



The Biomechanical Properties of Rabbit Cornea at Different Corneal cross-linking irradiances.

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INTRODUCTION

- Previous researches investigate the corneal biomechanical properties of CXL use the extensometry technique .But there are some limitations of the extensometry technique

Extensometry technique

- corneal strip
- tension loads
- elastic modulus



VS

Inflation test

- the whole cornea
- posterior pressure
- tangent modulus



[1]. Wollensak G, Spoerl E, Seiler T. riboflavin/ultraviolet-a-induced collagen crosslinking for the treatment of keratoconus.

PURPOSE

- To investigate the corneal biomechanical properties of CXL using inflation test at different corneal cross-linking irradiances.
- To evaluate whether the Bunsen-Roscoe law can be used in CXL.
- provide the basis for the selection of clinical treatment parameters.

METHODS

- Eighty-four purebred Japanese rabbits were randomly divided into 7 groups .
- Left eyes as treat group, right eyes as normal group
- Riboflavin 0.22% (vibex xtra, avedro) and uva(370nm) in de-epithelialized cornea at different corneal cross-linking irradiation of equal total energy :

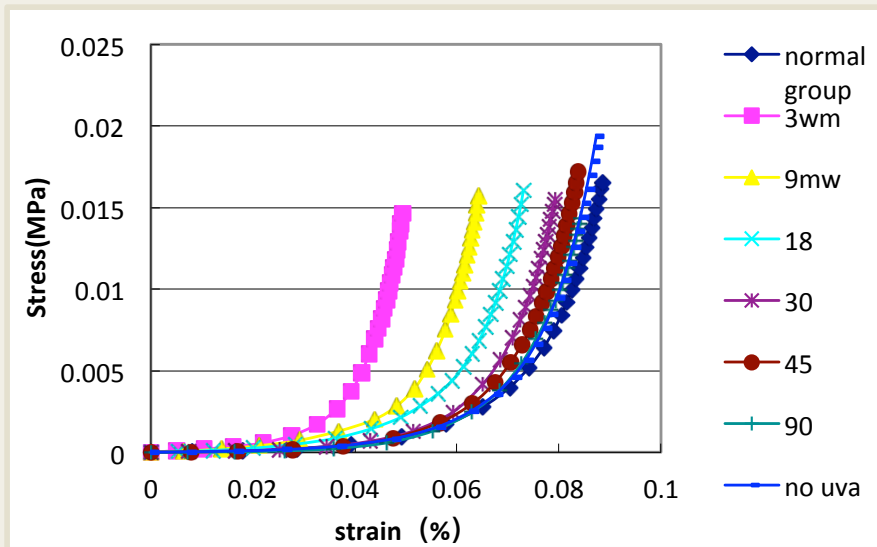
Group	N	Grouping scheme
3mw	12	3 mW/cm ² for 30 minutes
9mw	12	9 mW/cm ² for 10 minutes
18mw	12	18 mW/cm ² for 5 minutes
30mw	12	30 mW/cm ² for 10 minutes
45mw	12	45mW/cm ² for 2 minutes
90mw	12	90 mW/cm ² for 1 minutes
NUVA	12	Unirradiated



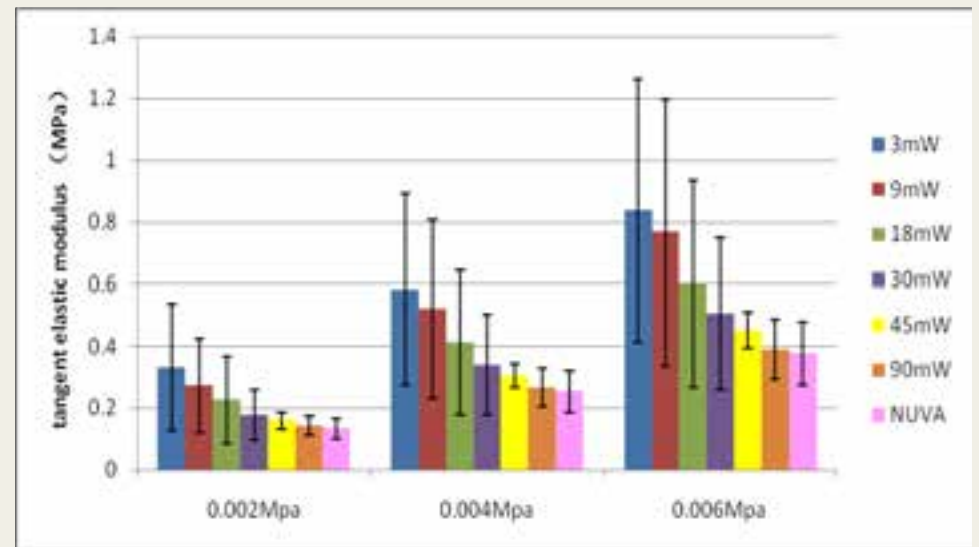
- All eyes were prepared for inflation test 1 week postoperatively

RESULT

- The relationship between stress and strain :



- * The tangent elastic modulus :



CONCLUSION

- The biomechanical properties of rabbit cornea underwent corneal collagen cross-linking decreased with increasing irradiance. $9\text{mw}/\text{cm}^2$ is probably the most optimal irradiance.
- The Bunsen-Roscoe law can't be readily used in corneal collagen cross-linking. KXL still needs to be optimized.