New nomogram for extremely thin KC corneas: clinical

Farhad Hafezi, MD PhD

Professor of Ophthalmology
University of Geneva
Geneva, Switzerland

UNIVERSITÉ DE GENÈVE
FACULTÉ DE MÉDECINE

Medical Director
ELZA Institute
Zurich, Switzerland

ELZA

Research Group Leader
Lab. for Ocular Cell Biology
University of Zurich, Switzerland

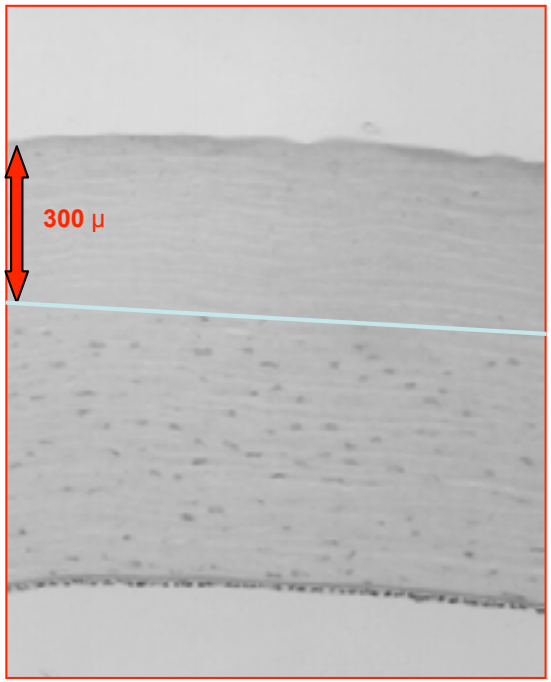
cabmm
center for applied biotechnology and molecular medicine

Professor of Ophthalmology
Keck School of Medicine
USC Los Angeles, USA

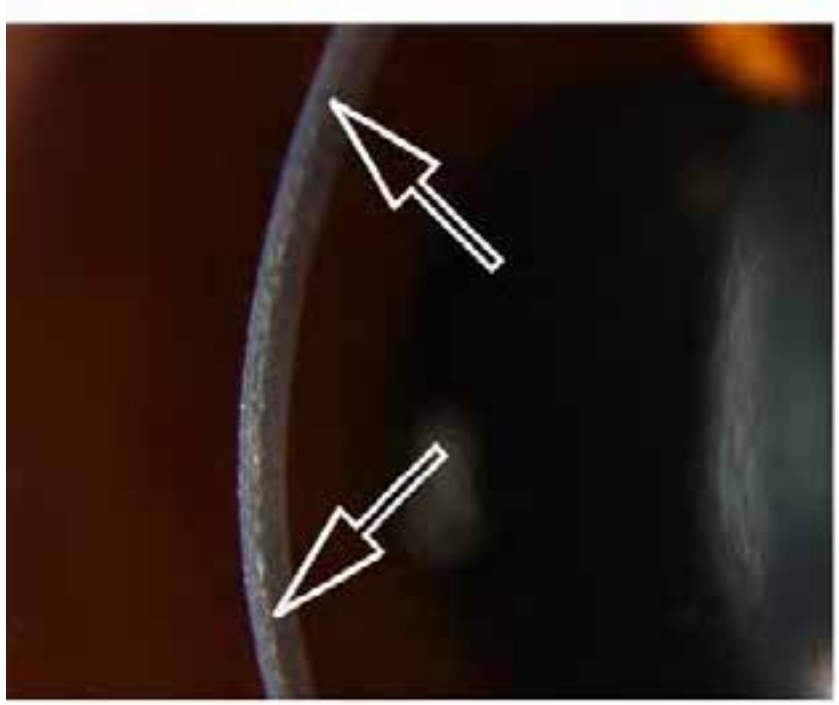
USC University of Southern California

Initial decision

- Establish irradiation parameters for minimal thickness = 400 µm



Wollensak, 1998, Exp Eye Res



Seiler & Hafezi, 2006, Cornea

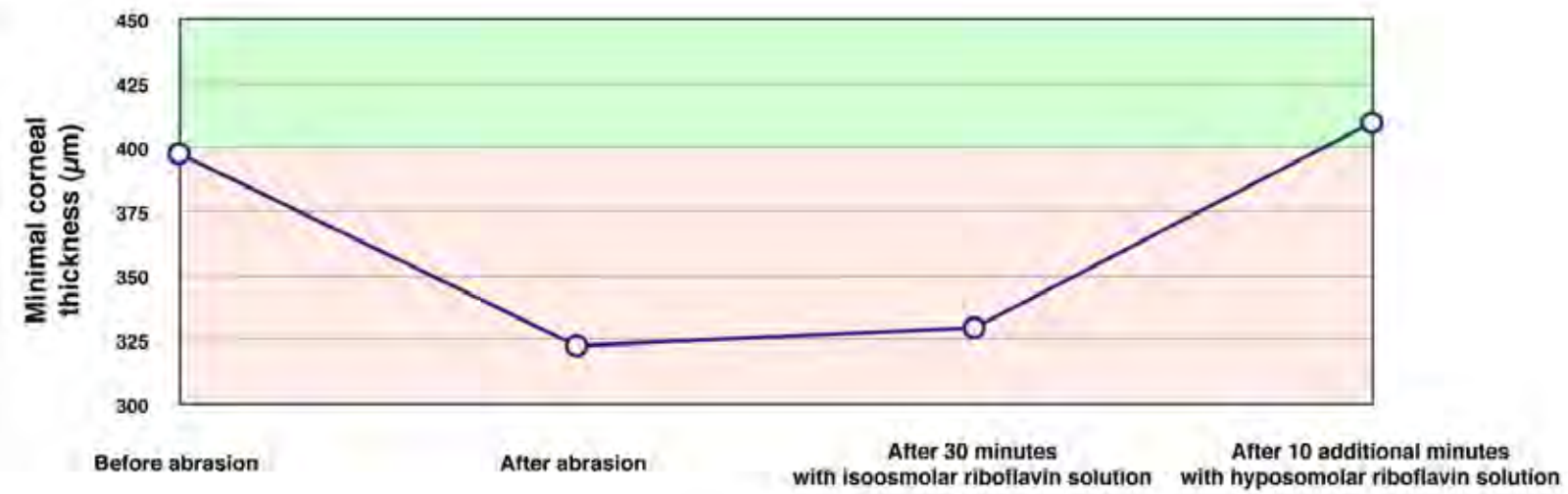
Treat thin corneas

TECHNIQUE

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

Hypo-osmolaric CXL

Transepithelial CXL

Contact-lens-assisted

Epithelial island CXL

Factors in CXL

Thickness

Riboflavin concentration

UV intensity

Hypo-osmolaric CXL

Transepithelial CXL

Contact-lens-assisted

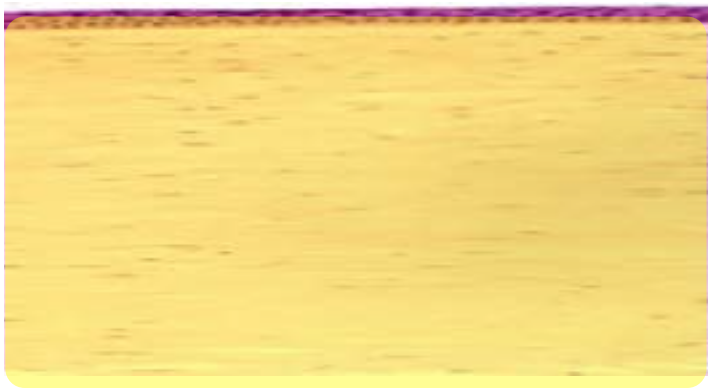
Epithelial island CXL

New model

- Riboflavin diffusion kinetics
- Oxygen diffusion kinetics

Fixed fluence (5.4 J/cm²)

400 µm



300 µm

Fixed fluence (5.4 J/cm²)

400 µm

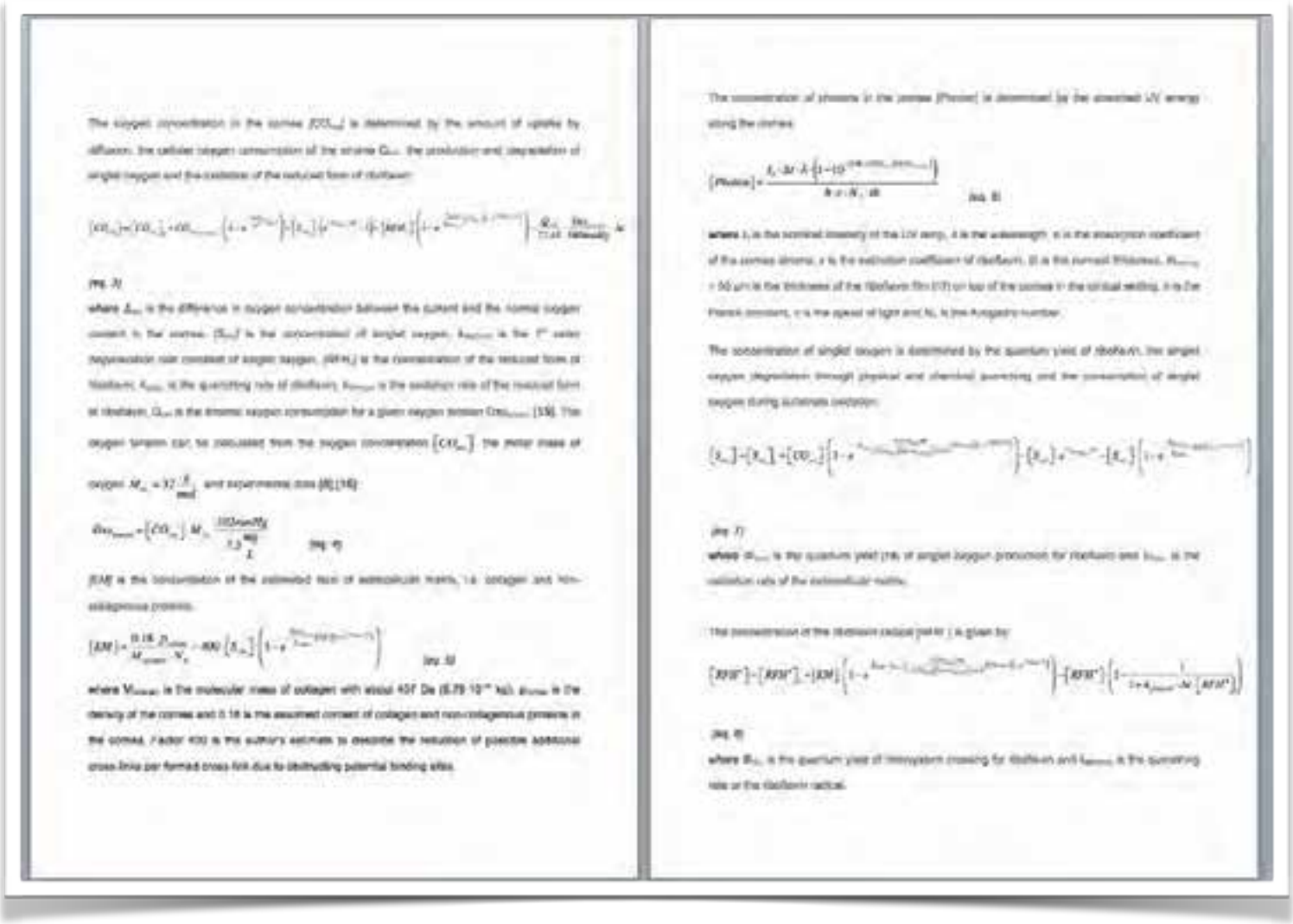
300 µm

- hypo-osmolaric
- contact lens-assisted

Adapted fluence

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'*

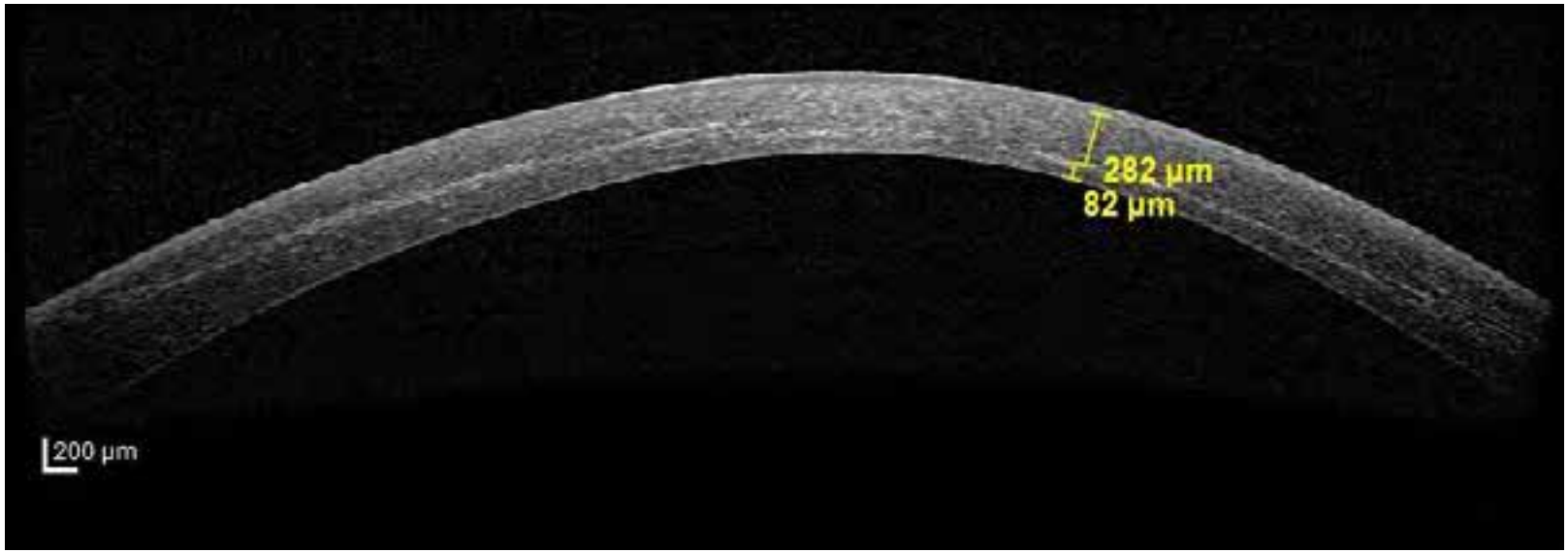
New model to adapt CXL effect between 200 µm and 400 µm



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?