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THE ROLE OF THE CRYSTALLINE LENS IN AMETROPIA

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ABSTRACT

When examining the dimensions of the crystalline lens, it is found that some may vary with different types of refractive error. The effects of several of these variations on refractive error are investigated in this thesis.

To examine whether lens thickness was significantly different in youth-onset myopes compared with emmetropes, a structural model was developed and tested. No substantial difference was found between the two groups. In both groups of eyes, increased lens thickness was found to contribute significantly to the refractive state of the eye; a thicker lens effectively being a stronger lens.

The crystalline lens may play a different role in early adult-onset myopia which develops after normal growth has ceased compared to its role in youth-onset myopia. Cross-sectional data from early adult-onset myopes, youth-onset myopes and emmetropes were evaluated to determine whether lens thickness differed among the refractive error groups. No significant differences were found.

However, some early adult-onset myopes and youth-onset myopes were re-evaluated three years after the initial data were collected and a significant increase in mean lens thickness

was found in the group of early adult-onset myopes. No significant mean lens thickness increase occurred in the group of youth-onset myopes.

To evaluate further the contribution of the crystalline lens dimensions to the refractive state of the eye, radii of curvature and lens thicknesses of a group of anisometropes were examined. Radii were found not to be consistently flatter or steeper in the relatively more myopic eye compared with the relatively less myopic eye and there was also no significant difference between mean lens thickness of the relatively more myopic eye compared to mean lens thickness of the relatively less myopic eye.

Crystalline lens thickness and radii of curvature were therefore found to play only a minor role in refractive error development. Deeper vitreous chambers and steeper corneal curvatures were found to be the major contributors to myopia.

AUTHOR'S STATEMENT

The investigations reported in this thesis are entirely my own work except where assistance is specifically acknowledged.

Rolene Scott

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PREFACE

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Scott R, Grosvenor T. (1993) Structural model for emmetropic and myopic eyes. *Ophthalmic and Physiological Optics* **13**:41-47.

Grosvenor T, Scott R. (1993) Three-year changes in refraction and its components in youth-onset and early adult-onset myopia. *Optometry and Vision Science* **70**:677-683.

TABLE OF CONTENTS

Chapter			Page
Abstract			i
Author's statement			iii
Acknowledgements			iv
Preface			v
Contents			vi
1	INTRODUCTION		1
2	THE CRYSTALLINE LENS		9
	2.1	Age related changes in gross anatomy of the lens	9
	2.2	Age related changes in the refractive power of the lens	14
	2.3	Relationships between the components of refraction	20
		2.3.1 Correlation ametropia and component ametropia	21
		2.3.2 Factor analysis	25
	2.4	The refractive error distribution curve	27
	2.5	Summary	29
3	METHODOLOGY		32
	3.1	Measurement of corneal curvature	32
		3.1.1 Accuracy	33
		3.1.2 Comparability	37
		3.1.3 Repeatability	48
		3.1.4 Inter-session repeatability of corneal power	58
		3.1.5 Summary	61
	3.2	Measurement of refractive error	62
		3.2.1 Repeatability	65
	3.3	Measurement of ocular dimensions	67
		3.3.1 Repeatability	68

3.4 Summary 71

4 STRUCTURAL MODEL 74
4.1 The concept of structural modelling 75
4.1.1 Multiple sample analysis 79
4.1.2 A structural model for the eye 82
4.1.3 Developing the model 82
4.1.3.1 The variables 82
4.1.3.2 The relationship between the variables 83
4.1.3.3 The model 85
4.2 Purpose of the study 86
4.3 Subjects 87
4.4 Measurement and assessment methods 88
4.5 Results 89
4.5.1 Results for emmetropic Eyes 92
4.5.2 Results for myopic Eyes 94
4.5.3 Results of multiple sample analysis 95
4.6 Implications of the analysis 96
4.6.1 Relationships involving lens thickness . 96
4.6.2 Corneal radius *versus* vitreous chamber depth 98
4.6.2.1 Longer eyes have flatter corneas: a paradox 98
4.6.2.2 The importance of corneal radius .. 105
4.6.2.3 Relationships between chamber depths 106
4.7 Summary 106

5 REFRACTIVE COMPONENTS IN EARLY ADULT ONSET MYOPIA 108
5.1 Definition of terms relating to myopia 110
5.2 The contribution of corneal curvature 111
5.3 The role of the crystalline lens 115
5.4 Differences in accommodative responses 117
5.4.1 Amplitude of accommodation 117
5.4.2 Accommodative response gradient 118

5.4.3 Resting point of accommodation 118
5.4.4 Accommodative hysteresis 122
5.5 Summary 124

6 CROSS-SECTIONAL STUDY OF REFRACTIVE COMPONENTS .. 128
6.1 Subjects and procedures 129
6.2 Results 131
6.2.1 Mean age and mean spherical equivalent refraction 131
6.2.2 Data analysis 132
6.2.3 Comparison of matched pairs 134
6.3 Implications of the results 136
6.3.1 Lens thickness and lens power 136
6.3.2 Corneal power 139
6.3.3 Anterior chamber depth 139
6.3.4 Vitreous chamber depth and axial length 140
6.3.5 Ratio between corneal radius and chamber depths 141
6.3.6 Matched pair data 142
6.3.7 Growth of the normal eye *versus* the myopic eye 143
6.4 Conclusions 143
6.5 Summary 145

7 LONGITUDINAL STUDY OF REFRACTIVE COMPONENTS 147
7.1 Subjects and procedures 149
7.2 Results 151
7.2.1 Changes in components of refraction 152
7.3 Implications of the results 159
7.3.1 Changes in lens thickness 159
7.3.2 Changes in vitreous chamber depth and axial length 160
7.4 Summary 161

8 DEVELOPMENT OF ANISOMETROPIA 163
8.1 Definitions 165

8.2 Prevalence of anisometropia at different ages 165
8.3 Progression of anisometropia 169
8.4 Summary 180

9 LENS PARAMETERS IN ANISOMETROPIA 182
9.1 Method for determining the radii of curvature 183
9.2 Apparatus for measuring radii of curvature .. 186
9.2.1 The object 188
9.2.2 The video camera 190
9.2.3 The digital image processor 192
9.2.3.1 Effect of object distance 193
9.2.4 Summary 195
9.3 Subjects 196
9.3.1 Procedure for data collection 197
9.4 Analysis 199
9.4.1 Power analysis 199
9.4.2 Repeatability of image analysis 204
9.5 Results 206
9.5.1 Comparison between means 207
9.5.2 Correlations with the degree of anisometropia 209
9.5.3 Lens parameters in anisometropic subcategories 219
9.5.4 Intercorrelations between components ... 222
9.6 Discussion 225
9.6.1 The crystalline lens 225
9.6.2 Vitreous chamber depth and axial length 227
9.6.3 Corneal power 228
9.7 Summary 229

10 CONCLUSIONS 231
10.1 Youth-onset myopia 232
10.2 Early adult-onset myopia versus youth-onset myopia 235
10.3 Anisometropes 237
10.4 Development of myopia 240

10.5 Future research 242

APPENDIX 1 244
APPENDIX 2 250
APPENDIX 3 260
APPENDIX 4 271
APPENDIX 5 273

REFERENCES 275

LIST OF TABLES

Table		Page
2.1	Mean values of lens thickness for boys and girls in different age groups	10
2.2	Variations in refractive components of the human eye with growth	18
3.1	Determination of accuracy of a Humphrey Auto Keratometer. Eight repeat measurements of radius of curvature of six steel balls	35
3.2	Results of linear regression analysis of the readings obtained using the Humphrey automatic and the Bausch and Lomb manual keratometer ...	40
3.3	Mean of the differences between readings taken using the Bausch and Lomb manual keratometer and the Humphrey Auto Keratometer and the limits of agreement between the two instruments	41
3.4	Studies comparing manual and automatic keratometers	45
3.5	Repeatability study of Humphrey automatic and Bausch and Lomb manual keratometers	48
3.6	Comparison of single measurements and the mean of two repeat measurements of corneal power using the Humphrey Auto Keratometer	55
3.7	Summary of studies in which refractive error has been determined by different methods	62
3.8	The 95 percent limits of agreement of measurements of ocular dimensions on two different occasions using ultrasound biometry	69
3.9	Summary of the mean differences and the 95 percent limits of agreement for measurements of ocular dimensions taken on two separate occasions	71
4.1	Means and standard deviations of measurements for emmetropic and myopic eyes	89
4.2	The structural model as applied to emmetropic and myopic eyes: goodness-of-fit and residual variance	91
4.3	The structural model as applied to emmetropic and myopic eyes: standardised regression coefficients and associated t statistics	91
4.4	The structural model as applied to emmetropic and myopic eyes: correlations between components of refraction and associated t statistics	92

5.1 Summary of studies examining the accommodative responses of subjects with different refractive errors 125

6.1 Mean age and mean spherical equivalent refractive error, right eye, for subjects in each group 131

6.2 Results of one-way analysis of variance used to establish the significance of differences in refractive components across three refractive error groups 133

6.3 Refractive error distributions for the two groups of myopes 135

6.4 Mean values of group characteristics for the seven pairs of subjects used in the comparison of pairs matched for amount of refractive error 136

7.1 Mean change and frequency distribution of changes in mean spherical equivalent refraction during the three-year period for subjects in each of the three refractive error groups 151

7.2 Means and standard deviations of changes in spherical equivalent refraction and components of refraction which occurred over a three-year period in each of three refractive error groups 153

7.3 Correlations between changes in spherical equivalent refraction and changes in the refractive components for subjects in each of the three refractive error groups 154

9.1 Results of using two sets of frame analyses to calculate radii of curvature and lens power for five randomly selected eyes 204

9.2 Means and standard deviations of measurements for both eyes of anisometropes 208

9.3 Regression coefficients obtained when regressing the degree of anisometropia as a function of the difference in refractive components and ocular dimensions 211

9.4 Distribution of significantly different lens parameters among three sub-categories of anisometropes 220

9.5 Correlations between the degree of anisometropia and the differences which exist in the refractive components and ocular dimensions of anisometropic eyes 222

9.6 Parameter estimates for the multiple linear regression equation relating the degree of anisometropia to the differences observed in the ocular dimensions of anisometropes 224

9.7 The relationship between the degree of anisometropia and interocular differences in axial length as reported by three independent studies 228

LIST OF FIGURES

Figure		Page
2.1	A comparison between the shape of a 10-year-old lens with that of an 82-year-old lens ...	12
2.2	The elements of the crystalline lens in adults and children	13
2.3	Mean values and standard deviations for lens power as determined by modified SRK (Sanders-Retzlaff-Kraff) formula, plotted with respect to age	19
2.4	Mean values of lens powers as a function of mean axial lengths for each refractive error group	24
3.1	Calibration graph showing eight Humphrey Auto Keratometer readings as a function of the known radius of six steel balls	34
3.2A	Relationship between automatic and manual keratometer readings along the horizontal meridian	38
3.2B	Relationship between automatic and manual keratometer readings along the vertical meridian	38
3.2C	Relationship between automatic and manual keratometer readings for the mean of the horizontal and vertical meridians (mean K) ..	39
3.3A	Comparison of measurements along the horizontal meridian: manual keratometer minus automatic keratometer readings *versus* the mean of the same readings	42
3.3B	Comparison of measurements along the vertical meridian: manual keratometer minus automatic keratometer readings *versus* the mean of the same readings	42
3.3C	Comparison of mean K values: determinations using the manual keratometer minus those using the automatic keratometer readings *versus* mean of the same readings	43
3.4A	Repeatability of measurements along the vertical meridian using the Humphrey Auto Keratometer: first reading minus second reading *versus* mean of the same readings	50

3.4B	Repeatability of measurements along the vertical meridian using the Bausch and Lomb manual keratometer: first reading minus second reading *versus* mean of the same readings	51
3.5A	Repeatability of mean K using a Humphrey Auto Keratometer: first determination minus second determination *versus* mean of the same readings	52
3.5B	Repeatability of mean K using a Bausch and Lomb manual keratometer: first determination minus second determination *versus* the mean the same readings	53
3.6	Mean of two measurements along the vertical meridian using the Humphrey Auto Keratometer: differences between two sets of measurements *versus* mean of the same two sets of measurements	56
3.7	Mean of two determinations of mean K using the Humphrey Auto Keratometer: differences between two sets of determinations and means of the same values	57
3.8	Determination of repeatability of the average of two corneal power measurements along the vertical meridian using a Humphrey Auto Keratometer across two measurement sessions	59
3.9	Determination of repeatability of mean K values using a Humphrey Auto Keratometer across two sessions	60
3.10	Determination of repeatability of noncycloplegic refractive error using Humphrey Autorefractor	66
4.1	Theoretical changes in refractive state of the eye when lens thickness is varied and other components alter in different ways	84
4.2	Proposed structural model for the eye	86
4.3	Model for emmetropic eyes	93
4.4	Model for myopic eyes	95
4.5	Corneal radius *versus* axial length	99
5.1	Keratometry values plotted with respect to age	112
6.1	Comparison of lens thickness dimensions across three studies	138

7.1 Graph showing significant correlation between the change in spherical equivalent refraction and change in vitreous chamber depth for early adult-onset myopes 155

7.2 Graph showing significant correlation between the change in spherical equivalent refraction and change in axial length for early adult-onset myopes 156

7.3 Graph showing significant correlation between the change in spherical equivalent refraction and change in vitreous chamber depth for youth-onset myopes 157

7.4 Graph showing significant correlation between the change in spherical equivalent refraction and change in axial length for youth-onset myopes 158

8.1 Patterns of anisometropic progression described by Hirsch (1967) 171

8.2 The distribution of the vertical meridian refractive error for 731 anisometropes presented in 10-year age groups 173

8.3 Changes in the mean spherical refractive error with age, in anisometropia (data from a longitudinal study) 174

9.1 Views of the light sources and camera supported in a keratometer casing 187

9.2 Diagram illustrating the holder for the two pairs of light sources 188

9.3 Components of a digital image processor 191

9.4 The relationship between mean image height and radius of curvature 194

9.5 The relationship between the degree of anisometropia and the associated differences in vitreous chamber depth 212

9.6 The relationship between the degree of anisometropia and the associated differences in axial length 213

9.7 The relationship between the degree of anisometropia and the associated difference in corneal power 214

9.8 The relationship between the degree of anisometropia and the associated difference in lens thickness 215

9.9 The relationship between the degree of anisometropia and the associated differences in anterior radius of curvature of the crystalline lens 216

9.10 The relationship between the degree of anisometropia and the associated differences in posterior radius of curvature of the crystalline lens 216

9.11 The relationship between the degree of anisometropia and the associated differences in lens power based on radii of curvature of the crystalline lens 218

9.12 The relationship between the degree of anisometropia and the associated differences in lens power calculated using the method proposed by Bennett (1988) 218