

IMPRESSION CYTOLOGY IN SOFT COLOURED CONTACT LENSES

Thesis

Submitted for partial fulfillment of
the M.SC. degree in Ophthalmology

By

Radwa Mohammed Nabeel

M.B., B. Ch. Ain Shams University

Supervised by

Professor Doctor . Shaker Ahmed Khedr

Professor of ophthalmology

Vice dean for postgraduate Studies & research

Faculty of Medicine - Ain Shams University

Professor Doctor . Mamdouh Hamdy El Kafrawy

Professor of ophthalmology

Faculty of Medicine - Ain Shams University

Faculty of Medicine

Ain Shams University

Cairo

2005

Acknowledgement

First and foremost I am grateful and thankful to Allah for allowing me to successfully accomplish this study.

I wish to thank and to express my sincere gratitude to ***Prof. Dr. Shaker Ahmed Khedr*** , Professor of Ophthalmology , vice dean for postgraduate studies and research , Faculty of medicine Ain Shams University for his indispensable guidance and keen suggestion in supervising the work. His constructive encouragement , unforgettable help and tremendous efforts , were behind the accomplishment of this work .

I wish to thank ***Prof. Dr. Mamdouh Hamdy El-Kafrawy*** , Professor of Ophthalmology , Faculty of medicine Ain Shams University , for

the valuable time , the great efforts he has given to me and his continuous guidance and encouragement in preparing this study .

Finally, I want also to thank my *family* for their sincere help and encouragement in my career and life .

Radwa Mohammed Nabeel (M.B.B.Ch.)

Contents

	<i>Page</i>
- INTRODUCTION.....	1
- AIM OF THE WORK.....	4
- REVIEW OF LITERATURE :	
Anatomy.....	5
Physiology	12
Contact lenses.....	17
Impression cytology.....	43
- SUBJECTS AND METHODS.....	49
- RESULTS.....	68
- DISCUSSION.....	98
- CONCLUSION.....	105
- SUMMARY	107
- REFERENCES.....	109
- ARABIC SUMMARY	

List of Abbreviations

Ach.....	Acetyl choline .
ALDOX.....	Myristamidopropyl dimethylamine .
AMO.....	Advanced Medical Optics .
AOZ.....	Anterior optical zone .
APC.....	Anterior peripheral curve .
cGMP.....	Cyclic guanosine monophosphate .
CL.....	Contact lens .
cm ²	Square centimetre .
D.....	Diopter .
DK/L.....	(Diffusion coefficient)(Solubility constant)/(CL central thickness) “ Oxygen transmissibility ” .
DYMED.....	Polyaminopropyle biguanide .
EGFR.....	Epithelial growth factor receptor .
E.I.P.I.Co.....	Egyptian International Pharmaceutical Industries Company .
EWCL.....	Extended wear contact lens .
GCD.....	Goblet cell density .
GPC.....	Giant papillary conjunctivitis .
4 HPF.....	Four high power fields .

HPMC.....	Hydroxypropyle methyle cellulose .
hr.....	Hour .
HS.....	Statistically highly significant .
HYDRONATE.	Hydroxyalkylphosphonate .
IC.....	Impression cytology .
LM.....	Light microscope .
max.....	Maximum .
min.....	Minimum .
mm.....	Millimetre .
n.....	Number .
Na ⁺	Sodium .
Na ⁺ / k ⁺ .ATPase	Sodium / potassium adenosine triphosphatase .
N/C.....	Nuclear cytoplasmic ratio .
nm.....	Nanometre .
NS.....	Statistically non significant .
<i>P</i>	Probability .
PAS.....	Periodic acid schiff .
PHEMA.....	Polyhydroxyethyle methacrylate .
PO ₂	Oxygen partial pressure .

POLYQUAD....	Polydronium chloride .
POZ.....	Posterior optical zone .
PPC.....	Posterior peripheral curve .
®.....	Registered mark .
12 (R) HETE....	12 (R) hydroxyeicosatetraenoic .
12 (R) HETrE....	12 (R) hydroxyeicosatrienoic .
S.....	Statistically significant .
SCCL.....	Soft coloured contact lens .
SCL	Soft contact lens .
SD.....	Standard deviation .
SLK.....	Superior limbic keratoconjunctivitis .
t.....	Student's t-test .
TM.....	Trade mark .
TSCL.....	Tinted soft contact lens .
µg.....	Microgram .
µL.....	Microlitre .
µm.....	Micrometre .
χ^2	Chi-square test .
%.....	Percentage .

List of Tables

<i>Table No.</i>	<i>Title</i>	<i>Page</i>
1	Staining protocol	62
2	Comparison between cases and controls regarding age.....	69
3	Comparison between cases and controls regarding gender	70
4	Results of specimen examination in case group before CL wear.....	73
5	Distribution of goblet cells in specimens of case group before CL wear.....	74
6	Distribution of cell size in specimens of case group before CL wear.....	74
7	Results of specimen examination in control group before CL wear.....	75
8	Distribution of goblet cells in specimens of control group before CL wear.....	76
9	Distribution of cell size in specimens of control group before CL wear.....	77
10	Correlation between duration of CL wear and epithelial parameters among cases (before , one and three months after CL wear).....	81

Table No.	Title	Page
11	Correlation between duration of CL wear and epithelial parameters among cases (one and three months after CL wear).....	82
12	Correlation between duration of CL wear and distribution of goblet cells among cases.....	83
13	Correlation between duration of CL wear and cell size among cases.....	84
14	Correlation between duration of CL wear and epithelial parameters among controls (before , one and three months after CL wear).....	85
15	Correlation between duration of CL wear and epithelial parameters among controls (one and three months after CL wear).....	86
16	Correlation between duration of CL wear and distribution of goblet cells among controls.....	87
17	Correlation between duration of CL wear and cell size among controls.....	88
18	Comparison between different groups regarding duration of CL wear and cohesion power.....	90

<i>Table No.</i>	<i>Title</i>	<i>Page</i>
19	Comparison between different groups regarding duration of CL wear and N/C.....	91
20	Comparison between different groups regarding duration of CL wear and degree of keratinization.....	92
21	Comparison between different groups regarding duration of CL wear and distribution of goblet cells.....	95
22	Comparison between different groups regarding duration of CL wear and of cell size.....	96

List of Figures

<i>Fig. No.</i>	<i>Title</i>	<i>Page</i>
1	Anatomy of the cornea	5
2	Photomicrograph of bulbar conjunctival epithelium . The surface is uneven and supplied with microvilli . Note goblet cells (<i>arrow</i>) . The substantia propria is composed of loose connective tissue and diverse cellular elements (<i>magnification x 240</i>)	11
3	Diagram illustrating the stimulation of cytochrome p450 monooxygenase pathway within the corneal epithelium from CLs	15
4	Single cut design and optical zones	20
5	Lenticular cut design and optical zones	20
6	Well-centred lens in straight position	23
7	Bubble trapped under lens (<i>too steep fit</i>)	23
8	Lens decentred superiorly (<i>too flat fit</i>)	23
9	Lens with edge stand-off (<i>extremely flat fit</i>)	23
10	Refraction over steep lens	25
11	Refraction over flat lens	26
12	(A) Postcorneal tattooing with pigment migration . (B) Translucent cosmetic lens over corneal scar results in excellent imagery	29
13	(A) Inadvertent surgical traumatic aniridia . (B) Opaque cosmetic lens with aphakic correction	29

Fig. No.	Title	Page
14	Diagnostic toric lens fitting utilizing tinted mark . (A) Mark is rotated 45° nasally . (B) Lens is centring well with mark at 6 o'clock	32
15	(A) Nonoperable cataract in right eye without CL . (B) Nonoperable cataract covered by opaque prosthetic lens	32
16	Tinted contact lenses	33
17	CL induced GPC	36
18	Papillary hypertrophy at the limbus in SLK	36
19	Severe SCL deposits	38
20	Severe staphylococcal keratitis	38
21	Perineural infiltrates in acanthamoeba keratitis	40
22	Ring infiltrates in acanthamoeba keratitis	40
23	Biomedics55 transparent SCL.....	53
24	Biomedics colors SCCL.....	53
25	Application of the filter strip to the right eye.....	55
26	Applying pressure with the side of the forceps.....	55
27	Holding the pointed end of the filter strip and beginning peeling.....	56
28	Carefully lifting the paper off the conjunctiva while the eye is steady.....	56
29	The strip is almost completely peeled off with a narrow fold	

	of the conjunctiva attached to it.....	56
Fig. No.	Title	Page
30	The fenestrated metal multi-sample carrier with its compartments. The lid also shows the holes drilled in it . Alongside are the metal grips that grip the four sides of the lid to the carrier.....	58
31	Filter paper strips arranged in the sample carrier just before closing it.....	58
32	The sample carrier is seen immersed in the deep red colour of Gill's hematoxylin.....	60
33	The sample carrier is immersed in the modified eosin stain....	60
34	Uncovered sample carrier immersed in xylene with the filter paper strips appearing stained brilliant blue.....	61
35	Mounted slides left for the Canada balsam to dry.....	61
36	Comparison between cases and controls regarding age.....	71
37	Comparison between cases and controls regarding gender.....	71
38	Normal epithelium : a sheet of epithelial cells , their relation to each other is intact , with N/C 1:1 , goblet cells (<i>arrow</i>) can be well defined by their magenta colour (<i>positive PAS</i>) , they appear globular in shape and larger than the surrounding cells.....	79
39	Picture of the same epithelium , one month later with higher magnification , showing N/C 1:4 otherwise normal criteria.....	80
40	Picture of the same epithelium , one month later with much higher magnification , showing N/C 1:6 otherwise normal criteria.....	80

<i>Fig. No.</i>	<i>Title</i>	<i>Page</i>
41	Comparison between different groups regarding duration of CL wear and cohesion power.....	93
42	Comparison between different groups regarding duration of CL wear and N/C.....	93
43	Comparison between different groups regarding duration of CL wear and degree of keratinization.....	94
44	Comparison between different groups regarding duration of CL wear and distribution of goblet cells.....	97
45	Comparison between different groups regarding duration of CL wear and cell size.....	97

Aim of the Work

The aim of the work is to evaluate the role of IC in objective diagnosis of changes in the corneal and conjunctival epithelium in SCCL wearers .