced the methicillin resistant *Staphylococcus aureus* ssp. *aureus* ATCC BAA-44 levels on mobile phone surfaces below the detection limit within 2 minutes, except in trial 2 in which some growth was detectable on frontside of the phone at this time point (but not later). The antibacterial activity against *S. aureus* ssp. *aureus* ATCC BAA-44 was thus demonstrated.

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Note

We store the samples three months after reporting.

We will give the copies of all the laboratory data to client on request.