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Determination of possible vision changes following osteopathic cranial manipulation

Abstract

Many patients and practitioners of manipulative therapies have reported anecdotal incidences of visual changes following manipulations of various kinds, from chiropractic to craniosacral therapy to osteopathic cranial manipulation. There is a general lack of research into whether these changes actually do occur and, if they do, what is their nature and extent. There are many documented case studies of these visual changes, often improvements, in the literature. These case studies inspired us to undertake this study, to try to document any visual changes following osteopathic cranial manipulation. An OD thesis by two of our predecessors at Pacific University College of Optometry researched the pertinent literature, both published and unpublished, concerning visual changes following cranial manipulation. The purpose of this study is to build upon this previous literature research by giving a series of visual tests to a group of normal subjects before osteopathic cranial manipulation and then repeating these same vision tests after the treatments to document any possible changes in an objective manner. The two optometric examiners were blinded as to what the osteopathic evaluation and treatment was for each subject to minimize prejudice in the optometric data gathering. The study showed that, at least for this group of 20 normal subjects, there was no statistically significant visual improvement following osteopathic cranial manipulation as measured by the optometric tests that were performed. However, some of the individual subjects reported subjective beneficial visual improvement. Because of this, more research is needed with a group of subjects who have had traumatic brain injury or spinal injury .

Degree Type

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Master of Science in Vision Science

Committee Chair

Willard B. Bleything

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Determination of Possible Vision Changes Following Osteopathic Cranial Manipulation

BY

Herbert T. Black & Sophia Swedberg

A thesis submitted to the faculty of the
Pacific University College of Optometry
Forest Grove, Oregon
in partial fulfillment of the requirements for the degree of
Doctor of Optometry
May, 1998

Advisors:

Willard B. Bleything, OD, MS, FAAO

Salisa Williams, OD

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Sophia Swedberg Date

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12.14.97

Willard B. Bleything, OD, MS, FAAO Date

12-4-97

Salisa Williams, OD Date

Biographies

Herbert T. Black

Herb Black received his B.S. degree in geology from Dickinson College in Carlisle, Pennsylvania and his M.S. in geology from the University of Colorado in Boulder. He practiced petroleum exploration geology and geophysics for almost twenty years in Denver, Colorado and Washington, DC before deciding to change careers and go to Pacific University College of Optometry. While employed full-time as a geologist at the Department of Energy, he worked part-time as a vision therapist for two years in Bethesda, Maryland.

After graduating from Pacific in May, 1998, Herb intends to work as a behavioral optometrist in a private practice setting, helping people of all ages to ameliorate visual problems that impede learning. He also intends to work as part of a multidisciplinary team, incorporating other treatment modalities such as osteopathic cranial manipulation, chiropractic adjustments, nutrition, educational tutoring, and occupational therapy, to optimize the treatment of functional visual problems.

Sophia Swedberg

Sophia graduated from the University of North Dakota in Grand Forks, with a Bachelor of Science degree in Dietetics. She worked in the Saint Louis area as a Clinical Dietitian specializing in cardiac intensive care, cardiac rehab, and nutrition support before attending Pacific University.

Sophia's interest in the effects of manipulation on vision is shared by her brother who is studying chiropractic medicine in Kansas City, Missouri. She plans to obtain an associate position as an optometrist in private practice with the hope of someday opening a practice of her own.

Abstract

Many patients and practitioners of manipulative therapies have reported anecdotal incidences of visual changes following manipulations of various kinds, from chiropractic to craniosacral therapy to osteopathic cranial manipulation. There is a general lack of research into whether these changes actually do occur and, if they do, what is their nature and extent. There are many documented case studies of these visual changes, often improvements, in the literature. These case studies inspired us to undertake this study, to try to document any visual changes following osteopathic cranial manipulation. An OD thesis by two of our predecessors at Pacific University College of Optometry researched the pertinent literature, both published and unpublished, concerning visual changes following cranial manipulation.

The purpose of this study is to build upon this previous literature research by giving a series of visual tests to a group of normal subjects before osteopathic cranial manipulation and then repeating these same vision tests after the treatments to document any possible changes in an objective manner. The two optometric examiners were blinded as to what the osteopathic evaluation and treatment was for each subject to minimize prejudice in the optometric data gathering.

The study showed that, at least for this group of 20 normal subjects, there was no statistically significant visual improvement following osteopathic cranial manipulation as measured by the optometric tests that were performed. However, some of the individual subjects reported subjective beneficial visual improvement. Because of this, more research is needed with a group of subjects who have had traumatic brain injury or spinal injury.

Introduction

There is growing interest among behavioral optometrists in the effects of Osteopathic Cranial Manipulation (OCM) and other manipulative techniques on the visual system. There are reports in the literature detailing beneficial effects of various types of manipulation on vision.[1-8] Case reports indicate that OCM may facilitate the recovery of patients' visual systems after suffering from an acquired brain injury or spinal cord injury. OCM has been used to reduce the high intraocular pressure of glaucoma and ocular hypertensive patients when standard medical therapy has failed or was not tolerated by the patient.[7,9] As a non-traditional treatment modality OCM is becoming mainstream in the field of Holistic Optometry and is often incorporated into vision therapy treatment programs across the United States.

It is common for head-injured patients to suffer from accommodative problems among a host of other visual problems long after the actual injury.[2] It is speculated that OCM can be used to return a patient's accommodative system to pre-injury status after several treatment sessions.[2] Acquired brain injury visual systems may include: blurred vision, photophobia, words appearing to move, diplopia, asthenopia, headaches with visual tasks, loss of visual field, and difficulty with reading, comprehension, memory, attention, and concentration.[9]

Purpose

The purpose of this study is to determine if OCM has an effect on the visual systems of normal subjects, with the goal of continued research in a group of brain injured patients.[10] This research was inspired by a recent

literature review and OD thesis by Robert Wilkes and Michael Secrest. This review discusses the history and rationale of cranial therapy and other manipulative techniques and their effects on vision and the nervous system.[11]

Methodology

Optometric Methods

Twenty optometry students were enrolled in the *Determination of Possible Visual Changes Following Osteopathic Cranial Manipulation* study conducted at Pacific University's Family Vision Center located in Forest Grove, Oregon. Eligibility criteria included that subjects must: be full-time spectacle wearers (occasional soft contact lens wearers were accepted, but no subjects wearing rigid-gas permeable lens wearers were allowed), be pre-presbyopic, not be undergoing any treatment from a physician for ocular or systemic disease, not have undergone refractive surgery, and not be taking any medications.

The subjects were each given vision tests immediately before and after osteopathic cranial evaluation and/or treatment. The vision tests included: distance visual acuities, habitual phoria at far, static retinoscopy, monocular subjective to best visual acuity with Jackson cross cylinder, subjective to 2/3 of the 20/20 line, subjective to best visual acuity, induced phoria at far, positive relative accommodation with phorias, negative relative accommodation with phorias, automated refraction (Nidek AR-1000 Autorefractor), intraocular pressures (Keeler Pulsair) (average of 4 readings per eye), stereoacuity (Stereobutterfly and Wirt 4 Dot), binocularity (Van Orden Star), and corneal topography (Humphrey).

Osteopathic Methods

Twenty subjects were examined one at a time by two osteopathic physicians. One physician examined the cranial region of each subject, while the other physician recorded his findings. Then the physicians switched examiner/scribe roles and the neck, back, ribcage, pelvis, and sacrum regions were examined. Observational, palpatory, and passive range of motion data were collected.

Observational findings included estimates of symmetry of facial features and notations of standing postural imbalances. The facial features: orbit and ear heights, and nasal deviation served as indicators of cranial region somatic dysfunction. Posture findings: relative occipital, acromial, scapular, ileac crest and greater trochanter heights reflected gravitational compensation for somatic dysfunction in the rest of the body. (See Table 2)

Gentle palpation was used to detect somatic dysfunction in the examined body regions. In the cranial region light contact of the physicians' hands and gentle pressure on the scalp were used to diagnose lesions of the cranial movements, membranes, fluids and sutures. Passive shoulder abduction was recorded for each subject.

Each subject was then treated according to the somatic dysfunctions discovered on screening. Since no two subjects had the same lesions, no two received the same treatment. Osteopathic treatment methods included Sutherland's Osteopathy in the Cranial Field and ligamentous strain, Mitchell's muscle energy, Jones' strain counterstrain and Fulford's percussion-assisted fascial release techniques.

Results

Twenty subjects provided informed consent with a medical history and were entered into the study. The subjects included nine males and eleven females, ranging in age from 23 to 36 years.

Table 1 shows the results of the statistical analysis (paired t-test) of the optometric tests run on the subjects *as a group*. The column on the left shows all the tests run before and after OCM and the second column shows the level of significance of the statistical test (P-value). The P-value of statistical significance gives an indication of whether or not there was a significant change in the visual system parameter measured by each optometric test after OCM. The t-test requires that a null hypothesis be stated and then tested for significance. Our null hypothesis in each instance was that the particular optometric test showed no change after OCM. To refute the null hypothesis for any test, the P-value would need to be below .01.

As can be seen in Table 1, the only optometric test which showed a statistically significant change ($P < .01$) was that the intraocular pressure (IOP) in the right eyes (OD) of the group members as a whole actually increased significantly after OCM. We tend to think that this is an aberration and is meaningless since it is just one eye and the amount of increase was on the order of one to two millimeters of mercury, which is well within the expected daily fluctuation of normal subjects (Figures 3 and 4).

Statistical analysis of all the other optometric tests showed that there were no statistically significant changes of any visual system parameters of the group of subjects measured after OCM. However, as can be seen in the graphs of the actual changes after OCM of various optometric test results, there were isolated cases of individuals whose visual systems improved after OCM,

especially subject #6, who showed improvements in the following tests after OCM: autorefraction, intraocular pressure, negative and positive relative accommodation (#'s 21 and 20), monocular and binocular subjective to best visual acuity, and retinoscopy (Figures 1 through 16). The statistical tests of the group do not show such individual changes as they are all mixed in with the other group members. (Table 1).

Table 2 shows the osteopathic methods that were used on each of the subjects.

Discussion

Analysis of the data suggests that as a group there was a statistically significant rise in intraocular pressure found in the right eyes, but not in the left eyes. The total change for the group was an average of 1 mm of Hg, well within normal diurnal variation limits. No other significant, measurable vision changes following OCM were found using statistical analysis.

Although when comparing subjects' data there were changes in refraction within subjects, some may theorize that this was due to a release in ciliary tonus after OCM. Many of the subjects claimed that their vision appeared to be more vibrant and expanded following OCM, but a change in refraction was not found. This may be a result of improved circulation to the visual system within the brain. The subjects also commented that the treatments were very relaxing and made them feel calm.

Conclusions

This study dealt with the effects of OCM on the visual systems of normal subjects and showed no clinically significant results. It may prove beneficial to determine whether OCM is effective in facilitating visual rehabilitation in a

group of brain injured patients in future research projects. A study providing several treatment sessions to patients along with vision therapy versus vision therapy alone, OCM alone, and no treatment provided groups should be compared.

Optometrists working together with other members of the healthcare team will be more capable of providing excellent care to patients when there is an understanding of what each individual team member has to offer. Overlap between the disciplines can provide useful information from a different perspective or point of view. It takes many helping hands and hearts to rehabilitate a person after a traumatic life-changing injury. Osteopaths and optometrists working together can learn a great deal of information from each other, as well as from the other healthcare professions.

Acknowledgments

We are grateful to Dr. Willard Bleything for his guidance and helpful suggestions in all phases of the study. Dr. Bleything and Dr. Salisa Williams were instrumental in suggesting the original idea for this thesis to us. Drs. Robert Wilkes and Michael Secrest wrote a comprehensive literature review of the effects of manipulation on vision which aided this study tremendously. Drs. Miller and Ellie Reikowitz, osteopathic physicians, performed the osteopathic evaluations and treatments at Pacific University; we are indebted to them for their hard work and interest in this study. Last but not least, we wish to thank Beta Sigma Kappa (BSK), the national optometric honor fraternity, for their generous financial support of this research.

Table 1

Paired t-test (pre and post Osteopathic Cranial Manipulation) Statistical Results:

Test:	P-Value:
Autorefractor OD sphere	.4681
Autorefractor OS sphere	.5263
Autorefractor OD cylinder	.3722
Autorefractor OS cylinder	.7279
Intraocular pressure OD	.0051 **
Intraocular pressure OS	.4267
Corneal mapping	.7603
Van Orden Star	.5090
#21	.3440
#21 phoria	.0884
#20	.3440
#20 phoria	.9113
#13b	.3476
7A sphere OD	.0828
7A sphere OS	.1100
7A cylinder OD	•
7A cylinder OS	.5778
7A axis OD	.3484
7A axis OS	.0663
MSBVA sphere OD	.0569
MSBVA sphere OS	.7547
MSBVA cylinder OD	•
MSBVA cylinder OS	.4469
MSBVA axis OD	.3619
MSBVA axis OS	.0665
Retinoscopy sphere OD	.6446
Retinoscopy sphere OS	.1760
Retinoscopy cylinder OD	.3828
Retinoscopy cylinder OS	.3489
Retinoscopy axis OD	.4588
Retinoscopy axis OS	.5923
Habitual phoria	.2500
Autorefractor OD SE	.5952
Autorefractor OS SE	.7068
#21 Net	.3306
#20 Net	.6289
MSBVA OD SE	.0350
MSBVA OS SE	•
Retinoscopy OD SE	.4144
Retinoscopy OS SE	.0967

** Significant at p= .01

Definitions

SE	**Spherical equivalent (sphere + one-half cylinder**
#7A	Binocular subjective to best visual acuitiy
#13b	Phoria at 40 cm.
#20	positive relative accommodation
#21	negative relative accommodation
MSBVA	Monocular subjective to best visual acuity

Table 2

Osteopathic Cranial Methods for 20 Subjects:

	OCF	CS	LAS	ME	PH	ART	FPR	HVLA	ORAL	# of Δ's
1	X	X	X		X					1
2	X	X			X					4
3	X	X			X				X	2
4	X				X				X	1
5	X	X			X				X	0
6	X		X		X				X	1
7	X	X			X				X	2
8	X									3
9	X				X					2
10					X					3
11	X		X		X					0
12	X				X	X				1
13	X	X	X		X				X	2
14	X		X		X					1
15	X				X					0
16	X	X	X		X					0
17	X	X	X		X					0
18	X	X	X	X	X	X				2
19	X	X			X				X	2
20	X	X		X					X	2

Definitions

OCF	Osteopathy in the cranial field
CS	Counter strain
LAS	Ligamentous articular strain
ME	Muscle energy
PH	Percussion hammer
ART	Articulotory techniques (broad)
FPR	Facilitated positional release
HVLA	High-energy low-amplitude
ORAL	Cranium
MFR	Myofascial release

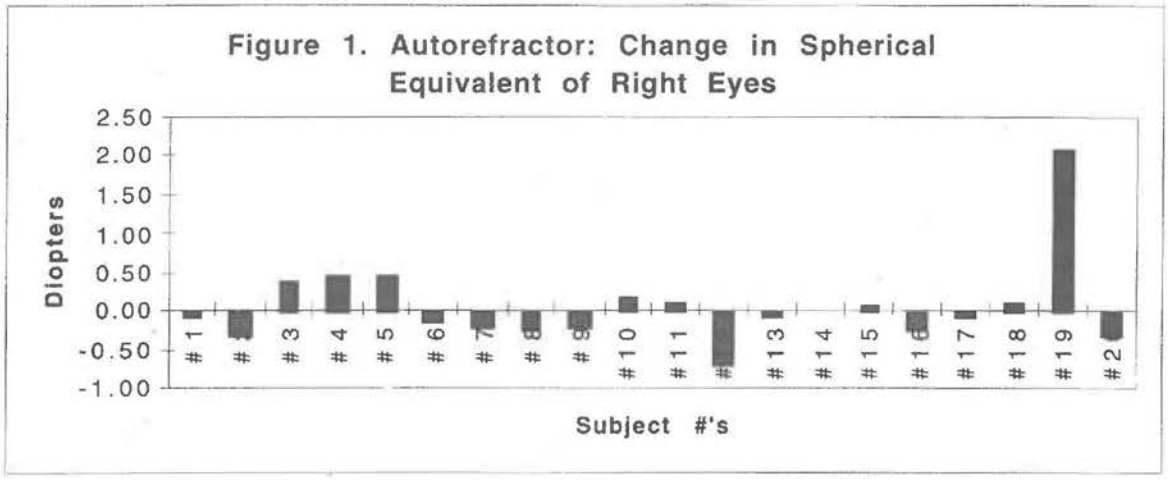


Figure 1. Autorefractor: Change in Spherical Equivalent of Right Eyes
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
Diopters
#3
#4
#5
#6
#10
#11
#13
#14
#15
#17
#18
#19
#2
Subject #'s

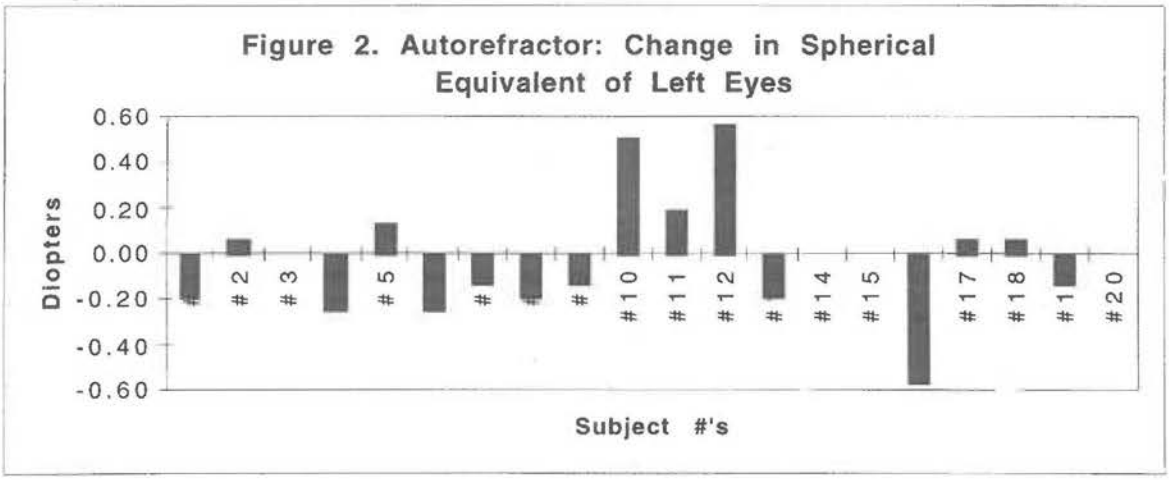


Figure 2. Autorefractor: Change in Spherical Equivalent of Left Eyes
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
Diopters
#2
#3
#5
#10
#11
#12
#14
#15
#17
#18
#20
Subject #'s

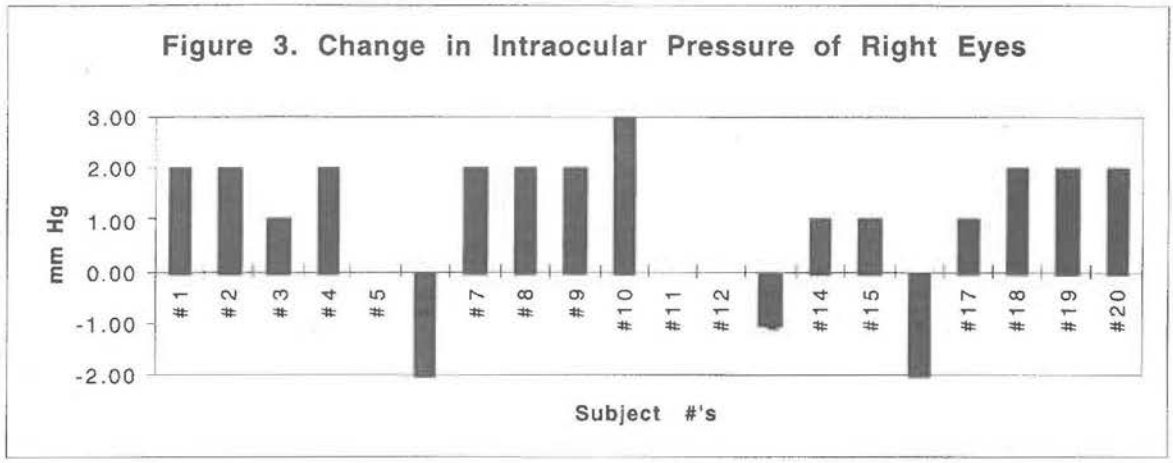


Figure 3. Change in Intraocular Pressure of Right Eyes
3.00
2.00
1.00
0.00
-1.00
-2.00
mm Hg
#1
#2
#3
#4
#5
#7
#8
#9
#10
#11
#12
#14
#15
#17
#18
#19
#20
Subject #'s

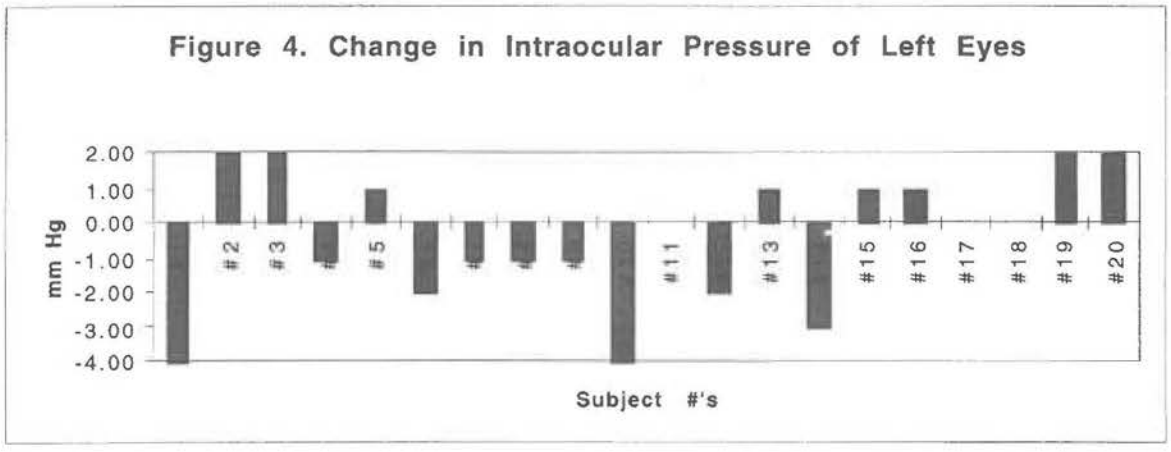


Figure 4. Change in Intraocular Pressure of Left Eyes
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
mm Hg
#2
#3
#5
#11
#13
#15
#16
#17
#18
#19
#20
Subject #'s

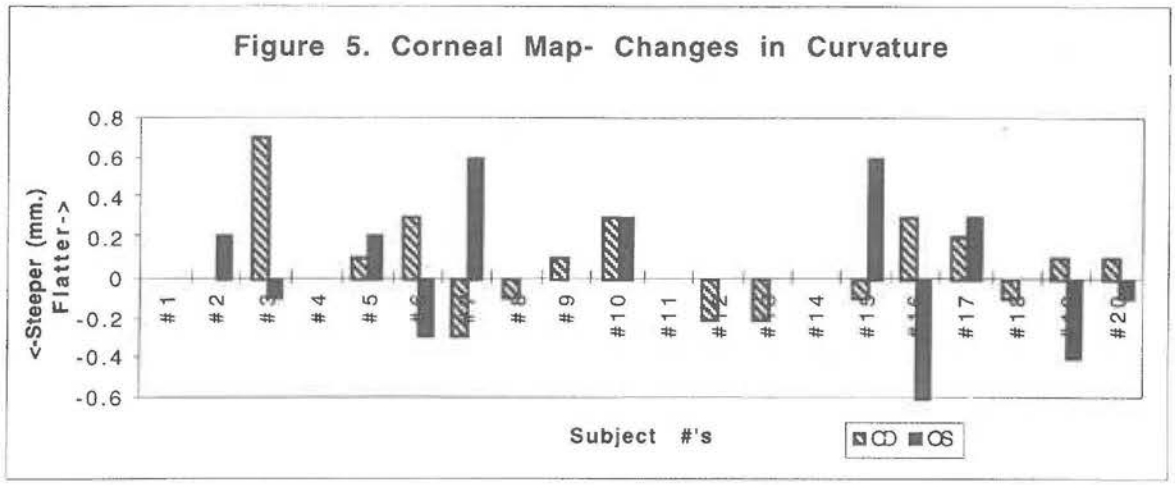


Figure 5. Corneal Map- Changes in Curvature
<-Steeper (mm.) Flatter->
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
#1
#2
#3
#4
#5
#9
#10
#11
#14
#17
Subject #'s
OD
OS

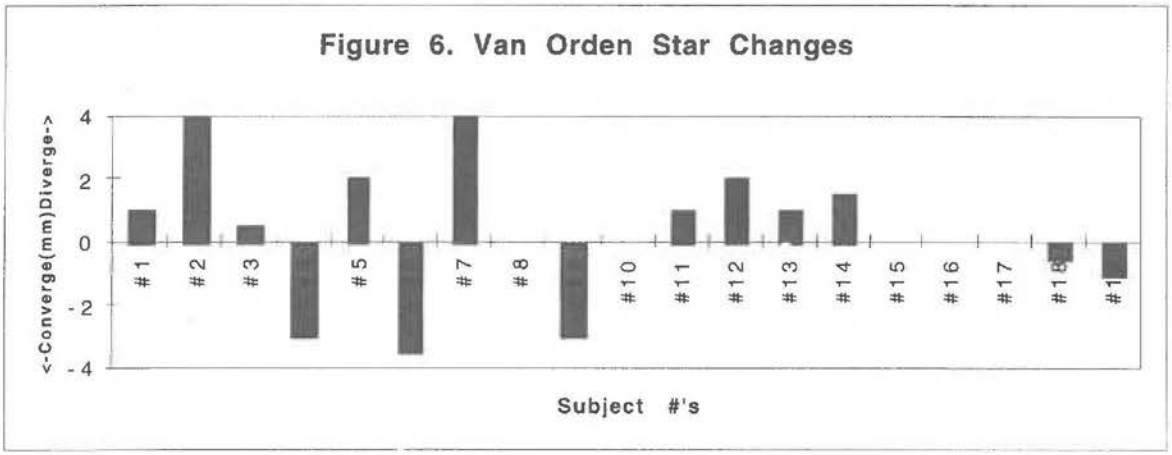


Figure 6. Van Orden Star Changes
<-Converge(mm)Diverge->
4
2
0
- 2
- 4
#1
#2
#3
#5
#7
#8
#10
#11
#12
#13
#14
#15
#16
#17
Subject #'s

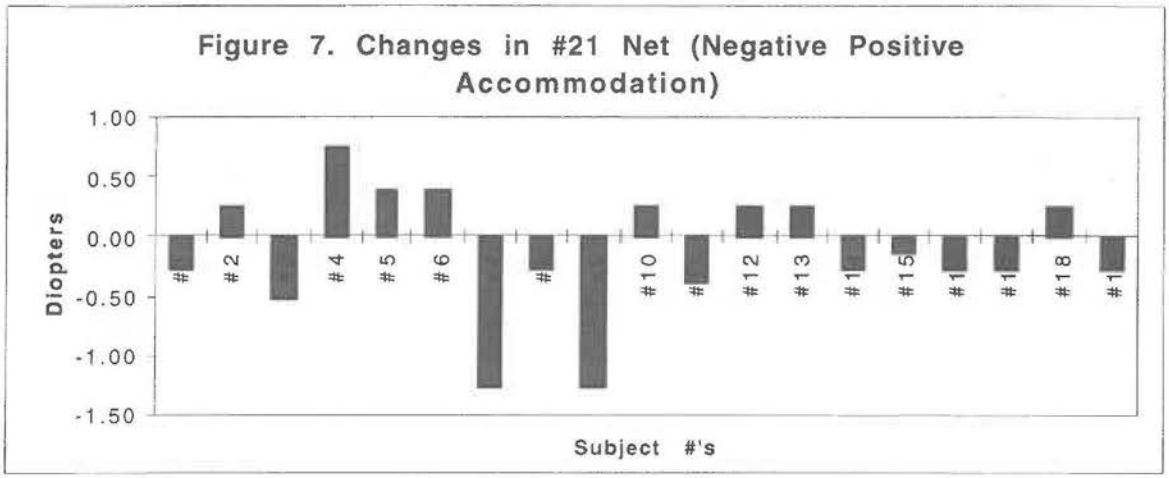


Figure 7. Changes in #21 Net (Negative Positive Accommodation)
1.00
0.50
0.00
-0.50
-1.00
-1.50
Diopters
#
#2
#4
#5
#6
#
#10
#
#12
#13
#1
#15
#1
#1
#18
#1
Subject #'s

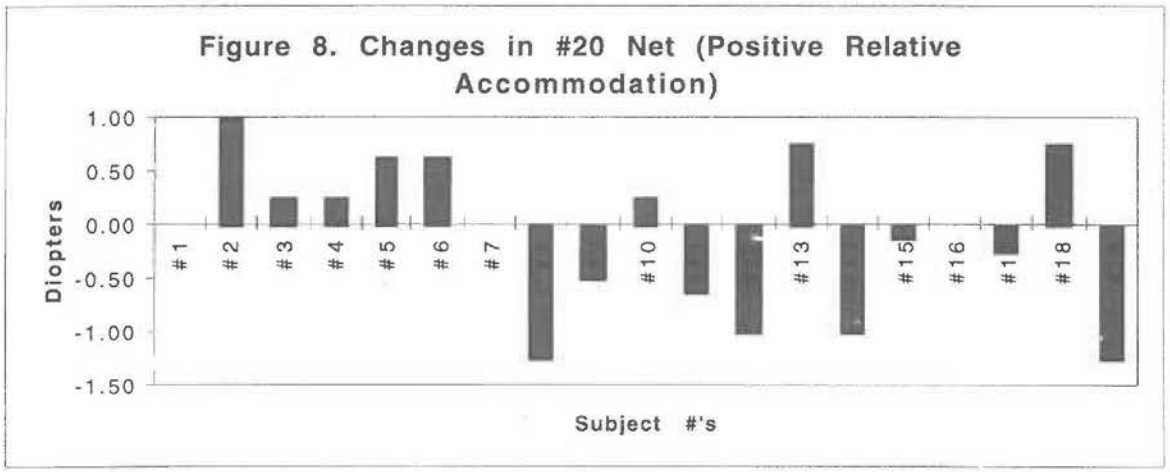


Figure 8. Changes in #20 Net (Positive Relative Accommodation)
1.00
0.50
0.00
-0.50
-1.00
-1.50
Diopters
#1
#2
#3
#4
#5
#6
#7
#10
#13
#15
#16
#1
#18
Subject #'s

Figure 9. Change in #13B (Lateral Phoria at 40 cm.)

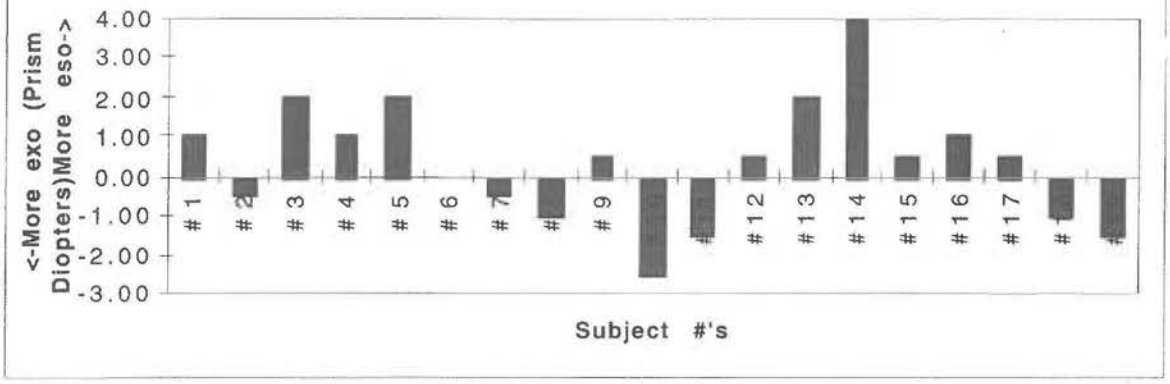
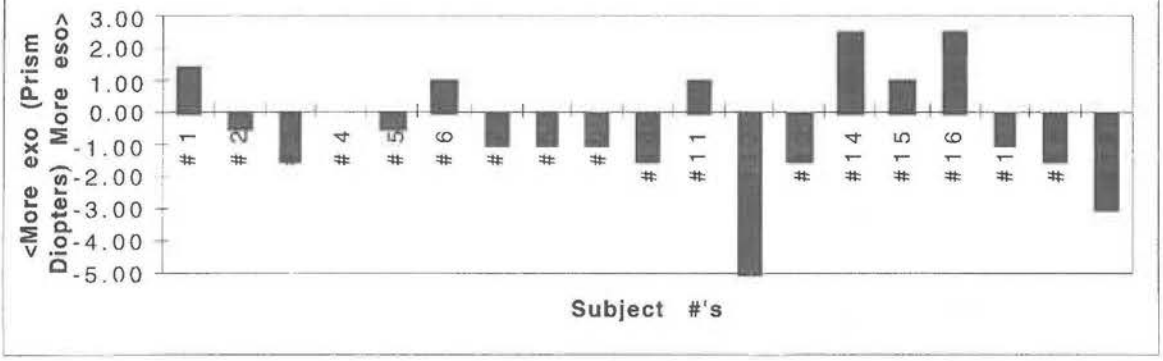


Figure 10. Change in Habitual Phoria



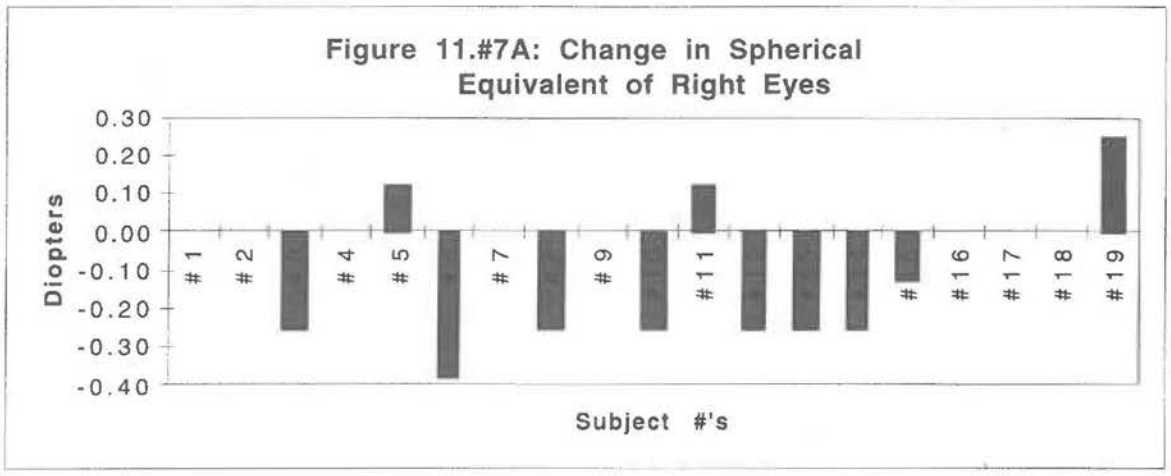


Figure 11.#7A: Change in Spherical Equivalent of Right Eyes
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
Diopters
#1
#2
#4
#5
#7
#9
#11
#16
#17
#18
#19
Subject #'s

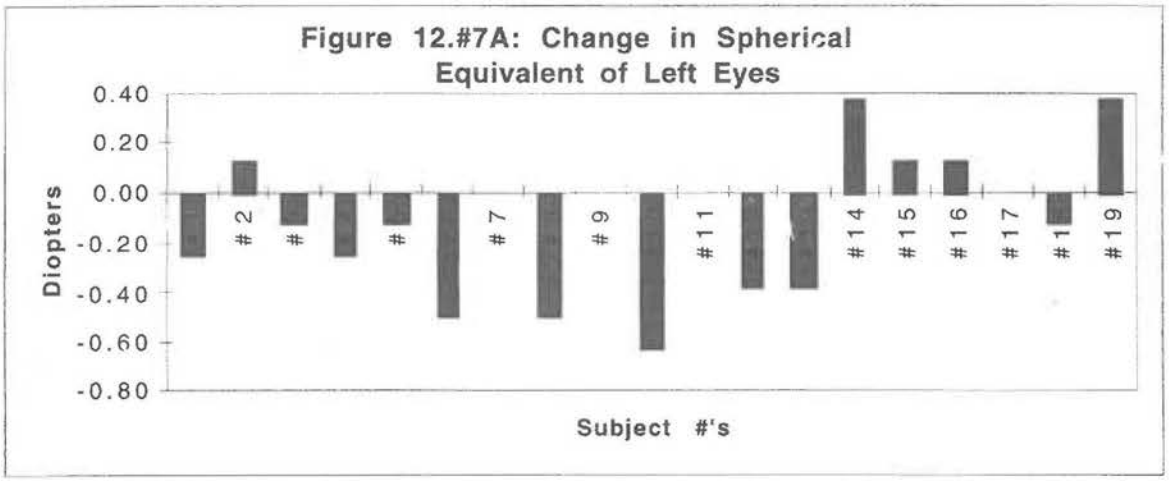


Figure 12.#7A: Change in Spherical Equivalent of Left Eyes
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
Diopters
#2
#7
#9
#11
#14
#15
#16
#17
#19
Subject #'s

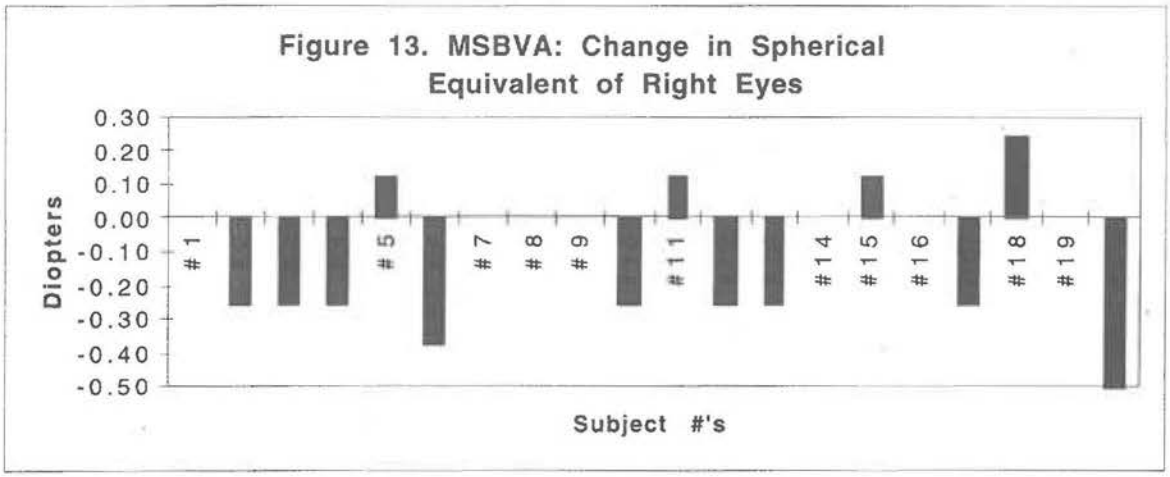


Figure 13. MSBVA: Change in Spherical Equivalent of Right Eyes
0.30
0.20
0.10
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
Diopters
#1
#5
#7
#8
#9
#11
#14
#15
#16
#18
#19
Subject #'s

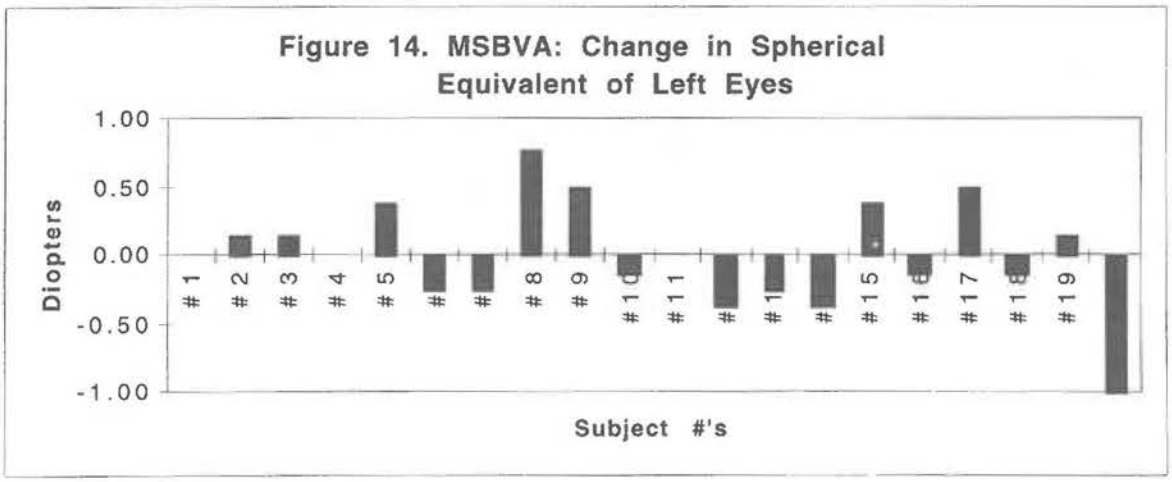


Figure 14. MSBVA: Change in Spherical Equivalent of Left Eyes
1.00
0.50
0.00
-0.50
-1.00
Diopters
#1
#2
#3
#4
#5
#8
#9
#15
#17
#19
Subject #'s

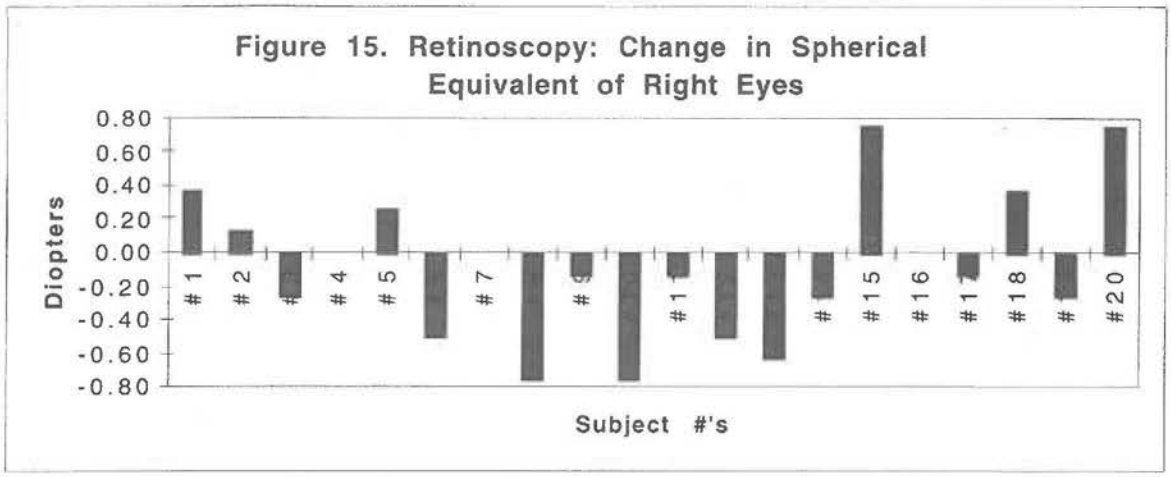


Figure 15. Retinoscopy: Change in Spherical Equivalent of Right Eyes
Diopters
0.80
0.60
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
#1
#2
#4
#5
#7
#15
#16
#18
#20
Subject #'s

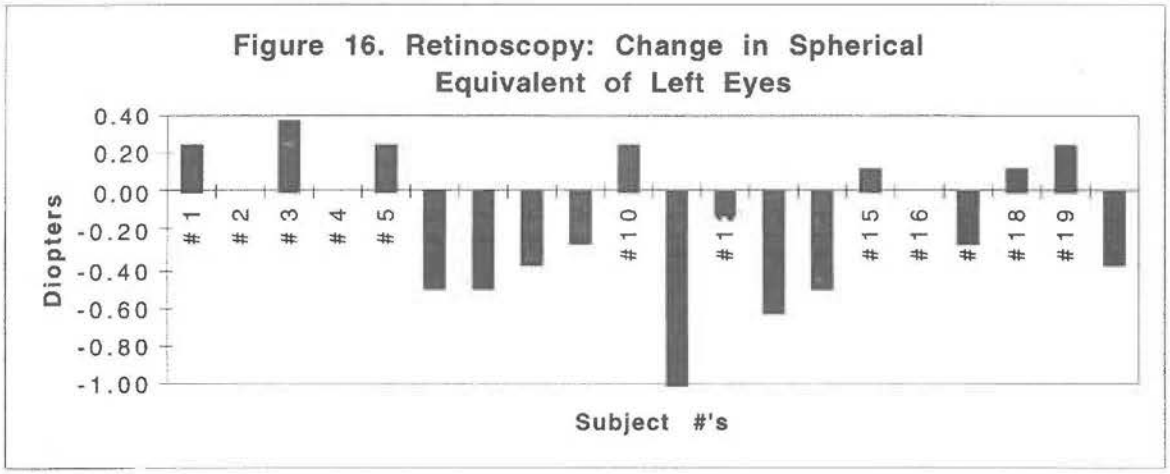


Figure 16. Retinoscopy: Change in Spherical Equivalent of Left Eyes
Diopters
0.40
0.20
0.00
-0.20
-0.40
-0.60
-0.80
-1.00
#1
#2
#3
#4
#5
#10
#15
#16
#18
#19
Subject #'s

References

1. Gilman F, Bergstrand J. Visual recovery following chiropractic intervention. J of Behavioral Optom 1990; 1(3): 73-74.
2. Terret A, Gorman R. The eye, the cervical spine, and spinal manipulative therapy: a review of the literature. Chiropractic Technique 1995 May; 7(2): 43-53.
3. Gorman R, Anderson R, Bilton D, Favoloro R, Pitorino A. Case Report: Spinal strain and visual perception deficit. Chiropractic J of Australia 1994 December; 24(4): 131-134.
4. Gorman R. The treatment of presumptive optic nerve ischemia by spinal manipulation. J of Manipulative and Physiological Therapeutics 1995 March/April; 18(3): 172-177.
5. Schutte B, Teese H, Jamison J. Chiropractic adjustments and esophoria: A retrospective study and theoretical discussion. J of the Australian Chiropractors' Assoc 1989 Dec; 19(4): 126-128.
6. Frymann V, Carney R, Springall P. Effect of osteopathic medical management on neurological development in children. J Amer Osteopathic Assoc 1992 June; 92(6): 729-744.
7. Shrader T, Optometry and chiropractic share mutual concerns. The ACA J of Chiropractic 1977 Mar: 16-19.
8. Changjiang Z, Yici W, Wenqin L, Yimou I, Zhixiang S, Jinxue L. Study on cervical visual disturbance and its manipulative treatment. J of Traditional Chinese Med 1984; 4(3): 205-210.
9. Cipolla V, Dubrow C, Schuller E. Preliminary study: An evaluation of the effects of osteopathic manipulative therapy on intraocular pressure. J Amer Osteopathic Assoc 1975 Jan; 74(1): 147-157.
10. Optometric Extension Program, Educational Brochure #B123. Acquired Brain Injury & Hidden Visual Problems.
11. Wilkes R, Secrest M, Craniosacral Therapy and Vision, Pacific University Doctor of Optometry Thesis, Nov 1996.