



ZAPRAY®

S U S T A I N A B L E D I S I N F E C T I O N

WHAT IF MANUAL DISINFECTION...

WOULD BE AUTOMATED
AND ELECTRONICALLY
VALIDATED ?



BECOMES MORE COST-
AND LABOR EFFICIENT ?



IS EFFECTIVE AGAINST SUPER-
BUGS AND CHEMICAL
RESISTENT ORGANISMS ?



No
consumables

100%
Silent

Long lifetime

Ultra low
power
consumption

Low
maintenance

recyclable

NO HEAT !

UV-C-LED DISINFECTION



**5 WATT
PER CYCLE**

REDUCING
ENERGY CONSUMPTION



NO HEAT

DISINFECTION
FOR ALL ELECTRONICS



**SUSTAINABLE
DISINFECTION**

REDUCING ECOTOXIC EXPOSURE.
SAVINGS ON CONSUMABLES



**AUTOMATED
&
VALIDATED**

REDUCING LABOR
COST & HUMAN ERROR

MANUAL DISINFECTION

Patient Safety:

Disinfection with wipes is manual and time consuming
=> Risk of human variation / error

Multi-Resistance:

Occurrence of **M**ulti-**D**rug or Heat **R**esistant (MDR) Organisms

HealthCare worker:

Exposed to chemicals => irritation of skin, eye & respiratory system

Not Sustainable:

Ecotoxic chemicals
Waste (wipes, bottles, ..)



Material robustness:

- Materials not always suited to heat or chemicals
- fragile ⇔ 'rubbing'



ZAPARAY UV-C LED DISINFECTION

Increased Patient Safety:

Automated and electronic validated process

No Resistance:

All DNA containing organisms are subject to UV-C disinfection. Without exception.

HealthCare workers benefits:

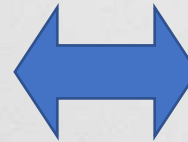
Reduced exposure to chemicals.
Less labour intense, faster disinfection.

Highly sustainable:

Less wipes : less waste : less chemicals.
Low energy consumption

Extended equipment lifetime:

Less damage to fragile materials.
No heat, no chemical residues.



ZAPARAY®
RAY-TWO



REAL TIME
UVC DOSE
LOGGING

100 mJ/cm²
UVC LED dose
per cycle

INTRODUCTION



UVC disinfection has been used in healthcare setting since 1930.

All organisms with DNA/RNA are sensitive to 270nm UVC-LED radiation.

Depending on the pathogen, a certain amount of radiation (mJ/cm²) results in a certain reduction (LOG x)

ZAPARAY's unique UVC-LED technology has been tested in multiple laboratories.

Tests with the RAY-ONE have proven up to a LOG 7,2 reduction for viral contamination and

a >LOG 9 reduction of *Staphylococcus Aureus*.

ZAPARAY invests heavily in academic research as UVC-LEDs are novel radiation sources. Multiple studies are ongoing in collaboration with Ghent University and other research partners.



UVC sensitivity of *Bacillus subtilis*

Spore	Lamp Type	Fluence (UV dose) (mJ/cm ²) for a given log reduction without photoreactivation					Protocol?	Notes	Reference
		1	2	3	4	5			
<i>Bacillus subtilis</i>									
ATCC 6633	LP	12	18	24	30	36	yes		Quails & Johnson 1983
ATCC 6633	LP	36	48	59	77		yes		Chang et al. 1985
ATCC 6633	LP	28	40	50			yes		Sommer et al. 1998
ATCC 6633	LP	19	40	60	81		yes		Sommer et al. 1999

[DOWNLOAD](#)

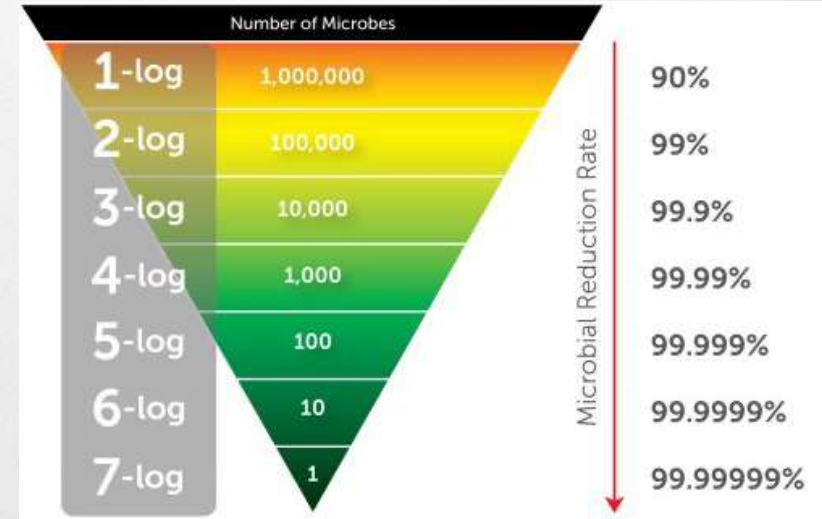
External studies have documented the UVC radiation dose required to reduce pathogens. This dose is measured in mJ/cm²

A typical dose required for a 99,99% (LOG4) bacterial reduction is +-10mJ/cm².

ZAPARAY's RAY-TWO provides > 100mJ/cm² with a single radiation cycle.

Online reference literature:

[NIST](#) - [IUVA](#)



Pathogen		mJ/cm ²	reduction
<i>Clostridium difficile</i>	spores	46	LOG 3
<i>Escherichia coli</i>	bacterial	10	LOG 5
MRSA	bacterial	10	LOG 3
<i>Candida albican</i>	yeast	56	LOG 4
Norovirus	virus	27	LOG 4
Poliovirus	virus	30	LOG 4
Adeno virus	virus	100	LOG 4
<i>Bacillus subtilis</i>	spore	81	LOG 4

As tested with the RAY-TWO:

Porcine respiratory Coronavirus
 Staphylococcus aureus
 Pseudomonas aeruginosa
 Mycobacterium terrae

The results were in line with available UVC literature:
 Historical laboratory results for these 4 pathogens



LOG 1 to 6 : measured doses

Bacterium	Lamp Type	1	2	3	4	5	6
<i>Staphylococcus aureus</i>							
	LP	2.1	3.2				
(hem)	LP	2.6					
ATCC 25923	LP	3.9	5.4	6.5	10		
ATCC 25923	LP	4.4	5.8	6.4	7.3	9	

		Fluence (UV Dose) (mJ cm ⁻²) for a Given Log Reduction Without Photoreactivation							
Bacterium	Lamp Type	1	2	3	4	5	6	Notes	Reference
<i>Pseudomonas aeruginosa</i>									
ATCC 10145	LP	2.8	5.5	7	9.3				[27]
ATCC 15442	LP	1.6	3	4.8	8				[28]
NCTC 13437 – Antibiotic resistant	LP	0.7	1.5	2.3	6				[31]
<i>Mycobacterium terrae</i>									
ATCC 15755	LP	3.8 ± 1.3	9.3	16					[35, 36]

LOG1 dose for PRCV: 1,3mJ/cm²

Porcine Respiratory Coronavirus (PRCV)	254	1.3*
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Heßling et al.: Ultraviolet irradiation doses for coronavirus inactivation ...

VIRAL TEST

>99,99999%
REDUCTION

8,4 mJ/cm²
UVC LED dose
radiated

Onderwerp: Re: field tests UVC LED disinfecter RAY-ONE

Datum: vrijdag 29 januari 2021 om 13:11:34 Midden-Europese standaardtijd

Van: Hans Nauwynck

Aan: Duncan Verstraeten - ZAPARAY

1° Material and methods

Virus: porcine respiratory coronavirus - virus titer: $10 \exp 8.0 \text{TCID}_{50}/\text{ml}$ (surrogate for SARS-CoV-2)
Aliquots of 250µl of virus were brought into one well of the special 6-well plates (FEP models), delivered by the company. One 6-well plate was not exposed to UV-C light (control). The other 6-well plates were exposed to UV-C light of the device ZAPARAY RAY-ONE. Positions in the device and exposure times changed depending on the experiment (see results).
Afterwards, the fluids were collected and titrated on ST-cells.

2° Results

Control

Virus titer in non-exposed 6-well plate: $10 \exp 8.0 \text{TCID}_{50}/\text{ml}$ (reference control value)

Experiment 1 (ZAPARAY RAY-ONE with reflectors)

Three 6-well plates were placed at three different positions in the device (Center, Lateral, Front) as mentioned in the proposal. Two exposure times were used: 30 seconds and 60 seconds

- Center UV-C exposed for 30": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)
- ~~Lateral UV-C exposed for 30": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)~~
- Front UV-C exposed for 30": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)
- Center UV-C exposed for 60": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)
- Lateral UV-C exposed for 60": $10 \exp 2.8 \text{TCID}_{50}/\text{ml}$
- Front UV-C exposed for 60": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)

Experiment 2 (ZAPARAY RAY-ONE with reflectors)

Four 6-well plates were used. They were enclosed in a plastic bag. The plate was positioned in the center of the device as mentioned in the proposal. Four exposure times were used: 30, 60, 90 and 120 seconds.

- Center UV-C exposed for 30": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)
- ~~Center UV-C exposed for 60": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)~~
- Center UV-C exposed for 90": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)
- Center UV-C exposed for 120": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)

Experiment 4 (ZAPARAY RAY-ONE without reflectors)

Four 6-well plates were used. The plate was positioned in the front of the device as mentioned in the proposal. Four exposure times were used: 10, 20, 40 and 60 seconds.

- Front UV-C exposed for 10": $10 \exp 5.6 \text{TCID}_{50}/\text{ml}$
- ~~Front UV-C exposed for 20": $10 \exp 2.0 \text{TCID}_{50}/\text{ml}$~~
- Front UV-C exposed for 40": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)
- Front UV-C exposed for 60": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)

3° Conclusions

The device ZAPARAY RAY-ONE with and without reflectors is powerful to inactivate coronaviruses. Within 1 minute a virus reduction of $>5 \log_{10}$ was obtained (mostly $>7.2 \log_{10}$). A plastic bag did not affect the inactivating power of the device. Without reflectors, the ZAPARAY RAY-ONE was still very performant.

Experiment 3 will be performed next Monday (results on Friday).

Onderwerp: Experiment 3

Datum: zondag 7 februari 2021 om 12:27:19 Midden-Europese standaardtijd

Van: Hans Nauwynck

Aan: Duncan Verstraeten - ZAPARAY

1° Material and methods

Virus: porcine respiratory coronavirus - virus titer: $10 \exp 8.0 \text{TCID}_{50}/\text{ml}$ (surrogate for SARS-CoV-2)
Aliquots of 250µl of virus were brought into one well of the special 6-well plates (FEP models), delivered by the company. One 6-well plate was not exposed to UV-C light (control). The other 6-well plates were exposed to UV-C light of the device ZAPARAY RAY-ONE. Positions in the device and exposure times changed depending on the experiment (see results).
Afterwards, the fluids were collected and titrated on ST-cells.

2° Results

Control

Virus titer in non-exposed 6-well plate: $10 \exp 8.0 \text{TCID}_{50}/\text{ml}$ (reference control value)

Experiment 3 (ZAPARAY RAY-ONE with reflectors)

Seven 6-well plates were prepared and placed one by one at the front left side of the device as mentioned in the proposal. Increasing exposure times were used: 5, 10, 15, 20, 30, 40 and 60 seconds.

- Front UV-C exposed for 5": $10 \exp 5.6 \text{TCID}_{50}/\text{ml}$
- Front UV-C exposed for 10": $10 \exp 2.8 \text{TCID}_{50}/\text{ml}$
- Front UV-C exposed for 15": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)
- Front UV-C exposed for 20": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)
- Front UV-C exposed for 30": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)
- Front UV-C exposed for 40": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)
- Front UV-C exposed for 60": $\leq 10 \exp 0.8 \text{TCID}_{50}/\text{ml}$ (negative)

3° Conclusions

The device ZAPARAY RAY-ONE with reflectors is powerful to inactivate coronaviruses. Within 15 seconds a virus reduction of $>7.2 \log_{10}$ was obtained.

Prof. dr. Hans Nauwynck

Laboratory of Virology
Faculty of Veterinary Medicine
Ghent University
Salisburylaan 133
9820 Merelbeke



BACTERIAL TEST
(GRAM POS)

>99,9% REDUCTION

25,2 mJ/cm²
UVC LED dose radiated

Evaluation of the Efficacy of a UV Light Disinfection System.

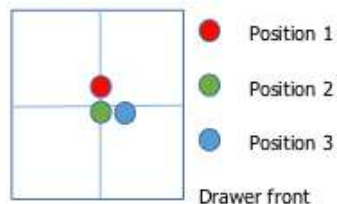
Client Details: **Zaparay**
Client Contact Name: Mieke Flour
Client Email: mieke@zaparay.com

PO Number: -
Date Of Report: 11/08/21

Melbec Reference Number: **30054**

Method Overview:

Mix test organism and Bovine Serum Albumin (low level soiling as per EN14561).
Add 50µl of the test mixture onto one face of a 2cm stainless steel cube (as per EN13697).
Test each face orientation individually.
Dry onto the surface.
Place triplicate test cubes in the drawer (see diagram below).
Set the machine for 30 minutes. At 3 min open the drawer to stop the machine and remove the cubes.
Prepare control cubes in the same way as the test cubes but without exposure to UV.
After exposure recover the organisms from the cubes by placing the cube face down onto glass beads in 10ml of saline.
Tenfold serially dilute to obtain countable numbers and carry out pour plates using TSA (35 - 38°C, 48h±6h).
Log reduction after exposure calculated by comparison of test recovery and control recovery.



Layout of Test Discs in Drawer (5cm between centre points)

Test Organism:
Staphylococcus aureus ATCC 6538

Test Results:

Recovery from Test Cubes.

Test Replicate & position	Orientation of Inoculated Face Cfu/cube face					
	Facing the Back of the Drawer	Facing the Front of the Drawer	Facing the Right of the Drawer	Facing the Left of the Drawer	Facing Upwards	Facing Downwards
1	1.32 x 10 ⁵	1.10 x 10 ³	4.40 x 10 ⁴	4.20 x 10 ⁵	2.50 x 10 ⁵	6.80 x 10 ⁴
2	3.10 x 10 ⁴	2.00 x 10 ³	1.70 x 10 ⁴	1.37 x 10 ⁴	2.70 x 10 ⁵	4.10 x 10 ³
3	1.60 x 10 ⁴	3.20 x 10 ³	8.00 x 10 ³	8.80 x 10 ⁴	4.20 x 10 ⁴	2.60 x 10 ⁴
Mean Log	4.76	3.32	4.36	5.24	5.27	4.51

Recovery from Control Cubes:

Test Replicate	Cfu/cube face
1	1.90 x 10 ⁸
2	1.70 x 10 ⁸
3	2.30 x 10 ⁸
Mean Log	8.29

Log Reduction of Test Organism on Test Cube Compared to Control Cube:

Orientation of Inoculated Face Mean Log Reduction					
Facing the Back of the Drawer	Facing the Front of the Drawer	Facing the Right of the Drawer	Facing the Left of the Drawer	Facing Upwards	Facing Downwards
3.53	4.97	3.93	3.05	3.02	3.78

Ambient Temperature (°C) and Relative Humidity Values (%):

	Orientation of Inoculated Face					
	Facing the Back of the Drawer	Facing the Front of the Drawer	Facing the Right of the Drawer	Facing the Left of the Drawer	Facing Upwards	Facing Downwards
Ambient Temperature	20.4°C	20.0°C	20.0°C	20.3°C	20.4°C	20.0°C
Relative Humidity	56.5	52.8	53.9	52.7	52.0	51.2

	Control
Ambient Temperature	19.7°C
Relative Humidity	52.5

Conclusion:

Exposure to the UV light in the prototype device gave a reduction of the test organism on each face of the cube. There was some variability depending on the orientation of the cube.

BACTERIAL TEST
(GRAM NEG)

Evaluation of the Efficacy of a UV Light Disinfection System.

Client Details: **Zaparay**
 Client Contact Name: Mieke Flour
 Client Email: mieke@zaparay.com
 PO Number: -
 Date Of Report: 19/09/21
Melbec Reference Number: 31680

Test Organism:
Pseudomonas aeruginosa ATCC 15442

Test Results

Test Organism	Test Replicate & position	Test	cfu/disc		Log Reduction (Mean Control Log – Test Log)	Mean Log Reduction (Mean Control Log – Mean Test Log)
			Control Replicate	Control		
<i>Pseudomonas aeruginosa</i>	1	3.2×10^2	1	4.80×10^6	4.05	>5.06
	2	$<1.0 \times 10^1$	2	4.00×10^6	>5.56	
	3	$<1.0 \times 10^1$	3	2.10×10^6	>5.56	
	Mean Log	<1.50	Mean Log	6.56	-	

>99,999% REDUCTION

Method Overview:

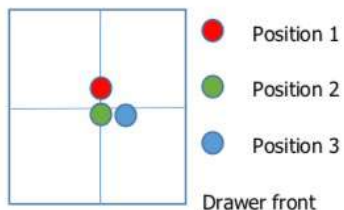
Mix test organism and Bovine Serum Albumin (low level soiling as per EN14561). Add 50µl of the test mixture onto the surface of a 2cm stainless steel discs (as per EN13697) Dry onto the surface. Place triplicate test discs in the drawer (see diagram below). Set the machine for 30 minutes. At 5 min open the drawer to stop the machine and remove the discs. Prepare control discs in the same way as the test discs but without exposure to UV. After exposure recover the organisms from the discs by placing the disc face down onto glass beads in 10ml of saline. Tenfold serially dilute to obtain countable numbers and carry out pour plates using Malt Extract Agar (29 - 31°C, 48h±6h). Log reduction after exposure calculated by comparison of test recovery and control recovery.

Relative Humidity and Temperature

Test Organism	RH %	Temp °C
<i>Pseudomonas aeruginosa</i>	56.7	23

Conclusion:

Exposure to the UV light in the prototype device gave a mean log reduction of >5.06 for the *Pseudomonas aeruginosa* with a contact time of 5 minutes.



Layout of Test Discs in Drawer

42 mJ/cm2
UVC LED dose radiated

Evaluation of the Efficacy of a UV Light Disinfection System.

Client Details: **Zaparay**
 Client Contact Name: Mieke Flour
 Client Email: mieke@zaparay.com

PO Number: -
 Date Of Report: 16/01/22

Melbec Reference Number: **35994 – *Mycobacterium terrae***

Method Overview:

Mix test organism and Bovine Serum Albumin (low level soiling as per EN14561). Add 50µl of the test mixture onto the surface of a 2cm stainless steel discs (as per EN13697) and spread over the entire surface. Dry onto the surface. Place two test discs in the drawer, one disc directly on the weak spot and one disc directly on the powerful spot. Set the machine for 30 minutes. At 5 min open the drawer to stop the machine and remove the discs. Prepare control discs in the same way as the test discs but without exposure to UV. After exposure recover the organisms from the discs by placing the disc face down onto glass beads in diluent. Tenfold serially dilute to obtain countable numbers and carry out pour plates using Middlebrook and Cohn 7 H 10 medium with 10 % OADC enrichment (36°C±1°C, 21d). Log reduction after exposure calculated by comparison of test recovery and control recovery. Carry out two runs.

Test Organism:
Mycobacterium terrae NC 10856

Test Results:

Test Organism	Test Run	cfu/disc log/disc			Log Reduction (Control Log – Test Log)	
		Test		Control	Weak	Strong
		Weak	Strong			
<i>Mycobacterium terrae</i>	1	1.0 x 10 ¹ 1.0	<1.0 x 10 ¹ <1.0	1.85 x 10 ⁷ 7.27	6.27	>6.27
	2	1.0 x 10 ¹ 1.0	<1.0 x 10 ¹ <1.0	1.19 x 10 ⁷ 7.08	6.08	>6.08

Conclusion:

Exposure to the UV light in the prototype device gave log reductions of >6.0 for the *Mycobacterium terrae*. There did not appear to be a significant difference in the reductions achieved on the strong and weak spots in the machine.

MYCO-BACTERIA TEST

99,9999% REDUCTION

100 mJ/cm² UVC LED dose radiated

All tests are conducted using *Staphylococcus aureus* ATCC 25923

- Inoculation with a 10 µL droplet of a petri-dish followed by a 5 minute disinfection cycle using ZAPARAY RAY-ONE prototype 0/102



Petri dish	Cfu/mL		Log reduction (log control – log test)
	Test	Control	
EXPERIMENT 20221012	0	1,00E+09	> 9
EXPERIMENT 20221120	0	1,08E+09	> 9,03
EXPERIMENT 20221121	0	1,20E+09	> 9,08

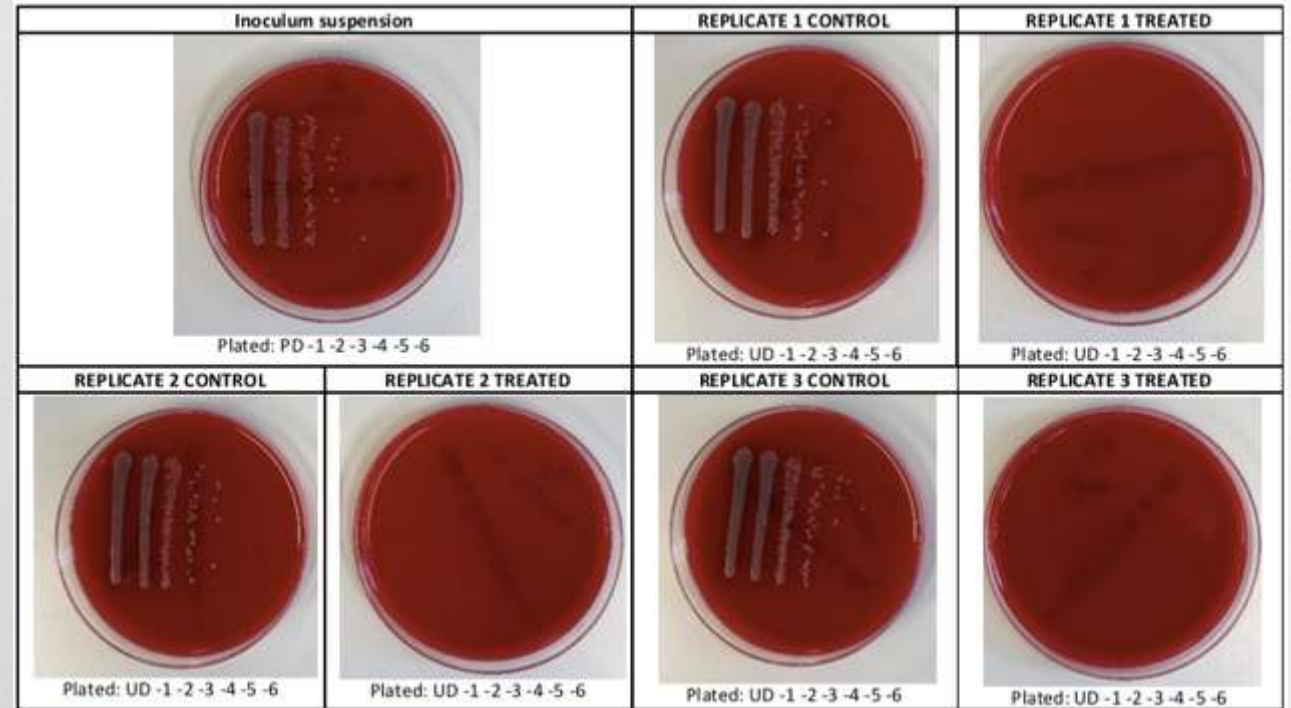
- Inoculation of a **nose sensor** followed by a 5 minute disinfection cycle using ZAPARAY RAY-ONE prototype 0/102



Nose sensor	Cfu/mL		Log reduction (log control – log test)
	Test	Control	
EXPERIMENT 20221127	0	2,09E+05	> 5,32
EXPERIMENT 20221129	0	2,61E+05	> 5,42

Tests performed on disposable video-laryngoscope blade without pre-cleaning

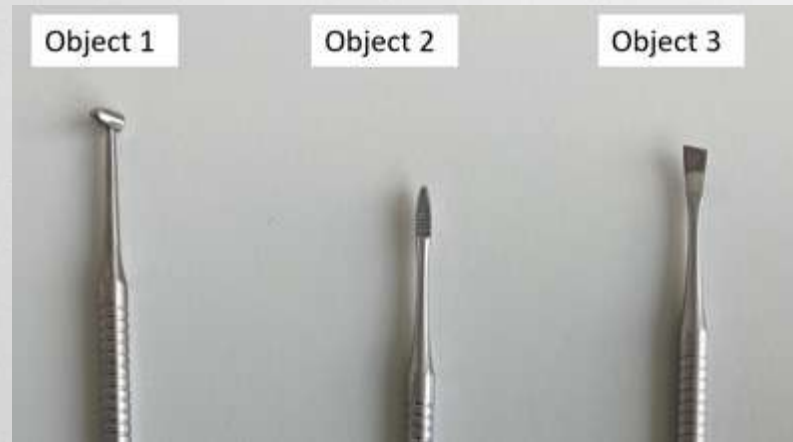
1. Inoculation followed by a 5 minute disinfection cycle using ZAPARAY RAY-ONE prototype 0/102



sample	Cfu/mL		Log reduction (log control – log test)
	Control	Treated	
Replicate 1	6,70E+06	0,00E+00	> 6,83
Replicate 2	8,60E+06	0,00E+00	> 6,93
Replicate 3	1,29E+07	0,00E+00	> 7,11

Tests performed on dental instruments **with (2)** and **without (1) pre-cleaning**

1. Inoculation followed by a 5 minute disinfection cycle using ZAPARAY RAY-ONE prototype 0/102



Experiment	LOG REDUCTION		
	Object 1	Object 2	Object 3
20221025	3,81	>7,00	>6,62
20221107	3,08	4,26	>6,48
20221108	3,50	4,15	>6,20
20220913	2,41	>6.75	>6,38
20220928	3,73	3,51	>6,34
mean	3,31	5,13	>6,40
stdev	0,58	1,62	0,16

2. Inoculation followed by a **3 second rinsing step** under running water followed by a 5 minute disinfection cycle using ZAPARAY RAY-ONE prototype 0/102

EXPERIMENT 20221127	Cfu/mL		Log reduction (log control – log test)
	Test	Control	
Object 1	0	6,00E+03	3,78
Object 2	0	1,31E+04	4,12
Object 3	0	3,60E+03	3,56

SUMMARY:

without pre-cleaning : influence of object shape

with pre-cleaning : total reduction

2022-2023 MICROBIOLOGICAL TESTING – UNIVERSITY GHENT – LBR – LLID laboratories

OVERVIEW PRELIMINARY TEST RESULTS HANNAH SIWE		LAST UPDATED		3/07/23	
Experiments on nose sensors					
experiment ID	untreated control	treated	log reduction		
non rinsed in third hand	20221127	1,64E+05	0,00E+00	>5,21	
	20221129	1,38E+05	0,00E+00	>5,14	
	20230110	1,18E+05	0,00E+00	>5,07	
non rinsed directly in drawer (15mL)	20230322	3,80E+04	0,00E+00	>4,58	
	20230327	9,60E+04	6,00E+03	1,2	
		1,20E+05	0,00E+00	>5,08	
	20230404	7,40E+04	6,80E+04	1,04	
		1,28E+05	0,00E+00	>5,11	
20230426	3,00E+04	2,00E+02	2,18		
non rinsed directly in drawer (10 mL)	20230502	4,20E+04	0,00E+00	>4,62	
		7,20E+04	6,00E+02	2,08	
	7,20E+04	0,00E+00	>4,86		
non rinsed directly in drawer (new protocol, swab)	20230604	1,50E+04	0,00E+00	>4,18	
	20230626	1,08E+05	0,00E+00	>5,0	
		1,68E+05	0,00E+00	>5,2	
		1,62E+05	0,00E+00	>5,2	
Experiments on laryngoscope blades					
experiment ID	untreated control	treated	log reduction		
non rinsed, directly in drawer	20230116	7,40E+06	0,00E+00	>6,87	
		5,20E+06	0,00E+00	>6,72	
		6,80E+06	0,00E+00	>6,83	
	20230124	4,60E+06	0,00E+00	>6,66	
non rinsed, directly in drawer in UVC through bag	20230610	9,60E+06	0,00E+00	>6,98	
		20230124	1,44E+07	0,00E+00	>7,16
	1,15E+07	0,00E+00	>7,06		
rinsed, directly in drawer	20230320	4,80E+05	0,00E+00	>5,68	
		1,86E+06	0,00E+00	>6,27	
	20230610	2,60E+05	0,00E+00	>5,41	
		5,00E+05	0,00E+00	>5,70	
		2,60E+05	0,00E+00	>5,41	
Experiments on video laryngoscope blades					
experiment ID	untreated control	treated	log reduction		
swabbing of 6 different areas	20230626	growth detected 6/6	no growth detected 6/6	NA	
Experiments on echoprobes					
experiment ID	untreated control	treated	log reduction		
swabbing of 8 different areas	20230103	growth detected 8/8	no growth detected 8/8	NA	

10 µL S. aureus in petri dish at 5 minutes		experiment ID	untreated control	treated	log reduction	
(predilution in 1000 µL)		20221012			0,00E+00	
		20221120			0,00E+00	
		20221121	1,00E+09		0,00E+00 >9	
		20221206			0,00E+00	
		20221213	7,40E+08		0,00E+00 >8,87	
		20221218			0,00E+00	
		20230109	7,60E+08		0,00E+00 >8,88	
		20230110			0,00E+00	
		20230306	1,08E+09		0,00E+00 >9,03	
		20230307	7,80E+08		0,00E+00 >8,89	
		20230312	8,20E+08		0,00E+00 >8,91	
		20230321				
		20230506	1,48E+09		0,00E+00 >9,17	
		20230512	1,33E+09		0,00E+00 >9,12	
(predilution in 100 µL)		20230606	7,60E+08		0,00E+00 >8,88	
		20230608				
		20230630				
10 µL S. aureus in petri dish at different time points		experiment ID	untreated control	treated	log reduction	
5 sec		20230522	9,00E+08	4,00E+05	3,35	
10 sec		20230522	9,00E+08	0,00E+00	>8,95	
		20230516	1,36E+09	0,00E+00	>9,13	
		20230512	1,33E+09	0,00E+00	>9,12	
20 sec		20230512	1,33E+09	0,00E+00	>9,12	
40 sec		20230512	1,33E+09	0,00E+00	>9,12	
2 min		20230512	1,33E+09	0,00E+00	>9,12	
3 min		20230512	1,33E+09	0,00E+00	>9,12	
10 µL S. pneumoniae in petri dish at different time points		experiment ID	untreated control	treated	log reduction	
5 sec		20230522	1,94E+07	0,00E+00	>7,29	
10 µL P. aeruginosa in petri dish at different time points		experiment ID	untreated control	treated	log reduction	
5 sec		20230522	1,14E+09	1,00E+04	5,06	



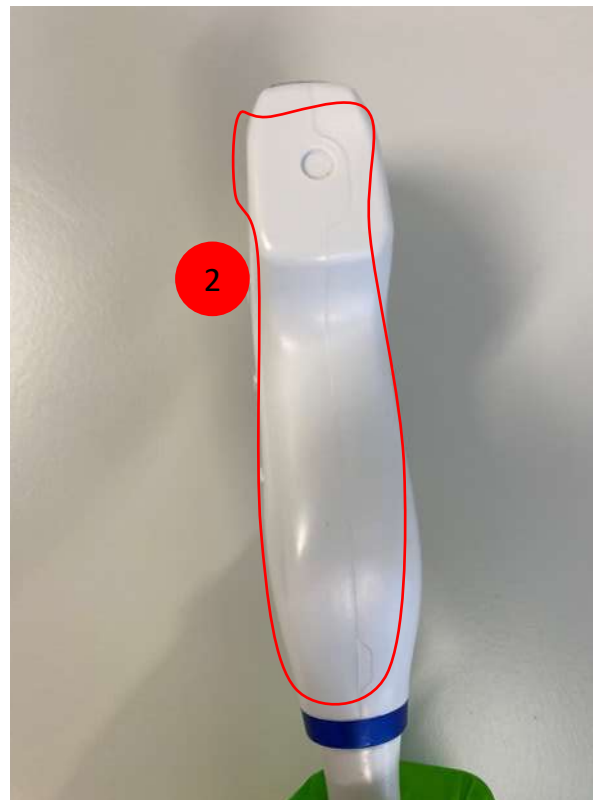
ZAPRAY®
S U S T A I N A B L E D I S I N F E C T I O N

ECHOPROBES



ECHOPROBES

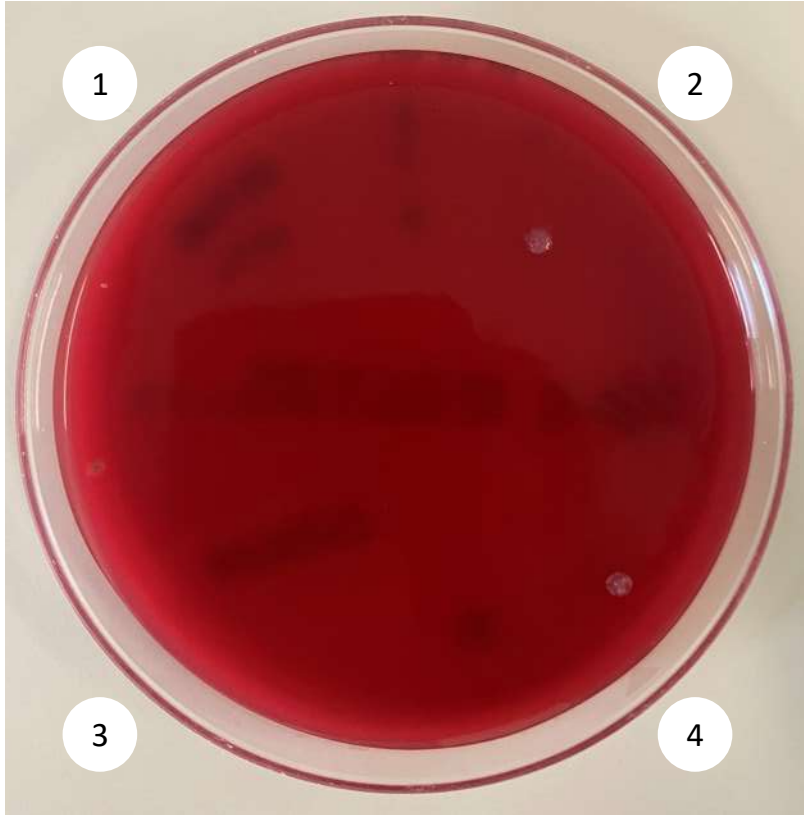
- Received the probes on Friday at 16h, both were disinfected by Tristel DUO LT by the healthcare workers. While putting the probes in the cart, there was a risk of cross contamination from the hands handling the instruments.
- Swabs were taken on 4 areas in two tests:
 - right after receiving the probes from Poli Gynaecologie
 - after they have been exposed to a 5 minute UV-C-LED cycle



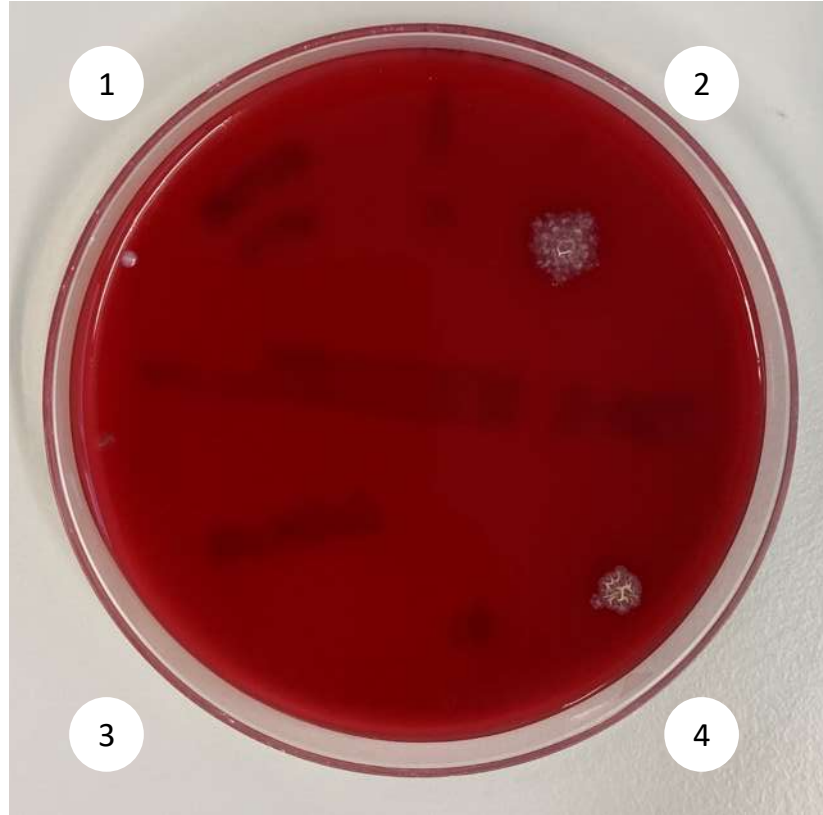
ECHOPROBES

RESULTS OF SWABS AFTER RECEIVING THE PROBES

24 hours at 37°C



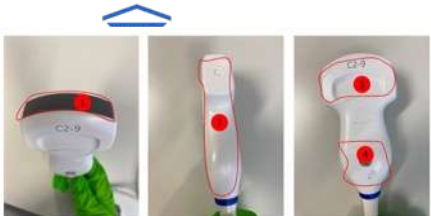
48 hours at 37°C



72 hours at 37°C



> yeast



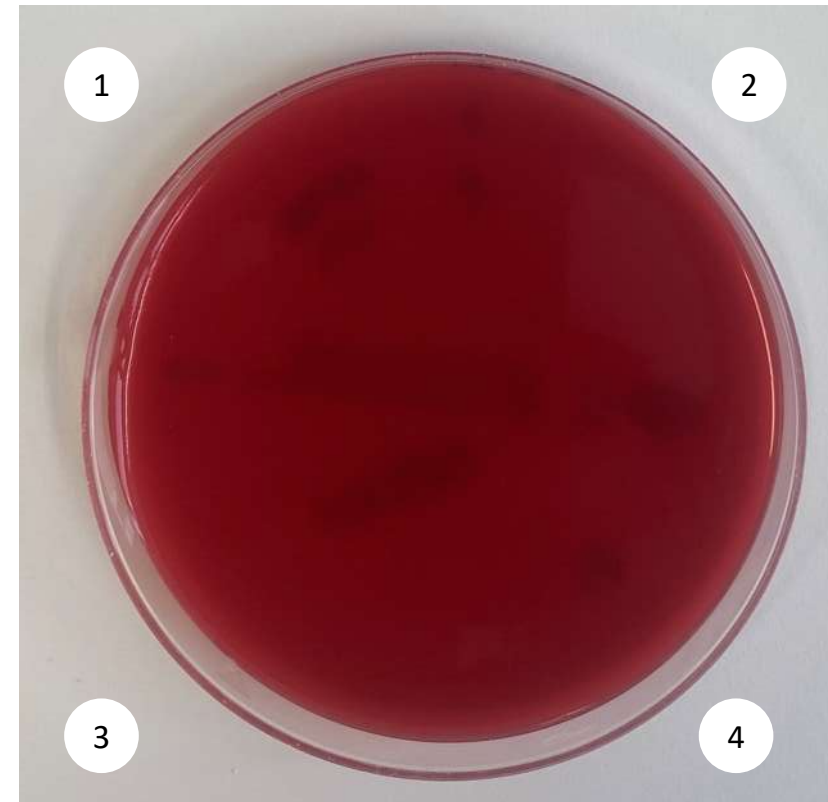
ECHOPROBES

RESULTS OF SWABS AFTER RECEIVING THE PROBES THAT WERE UVC EXPOSED

24 hours at 37°C

48 hours at 37°C

72 hours at 37°C



ECHOPROBES

Swabs were taken on 4 areas in two tests:

- right after receiving the probes from Poli Gynaecologie
- after they have been exposed to UVC 5 minute cycle

First conclusion:

The probes were contaminated prior to this test. A non defined organism was found on the surface, especially around the 'high-touch areas' 2 and 4. Some ultrasound gel residue was found in the cavity of area 4.

After a UVC-LED radiation cycle of 5 minutes, there was no longer a contamination found on the devices.



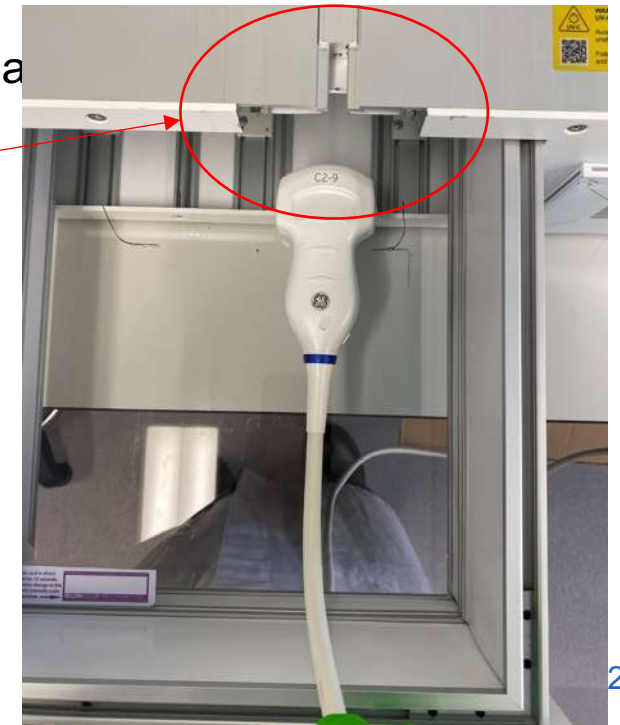
ECHOPROBES - PHASE TWO

Protocol: infecting the probes with a *Staphylococcus aureus* LOG9 inoculum.

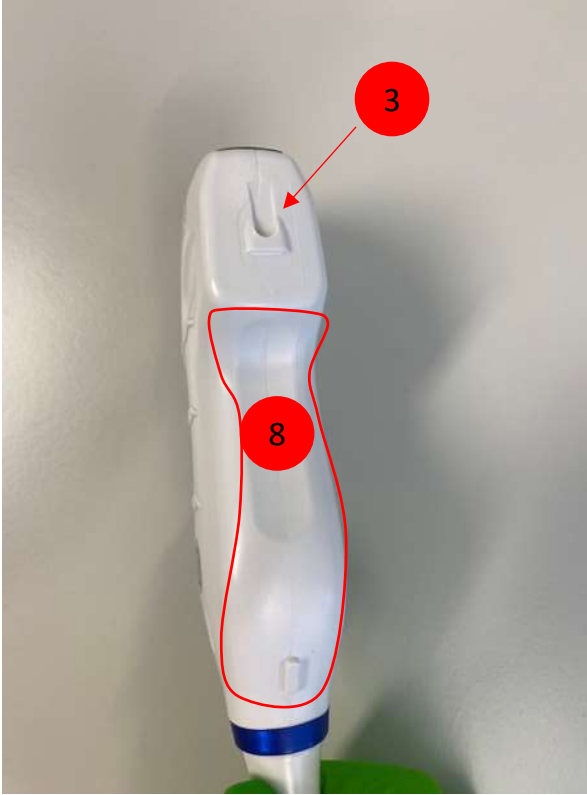
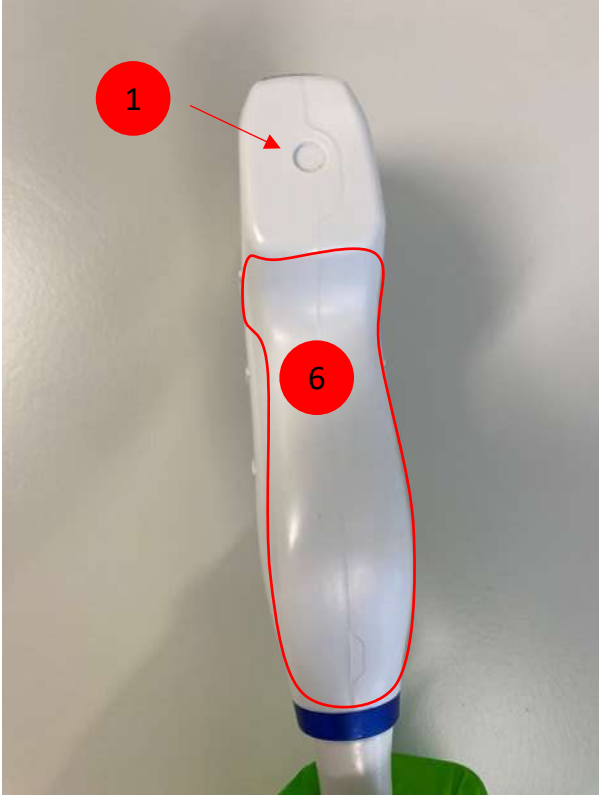
- d-3 plating of bacteria from -80°C and d-1 passaging by picking up one colony from d-3 plate and replating
- Objects inoculated by dipping tissue in a 50 mL tube containing 45 mL inoculum suspension and rubbing over the front and sides of the echoprobes. Then, dipping again and rubbing the inoculum over the echoprobes for a second time
 - OD: 1,5214 = $1,35\text{E}+09$ cfu/mL
- Collection of bacteria on objects by dipping a sterile cotton swab in saline a area + plating a quadrant.
- Objects placed directly in the RAY-ONE UV-C-LED device drawer.

Object in drawer

- The RAY-ONE device was adapted to facilitate the cable part of the probe. In order for most of the cable and the connector to remain outside of the device
- Object was not centered in the drawer during radiation because the “cut out” for the cable was off center (object had tendency to shift left or right)



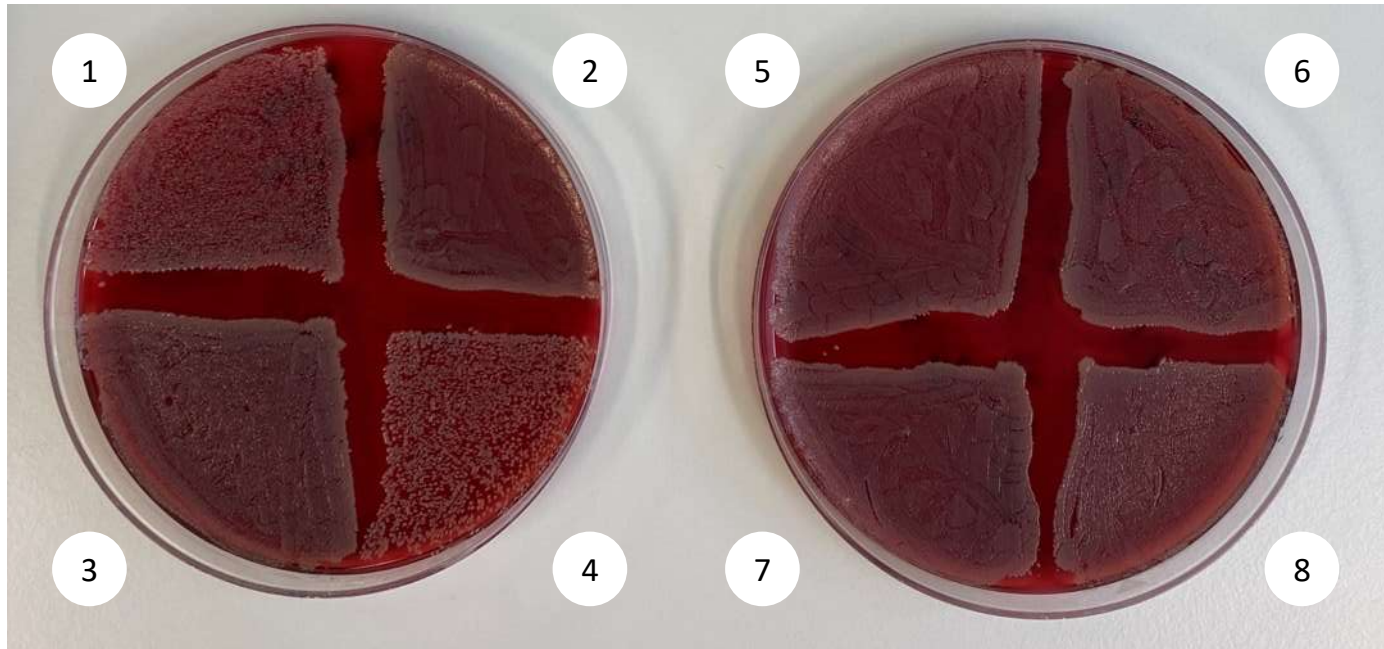
ECHOPROBES - PHASE TWO



Contamination areas

ECHOPROBES

UNTREATED



TREATED



ECHOPROBES

Second conclusion:

The non-treated echoprobes show a significant growth.

The UVC-LED radiated probes do not show any remaining organism

UNTREATED



TREATED

