New nomogram for extremely thin KC corneas: clinical

Farhad Hafezi, MD PhD
Initial decision

- Establish irradiation parameters for minimal thickness = 400 µm


Seiler & Hafezi, 2006, Cornea
Treat thin corneas

1. Historical

2. Hypo-osmolaric CXL

Collagen crosslinking with ultraviolet-A and hypoosmolar riboflavin solution in thin corneas

Farhad Hafezi, MD, PhD, Michael Mrochen, PhD, Hans Peter Iseli, MD, Theo Seiler, MD, PhD

JCRS, 2009
Other techniques

1. Historical

2. Hypo-osmolaric CXL

3. Other techniques

- Hypo-osmolaric CXL
- Transepithelial CXL
- Contact-lens-assisted
- Epithelial island CXL
Factors in CXL

1. Historical
2. Hypo-osmolaric CXL
3. Other techniques

- Thickness
- Riboflavin concentration
- UV intensity

- Hypo-osmolaric CXL
- Transepithelial CXL
- Contact-lens-assisted
- Epithelial island CXL
New model

- Riboflavin diffusion kinetics
- Oxygen diffusion kinetics
Fixed fluence (5.4 J/cm²)

1. Historical
2. Hypo-osmolaric CXL
3. Other techniques
4. New model

400 µm  300 µm
Fixed fluence (5.4 J/cm$^2$)

1. Historical
2. Hypo-osmolaric CXL
3. Other techniques
4. New model

- hypo-osmolaric
- contact lens-assisted

400 µm
300 µm
Adapted fluence

1. Historical

2. Hypo-osmolaric CXL

3. Other techniques

4. New model

5.4 J/cm²  

xx J/cm²  

xx J/cm²  

400 µm  

300 µm  

250 µm  

3 mW/cm² for 30’  

3 mW/cm² for xx’  

3 mW/cm² for xx’
New model to adapt CXL effect between 200 µm and 400 µm

1. Historical
2. Hypo-osmolaric CXL
3. Other techniques
4. New model

Kling & Hafezi., JRS, in press
Treat corneas thinner than 400 µm

- Prospective study, ELZA Zurich
- Currently 14 eyes
- Depth of demarcation line at 1 month

- Treated so far: 245 µm to 395 µm
Conclusions

• The future: customized settings for every corneal thickness

• Use one single riboflavin solution: no more confusion with multiple different riboflavin solutions

• Can the CXL effect stabilize a 250 µm cornea?