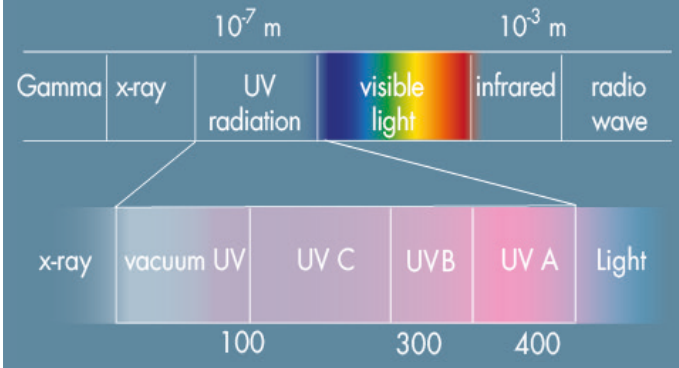
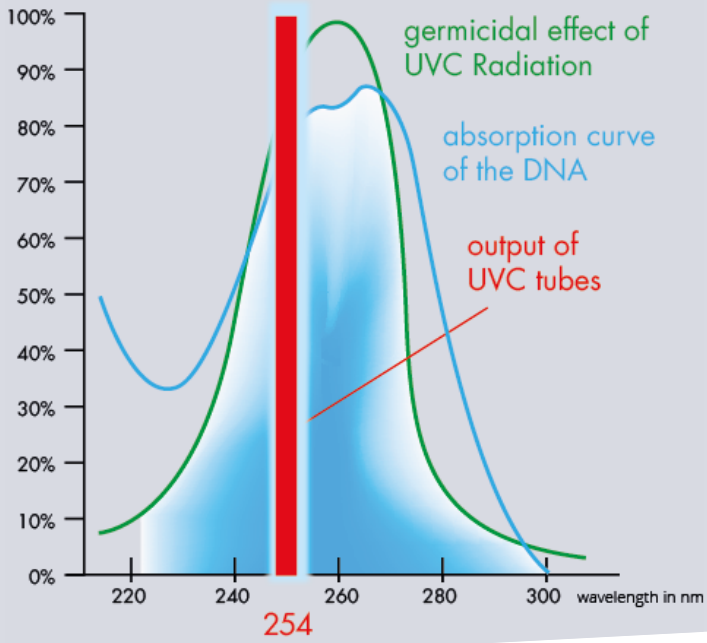
The principle of UVC disinfection

with UVC_{254nm} against all types of microorganisms

Hygiene and sterilization with UVC is more important than ever in times of convenience food, MRSA in hospitals, globalization and industrial agriculture. Particularly where quality and safety are of great importance for humans, animals and products, this efficient and powerful method is used. Why and how the UVC technology operates without residue around the clock and without the use of chemicals against all types of microorganisms, has been scientifically proven.



UV radiation is generally divided into the areas of UVA, UVB and UVC. UV radiation has a shorter wavelength and more energy than visible light. By the term UVC disinfection, it therefore does not bond the entire range of 100-300 nm, but particularly the range around 260 nm, where the DNA is most sensitive. There, the energy of the photons reacts with the DNA and destroys it.



An analysis of the disinfection level of UVC (green line) shows the highest efficiency between 240-280 nm with a maximum at 260 nm. If you compare the absorption spectrum of the genetic material (DNA, blue line), you see an almost identical course.

The DNA molecule consists of four basic building blocks (adenine, thymine, guanine and cytosine) in a double helix. If two thymines are next to each other, the UVC acts by destroying the connection to the opposite strand and linking them to form stable dimers. UVpro tubes emit most of their photons at 254 nm (red bar), exactly at the maximum of DNA destruction.

The higher the UVC intensity [mW / cm²] and longer the irradiation time [s], the higher the UVC dose [mJ / cm²] and thus the number of lethal DNA damages for the microorganisms.

↓

Thymine dimer formation in the DNA
Uracile dimer in the RNA

↓

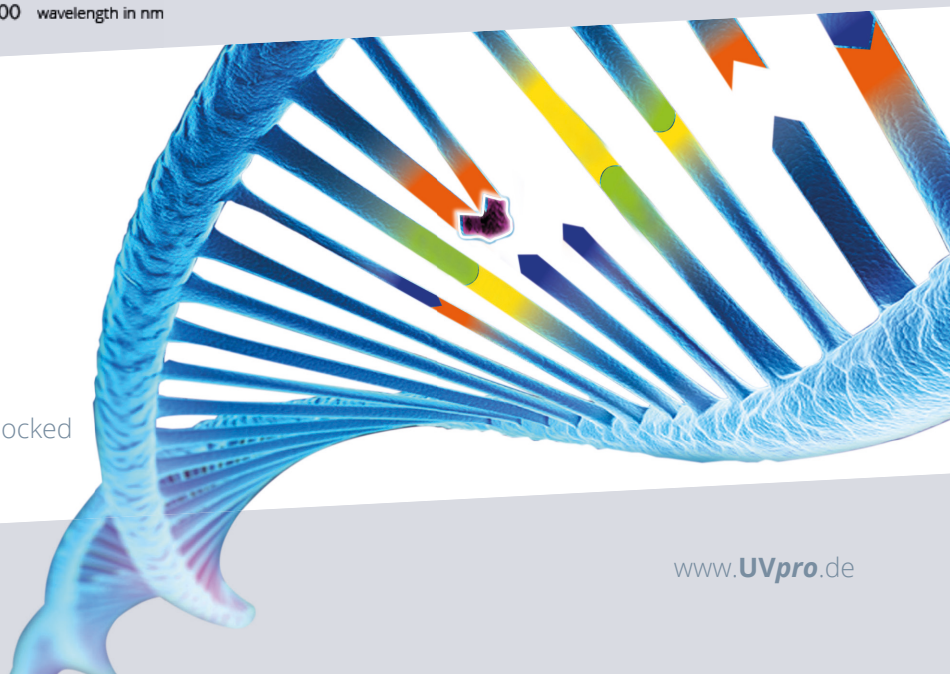
DNA and RNA are destroyed

↓

Transcription and translation are stopped
No DNA copy or protein biosynthesis

↓

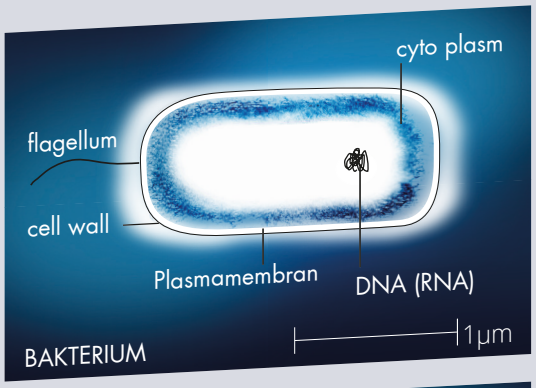
Cell division, proliferation and cell function are blocked
Microorganisms of all kinds die



LD_{90}-dose as a measure for disinfection

Size, structure and pigmentation influence the UVC effect

In UVC disinfection, there is a specific lethal dose (LD) for each type of microorganism. Resistances do not exist! The standard is the LD_{90}, the dose at which 90% of a population is killed.

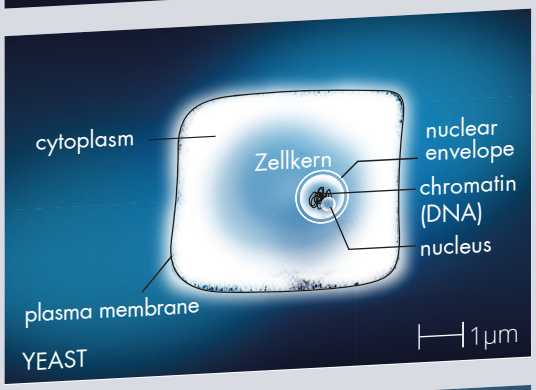


Bacteria and viruses

- DNA (RNA) barely protected
- small cells
- simple cell without nucleus

→ **low LD_{90} dose**

1-6 mJ/cm²

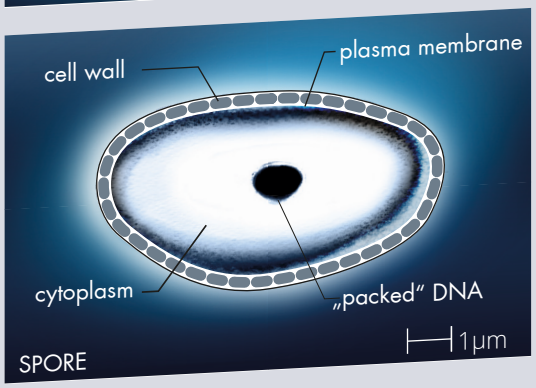


Yeasts and vegetative fungal cells

- DNA as chromosomes
- big cell with organelles
- complex cell with nucleus

→ **medium LD_{90} dose**

4-10 mJ/cm²



Mold spores

- DNA packed in a complex way
- dense cell volume
- robust cell wall with pigments

→ **high LD_{90} dose**

8-100 mJ/cm²

Typical LD_{90} Doses* [mJ/cm²]

Viruses	
PRRS Virus	1,8
Influenza A Virus	2,1
Herpes Virus	4,3
Hepatitis A Virus	6,7
Rota Virus SA11	7,5
Bacteria	
Campylobacter spec.	2,2
Legionella spec.	2,3
Escherichia coli	2,5
Salmonella spec.	4,3
Pseudomonas spec	4,5
Streptococcus spec.	4,5
Staph. aureus	4,8
Listeria spec.	5,0
Bacillus subtilis (Sp.)	6,8
Yeasts	
Saccharomyces. ellip.	3,5
Sacch. cerevisiae	6,2
Sacch. carlsbergensis	7,5
Candida albicans	11,0
Mold spores	
Penicillium roquefortii	13
Mucor mucedo	18
Penicillium digitatum	38
Aspergillus glaucus	44
Aspergillus niger	98

*Exemplary values from the literature without guarantee and claim to completeness

UVC disinfection with UV*pro*

- Residue-free measures against germs in water, air and on surfaces around the clock
- Easy installation, retrofittable into existing systems, variable use

We plan your project with a software-based 3D simulation and develop efficient solutions tailored to your needs.

Up to 99,99% fewer germs

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