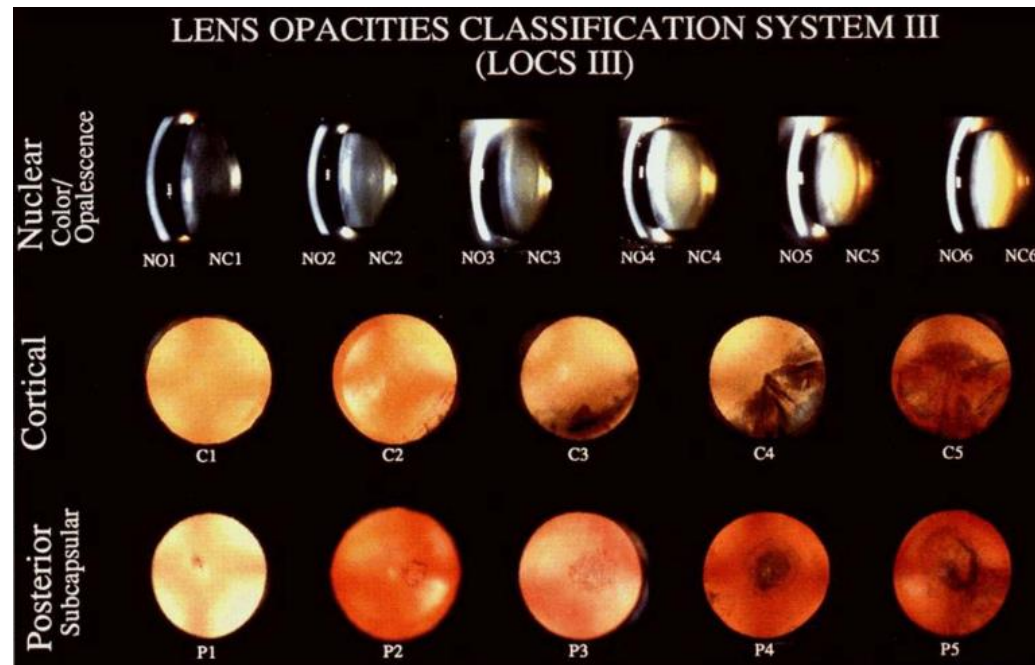


NanoLaser

Principle of Function

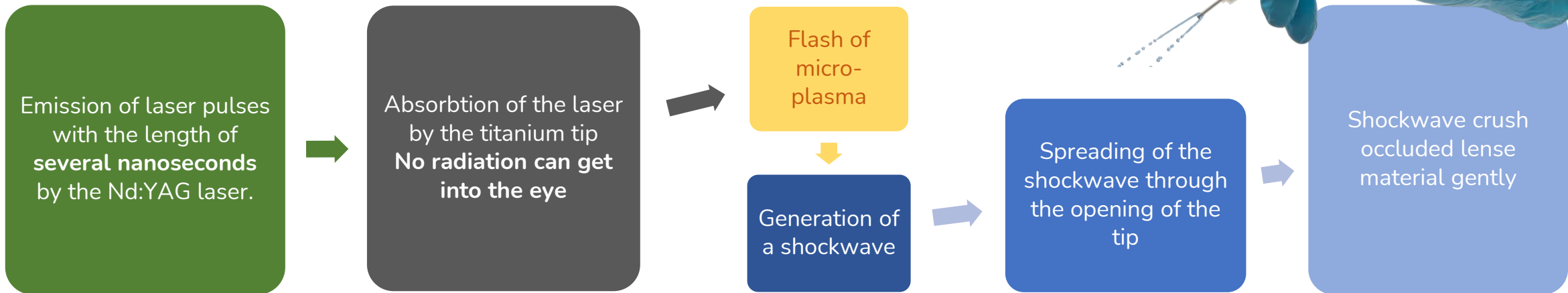
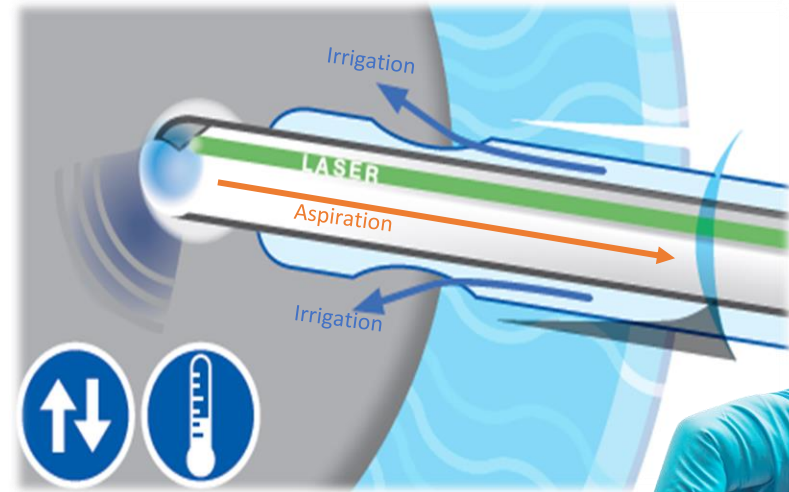
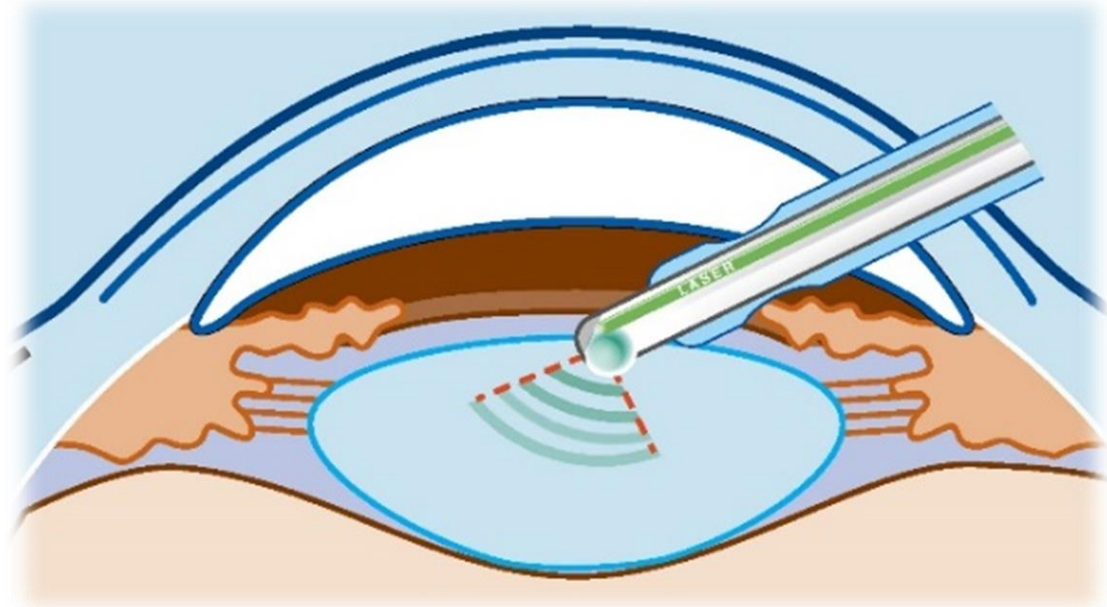
Indication

Indication	Contraindication	Risks
Lense emulsification for lenses with hardness 1 to 3+ (LOCS)	Lense Hardness > 4 Uveitis	Capsular rupture, Endophthalmia, Corneal edema, Corneal folds, Tear of Descemet's membrane, Macular edema/trauma, discomfort, pain
Lense emulsification bei Fuchs' dystrophy		
Clear lense extraction / Refractive lense exchange (RLE)		



NanoLaser: Reputable – profitable - safe

Mode of action: NanoLaser



Ultrasound vs. NanoLaser

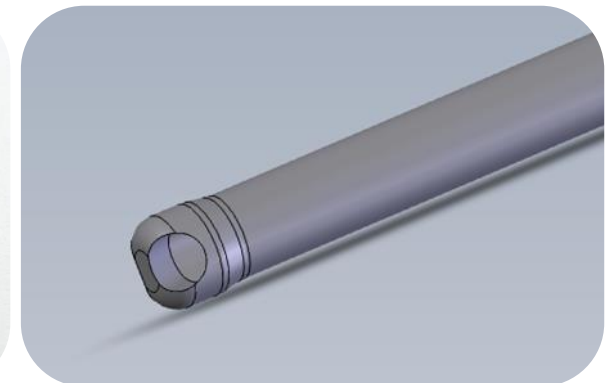
Ultrasound:

- + over 50 years of development
- + standardized procedure
- + high experience potential
- relevant energy input into the eye
- oscillating tip → Thermal side effects
- damage of the endothel is possible
- re-sterilisation of the handpieces
- rupture of the capsule is possible



NanoLaser:

- + minimal energy input into the eye
- + no thermal side effects
- + directed emission of the energy (away from endothelia)
- + 100 % single use: best hygienic safety
- + atraumatic tip → gentle to iris and capsule
- relatively new procedure
- minimal longer treatment time (3 – 5 minutes)
- Very hard lenses can not be treated

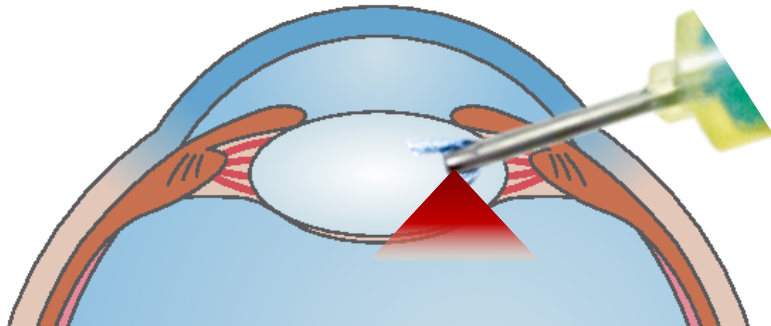


Energy input to the eye

NanoLaser offers you a **minimal energy input** while **directing** the spreading of the shockwave away from endothelium

NanoLaser

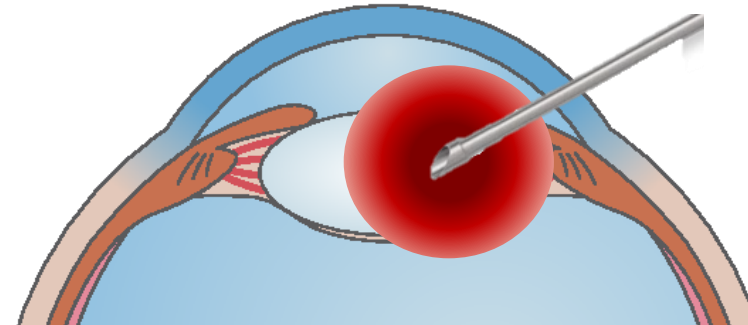
3 – 5 mJ per pulse
1,5 bis 2,5 J (500 pulses)



gentle emission of shock wave
conical spread in the direction of the nucleus
-> energy application directed away from endothelium

Phaco

1 – 2 % sek.
Äquivalent 50 – 100 J



homogeneous, circular spreading of the oscillation,
towards the lense as well as the endothelium

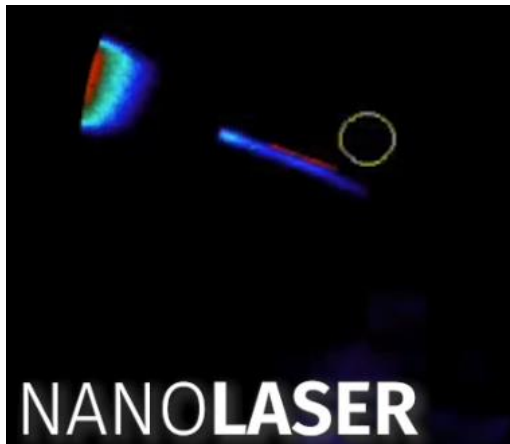
For now there is no alternative to perform a cataract surgery with lower energy input than **NanoLaser!**

Thermal effects

No rising temperature or thermal stress occurs using the NanoLaser due to the absence of movement of the tip.

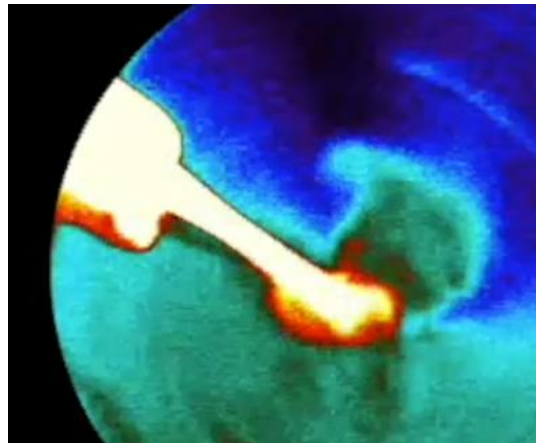
NanoLaser

No mech. movement



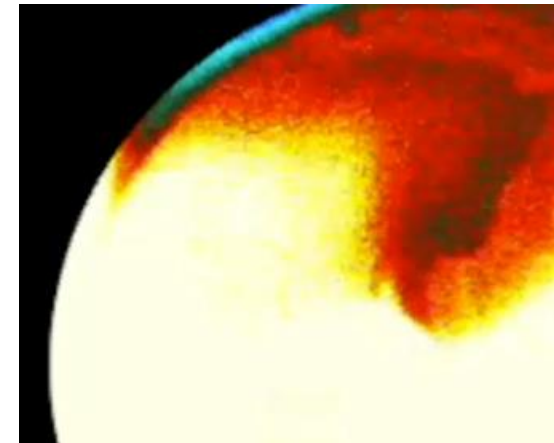
Phaco

Linear movement



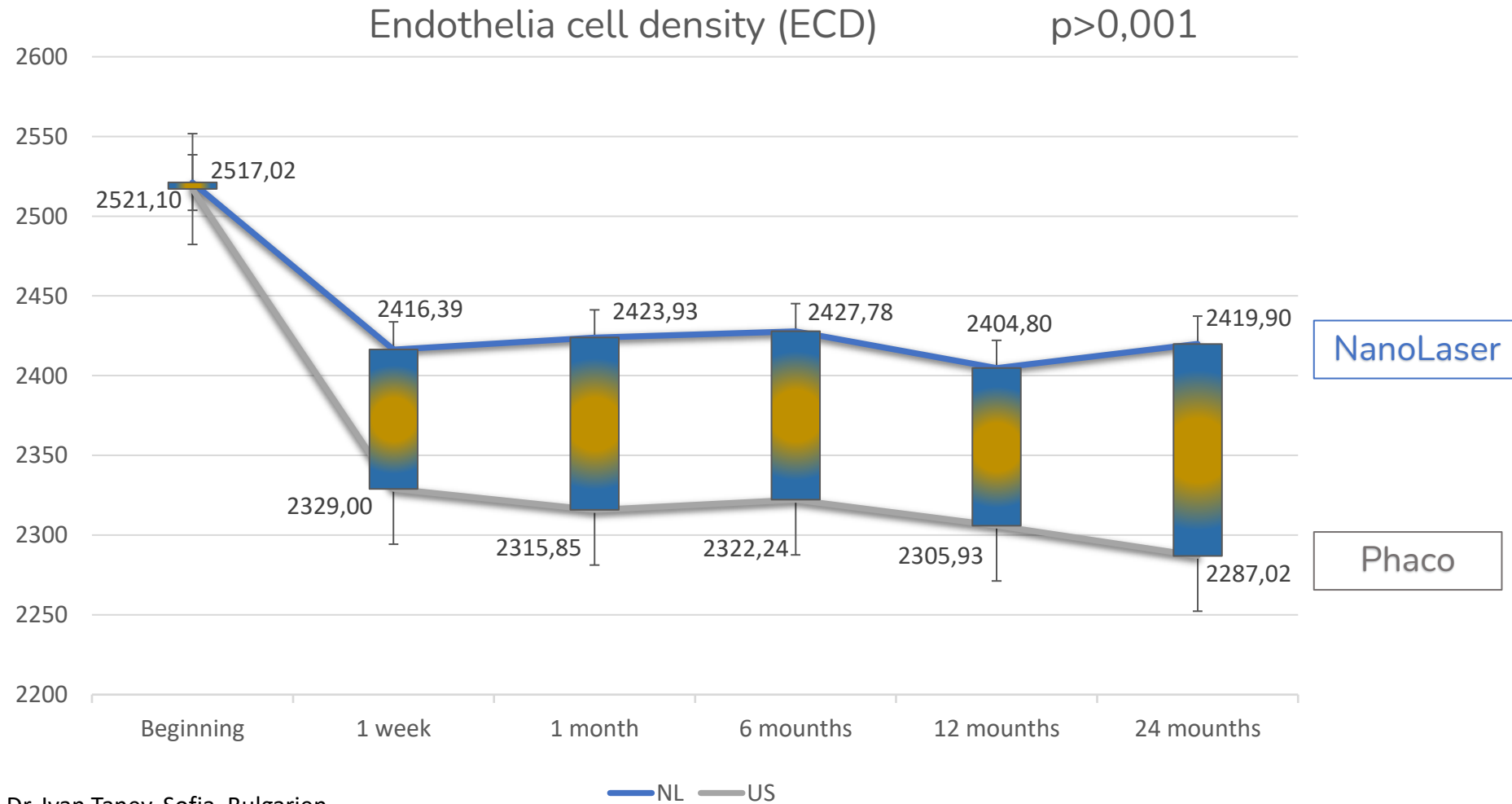
Phaco

Torsional movement



NanoLaser: Reputable – profitable - safe

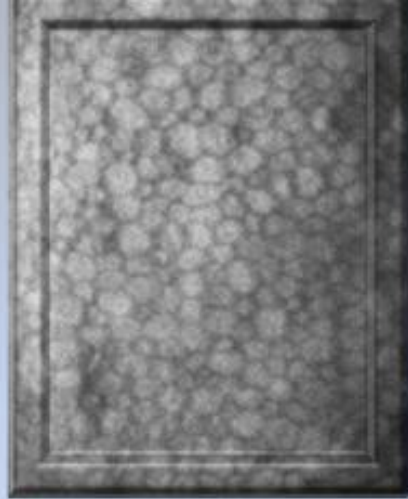
Gentle to the endothelia



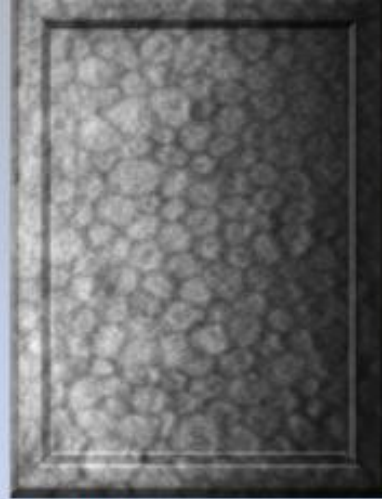
NanoLaser: Reputable – profitable - safe

Gentle to the endothelia

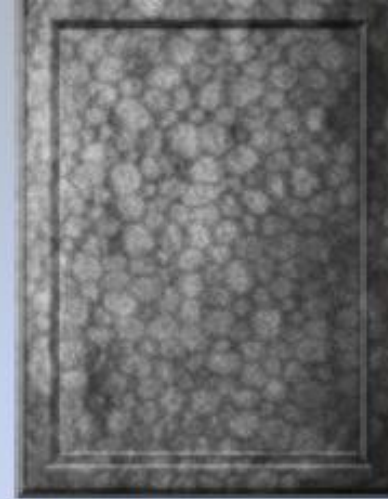
Nano Laser



preop



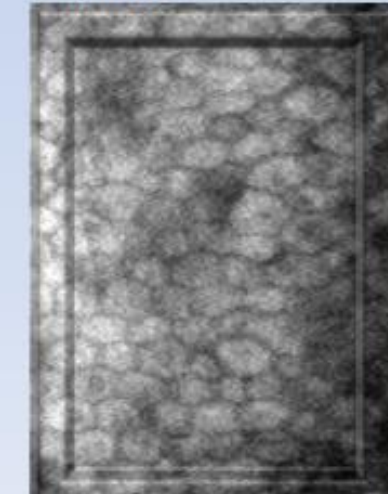
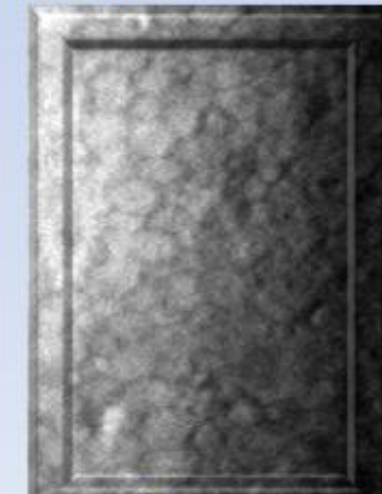
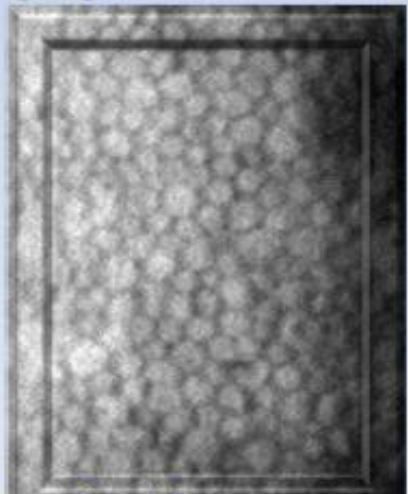
6 months



12 months

Shape of endothelia cells do not change due to less to no migration of the cells after the treatment

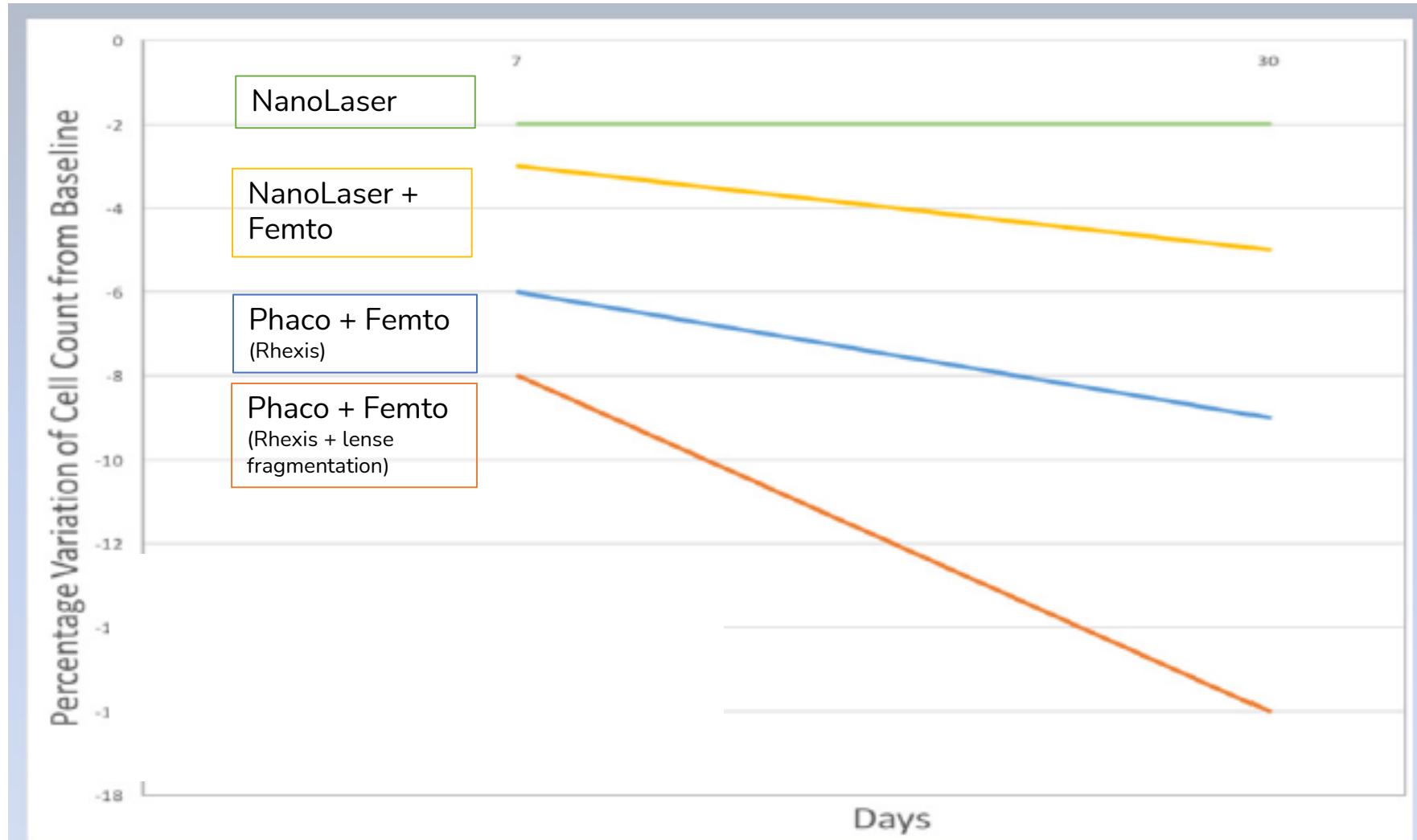
Shape of endothelia cells change due to migration of the cells after the treatment



Ultrasound

NanoLaser: Reputable – profitable - safe

Gentle to the endothelia



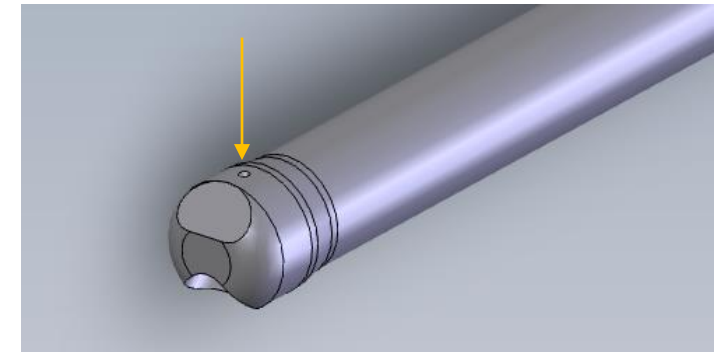
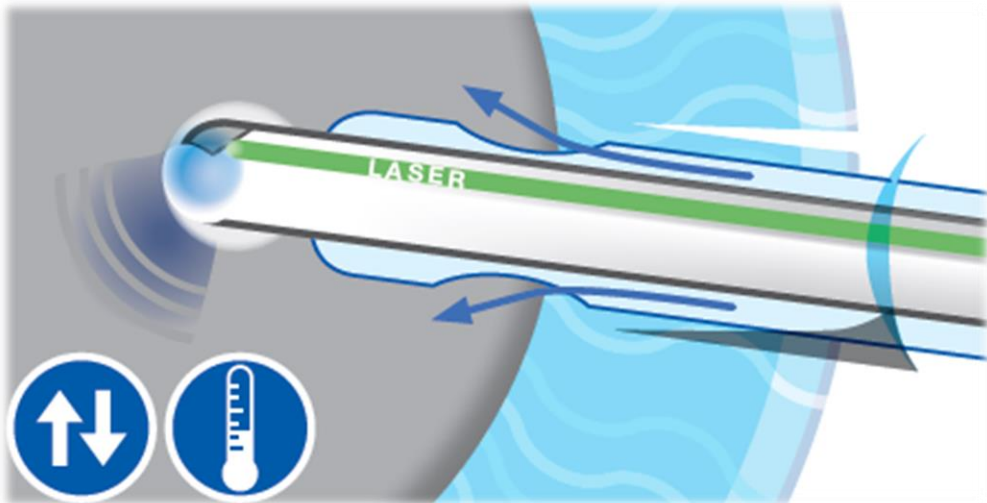
Loss of endothelia

NanoLaser: Reputable – profitable - safe

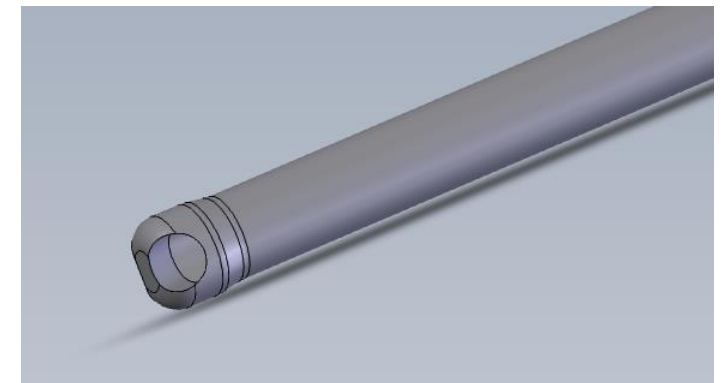
Atraumatic

The tip of the NanoLaser has been designed with **maximal precaution** – the absence of sharp edges lead to sparing of the iris and capsule

During the treatment, **no mechanical effects** occur



Orientation mark



lateral opening

NanoLaser handpiece Cetus Probe

Ordering number: LY11004s_VE20

1 packaging unit contains 20 NanoLaser handpieces

Enclosed to every handpiece is a yellow cataract surgery sleeve

Ordering number: WE01407s_VE5

Optimal width of incision for the NanoLaser probe:

2,4 – 2,5 mm

In field incision widths are in the range of 2,2 – 2,75 mm



100 % single-use handpiece

100% Single use handpieces – State of the Art

- Ready to use: Saves time and costs of reprocessing
- Minimizing the risk of infection – minimal risk for endophthalmitis
- US-phaco handpieces require reprocessing - not up-to-date in ophthalmic surgery

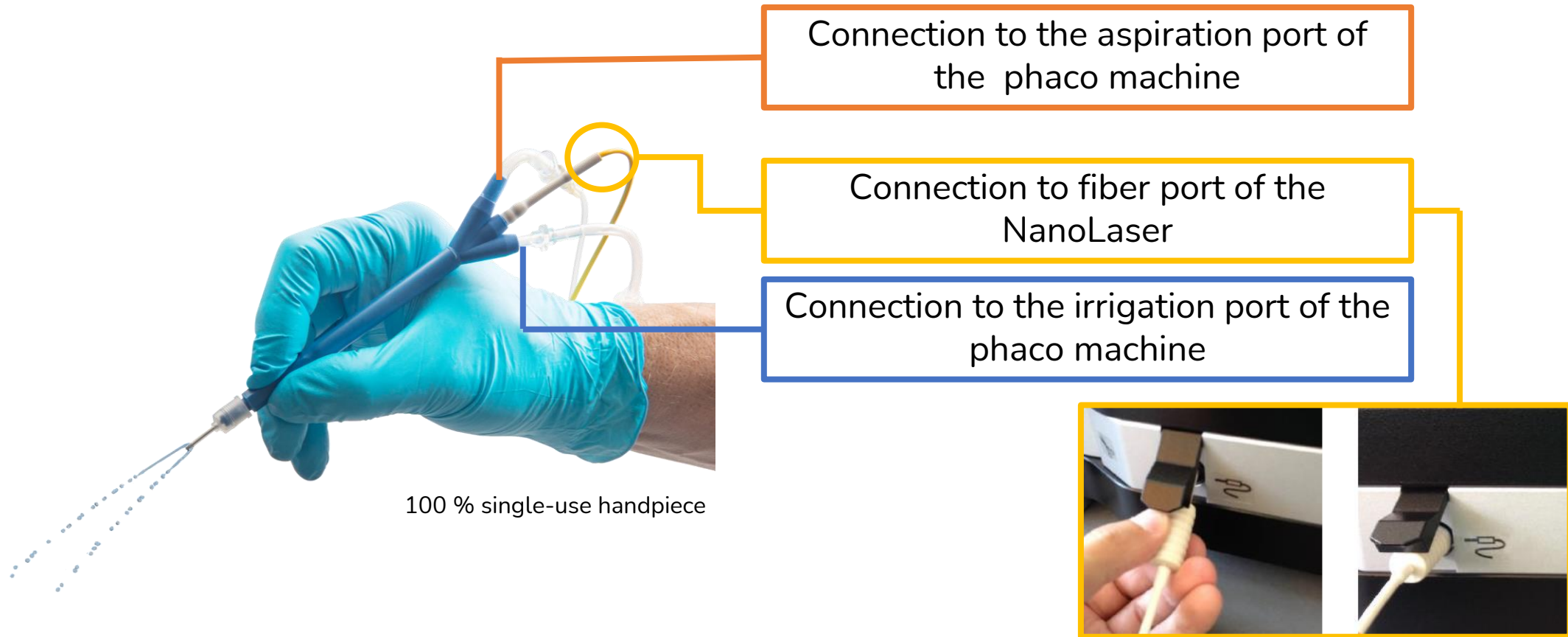


The German Association for Sterile Supply (DSGV) points out the problems related to reprocessing of medical devices with narrow lumen and the resulting possible problems for the clinical routine. RKI and FDA also recommend single-use products in case of a construction containing narrow lumen.

Therefore: Single-use instead of re-use!

NanoLaser: Reputable – profitable - safe

Connection of NanoLaser and phaco machine



NanoLaser: Reputable – profitable - safe

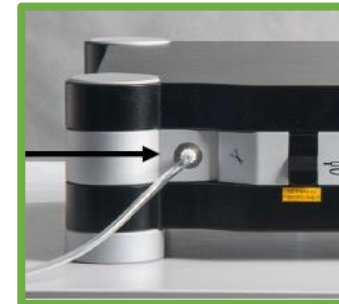
Connection of NanoLaser and phaco machine



Trigger tube remains on the device, not a disposable product!



Connection to the pneumatic vitrectomy cutter, phaco machine



Connection to the NanoLaser Luer Connector (REF: ST01022)

The NanoLaser can be coppled with every common phaco machine that has a **pneumatic vitrectomy trigger!**

Alcon Legion and Oertli CataRhex are not compatible.

NanoLaser: Reputable – profitable - safe

Connection of NanoLaser and phaco machine

Manufacturer	Device designation	Connector-basis	Comment
Alcon	Centurion Silver / Gold	Vit-Cutter Centurion	Connect ST01022 with back port, Seal the gray port (knot)
Alcon	Constellation	Vit-Cutter Constellation	Connect ST01022 with back port, seal the gray port (knot) Attention: pay attention to the hose used to install the NanoLaser program (23 G or 25 G) Connection to the phaco machine will automatically select this program.
Bausch&Lomb	Stellaris	EM07001	
D.O.R.C.	Associate / EVA	Vit-Cutter D.O.R.C.	Connect ST01022 and use blind plug (REF: ST01017s)
Geuder	Megatron, Megatron S3/ S4	EM07001	
Johnson&Johnson	White Star Signature	EM07001	
Nidek	Fortas CV-30000, CV-7000R, CV-9000, CV-9000R	EM07001	
Oertli	Pharos, OS3, OS4	EM07001	
Optikon (BVI Medical)	R-Evolution, R-Evo Smart	EM07001 modified	ST01022 on both sides
Ruck (Hoya Group)	Pentasys / Cube	EM07001	
Zeiss	Visalis	EM07001	

Brief overview of phaco parameters and technologies

Application specialists / medical product consultants from the phaco machine manufacturers take care of the programming of the NanoLaser phaco - it is necessary to create a new program in order to use NanoLaser

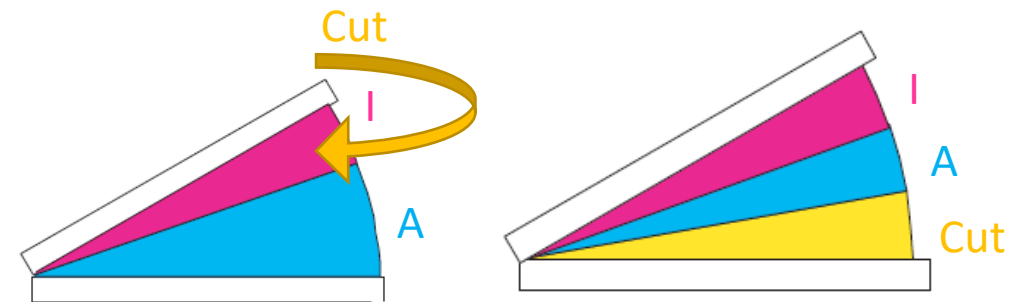
Procedure is called I-A-Cut

Relevant parameters:

1. Irrigation (I)
2. Aspiration (A)
3. Cut (cutting rate - Access to pneumatic vitrectomy cutter)

Control of these 3 parameters via foot-switch

Function assignment dependent on phaco manufacturers



Brief overview of phaco parameters and technologies

Irrigation

- **Gravitation:**
Bottle height in the infusion stand determines the flow (cheapest option)
Specification of the bottle height in cm relative to the patient's eye

- **Pressure infusion:**
Pressure is applied to the infusion bottle or bag
Indication of the IOP in mmHg

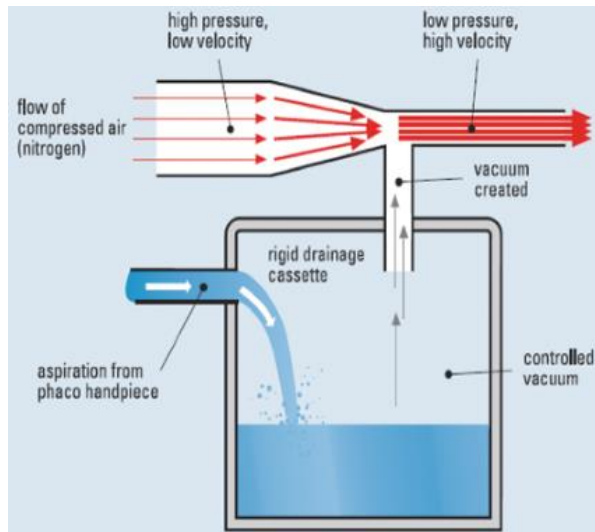
→ ideal for NanoLaser treatment

Brief overview of phaco parameters and technologies

Aspiration

peristaltic pump:

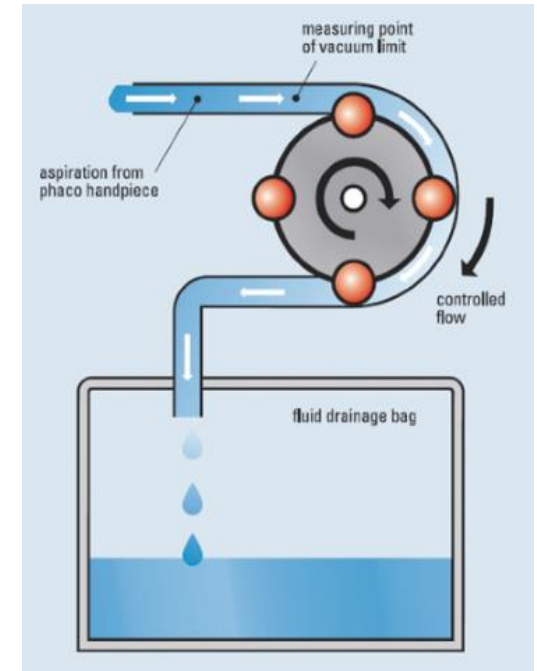
- Flow-based, with a constant flow
 - Vacuum is build up by occlusion of the core on the tip of the handpiece
 - collection bag
- Parameter settings: flow (cc/min) and vacuum (mmHg)



venturi pump

venturi pump:

- Vacuum based, flow depends on the vacuum
 - Continuous vacuum, no occlusion needed
 - Collection cassette
- Parameter settings: vacuum (mmHg)



peristaltic pump

Brief overview of phaco parameters and technologies

- The **Irrigation** and **Aspiration** are also relevant parameters for US phaco
- instead of ultrasound of phaco machine the **energy of the NanoLaser** is used
- NanoLaser is triggered by the **foot-switch of the phaco-machine**
- Therefore NanoLaser is connected via **pneumatic vitrectomy cutter port**
- pneumatic impulses triggers the NanoLaser

The **cutting rate** of the phaco machine determines the frequency of the nanolaser pulses.

Frequency of the NanoLaser: 1 to 10 Hz = Cutting rates up to 600 cpm
(Setting of this parameter on the phaco machine)

No frequency adjustment can be made at the NanoLaser when phaco triggering is selected

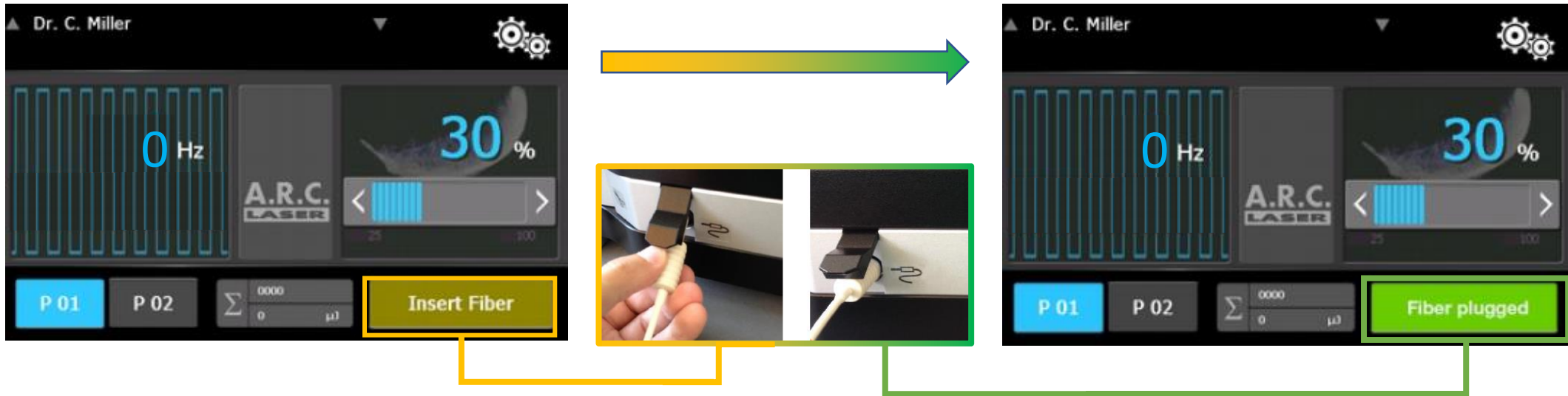


Activated service foot-switch of NanoLaser (only service purpose)



Activated phaco trigger: NanoLaser is triggered by phaco machine

Surgical technique



NanoLaser Settings:

energy:

clear lense: 30 %

soft core: 45 % = Standard setting

harder cores: 50 – 60 %

Display of frequency – **cutting rate** of the phaco machine in Hz
usually about 3 – 8 Hz
(how many times a shock wave is emitted per minute)

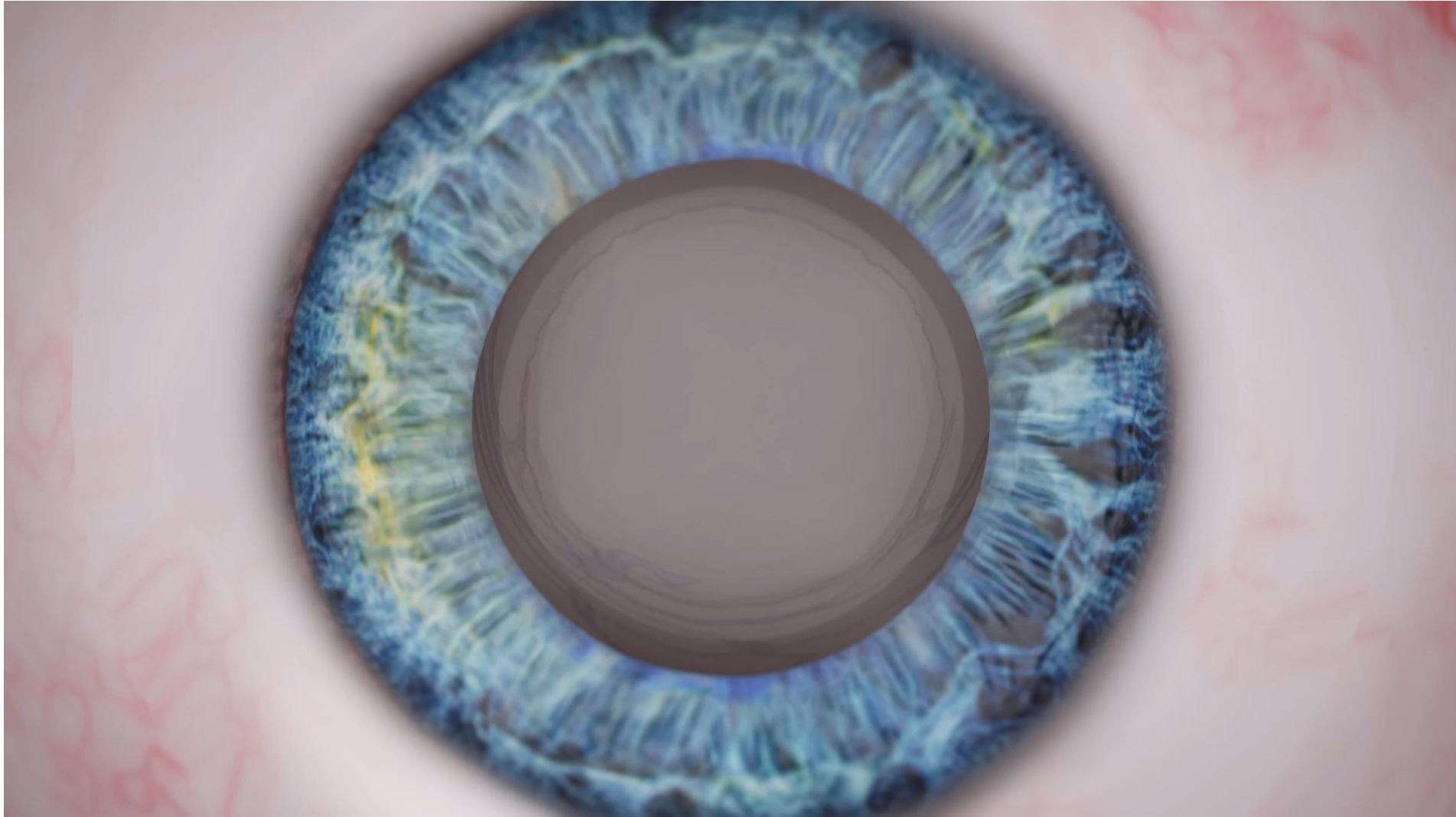
NanoLaser treatment protocol:

energy: 200 mJ up to 5 J, mean < 1 J

pulse: 150 up to 1000, mean 200 – 600

NanoLaser: Reputable – profitable - safe

Surgical technique – animation video



Surgical technique – important information at a glance

1. Do not try to gouge or cut the core, the **laser handpiece will not cut!**
2. **Rotate the handpiece around its own axis** (similar to a drill).
The goal is to create a hole to position the tip and fix the core for the chop technique!
3. **The core should be broken**; without fragments, the core material cannot be processed by the laser handpiece.

NanoLaser requires occlusion!
4. **The epinucleus should be preserved** until the end of the core preparation to protect the capsular bag.
5. **Use your second hand!** The manipulator must stabilize/push the core fragments against the laser handpiece for crushing.
6. The core material should be between the chopper/manipulator and the laser handpiece!
The second hand (manipulator) supports holding the core fragments. The laser tip itself has a very poor holding power!
7. Always try to **achieve occlusion first before applying laser pulses**;
Laser pulses that are released without material occlusion have no (material) crushing effect!
8. **The manipulator/ chopper may touch the laser tip**, there will be no damage!
Press against the laser tip with the manipulator; You can mechanically crush core fragments between the Manipulator and the laser tip.
9. A **fading noise from the laser** exposures (fading chopping effect) means that the handpiece tip is completely occluded and consequently the **laser is producing weaker/no shock waves**. This is generally a temporary situation. To rectify this situation, you should not reduce the suction or stop firing laser pulses (although you will no longer feel the laser pulses). **Rotate the laser handpiece** around its own axis and use the manipulator to help free the tip of the laser handpiece from hard core fragments. Usually there is no need to enlist the help of the manipulator; after a short time the laser effect returns. ("the laser has shot itself free").