Innovations in Femtosecond and excimer laser machines

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- Thanks to the RIO board especially Prof dr Tarek El Beltagy, Prof dr Sherif Karawia and Prof dr Hisham Ali, for inviting me to be her today. It is a pleasure and great honor.
- No Financial interest in any of the products mentioned in this presentation.

The aim of innovations

- Research and development performed by industrial companies of excimer and femtosecond laser machines is ongoing.
- Over years, It had resulted in many improvements, upgrades and application of laser machines.
- Some of these innovations are highlighted in this presentation.

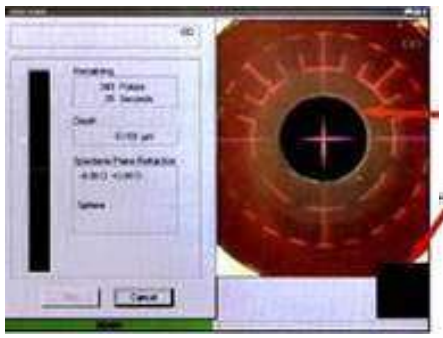
VISON: Future (hoped for): Lean and efficient femtolaser and excimer laser machine

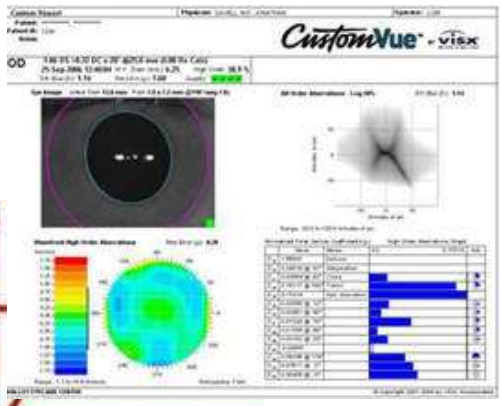
- **You only buy the machine.**
- **No Cards.**
- **No licenses.**
- **No gas bottles.**
- **Move to patients in rooms.**
- **Arms move to the eye of patient.**
- **May be doing surgery as an outpatient basis like YAG.**

Excimer laser machines innovation

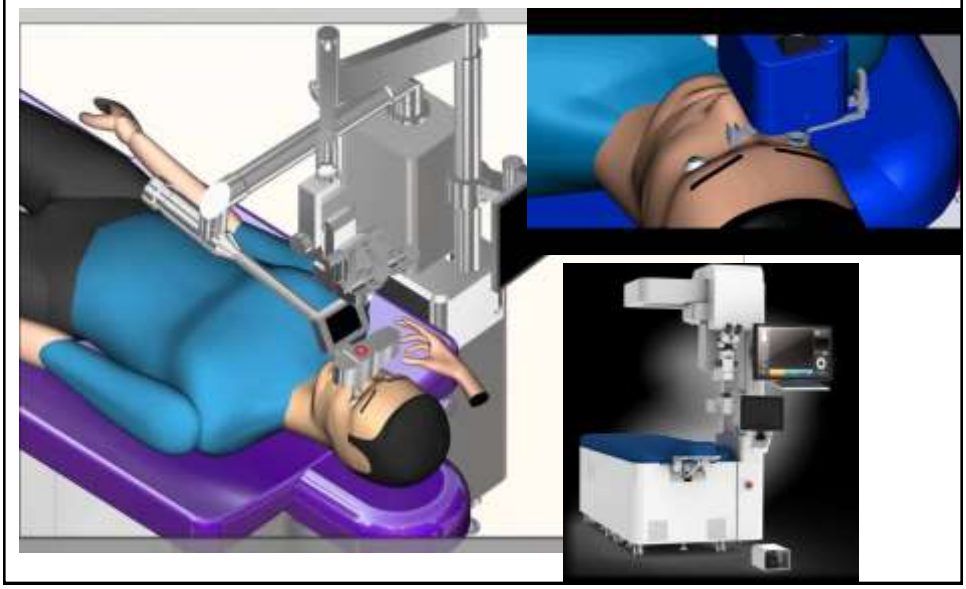
- **Body mass and size:** smaller **footprints** and space saving ergonomic machines. Examples generations of Technolas B&L., (Keracor 117c – 217c- 217p-Teneo).
- **Frequencies** (50Hz-100 Hz- 200 Hz- 500Hz- 1050 Hz)
- **Spot size** (5.0 mm -2.0 mm -1.0 mm 0.5 mm).
- **Software features:** Eye trackers, tissue savings (Visx Abbott), one step epithelial removal and ablation, topoguided, wavefront guided, Q-value adjusted customizations.
- **Lean concepts and waves of conversion** and back to the surface ablation (PRK).

Eye trackers and different types of customizations

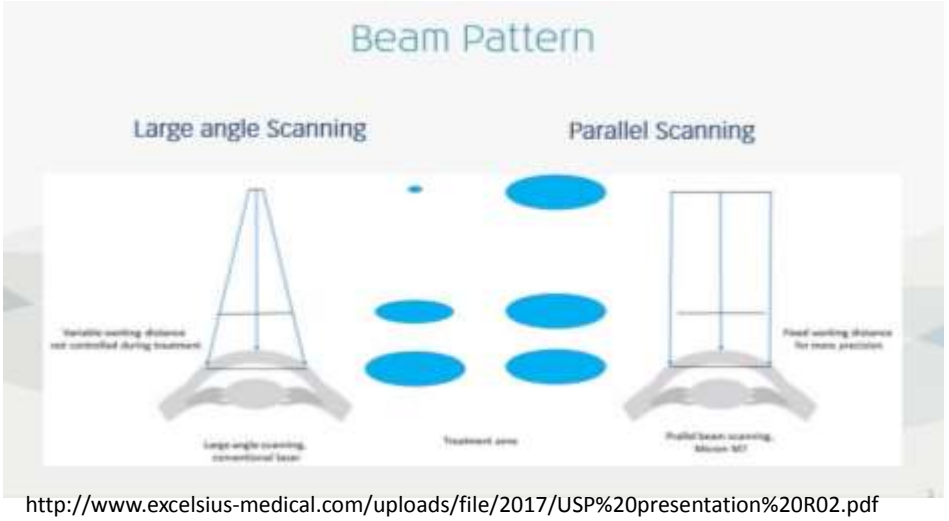




Excimer machine (Excelsius) with fixed table. No patient motion. Laser delivery terminal piece is moving



Parralel beam scanning excimer (Micron M7) (conventional lasers large angle scanning)



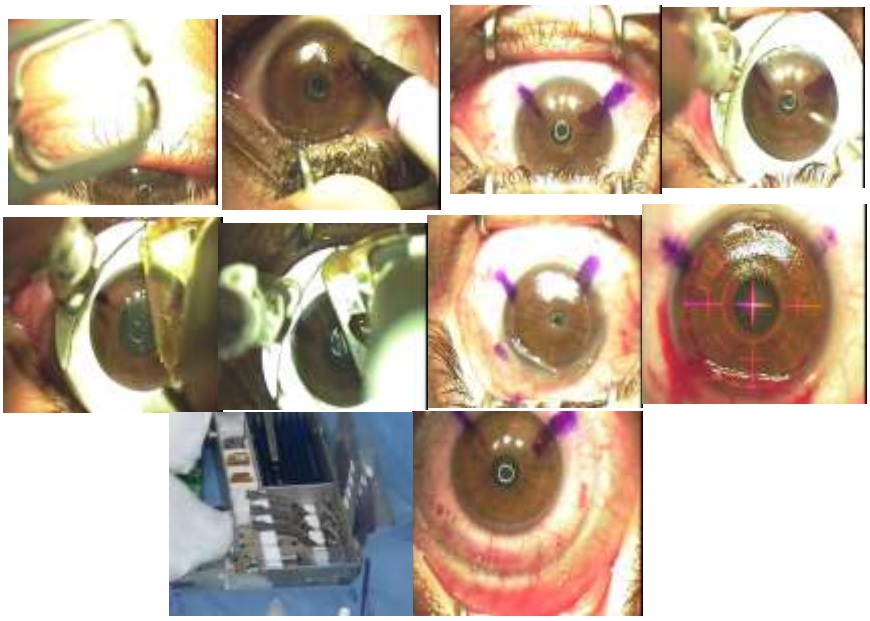
http://www.excelsius-medical.com/uploads/file/2017/USP%20presentation%20R02.pdf

Solid state excimers (No Gas Bottles ???)

- Solid state excimer machines (??) with no gas consumption. Any time your are able to operate.

A solid state excimer machine. Is it a dead technology ? Or may have a rebirth ?

Steps of Conventional Lasik (Over processing, many steps)



Steps of ASA (PRK) (only one or two steps)

Advanced surface ablation (PRK), bilateral case, no speculum.

Femtosecond laser machines innovations

- Corneal/ Cataract OR Combo machines: Victus- Zeimer 8.
- Body, footprint and mobility: fixed and mobile machines: Zeimer 8.
- Laser delivery end: Robotic arm or fixed head.
- Amplification or without ?
- Beam characteristics: size of pulses, frequency, energy, overlap, tissue bridges.
- Corneal surgeries. Femtoflaps, PKP Incision patterns (Mushroom, zigzag, etc), Lamellar grafting, fDSEK, ICR: tunnels- Pockets, 355 rings,
- Cataract surgeries: Corneal incions placement and design, Capsuolotomy sizing and location, , patterns of lentotomy (fragmentation)., co-management of astigmatism

Femtolaser machine (LDV Z series), with a small footprint, mobile, with a robotic arm.

The robotic arm over the eye of patient with a top view camera

Zeimer Z4: Less motion and less transport: LEAN in this point. Mobile between centers ??

Femtolasik flap with Z4, high frequency, small overriding spots, low energy. No or little tissue bridges, better cutting, less resistance.

VISON: Future (hoped for): Lean femtolaser and excimer laser machine charecteristics

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THANK YOU FOR YOUR ATTENTION