

# **RECENT TRENDS IN TREATMENT OF PRESBYOPIA**

Essay

**Submitted for the partial fulfillment of MSc degree  
In ophthalmology**

**By**

**Mona Abd El-Fatah Mohamed**

M.B.B.Ch

Faculty of medicine, Ain Shams University

**Under supervision**

**Prof. Dr .Hussein Shaker Al-Markaby**

Professor of ophthalmology

Faculty of medicine, Ain Shams University

**Dr. Maha Mohamed Ibrahim**

Lecturer of ophthalmology

Faculty of medicine, Ain Shams University

Cairo

2010

# الوسائل الحديثه المستخدمه لعلاج الابصار الشيخوخى

رسالة مقدمة من

الطبيبة/منى عبد الفتاح محمد

توطئه للحصول على درجة الماجستير

فى طب و جراحة العيون

تحت اشراف

ا.د. حسين شاكر المرقبى

أستاذ طب وجراحة العيون-جامعة عين شمس

د. مها محمد ابراهيم

مدرس طب وجراحة العيون-جامعة عين شمس

القاهرة

٢٠١٠

" بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ "

" قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ  
أَنْتَ الْعَلِيمُ الْحَكِيمُ "

سورة البقرة / آية ٣٢

## **Recent trends in treatment of presbyopia**

Mona Abd El-Fatah Mohamed,  
M.B.B.Ch, Faculty of medicine, Ain Shams University

Presbyopia which faces many people after 40yrs is a big problem as it make patient complains from headache, strain and blurring of vision after reading small font print. The pathophysiology of presbyopia is likely to result from deterioration in structure and function of a number of inter-related tissues. Changes in crystalline lens dimensions with age, the associated change in geometry of zonular attachments, and changes in viscoelastic properties of the lens capsule and lens matrix would, however, appear to be the principal correlates for the onset of presbyopia this changes approved by many theories like Helmholtz theory, Schachar theory. The treatment is the challenge as there are 4 ways by supportive approach like using drugs which contain lutein and zeaxanthin, another way by exercise, optical non surgical approach like glasses and lenses, corneal approach like monofocal lasik and multifocal lasik , scleral approach like scleral expansion band, lenticular approach like IOL implantation.

## **Acknowledgment**

I would like to express my sincere gratitude and appreciation to  
**Prof. Dr. Hussien Shaker Al-Markaby**, Professor of  
ophthalmology, faculty of medicine, Ain Shams University, for  
honoring me by his supervision on this essay.

I would like to express my thanks, great appreciation and deepest  
gratitude to **Dr. Maha Mohamed Ibrahim**, Lecturer of  
ophthalmology, faculty of medicine, Ain Shams University, for  
her patience, kind supervision, generous cooperation, great  
encouragement and valuable guidance

Finally, I would like to thank my family and my friends for their  
support, encouragement and giving me the example and the push  
to success in my entire life.

## **List of contents**

**Acknowledgment**

**List of contents**

**List of abbreviations**

**List of Figures**

**Introduction**

**Aim of work**

**Chapter 1: Anatomy of the crystalline lens, ciliary muscle and zonules**

**Chapter 2: Optical principle of accommodation**

**Chapter 3: The first line supportive treatment**

**Chapter 4: Optical correction of presbyopia**

**Chapter 5: Surgical correction of presbyopia**

**Summary**

**References**

**Arabic Summary**

---

## **List of Figures**

Fig 1	The upper half of a sagittal section through the front of the eye ball	-7-
Fig 2	Masson's Trichome stains of the lens capsule	-9-
Fig 3	The ultra structure of the lens, zonules fibers, Ciliary process	-10-
Fig 4	Histology of a normal ciliary body of the human eye	-12-
Fig 5	Maximal and minimal accommodative amplitudes	-15-
Fig 6	Changes occur in lens during accommodation	-16-
Fig 7	Anatomy of the lens and ciliary body and zonules	-17-
Fig 8	New theory of Schachar	-23-

---

---

Fig 9	Showing how target move near to lens is focused further back and is blurred unless lens power is increased	-29-
Fig 10	Two donuts (circles) used for training RWG method	-31-
Fig 11	To stimulate stronger accommodation the eye converge nearer than target distance	-33-
Fig 12	Showing accommodation and convergence	-34-
Fig 13	Using of convex lens in presbyopia	-42-
Fig 14	Franklin or Executive bifocal glasses	-43-
Fig 15	Cemented bifocal glasses	-44-
Fig 16	Round segment bifocal glasses	-46-
Fig 17	Flat top glasses	-46-

---



Fig 18	Curved top glasses	-47-
Fig 19	Bifocal with Ribbon Segment	-47-
Fig 20	Up curve bifocal	-49-
Fig 21	Special Golf Bifocal	-49-
Fig 22	Double-D multifocal, E-D Trifocal	-50-
Fig 23	Progressive lens	-51-
Fig 24	Concentric CL and Aspheric CL	-56-
Fig 25	Translating CL	-57-
Fig 26	Line of conductive Keratoplasty, steeping of the cornea to correct the hyperopia	-58-

---

Fig 27	Hyperopic LASIK done on the cornea. A myopic cornea is produced	-63-
Fig 28	Myopic LASIK done. Myopic ablation of 4 mm optical zone	-63-
Fig 29	Schematic diagram of a presbyopic eye in which hyperopic and myopic LASIK has been done.	-64-
Fig 30	Placement of corneal onlay	-66-
Fig 31	Inlay procedure	-66-
Fig 32	The ACI 7000 is a corneal inlay used for presbyopia correction	-67-
Fig 33	Scleral bands and site of insertions	-75-
Fig 34	Presbyopic anterior chamber IOL	-77-
Fig 35	A monofocal IOL, such as the Crystalens, focuses light to a single point	-79-

---

Fig 36	Rezoom multifocal IOL	-80-
Fig 37	A refractive multifocal IOL, such as the ReZoom™ IOL, splits light into two main images	-81-
Fig 38	Acrysof RestoR IOL	-83-
Fig 39	A diffractive multifocal IOL, such as the Restor®, splits light into two main images	-84-
Fig 40	The Crystalens	-86-
Fig 41	Movement of crystalens inside the posterior chamber	-87-
Fig 42	The human optics accommodative 1CU lens	-88-
Fig 43	The TetraFlex IOL	- 94 -
Fig 44	The NuLens	- 95 -

Fig 45	VisioLite patented optical probe and tip	- 96 -
Fig 46	LaserACE critical zones "Physiology"	- 98 -

---

---

## **List of abbreviations**

<b>ACS</b>	<b>Anterior ciliary sclerotomy</b>
<b>AMD</b>	<b>Age related macular degeneration</b>
<b>ASCRS</b>	<b>American Society of Cataract and Refractive Surgery</b>
<b>BSCVA</b>	<b>Best spectacle corrected visual acuity</b>
<b>CL</b>	<b>Contact lenses</b>
<b>CK</b>	<b>Conductive keratoplasty</b>
<b>D</b>	<b>Diopter</b>
<b>EDTA</b>	<b>Ethylenediaminetetraacetic acid</b>
<b>FDA</b>	<b>Food and Drug Administration</b>
<b>IOL</b>	<b>Intra ocular lens</b>
<b>IOP</b>	<b>intraocular pressure</b>
<b>LaserACE</b>	<b>Laser anterior ciliary excision</b>
<b>LASIK</b>	<b>Laser assisted insitu keratomileusis</b>
<b>LECs</b>	<b>Lens epithelial cells</b>
<b>PAL</b>	<b>Progressive addition lenses</b>
<b>PAS</b>	<b>Periodic Acid Schiff</b>
<b>PMMA</b>	<b>Polymethylmethacrylate</b>
<b>PRELEX</b>	<b>Presbyopic lens exchange</b>
<b>PRK</b>	<b>Photorefractive keratectomy</b>
<b>RK</b>	<b>Radial keratotomy</b>

---

<b>RF</b>	<b>Radiofrequency</b>
<b>SEB</b>	<b>Scleral expansion band surgery</b>
<b>SEP</b>	<b>Scleral expansion plug</b>
<b>TK</b>	<b>Thermokeratoplasty</b>

---

## **AIM OF WORK**

Aim of work is to spotlight on the recent ways to treat presbyopia