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*Official Journal of POMMM-POMMM and SASS-
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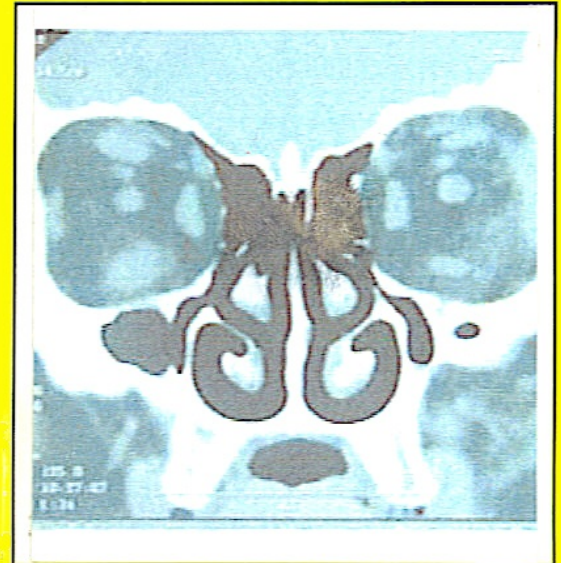
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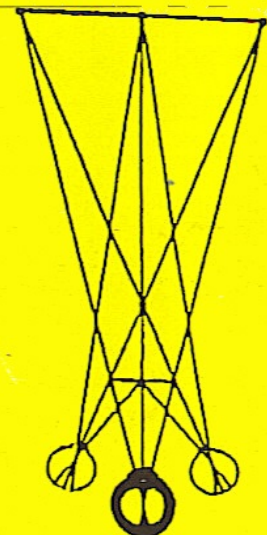
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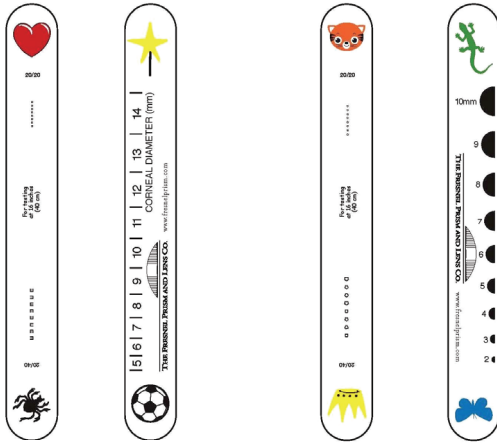


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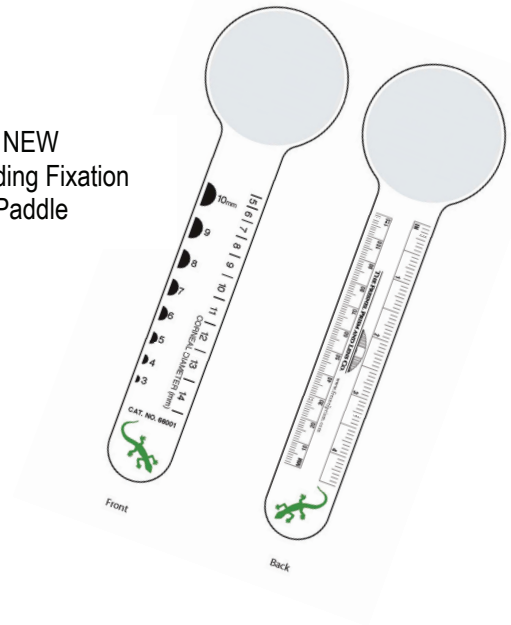
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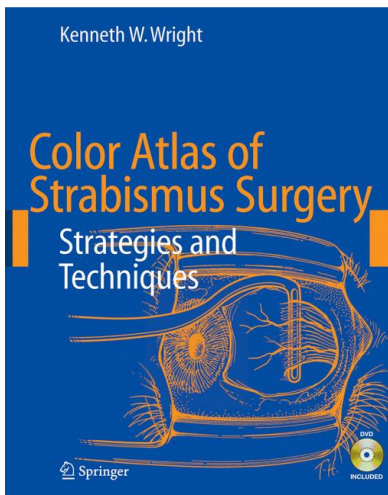


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The designation of individual issues is by the quarter, not the season, because seasons are never the same, but opposite, in the Northern and Southern hemispheres. The seasons are however designated on the cover with the Northern season. on the top and, inverted below, the current season in the Southern hemisphere.

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BINOCULAR VISION & Strabismus

Quarterly

“... the belief that one's view of reality is the only reality is the most dangerous of all delusions ...”

-Watzlawick, 1976

EDITOR
Paul E. Romano, M.D., M.S.O

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LEONARD APT, M.D.

Dr. Apt has been honored as “Physician of the Year”. Active Emeritus Professor Ophthalmology, Director Emeritus and Founder of the Division of Pediatric Ophthalmology and Strabismus and Co-Director of UCLA’s Center for Child Blindness, he was the first physician to be board certified in both pediatrics and ophthalmology. He helped create pediatric ophthalmology as a new sub-speciality in academic medicine.

Dr. Apt has received countless honors, special appointments, and professional titles nationally and internationally. He is involved in many philanthropic activities, and has been a founder and major contributor to numerous academic, medical and cultural organizations. At UCLA he has the distinction of being the only faculty member who has endowed both a chair and fellowship in his name.

A true renaissance man, Dr. Apt supports and has a special interest in the arts, music, sports, gourmet food, and wine. His first priority, however, is to preserve the eyesight of infants and children. *(Condensed from announcement from the official announcement)*

ARTHUR ROSENBAUM, M.D.

It is with great sadness that we report of passing of a colleague and friend, Art Rosenbaum. Internationally respected pediatric eye surgeon, he died June 22 at Ronald Reagan UCLA Medical Center after a long battle with cancer. In his 36 years at UCLA, he treated more than 10,000 children. “Arthur was brilliant at analyzing very complicated cases of strabismus and devising innovative surgical strategies to resolve them” said colleague Dr. Sherwin Isenberg. “Colleagues around the country relied on his diagnostic expertise and consulted him on their cases.

As his colleagues recall, Rosenbaum had a great passion for strabismus surgery and loved to talk about Duane’s syndrome. “Duane’s syndrome intrigued Arthur because it was relatively common, and we operated on it a lot” said Dr. Joseph Demer. “It’s an innovative approach that I still use today in the operating room.”

Son of Dr. Harry (also a well respected ophthalmologist) and Evelyn Rosenbaum, he earned his undergraduate degree at the University of Michigan in 1962 and his medical degree at Washington University in St. Louis in 1966. After a one year internship at Mt. Zion Hospital in San Francisco, he conducted research as a commissioned officer at the National Institutes of Health in Bethesda, Maryland from 1967 to 1969. He arrived at UCLA for the first time in 1972 to complete his residency in ophthalmology at the Jules Stein Eye Institute. Next came specialty training in two fellowships. The first focused on pediatric ophthalmology and strabismus at the Smith-Kettlewell Institute of Visual Sciences in San Francisco under the mentorship of Dr. Arthur Jampolsky. The second fellowship expanded his training in the diagnosis and therapy of retinoblastoma under Dr. Robert Ellsworth in New York and Dr. Marshall Parks in Washington D.C. He joined the UCLA faculty in 1973.

Affectionately called “Maestro” in the conference room by colleague Isenberg, Rosenbaum was an enthusiastic teacher with exceptional skill at explaining complex topics in understandable way to ophthalmic residents and fellows.

A memorial fund has been established: Donations may be sent to the Arthur L Rosenbaum, M.D., Memorial Fund, c/o Jules Stein Eye Institute, 100 Stein Plaza, UCLA, Los Angeles CA 90024.m *(Condensed from the original obituary by Elaine Schmidt, June 30, 2010)*

EDITORIAL: STRABOLOGY? YES !... and EVAs, the Requisite New Cornerstone for Us and our Future (& for “Strabology®” too); Graves’ Ophthalm{y}opathy; Triplopia and Diplopia & Rx; Intermittent Exotropia. & CELEBRATE with us OUR 25TH ANNIVERSARY!

I know I owe **Joseph Lang** a lot. Now that includes the word “strabology” which he used regularly instead of “strabismology” or its extension strabismologist, which then became “strabologist”. I also heard and saw the occasional use of “strabolgy” and “-ist” by other European ophthalmologists at the time we were starting this periodical 25 years ago and we frequented European meetings as well as US meetings, in part to promote it.

I frankly like and enjoy the sound, the sight and the saying and speaking of the contracted word much better than the conventional longer word. “Strabology” is to me, almost musical. “Strabismology” always seems TOO long, too many syllables and among other things prone to misapprehension, misunderstanding and mis-spelling. “Strabology” is only ten letters and perfectly spelled simply phonetically in most languages. The “ism” in the conventional word is a tripping point in both speaking, spelling and writing (all three!).

After all, “ism” is just the ultimate euphuISM, no, ?

Def. (*Webster’s*: “1.an affected style [in words]...2.any similar ornate style of writing or speaking; high flown, periphrastic ([using] **unnecessarily long** ...expression) language”).

(*Wikipedia*: “ ‘Euphuēs’ is Greek and means ‘graceful,witty’)... the Greek word was adopted by Lyly in 1580 to describe the then current “highly artificial and mannered style” in speaking and writing at that time.

-ism, a suffix appearing in loanwords from Greek, where it was used to form action nouns from verbs (*baptism*); on this model, used as a productive suffix in the formation of nouns denoting action or practice, state or condition, principles, doctrines, a usage or characteristic, devotion or adherence, etc. (*criticism*; *barbarism*; *Darwinism*; *despotism*; *plagiarism*; *realism*; *intellectualism*). Cf. **-ist**, **-ize**. | < Gk *-ismos*, *-isma* n. suffixes, often directly, often through L *-ismus*, *-isma*, sometimes through F *-isme*, G *-ismus* (all ult. < Gk) | **is-ma-el**

Somebody converted it to an “action noun” by adding “ism”: no big deal! =nada! & “-ism” is **REDUNDANT** if you’re an “ology”, a “Science of...” anyway. [*ditto “science” and “evidence based”, right?*]

Also in the dictionary you will find another good real word. “STRABOTOMY”

one or both eyes so that both cannot be directed at the same object at the same time; squint; crossed eye. [1675–85; < NL < Gk *strabismós*, equiv. to *strab(ós)* squinting + *-ismos* -ISM] —**stra-bis/mal**, **stra-bis/mik** **stra-bis/mi-cal**, *adj.* —**stra-bis/mal-ly**, *adv.*
Strabo (strā/bō), *n.* 63? B.C.–A.D. 21?, Greek geographer and historian.
stra-bot-o-my (strə bot/ə mē), *n.*, *pl.* **-mies**. *Surg* the operation of cutting one or more of the muscles of the eye to correct strabismus. [1855–60; < Gk *strabós* (see STRABISMUS) + -TOMY]

If we can do that,(? If only five years?), surely we can do “strabology”.

Funny, in that clip is also *Webster's* definition of "strabismus". Elsewhere its origin is said to be from "strabos", Greek word for **crooked or deviated** and not something named after that Greek geographer!

We tried to get the International Strabismology Association to use "strabology" instead of the "ism" term but I got zero response. In fact I have always gotten zero response on that proposal from every MD strabismologist in the US we have proposed it to. Europeans? No sweat...

When we had some bread to give back to my adopted subspecialty and its mentors, I tried to use the short term when naming whatever about PO & S something or other I wanted to honor.. The resistance I ran into was extraordinary. It apparently seemed sacrilegious to many. Maybe even blasphemy? -considering the strength of the negative responses. I think I could get it to be accepted in only one or two places here of the several I tried.

We have considered it on and off for the second term in the title of our periodical, but this has been resisted regularly.

But now with consideration of a possibly closer relation to orthoptists through the IOA, we have new reasons to reconsider and found therein specific advantages to renew my quest:

I think we should consider "strabology" and its action nouns like "strabologist" to include all specifically trained workers and their work, research and clinical, in our special area of binocular vision and binocular alignment and misalignment or strabismus

That is a definition of "strabology", a medical science.

There is in fact no definition of a "strabismologist" in ordinary dictionaries or anywhere, not even Wikipedia, which however⁴ does include *orthoptists and -ics!*. Our term is not even *listed* in the indices of major strabismus or ophthalmology texts, and not even in Cassin and Solomon's *Dictionary of Eye Terminology*, and she is an *orthoptist* (*orthoptics and orthoptist are defined therein, however!*[*No wonder I got so little respect from her - I wasn't even really a real person to her, as a strabismologist, I guess?*]). So we contrived the foregoing definition.

More reasons:

Ever since Apt, Costenbader and Parks were so successful at inventing "pediatric ophthalmology" a wonderfully MARKETABLE pediatric medical specialty, burying the study and treatment of strabismus, per se, so deeply in it, that only Art Jampolsky was able to convince them to make it the American Association for Pediatric Ophthalmology and STRABISMUS. (Strabismology would have been better grammatically, pairing a couple of "ologies", and STRABOLOGY would have been even quicker and better...[WOULD SOMEONE BE WILLING TO PROPOSE A CHANGE TO THE AAPOS? -CONTINUED WIDESPREAD FEAR OF OUR PERIODICAL WE HAVE BEEN FORBIDDEN TO SOLICIT PAPERS FROM REGISTRANTS AT SAN DIEGO -IT IS FLATTERING, IN FACT- MAKES OUR PROSPOSING IT DANGEROUS]) The study and treatment of Ocular Motility Disorders and Strabismus used to be a distinct and separate ophthalmologic subspecialty entity which included any age with such

problems. But it never had an easy moniker like other eye subspecialties (Cornea! Retina! And even Glaucoma was simplified to “the ‘coma” for patients). So we were vulnerable!

Orthoptists, and -ics, created as a stand alone paramedical profession, and regularly trained and were certified to specifically assist in the difficult examination and treatment of such problems, especially in young children. They SURE got their name right!

Now, however, we see many STRABOLOGISTS proclaiming their business as “Pediatric Ophthalmology and *Adult Strabismus*”. No one practices just strabismology anymore.... Similarly, orthoptists are finding they must also be ophthalmic technicians to maximize their employment opportunities. As our subspecialty continues to slip away in the public eye.

We frankly hope that the shorter term “strabology” will find more favor of public recognition and memory and remembering our specific medical eye specialty. There was a time (and not very long ago) that no layperson knew what an “ophthalmologist” was. Now many seem to. Maybe we can make strabologist similarly known with time.

It was my original intent to practice only strabology, and my fellowship was only in that subject, or rather “ocular motility” with von Noorden at the Wilmer for two years, but when I finished all my training, those ophthalmology ocular motility jobs had virtually disappeared. I had only one offer of such from Ed Dunlap, my old alma mater, Cornell (B.A . And M.D.), but it was not FT. Miles Galin, a CUMC alum who, as an eye resident there, examined me as a medical

student on an amblyoscope! in 1958 and pronounced me totally lacking binocular vision and always would, was also interested in me but never made any offer.

Wilmer Head Ed Maumenee, who co-authored a strabismus text with my mentor there, asked me in 1969 what I planned to do when I left Wilmer. I told him I would have to find a job as a pediatric ophthalmologist. He said “what’s that ?”.

Thanks to my exposure to Marshall Parks while in training in his neighborhood for five years, I was able to complete my surgical training by myself.(At Wilmer for two years, I only got into the O.R. for a case once when some resident named Steve Ryan got lost doing eye muscle surgery while Gunter was out of town.).

Two years after I finished at Wilmer, even my mentor, Gunter v., left Wilmer and took a new job at Baylor as a pediatric ophthalmologist too!.

Well maybe by providing a more succinct name for those of us who really find the rest of pediatric ophthalmology both overwhelming and frustrating, and not what we really wanted to do, we can re-establish our subspecialty for itself again, under the name “strabology”.

We have defined “strabology” as the study of binocular vision, binocular alignment and misalignment or strabismus (all nouns in parallel so that is good grammar) and declare that anyone who has a special interest and training in normal and abnormal (i.e.disorders of) binocular vision and strabismus should be considered a “strabologist”

That includes C.O.s and international equivalents; C.O.T.s, ditto; O.D.s and M.D.s

and D.O.s (and the latter two may call themselves “strabismologists” or “surgical strabologists” to differentiate themselves from lesser trained non-surgeons). I’m going to see if Wikipedia will buy it!

Of course literal “orthoptics” is what all strabologists intend to do but we can’t take that word away from orthoptists after all this time. Maybe we could apply to them to be “surgical orthoptists”

At the same time this may well help the ISA and the IOA to maintain their special separate identities. We certainly hope so.

In keeping with the foregoing, we plan to next year change the name of this periodical from “*Binocular Vision and Strabismus Quarterly*” to “*Binocular Vision and Strabology Quarterly*” At least our acronym will remain unchanged at “*BV&SQ*”.

IN THIS ISSUE

The Economic Value Added (EVA) Resulting from Medical Care of Functional Amblyopia, Strabismus, (Pathologies of Binocular Vision) and Asthma. Beauchamp CL, Felius J, Beauchamp GR. *Binocul Vis Strabismus Q* 2010; 25:206-216)

The so called “health care crisis” is a political claim that has nothing to do with real medical care and **reality**, we all know that. Rather, our professional progress is upwardly **asymptotic**! What we do have is a world wide financial crisis because we Docs have been too successful, but the success is not free, it is expensive, and when combined with people living longer and therefore needing more of it, society cannot any longer afford all of it; or all that it needs and demands.

The fact is that humans, on average, (and society) do not either generate totally the money or not save enough of what they do generate, to pay the cost of all the good medical care for them for all of their now extended lifetime.

Persistent inflation by governmental financial systems is the major cause and contribution of our governments to this problem but there is nothing we can do to stop that apparently, and Bernanke has recently killed zero inflation as our final financial objective, but has committed us to permanent inflation of at least 2.5% per year. But remember 1980?

Our productive life is now perhaps 50+ years so that means every human must REcreate 50x3% at least = 75% of his NET WORTH every lifetime, just to stay even.... after they pay for all their other taxes.

So double down on all your bets !!!!

We who offer costly medical care are going to have to compete for what limited money is available to buy it.

How do we do that?

Step one is to show how much your services are worth in terms of **Quality of Life, and Length of Life. That has now appeared as “the bottom line” EVA which is expressed naturally in dollars (happiness units????) of universal value of any product especially medical care: years of human comfort.....**

That is why we call publication of this article what we need:

A Requisite New Cornerstone for Us, our future and for “Strabology”

We thank the authors, Doctors C.

Beauchanp, Joost, and G. Beauchamp for honoring this periodical by submitting it to us for consideration for publication. We are proud to...

Fortunately they demonstrate that what we accomplish for our patients is of significant value to our society. Therefore our society might pay for it.

So this is only the first step... Next will be some method of deciding whether the cost of services is worth the EVA.

And then whether there is enough bread in our economy to pay for it- and hopefully at least for everybody who needs it. You know when everybody gets their EVAs done and adds them up, we can't afford life!

The patient is being removed from the decision making process, that is obvious, isn't it. So it is only a matter of time before some government official makes those final decisions. You will be competing against your fellow medical care givers for this.

But obviously the EVA is the foundation for all these subsequent negotiations and decision. Great to have it.....

Ocular Movement Disorders and Extraocular Muscle Involvement in Iranian Graves' Ophthalmopathy Patients. K-Jafari A, Sadeghi-Tari A, Minaee-Noshahr N, Ameri A, Anvari F, Ali-Mahmoudi A, Eshraghi B, Rajabi MB, Rajabi MT. *Binocul Vis Strabismus Q* 2010;1 25:217-230

We commend these authors for this fine piece of work. They have done a superb job of collecting, presenting and writing about their experience with these very serious ophthalmology patients, particularly troubled

with problems of ocular motility and binocular vision due to the major involvement of the extraocular eye muscles, per se, well documented in this paper.

Abnormal Binocular Vision: Monocular Diplopia of Physical Origin: Two Case Reports: Its Relationship to the Physiology and Arrangement of the Visual Directions of the Retinal Areas; Binocular Triplopia. Khawam E, Nouredin B, Fahed D, Khatib L. *Binocul Vis Strabismus Q* 2010; 25:231-237.

Dr. Khawam and his colleagues regularly astound us with the intellectual intensity they bring to their work and profession in such a constantly worn-torn country. Not only does he survive there, but he is still able and does think constructively and extraordinarily.

This current work delves into abnormal binocular and monocular vision in a manner that will educate us thoroughly to severely symptomatic abnormal monocular and binocular vision.

Intrastromal Corneal Tattooing As Treatment in a Case of Intractable Strabismic Diplopia (Double Binocular Vision) Laria C, Alió JL, Piñero DP. *Binocul Vis Strabismus Q* 2010; 25:238-242

And here is a serious treatment for one of the problems mentioned in the foregoing article, nicely illustrated by the author. That was cover photo material except the fat muscles in Jafari et al's article were more readily visible and impressive.

Management of Intermittent Exotropia Strabismus of the Divergence

**Excess Type. Thorburn D, Koklanis K,
Georgievski Z. *Binocul Vis Strabismus Q*
2010; 25:243-252**

We applaud these authors for providing leadership amongst our orthoptic co-conspirator “clan” for their continued academic performance and contributions. We have tried to facilitate orthoptists contributions to this periodical and hope to have an enlarged participation in the future.

Elsewhere in the issue, There’s an interesting new amblyopia patch on the next page, and we our elections are over, so it is politics are done for now, so back to the more usual Hyde Park blog for this issue.

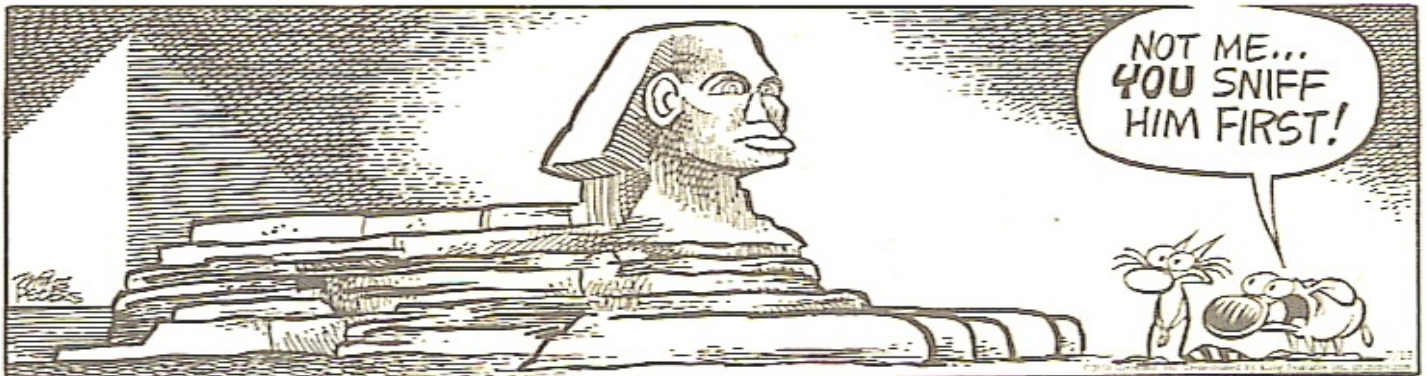
You will note this issue is a bit longer than usual. One of the greatest advantages of having 100% control of a publication is that when you start to get behind in the number and length of articles that are ready to publish, you can just make the next issue longer and we have done that. Electronically published, paper and printing costs are not a consideration, just the labors of our staff and when you are officially “retired” that’s not a problem.....

We finish up with a followup to the last issue’s article by Egyptologist Mims III:

AHappy Holidays and 2011 -per

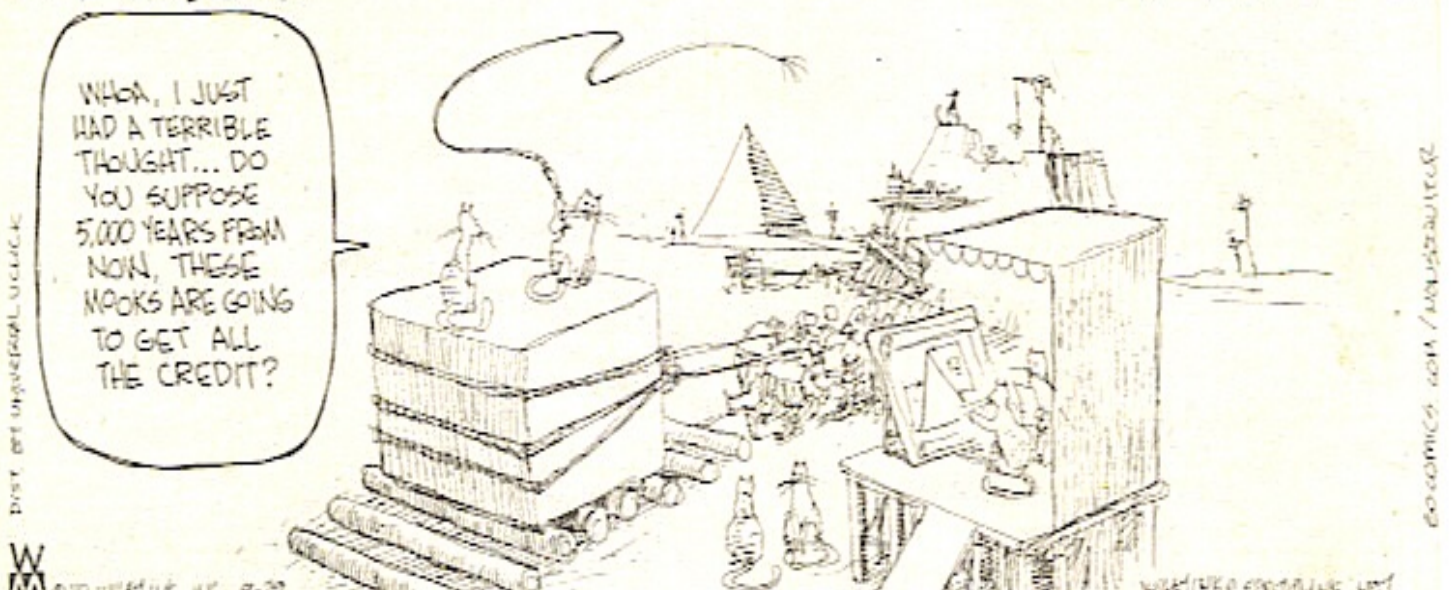
MOTHER GOOSE & GRIMM

By Mike Peters



Non Sequiter

By Wiley Ink



From: Judy Robinson,CO,COT To: Paul E. Romano
Subject: Fw: News for publication in your esteemed journal

— Original Message —

From: [Dr. Kumar](#)
To: [Judy @ BV&SQ](#)
Sent: Friday, November 12, 2010 8:47 AM
Subject: News for publication in your esteemed journal

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<!--[if !vml]-->

<!--[endif]-->

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Original Evidence Based Scientific Article

The Economic Value Added (EVA) Resulting from Medical Care of Functional Amblyopia, Strabismus, (Pathologies of Binocular Vision) and Asthma

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Medical Center and the (2) Retina Foundation of the Southwest, Dallas, Texas*

ABSTRACT: Introduction: Value analysis in health care calculates the **economic value added** (EVA) that results from improvements in health and health care. Our purpose was to develop an EVA model and to apply the model to typical and hypothetical (instantaneous and perfect) cures for amblyopia, surgical strabismus and asthma, as another, but non-ophthalmological disease standard for comparison, in the United States.

Methods: The model is based on changes in utility and longevity, the associated incremental costs, and an estimate of the value of life. Univariate sensitivity analyses were performed to arrive at a plausible range of outcomes.

Results: For the United States, the EVA for current practice amblyopia care is \$12.9B (billion) per year, corresponding to a return on investment (ROI) of 10.4%/yr. With substantial increases in investment aimed at maximal improvement (“perfect cure”), the EVA is \$32.7B/y, with ROI of 5.3%/yr. The EVA for typical surgical strabismus care is \$10.3B/y. A perfect cure may yield EVA of \$9.6B/y. The EVA for asthma is \$137B/y (ROI 20.4%/yr.), while a perfect cure may yield EVA of \$110B/y.

Sensitivity analysis demonstrated the relatively large effects of incidence, utility, and longevity, while incremental costs have a relatively minor effect on the EVA.

Conclusion: The economic value added by improvements in patient-centered outcomes is very large. **Failing to make** the necessary investments in research, prevention, detection, prompt treatment and rehabilitation of these diseases, **at virtually any conceivable cost, appears economically, medically, morally and ethically deficient** and consequentially **wasteful at very least economically for our society.**

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INTRODUCTION

In the context of a highly regulated marketplace characterized by high demand for services and presumed limited resources, new disciplines are required to both navigate the system and assure access to quality health care services. Methods to evaluate the cost-effectiveness of medical interventions are now becoming standard. Prominent among them is cost-utility analysis, which permits the integration of cost with quality and, in theory, enables cross-referencing of the benefits across disparate services. A significant issue is the dominance of cost in all of these analyses, and the derivative presumption that health care is a cost center. In this view, the primary element to manage is cost and the first management response will be to cut costs. The assumption is that quality will not necessarily suffer if we “do more with less.”

On the other hand, it is likely that this view is incorrect and that improvements in health care are highly contributory to both individuals and society in two important ways. There is no argument with the notion that good health is an important precondition of a happy and fulfilling life. There is also strong emerging evidence that improvements in health and health care contribute to economic growth. Nordhaus calculated that approximately 50% of the growth in the U.S. economy during the 20th century was attributable to improvements in health and health care (1). Death rates from cardiovascular disease in the U.S. have decreased by 20% between 1970 and 1990 (2), and the Lasker Foundation has calculated that the economic contribution of the added longevity totaled about \$48 trillion (3). Cutler and Richardson (4) and others have evaluated the expected returns on improvements in longevity and quality-of-life, and Cutler has

opined that the overall economic opportunity in health care approaches a quadrillion (10^{15}) dollars. While the economic contribution resulting from improvements in quality of life remains inconclusive, there is emerging evidence that the longevity premium may be increased by 30% by concurrent improvements in utility (4).

In this paper, we propose a model for the calculation of the *economic value added* (EVA) that results from improvements in quality of life (utility) and longevity. We apply this model to amblyopia, surgical strabismus, and asthma. The first two of these conditions presumably will result in returns based solely on improvements in quality of life. Asthma has both quality of life and length of life implications. For amblyopia and strabismus we performed two sets of analyses (with sensitivity ranges): 1) current practice returns, and 2) an imagined “perfect cure”. Thus, we calculated the EVA for each reference condition for an “average” patient by current practice, and assessed the economic opportunity given a hypothetical “perfect cure.”

METHODS

A model is presented that aims to compute the EVA based on estimates of the economic value of life and the improvements in quality-of-life and longevity related to health interventions. The age at which interventions occur, a coefficient for the relative contribution of health and healthcare improvements to the overall economy, and the costs incurred are all incorporated into the model. In particular, EVA is defined here as the difference between changes in a person’s value of life (due to changes in health status) and the incremental costs to achieve these changes. In mathematical notation:

$$EVA = \Delta V_L - \Delta C$$

(Equation 1)

or:

$$EVA = (V_L \cdot (\Delta U + \Delta L) \cdot K_1 \cdot K_2) - \Delta C$$

(Equation 2)

Model parameters

Incorporating a number of well-defined demographic and economic statistics listed in **Table 1, below**, the following model-specific parameters were used:

Value of life (V_L): Numerous attempts have been made to assign a monetary value to a human life. Cutler and Richardson (4) summarized these attempts and proposed a benchmark value of \$100,000 per life year in the absence of disease. This number would result in an estimate of V_L of **\$7.7 million for a life expectancy at birth of 77 years**. Alternatively, one could argue that the per-capita Gross Domestic Product (GDP) is an estimate for the value of life. In 2005, the total United States GDP was \$12.5 trillion (5),

resulting in a per capita value of \$3.3 million (for a population size of 296 million). **For our model we set V_L equal to \$6 million, and the corresponding value per life year is then \$77,000.**

Improvements in quality of life (U): Quality of life may be represented by utility (U), a quantity that is typically measured on a continuous scale from 0 to 1. The end points of this scale correspond to death (U=0) and perfect health (U=1). Various techniques have been used to elicit U for numerous defined health states; the most-widely accepted techniques being the time-tradeoff and the standard gamble methods and rating scales (see (6) for a review). Unfortunately, the utility of amblyopia has not been systematically studied or reported. Previous cost-effectiveness analyses for the screening for (7) and treatment of (8,9) amblyopia have relied on utility data elicited from patients with unilateral and bilateral reduced visual acuity due a wide variety of ophthalmic conditions (10,11). König & Barry (8) assumed that many patients with amblyopia develop compensatory mechanisms reducing their disutility. They therefore adjusted the mean disutility (U) of 0.08 (corresponding to the difference in mean utility between

Table 1. United States Demographic and Economic Data

Parameter	Value
Population (2005 estimate) ²⁷	296.5 million
Birth rate (2005 estimate) ²⁸	14.0 per 1,000
Annual births (2005 estimate) ²⁸	4.14 million
Life expectancy at birth (L _e ; 2003 data) ²⁰	77.4 years

patient groups with unilateral and bilateral good acuity (10,11) to 0.04 in their cost-utility analysis of amblyopia therapy. Membreno *et al.* (9), based on data from the same publications (10,11), assumed a mean disutility of 0.03, corresponding to the difference in mean utility of patients with unilateral reduced acuity of 20/80 ($U=0.86$) and the mean utility of patients with unilateral reduced acuity of 20/30 ($U=0.89$). Indeed, the acuity in the untreated amblyopic eye has been reported to be 20/80 on average (12). The mean utility of good visual acuity in *both* eyes was 0.97 (11). In our model, we therefore repeated the calculations with U set to 0.04 as a “typical” achievement and with U set to $0.97-0.86=0.11$ as a “maximum achievable” improvement due to amblyopia management.

Published data from adult patients with misaligned eyes (13) showed that the median utility for strabismus is 0.93, with a median value of 0.90 (interquartile range 0.83–1.0) for the subgroup of patients undergoing surgery,

and that the median post-operative utility equals 1.0. For our model calculations, we therefore set $U=0.10$ for surgical strabismus.

Estimates of the mean utility associated with asthma have ranged from 0.70 to 0.93, depending on the method of measurement as well as on the severity of the conditions included (14-16). We chose 0.80 as an intermediate value for this study, and U was therefore set equal to 0.20 for asthma.

Table 2 below summarizes the model parameters used in our calculations for amblyopia, strabismus and asthma.

Improvements in longevity (L): Because there are no known associations between amblyopia or strabismus and mortality, $L=0$ for these conditions. For asthma, $L \neq 0$ because a portion of patients die as a direct result of the disease. The mortality rate for asthma is 1.72 per 100,000 per year in the general population (17). Assuming an incidence of 9%, an average age at onset of

Table 2. Model Parameter Base Values

Condition	Utility Decrement, ΔU	Longevity Decrement, ΔL	Mean age of onset (years)	K_1	K_2
Amblyopia					
<i>typical improvement:</i>	0.04	0	4	0.5	0.95
<i>maximal improvement:</i>	0.11				
Strabismus	0.10	0	12	0.5	0.84
Asthma	0.20	0.010	30	0.5	0.61

K_1 : coefficient of health effect on the economy (see text); K_2 : life-utility effect (see text).

30 years (18,19) and a life expectancy of 47 years at the time of onset, this leads to:

$$\Delta L = 1 - \left(\frac{900 - 1.72}{900} \right)^{47} = 0.01$$

Coefficient of health effect on the economy (K₁): Although the premise of this paper is that improvements in patients' quality of life result in economic benefits, an unknown portion of the total improvement in quality of life due to improved health care may not directly contribute to the economy. Thus we implemented a "health effect" coefficient, K₁=0.50 in the model calculations, reflecting our assumption that half of the utility and longevity benefits have a direct positive effect on the economy.

Life-utility effect (K₂): This factor corrects for the expected duration of the effects, and is based on the estimated average age (A) at which the intervention occurs and the mean life expectancy at birth of the population (L_e), 77.4 years (20),

$$K_2 = \frac{L_e - A}{L_e} \quad (\text{Equation 3})$$

Hence, K₂ takes on values between 0 and 1. For interventions that take place very early in life, the expected duration of the effect is large and K₂ is close to 1, while for interventions that take place later in life, K₂ is smaller. The mean age of onset for the conditions studied was estimated at 4 years for amblyopia, 12 years for surgical strabismus, and 30 years for asthma (based on a blended average of childhood and

adult-onset patients (18,19)), as summarized in **Table 2, foot, prior page.**

Incremental costs (C): The incremental costs were based on the estimated cost per patient and the incidence of the condition. For amblyopia and strabismus, no actual data are available for the incidence or prevalence in the US, although the range of 2% – 4% is widely assumed for both conditions.

For our calculations, we set the incidence of amblyopia at 3% and for *surgical* strabismus at 1%.

For amblyopia, a blended cost model was applied that included the cost of screening every child (4.14 million children annually) and to treat those diagnosed (3% incidence, or 124,000 children per year), resulting in an average cost of \$300 per child, or a total cost per year of \$1.24 billion.

For surgical strabismus, the cost-model did not include screening and the total cost was based on the estimated cost to treat per patient. With incidence 1% and cost per patient \$4254, (21) the total cost resulted in \$176 million per year.

For asthma, reports on the direct costs vary widely. For children, based on 9% incidence (or 372,600 new cases per year) and a cost of \$426 per patient per year for 12 years (22,23), resulting in \$5,112 per child and total direct costs of \$1.9 billion per year. Other estimates of cost that included adults, who may have more complications (including higher death rates) and expensive treatment requirements, are considerably higher. A recent report by the Asthma and Allergy Foundation (24) put the total direct expenditures at \$10.4 billion per year. For our model calculations we assumed an intermediate cost number of \$5.1 billion per

Table 3. RESULTS: Calculated Estimated Medical Costs Per Person for Amblyopia, Strabismus and Asthma

Condition	Direct cost per person	Reference	Units	Cost per person (2005 dollars)
Amblyopia				
<i>typical improvement:</i>	\$300			\$300
<i>maximal improvement:</i>	\$750			\$750
Strabismus	\$4,254	Beauchamp et al. 2006 ²¹	2005 US dollars	\$4,254
Asthma	\$13,700	Smith et al. 1997 ²⁵	1994 US dollars	\$18,100

year (or \$18,100 total direct costs per patient; in 1994 dollars) as reported by Smith et al.(25).

RESULTS

Alternative scenarios

In addition to modeling the EVA based on the parameter values listed above and in Table 2, two types of secondary analysis were performed.

Univariate sensitivity analysis, in which parameters of the model (V_L , K_1 , incidence, U , L , and C) were varied individually, resulted in a range of plausible outcomes. (See also Table 5, overleaf, which lists the range of parameter values used in these calculations).

Secondly, EVA model calculations for the hypothetical scenario of a perfect cure (presumably at a much higher cost; five times the current levels) were performed in order to provided insight in the economic opportunity for each of the conditions studied.

Application of the model in Equation 2 to the parameter values in **Tables 1, 2 and 3** led to the baseline results presented in **Table 4, see next page**. The modeled life-time benefit of medical care for each of the conditions was in the hundreds of thousands dollars, while the annual contribution to the U.S. country economy exceeded \$10 billion at a relatively low cost, resulting in EVA outcomes of the order of \$10 billion per year for amblyopia and strabismus and well over \$100 billion per year for asthma. The corresponding *percentage annual* returns on investments are listed in **Table 4**.

This is the real “bottom-line” of calculations of cost. Note that the return on the treatment of strabismus is huge and can hardly be denied or refused. This ROI of 58.6% is a far better return than the very best of any conventional and legal financial investment.

Table 4. Model RESULTS: Financial Benefits to the U.S. Economy from Treatment of Amblyopia, Strabismus and Asthma

Condition	Life-time benefit per patient (thousands of dollars)	Benefit to the economy (billions of dollars/year)	Total cost* (billions of dollars/year)	EVA† (billions of dollars/year)	Return on investment§
Amblyopia					
<i>typical improvement:</i>	114	14.1	1.24	12.9	10.4
<i>maximal improvement:</i>	313	38.9	3.11	35.8	11.5
Strabismus	253	10.5	0.18	10.3	58.6
Asthma	386	144	6.73	137	20.4

*) For amblyopia, the total cost included population screening.

†) The economic value added (EVA) as calculated using Equations 1 and 2.

§) Return on investment = EVA / (Total cost).

Table 5, next page, lists the results of the sensitivity analysis. Note, that the range of EVA outcomes varied considerably, but that the effects of variations in the estimated cost numbers had relatively small effects. The upper extremes for the range of cost numbers corresponded to the increased spending aimed at maximum improvements (the “perfect cure”), and the corresponding EVA outcomes (\$10.0 billion for amblyopia, \$10.0 billion for strabismus, and \$129 billion for asthma) led to returns on investment for these conditions of 11.5, 20.1, and 8.6 respectively.

The hypothetical scenario of achieving perfect results (at a higher cost) was modeled by elevating the cost numbers to 5 times the current spending levels. This led to EVA estimates of \$32.7B per year (amblyopia), \$9.6B per year (surgical strabismus); and \$110B per year (asthma). The corresponding returns on investment were 5.3, 10.9, and 3.3, respectively.

Table 5. Sensitivity Analysis

Parameter	Range of values	EVA for	EVA for	EVA for
		Amblyopia	Strabismus	Asthma
		(range, in billions of US dollars/year)		
Value of life (V_L)	\$3M – \$10M	5.8 to 22.3	5.07 to 17.3	65.1 to 233
K_1	0.33 – 1.00	8.1 to 27.0	6.8 to 20.8	88.1 to 281
<i>Amblyopia:</i>				
Incidence	2% – 4%	8.2 to 17.6		
ΔU	0.03 – 0.14	9.4 to 48.2		
ΔC	\$200 – \$1000	10.0 to 13.3		
<i>Strabismus:</i>				
Incidence	0.5% – 2%		5.2 to 20.6	
ΔU	0.016 – 0.2		1.5 to 20.8	
ΔC	\$3,000 – \$12,000		10.0 to 10.4	
<i>Asthma:</i>				
Incidence	6% – 12%			89.1 to 185
ΔU	0.07 – 0.3			48.0 to 205
ΔL	0 – 0.05			130 to 164
ΔC	\$4,000 – \$40,000			129 to 142

K_1 : coefficient of health effect on the economy (see text); ΔU : decrement in utility; ΔC : incremental cost; ΔL : decrement in longevity.

DISCUSSION

We have taken the perspective that the total value of health care interventions is related to their ability to deliver two outcomes: improved quality of life and increased longevity. We further posit that improvements in these two core outcomes deliver value, both human and economic. Rather than health interventions being a cost center, they are, as we have modeled herein, substantial contributors to societal vigor, including economic growth.

The model presented here extends the work of Cutler and Richardson⁴ who have demonstrated that ‘health capital’ can be defined in terms of changes in utility and longevity if a monetary amount can be assigned to a healthy life (or life-year). Our model estimates the economic value added by increases in health capital, taking into account the cost at which improvements in health and health care occur.

Several model parameters require additional amplification. The value of an American human life has been estimated by a number of authors, and the value assumed in our calculations is a relatively conservative \$6 million. Cutler and Richardson (4) have summarized their own and other authors’ work to conclude that the economic value of a year of human life is about \$100,000; an added year of longevity, presumably at some level of compromised utility is about \$75,000. For ophthalmic conditions, the value is discerned in terms of added quality of life; for asthma there is a definable death rate with a calculable economic loss. For some ophthalmic conditions, there is specific data about the utility decrements bourn by patients (e.g. (11,26)). Most utility estimates in eye-related conditions are associated with the level of visual impairment (10,11), as well as the threat to the

fellow (presumably better seeing) eye. Moreover, utilities for eye (and other medical) conditions in childhood are generally not known, and subject to methodological concerns. Hence the utilities used were chosen from available literature on adults. The coefficient of health effect on the economy (K_1) is an arbitrary factor chosen to accept the likelihood that there will not be a one-for-one delivery of an economic benefit for an improvement of, say, 0.01 units of utility or for a year of added life. This coefficient is likely to be multi-factorial and non-linear: dependent on the condition under consideration as well as the health status. For our calculations, we chose an arbitrary conservative coefficient of 0.5. The life-utility effect is a factor that acknowledges that a condition does not likely effect all years of a patient’s life from the quality of life perspective. Hence, a median age of onset is ascertained, and taken as a fraction of expected average life span.

Costs were determined based on reported values for direct costs of care. Inclusion of indirect costs would decrease the return on investment. For amblyopia, we have assumed aggressive estimates of cost, to be as certain as we could that there would be sufficient funds available to approach a “perfect cure.” We assumed all costs were applied in the year of onset of disease. For amblyopia, we assumed a cost model that invests at least 2 times current spending; for surgical strabismus and asthma, we modeled 5 times and 2 times investments, compared to current spending. Since we assumed all costs were expended at the time of a diagnostic or preventive intervention (prior to treatment), neither the costs nor the benefits were discounted for the analysis. Cost data for most clinical conditions are difficult to ascertain, and estimates vary widely.

Accordingly, we tested across large ranges. Yet, costs are the least impactful on the outcomes of care, while the sensitivity analyses suggest that incidence, utility and longevity have an important impact on the EVA.

The results presented here suggest an important perspective. Far from medical care being a cost center, it appears that health is a massive economic engine. Improvements in health status (i.e., quality of life and longevity) result in extremely beneficial returns on investment. It can be said now that health creates wealth. A derivative perspective is that to fail to make the investments required to improve core patient outcomes is consequentially wasteful. In some cases, it is likely that we fail to commit sufficient resources to appropriate care so that the overall population utility may be improved.

We offer this model to others to test its parameters and validity. We further suggest that these perspectives form the basis for an important new optimistic strategy for health care services. The opportunities apparently are so large as to stretch credulity. A positive, proactive strategy to eliminate the burdens of amblyopia, strabismus, asthma, and probably most (if not all) other medical conditions will likely have a number of highly desirable characteristics: improvement of the human condition, improvement of society economic vigor, and improved outcomes focused relationships between patients and their physicians. Our data demonstrate that investments in amblyopia detection and treatment, surgical cure of strabismus, and elimination of the health decrements of asthma are excellent investments, at virtually any conceivable cost.

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Original Evidence Based Scientific Article

Ocular Movement Disorders and Extraocular Muscle Involvement in Iranian Graves' Ophthalmopathy Patients

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ABSTRACT: Purpose: The aim of this study was to evaluate movement disorder patterns and extraocular muscle involvement in Iranian Graves' ophthalmopathy (GO) patients.

Methods: We examined 75 patients (37 women and 38 men) with GO. Female to male ratio was 0.97 among all patients and 0.72 among restrictive myopathic cases (male 18 (58.1%), female 13 (41.9%), $P=0.2$). Their age ranged from 16 to 66 years; mean age was 35.42 ± 11.63 and 33.55 ± 10.31 among patients affected by restrictive enlargement and whom did not, respectively.

Results: Orbital CT assessment showed EOM enlargement in 124 out of 150 orbits (82.6%). Clinical restriction was evident in 31 (41.3%) out of 75 patients. Bilateral restriction was observed in 14 out of 31 (45.1%). The most frequent type of movement limitation was supraduction limitation followed by abduction, inferaduction, and adduction limitations (59%, 40%, 31.1% and 13.3% respectively). This was compatible with Hess screen results and orbital CT reports in regard of IR, MR, SR, and LR involvement. Sixteen out of 75 patients reported diplopia. Mean Hertel exophthalmometry readings were higher in eyes with restrictive myopathy.

Conclusion: This study showed more restrictive myopathy in cases with more extraocular enlargement and positive correlation between severity of inferior rectus enlargement and Hertel reading. A higher rate of male patients in our study may be due to ethnic differences in GO in Iranian patients or due to severity of involvement in this group.

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INTRODUCTION

Graves' disease affects eyes through an autoimmune mechanism (1). Graves' ophthalmopathy (GO) represents the most frequent inflammatory condition of the orbital tissue and extraocular muscles (2).

Graves' ophthalmopathy can cause eyelid retraction, lagophthalmos, periorbital and lid edema, injection and edema of the bulbar conjunctiva, proptosis (exophthalmos), inflamed caruncle, increased orbital pressure, corneal exposure, disturbances in ocular motility, diplopia, and optic neuropathy (3). The edema and enlargement of retrobulbar tissue and extraocular muscles can explain proptosis and optic neuropathy. These changes are due to lymphocytic infiltration, activation of fibroblasts, accumulation of collagen and glycosaminoglycans (4,5).

Although some degrees of ocular involvement are detectable in almost all patients using different imaging techniques, clinical ophthalmopathy is observed in only one-third of them (6). Racial differences may also influence GO. It has been reported that Asians are at lower risk for developing ophthalmopathy compared to Caucasians (7). Restrictive myopathy in GO patients has been estimated as 25% in Iran (8), while another study has reported it 58.4% in East Asia (9).

External eye muscles are important contributors to the orbital process in Graves' ophthalmopathy. Computed tomography analysis can help to measure the thickness of the extraocular muscles. The usual approach to the enlarged eye muscles on MR imaging or CT is that the examiner evaluates one or two diameters of each muscle, and consecutive measurements of the same diameter(s) are performed during therapy in followup (10,11).

No consensus exists among radiologists concerning in which plane these diameters should be measured. Gorman (10) reported that cross-sectional areas might estimate muscle volume more precisely. However, it has not yet been verified whether muscle diameters or even cross-sectional areas in any plane can actually substitute for volume.

Hess screen test is used to help analysis muscle involvement in various strabismus disorders. The thickness of extraocular muscles and ocular motility are not frequently investigated in patients with GO (12). The current study has been designed to evaluate extraocular muscle enlargement and ocular motility disorders and their associations in Iranian GO patients.

PATIENTS and METHODS

Patients with moderate to severe or sight threatening Graves' Ophthalmopathy (13) which had been referred to our clinic from Endocrinology departments were included in our study from March 2007 to January 2009. The diagnosis of GO was made on the basis of Bartley & Gorman diagnostic criteria (14) when lid retraction was present: In the absence of this sign, the diagnosis was made only if proptosis, optic neuropathy or restrictive myopathy were associated with thyroid dysfunction or abnormal regulation and if no other cause for ocular condition was found.

Patients who had a history of ocular muscle surgery, previous strabismus or ocular muscle palsies, scleral buckling, orbital fractures, and previous orbital decompression were excluded from our study. All patients underwent complete ocular examination

including deviometry measurements and Hertel exophthalmometry.

Hess screen testing was performed in one meter distance by an optometrist. Hertel exophthalmometry was performed by an ophthalmologist. Orbital CT Scan in axial and coronal section were obtained also. The largest diameter of the middle section of each muscle was chosen for further comparisons. Muscle enlargement evidence in CT sections was graded as mild, moderate or severe by the same CT reporter that was blind to the patients. Enlargement definition was as follows: Mild: muscle thickness in cross-sectional images to be less than 2.5 times enlargement; moderate: less than 5 times; and severe as enlargement more than 5 times compared to normal muscle. For comparison, normative data was defined as thickness of normal inferior and superior rectus, which is nearly the same as the optic nerve in a cross-sectional CT. Normal medial rectus, however, is nearly "1-1.5" times the thickness of optic nerve. The thickness of a normal lateral rectus is less than thickness of the optic nerve. Thyroid hormonal status and duration of disease was assessed in all cases.

Clinical scaling of ocular motility was rated as follows (5): "Zero,0": no eye movement; "1": Eye movement range less than half of the full excursions; "2": Eye movement

range greater than half of the full excursions; and "3": Full eye movement. This motility score was measured per eye and per direction of gaze. Patients whose rating (score) was "3" was defined as non-restrictive and a rating of "0"- "2" was defined as restrictive.

Spearman's rank correlation of degree of eye movement rating and muscle enlargement in CT scan was performed.

This study was performed following the tenets of the Declaration of *Helsinki*, and after approval by the Institutional Review Board of Tehran University Eye Research Center. Analysis of data was performed with SPSS version 14 with use of Student's *t*-test for continuous variable, χ^2 analysis for discrete variables. Only P (probability of rejecting the Null hypothesis) values less than 0.05 were considered "statistically significant".

RESULTS

We assessed 75 GO patients (37 females and 38 males, 150 orbits). Female to male ratio was 0.97. Female to male ratio among those who had clinical restriction of eye movement was 0.72. The age and sex distribution of patients are shown in **Table 1, below**. No statistically significant difference for sex or age distribution was observed between these two groups (P=0.20, Fisher's exact test, P=0.46, *t*-test, respectively).

Table 1. (K-Jafari et al): Demographic Characteristics of the Two Research Groups: Restrictive And Nonrestrictive

	Restrictive (N=31)	Nonrestrictive (N=44)	P value
Age	35.42±11.63	33.55±10.31	0.2
Male/female	18/13	20/24	0.46

Extraocular muscle enlargement evidenced in orbital CT scans was observed in 124 out of 150 orbits (82.6%). (see Table 2,

next page; also Figure 1, below, and Figure 2, also next page shows a CT scan of one of our subject-patients.

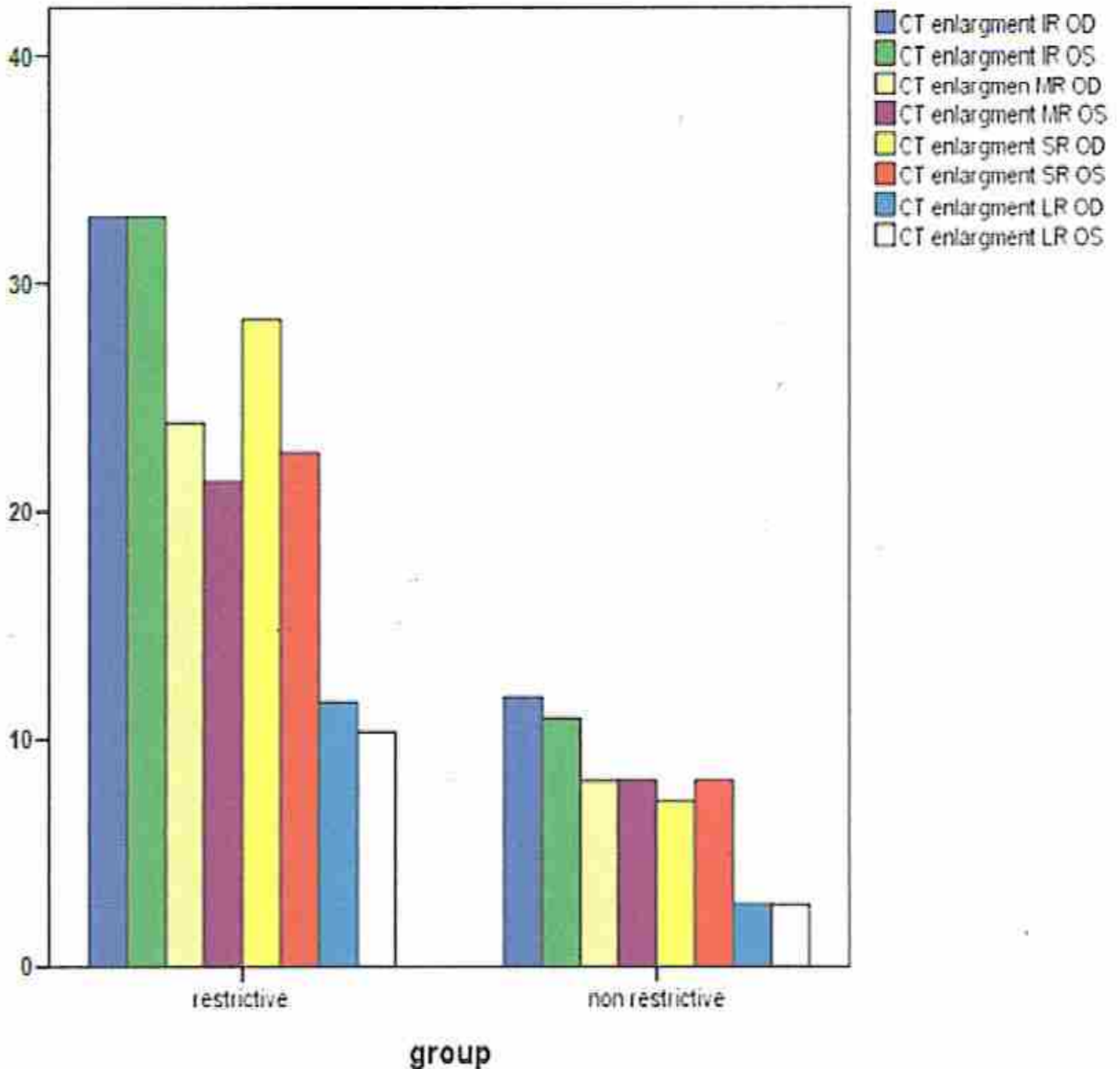


Figure 1 (K-Jafari et al): This figure shows the distribution of EOM enlargement between the two groups, Restrictive versus Nonrestrictive.

	Mild		moderate		severe		overall	
	OD	OS	OD	OS	OD	OS	OD	OS
IR	29 (36.7%)	25(33.3%)	12(16.1%)	16 (21.3 %)	8 (10.1 %)	6 (8 %)	49 (73.1 %)	47 (70.7 %)
MR	29 (38.7%)	35 (46.7%)	10 (38.7 %)	8 (10.7 %)	2 (2.7 %)	-	41 (84 %)	43 (83.3 %)
SR	18 (24 %)	27 (36%)	12 (16 %)	10 (13.3 %)	6 (8 %)	2 (2.7 %)	36 (48 %)	39 (52 %)
LR	16 (21.3 %)	14 (18.7%)	4 (5.3 %)	4 (5.3 %)	-	-	20 (26.6 %)	18 (24 %)

Table 2. (K-Jafari et al): **Data of Patients on CT Scan Scaling (Rating) of Enlargement (by mid-cross-section diameter) of extra ocular muscles**



Figure 2 (K-Jafari et al): *CT scans of the same patient in Figure 6. Moderate enlargement of inferior rectus muscle of the right eye and mild enlargement of the right superior rectus muscle can be seen.*

Table 3. (K-Jafari et al): Scaling of Clinical Restrictive Myopathy

	0		1		2		3	
	OD	OS	OD	OS	OD	OS	OD	OS
Sup	4 (5.3%)	2 (2.7%)	4 (5.3%)	4 (5.3%)	5 (6.7%)	7 (9.3%)	62 (82.7%)	62 (82.7%)
Ab	-	-	2 (2.7%)	-	8 (10.7%)	8 (10.7%)	65 (86.7%)	67 (89.31%)
Inf	-	-	2 (2.7%)	2 (2.7%)	6 (8%)	4 (5.3%)	67 (89.31%)	69 (92%)
Add	-	-	-	-	4 (5.3%)	2 (2.7%)	71 (94.7%)	73 (97.3%)

Clinical restriction was evident in 31 out of 75 (41.3%) of patients (45 out of 150 orbits (30%));

Forty-four (44) eyes (97.7%) were scaled (rated) 2; 14 eyes (31%) was scaled (rated) 1; and 6 eyes (13.3%) were scaled (rated) zero (6 for supraduction, **see Table 3, above**. Bilateral restriction, symmetrical or asymmetrical, was observed in 14 out of 31 (45.1%).

The most frequent type of movement limitation was supraduction (26 out of 45 eyes, 59%) followed by abduction, infraduction, and adduction (18, 14, 6 out of 45; 40%, 31.1%, 13.3%, respectively). Correlation of CT scoring and movement scaling of EOMs was statistically significant ($P < 0.0005$). Spearman's rank correlation ($r = 0.52$) denoted correlation between these two variables (**see Figure 3, next page**).

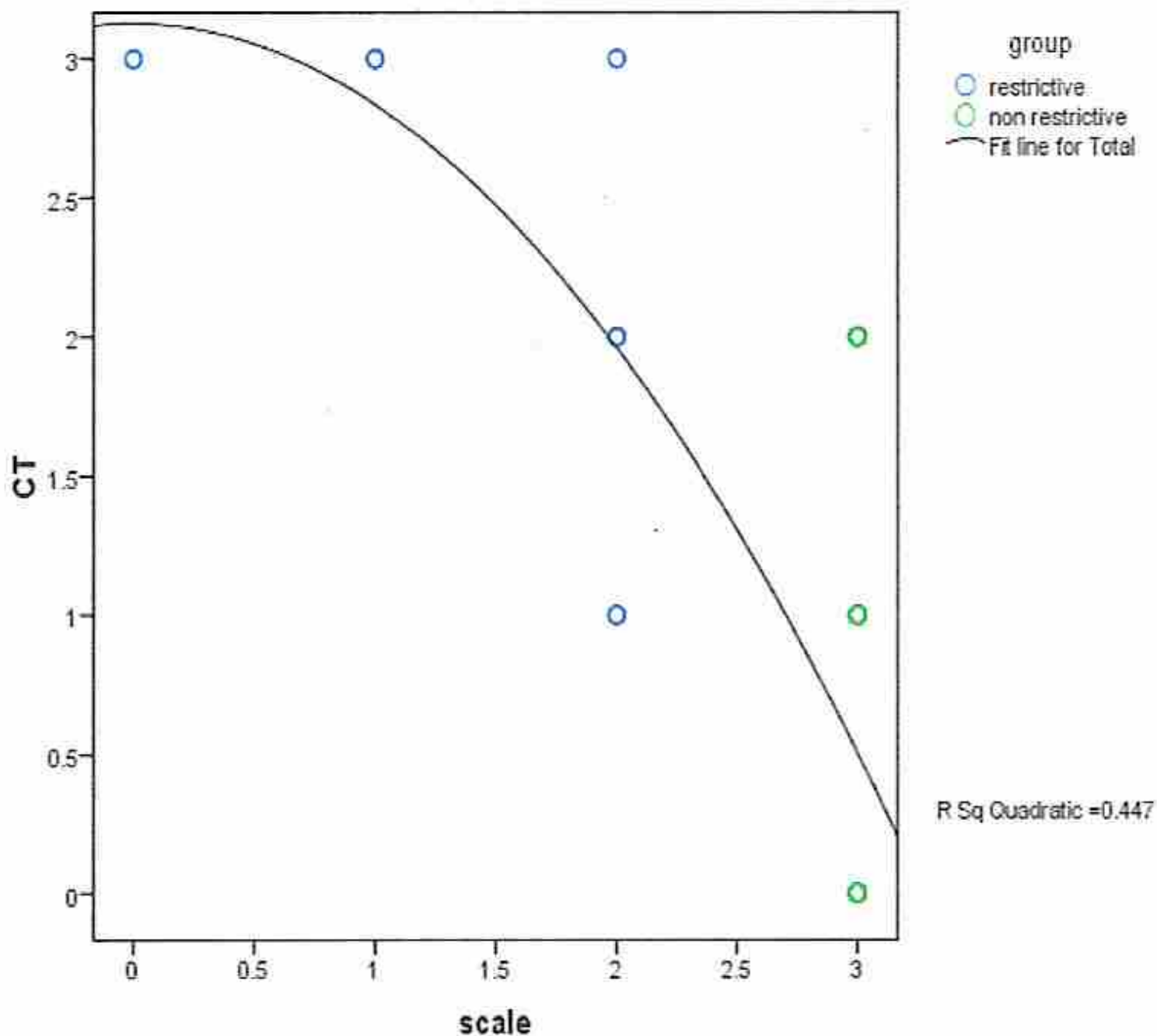
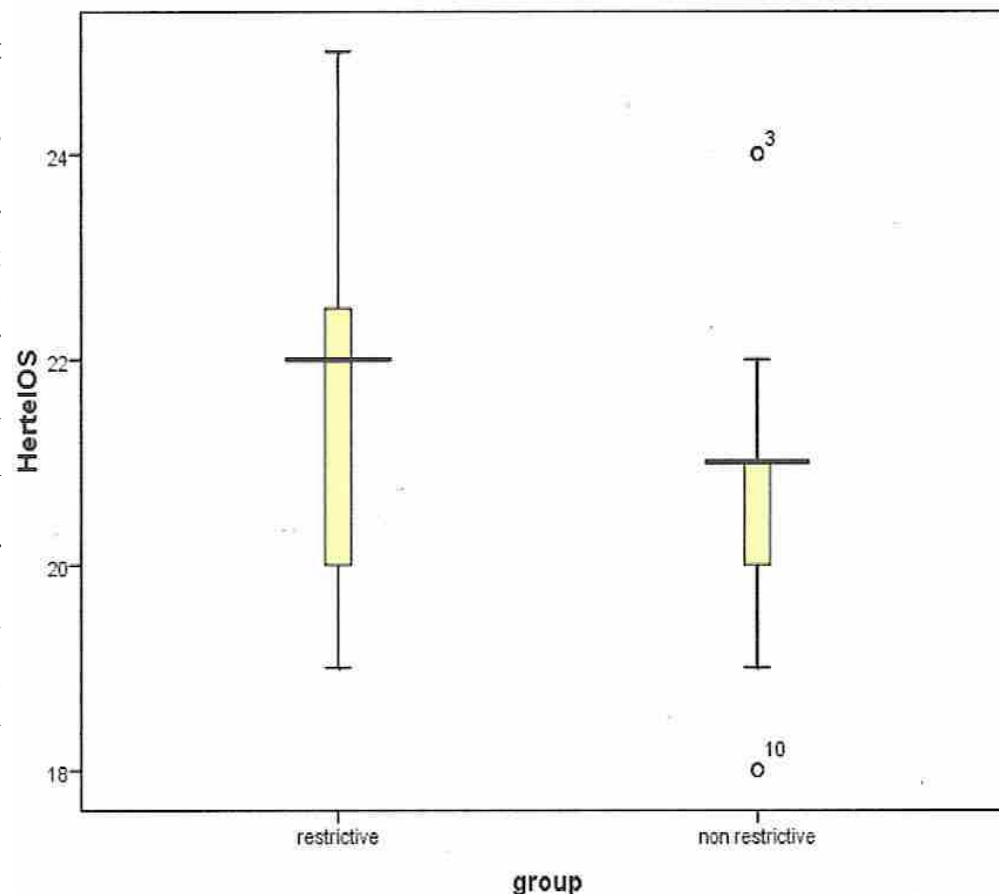
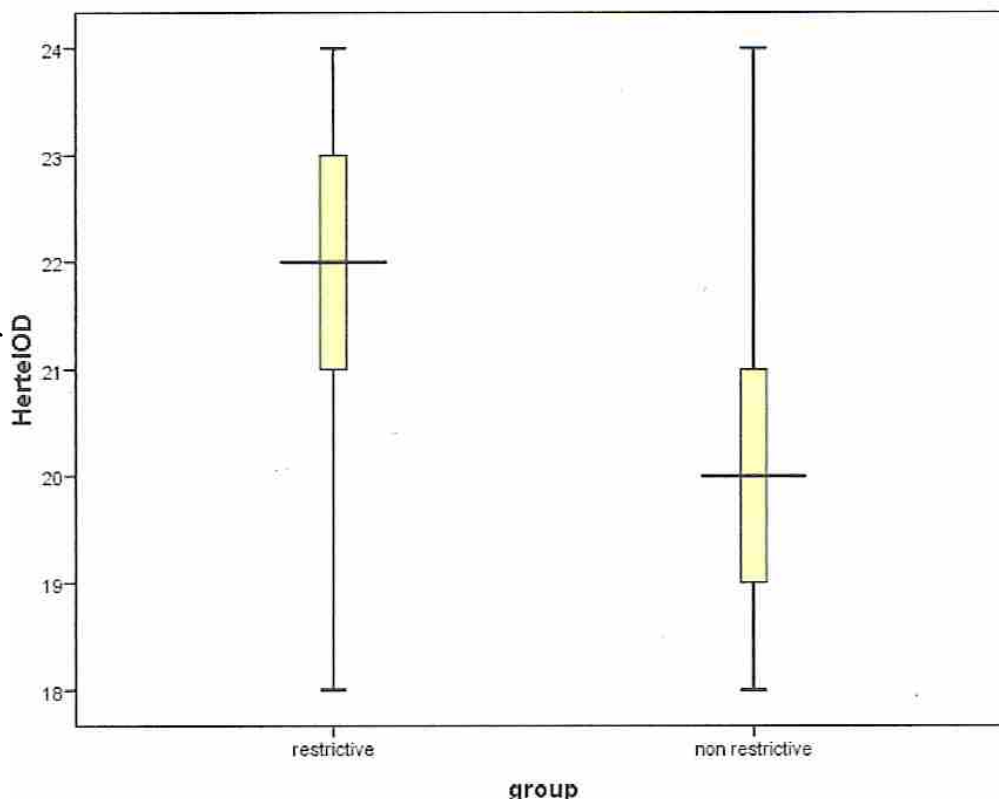


Figure 3 (K-Jafari et al): This figure shows correlation of CT scoring and movement scaling of EOMs with Spearman's rank correlation that denotes correlation between these two variables ($r=0.52$). Vertical line representing CT scoring: 0=normal; 1=mild; 2=moderate; and 3=severe extraocular muscle enlargement. Horizontal line showing scaling of EOMs motility: zero= no eye movement; 1= eye movement less than half of the full excursions; 2 = eye movement greater than half of the full excursions; and 3: full eye movement.

Mean **Hertel exophthalmometry** was calculated to be 20.93 ± 1.66 mm for right eyes and 21.20 ± 1.58 for left eyes. It was calculated to be 22.13 ± 1.52 for right eyes and 21.81 ± 1.62 mm for left eyes in those that showed clinical restriction of movement (**Figures 4, and 5, right**).

Legend for Figures 4,5 ->
*(K-Jafari et al): Hertel exophthalmometer measurements in the **right eyes (TOP)** and the **left eyes (BOTTOM)** of patients in both groups.*



.....
A statistically significant difference was observed between mean Hertel readings of both eyes and restrictive myopathy ($P < 0.0005$ for right eyes and $P = 0.02$ for left eyes, *t*-test). The relationship between CT extraocular muscle size and Hertel readings were statistically significant only for the IR muscle ($P = 0.024$, see **Figure 6, next page**). For all other rectus muscles this finding was not statistically significant ($P = 0.858, 0.686,$ and 0.924 for MR, SR and LR respectively).

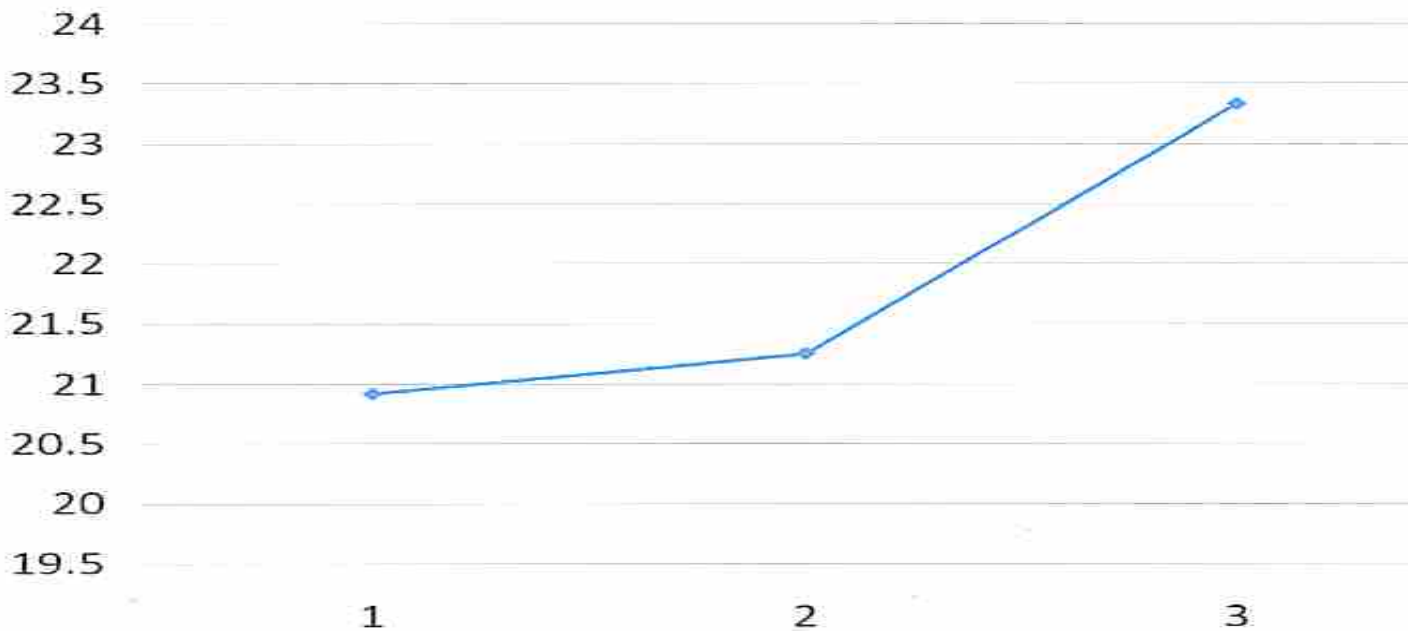


Figure 6 (K-Jafari et al): Showing relationship between CT scoring of inferior rectus muscles and Hertel reading. Horizontal numbers showing CT scoring for inferior rectus and vertical numbers showing Hertel readings.

Hess screen tests of patients are presented in **Table 4, below**. Restriction patterns evident in Hess screen tests were similar to clinical restrictions .

Figure 7, next page shows a Hess screen test of one of our patients.

Table 4. (K-Jafari et al): **Hess Screen Test Findings of Patients**

	Restrictive		Nonrestrictive	
	OD	OS	OD	OS
IR Limitation	21 (28 %)	19 (25.3 %)	54 (72 %)	56 (74.7 %)
MR Limitation	17 (22.7 %)	13 (17.3 %)	58 (77.3 %)	62 (82.7 %)
SR Limitation	14 (18.7 %)	8 (10.7 %)	61 (81.3 %)	67 (89 %)
LR Limitation	6 (8 %)	4 (5.3 %)	69 (92 %)	71 (94.7 %)

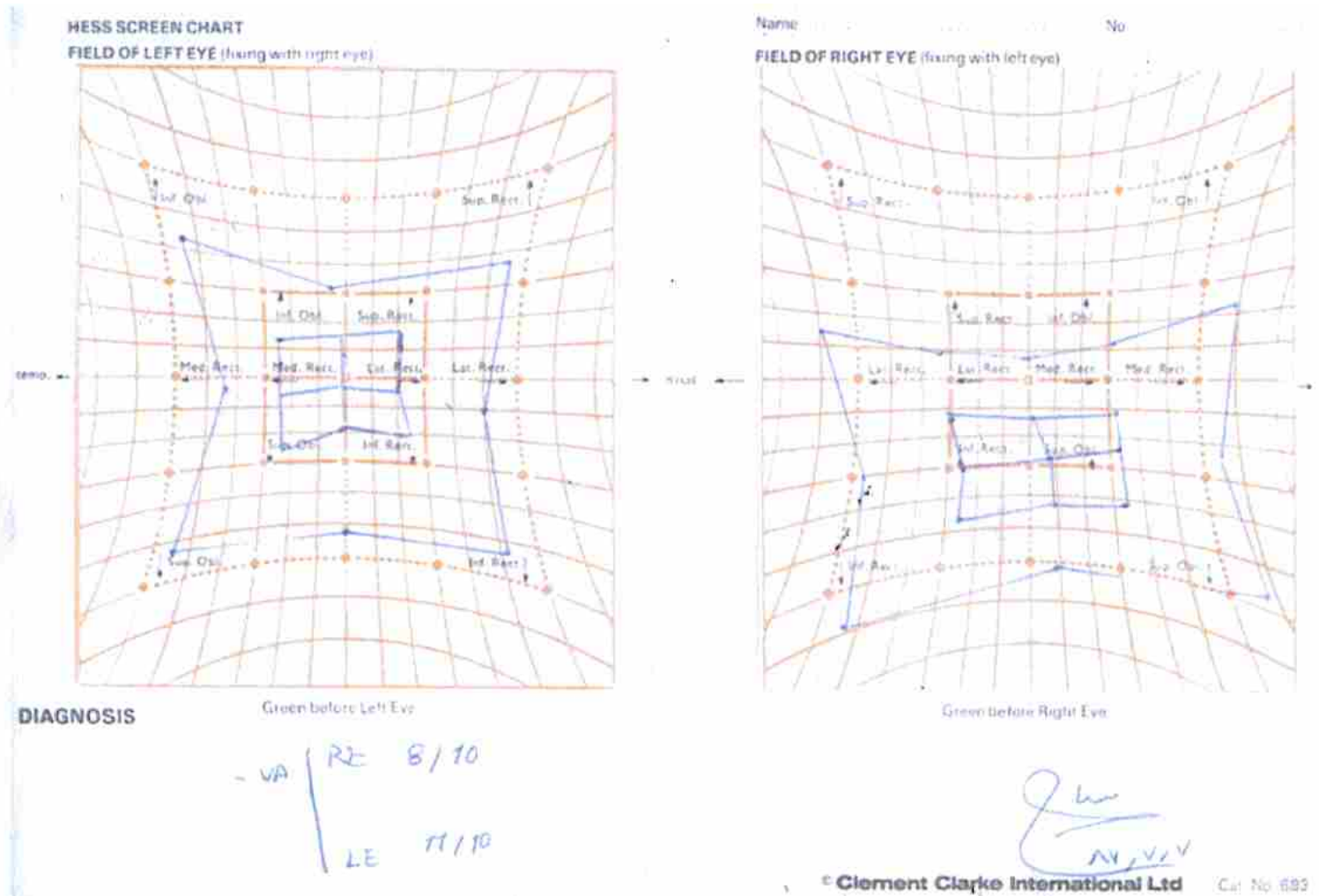


Figure 7 (K-Jafari et al): Hess screen Test of a patient.

Right, OD: In primary position there is a hypotropia. The patient has supraduction limitation. Supraduction movement scaling was zero.

Left, OS: In a primary position mild hypotropia can be seen. Left eye has supraduction limitation. Supraduction movement scaling (rated at) '1.'

Binocular Deviotometry measurement showed a hypotropia in 26 out of 150 (17.3%), exotropia in 6 out of 140 (4%), hypertropia in 14 out of 150 (9.3%), and esotropia in 16 out of 150 (10.6%).

Ten out of 75 patients (13.3%) had complaints about vertical diplopia, 6 out of 75 (8%) about horizontal diplopia,

and 4 out of 75 (5.3%) had both horizontal and vertical diplopia. Diplopia was observed only in the most severe cases of extraocular muscle involvement. All diplopic patients were categorized in movement scales of zero or "one". None of the patients in scale (rated) "2" and "3" had diplopia.

Table 5. (K-Jafari et al): Thyroid Function Status and Duration of Thyroid Disorder in the Two Groups

	Restrictive (N=31)	Nonrestrictive (N=44)
Hyperthyroidism	26 (83.9%)	40 (90.9%)
Euthyroid	2 (6.5%)	4(9.1%)
Hypothyroid	3 (9.7%)	0
Duration of throid disease (month)	42.48±23.76	24.55±12.92

Thyroid function status among patients are presented in **Table 5, above**. Average duration of thyroid disease in cases of restrictive myopathy was calculated to be 42.48±23.76 months and among those who didn't show any clinical restriction was much less calculated to be 24.55±12.92 months ($P<0.0005$, *t*-test).

DISCUSSION

In Graves' ophthalmopathy (GO), inflammatory cells infiltrate orbital tissues and extraocular muscles (EOMs) (12,15,16). Ocular motility disorders associated with this condition may be with or without diplopia (12). The cause of diplopia in this situation can be either lymphocytic infiltrate and swelling in active GO or fibrotic changes of EOMs in chronic inactive phase of disease especially in unilateral or asymmetric forms (12). Although, other factors such as binocular fusional capacity, gradual or instant changes, asymmetry of muscle involvement should be considered.

In the present study, we show that there is a positive correlation between CT scoring of

eye muscle cross section diameter and clinical EOM involvement. This finding is in concordance with the finding of Chen et al (9). It seems that the increased muscle volume most likely signified fibrosis and fatty degeneration of the muscles in these patients. It has been suggested that the eye muscles are affected before the onset of clinical signs and symptoms in Graves' disease (17). We can confirm that more than half the small population of our patients in our study showed muscle enlargement of at least one muscle, based on measurements of muscle size with CT. As the number of muscle involvement in CT and its size increases, the change of clinical manifestation increases also.

On the other hand, when evaluating relationship between CT scoring of muscle diameter and Hertel exophthalmometer reading, we observed that there was a positive relationship between CT scoring for IR muscle and Hertel reading. This means that with increasing size of the IR muscle, the Hertel reading would be increased; however, this association was not consistent for other muscles. Although in a study by Fidor-Mikita and Krupski (18), they reported that the

highest correlation between muscle enlargement and proptosis was present for the inferior rectus (77%) and medial rectus (70%) muscles.

Restrictive myopathy associated with GO has been reported as 43% in a report by Bartley and colleagues (19). Other studies reported this incidence 58.4% (9) in East Asian patients and 25% in Iran (8). In the present study, restrictive myopathy was evident in 41.3% of GO patients (30% of eyes), that is comparable to other studies.

Although mean age of the restrictive myopathy group was higher than the non-restrictive group in our study (35.42 ± 11.63 vs 33.55 ± 10.35 years), this difference was not statistically significant ($P=0.46$). This finding confirms other reports in this regard (9,20). This age difference, in addition to longer duration of thyroid disease causes more fibrotic changes in EOMs and results in more restriction.

Graves' Disease is nine times more frequent in females than males. Although in severe cases, males are more affected by 4 times (21). In the present study, female to male ratio was 0.97 overall and 0.72 in cases affected by clinical restriction. Our results in this regard are relatively similar to a previous report from Iran that reported an F/M ratio 1/1.7 (8). Patient selection from a referral center, less severe course of ocular disease in females and perhaps ethnic factors and variety could explain our different results from other studies.

The most common type of motility disorders in our study was supraduction limitation (59%) followed by abduction (40%), inferaduction (31.1%) and adduction (13.3%) limitations. These motility disorders

were consistent with inferior rectus, medial rectus, superior rectus and lateral rectus involvements, respectively, that were evident in CT sections too. This distribution of restriction is similar to those reported by other studies (8-12,22). Waard et al (23) in a study on 30 patients with Graves' ophthalmopathy found motility disturbances in 83% of them. In their study, restriction of elevation was the most frequent disturbance of eye movement in Graves' ophthalmopathy (61%) followed by restriction of abduction (42%). Muscle enlargement was found in 46% of their patients with Graves ophthalmopathy.

Thyroid function tests showed that 73.9% of our patients in whom restrictive myopathy was evident were hyperthyroid. In our GO patients without clinical movement restriction 90.4% were in hyperthyroid hormonal status. Both of these percentages are significantly higher than those in a similar study (5) (32% vs 69%). A possible explanation for these differences is a lower socioeconomic status of our patients that affects or afflicts their treatment for Graves' disease.

Although medial rectus muscle was frequently involved in our study (54%), its involvement generally was mild or moderate and related movements restriction mainly were recorded as Grade "2". Actually the most severe movement restrictions (Grades "0" and "1") were generally related to inferior rectus muscle involvement and some cases of superior rectus involvement. This was similar to the results of the study from East Asia (8).

Diplopia was observed only in the most severe cases of muscle involvement. All diplopic patients were categorized in involvement scales zero or one. None of the

patients in scales "2" or "3" had diplopia. It seems that with increase in severity of muscle limitation, risk of diplopia would be increased. This result was rational because fusional mechanisms do not work well when retinal image disparity exceeds fusional control in cases of acquired binocular deviations (24). Hess screen test results were similar to clinical restriction patterns and muscle involvement rating in CT reports. Although Hess screen examination is valid when only one eye is affected and the affected eye is compared to the normal eye, however, it shows that some degree of clinical involvement of eye motility disorders in such patients are monocular excursion movements (25).

CONCLUSION

Finally, this study showed more restrictive myopathy in cases with more extraocular enlargement and positive correlation between severity of inferior rectus enlargement and Hertel reading. Restriction rating pattern was similar to other studies with inferior rectus muscle as most frequently and severely involved muscle. Another finding was the high rate of hyperthyroid hormonal status in both affected and unaffected patients with restrictive myopathy. In addition, sex ratios for GO patients of both groups were different from other studies and similar to a previous study from Iran. These statistical results are not reflective of the total population of Iranian GO patients, because our patients were collected by a referral manner from endocrinologic

clinics. This finding also suggests that severe forms of GO are more common in male group so that although overall rate of GO is more common in female group; however, severe forms that are referred to ophthalmology clinics are more common in the male group. These results are suggestive of ethnic differences in GO presentation.

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Case Report

**Abnormal Binocular Vision:
Monocular Diplopia of Physical Origin: Two Case Reports.
Its Relationship to the Physiology and Arrangement of the
Visual Directions of the Retinal Areas; Binocular Triplopia**

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ABSTRACT: *Background and Purpose:* Monocular diplopia is an infrequent but disabling complication following laser peripheral iridotomy, or following cataract surgery. Our purpose is to clarify the intraocular mechanism of monocular diplopia (and binocular triplopia) of physical origin and its relation to the physiology and arrangement of the visual directions of the retinal areas in each eye.

Case Reports: This is a report of one patient who developed monocular diplopia following an “exposed” laser peripheral iridotomy, and of a second patient who developed monocular diplopia due to a swollen opacified central posterior capsule following cataract surgery.

Conclusion: Monocular diplopia of physical origin results from stimulation, by an object of regard, of two separate retinal areas that have two different visual directions due to optical ocular pathology.

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INTRODUCTION

Although laser-peripheral iridotomy (LPI) has replaced surgical iridectomies and avoids complications of surgery, some complications, considered minor, were reported (1). These complications include transient blurring of vision, corneal damage, uveitis, hyphema, increased intraocular pressure, localized lens damage, and closure of the iridotomies. In addition, more serious complications of monocular diplopia and visual disturbances, infrequently seen, were also reported. Murphy & Trope (1) attributed the phenomenon of diplopia and other visual disturbances to possible spherical and chromatic aberrations plus the diffractive interaction of the lid or lashes with the iridotomy.

Weintraub & Berke (2) suspected the phenomenon to be caused by a base-up prism effect of the tear film meniscus formed at the edge of the upper lid. This prism bends light rays upward, causing the second image to be perceived downward. They confirmed their hypothesis by eliminating the visual disturbance by bringing the lid forward, away from the eye, thus dissipating the tear meniscus.

Unlike Weintraub & Berke (2) who found this complication to occur even when the iridotomy seemed to be totally covered by the lid, Murphy & Trope (1) have suggested this complication can be avoided by placing the iridotomy entirely under the upper lid.

Spaeth et al (3), in a study of 93 glaucoma patients who had had a Nd:YAG LPI, visual symptoms occurred in 7% of cases and symptoms were more likely to occur in patients who have partially- and fully-exposed LPI than in those in whom the iridotomy is completely covered by the lid. And, they

found that LPIs appear to be more likely to cause symptoms when they are partially exposed than when they are fully exposed.

Fincham (4) found that slight monocular diplopia can occur in a large proportion of eyes with normal visual acuity. Generally one image is fainter than the other and is almost always displaced vertically upward. The usual amount of displacement is between 3 to 6 minutes of arc. Subjective tests and objective measurements show that in such cases the optical system of the eye has a prism power of 0.1 PD in the upper part of the pupil. He thought the defect is due to a refractive index difference in the lens substance.

To solve the problem of monocular diplopia, Fresco & Trope (5) suggested the use of an opaque, hydrophilic contact lens, with an opaque tint superimposed on the iridotomy area, or tattooing the cornea over the relevant area, [see pages 238-242] or tinted spectacles or tinted, total or localized, contact lenses.

Lima et al (6) used an artificial pupil to eliminate the effect of the iridotomy/IOL interaction; they also suggested soft contact lenses or iris sutures to close the iridotomy.

PURPOSE

The purpose of our paper is to present two patients who developed monocular diplopia following LPI in one patient, and due to an opacified, swollen posterior capsule following cataract surgery in the second patient. Our purpose also is to explain the intraocular mechanism of monocular diplopia in these two conditions and show its relation to the physiology and arrangement of the visual directions of the retinal areas.

CASE REPORTS

Case 1:

The first case, KA, is a 76 year old gentleman with chronic open angle glaucoma on Timolol/Dorzolamide combination drops (Cosopt®, MSD). On presentation, intraocular pressures (IOP) were 17 and 25 mm Hg in the right and left eyes respectively. Best corrected visual acuity was 20/50 in the right eye and Hand Motion in the left eye. Travoprost drops (Travatan®, Alcon) was added to the left eye which brought the IOP down to 18 mm Hg. Slit lamp exam revealed +2 nuclear sclerosis in the right eye with a healthy optic nerve head. Standard automated visual field was full. Slit lamp examination of the left eye showed +3 nuclear sclerosis and advanced glaucomatous cupping, both contributing to the severely impaired vision in the left eye. The patient underwent an uneventful phacoemulsification surgery to his right eye three months ago with insertion of a posterior chamber IOL. The final uncorrected visual acuity of the right eye was 20/20 six weeks later, with a mean IOP of 18 mm Hg off any glaucoma medications. The patient complained of monocular diplopia in the right eye. Slit lamp examination revealed a patent and exposed PI at 3 o'clock in both eyes.

Case 2:

The second case, KM, is an 87 year old healthy gentleman on no systemic medications. The patient presented initially 7 years ago with visual acuities of counting fingers (CF) at 1m in the right eye and CF 0.5m in the left eye. Dense nuclear sclerosis was noticed on exam and the fundi could not be assessed. The retina was flat by ultrasound.

The patient underwent uneventful bilateral phacoemulsification cataract extraction procedures with IOL insertion. The patient's quality of life improved significantly, despite having a final uncorrected visual acuity 6 weeks later of 20/50 in each eye. Fundus exam in both eyes revealed myopic fundi: diffuse chorioretinal atrophy and peripapillary atrophy. The patient was lost to followup. He presented again few months ago with a complaint of monocular diplopia in the left eye, and triplopia when both eyes fixated the same object of regard. Slit lamp exam revealed posterior capsular opacification dividing the left pupil vertically into two half circles. The rest of the exam was normal. Nd:YAG laser capsulectomy was done and the diplopia resolved.

Physiology of the Retinal Areas and Arrangement of the Visual Direction

To understand the mechanism of monocular diplopia of physical origin, one should recall the physiology and arrangement of the visual directions of the retinal areas: the principle visual direction of the fovea and the related secondary visual directions of all the extrafoveal retinal areas in the eye (7,8). Each retinal area possesses a certain visual direction in which the stimulus which reaches that retinal area is localized in space. The visual direction of the fovea, i.e., the visual direction of the object of fixation, is called the principal visual direction. All the secondary visual directions of all other retinal elements are related to the principal visual direction. This relationship is stable, fixed, and intrinsic for each direction of gaze. This relationship shifts, together with the principal visual direction, with changes in the position of the eye, but the relationship of the secondary

visual directions to the principal visual direction remains the same (9) (see **Figure 1, RIGHT** >).

Legend for Figure 1 (Khawam): Relative subjective visual directions:

(A) the eye in the straight-ahead position,

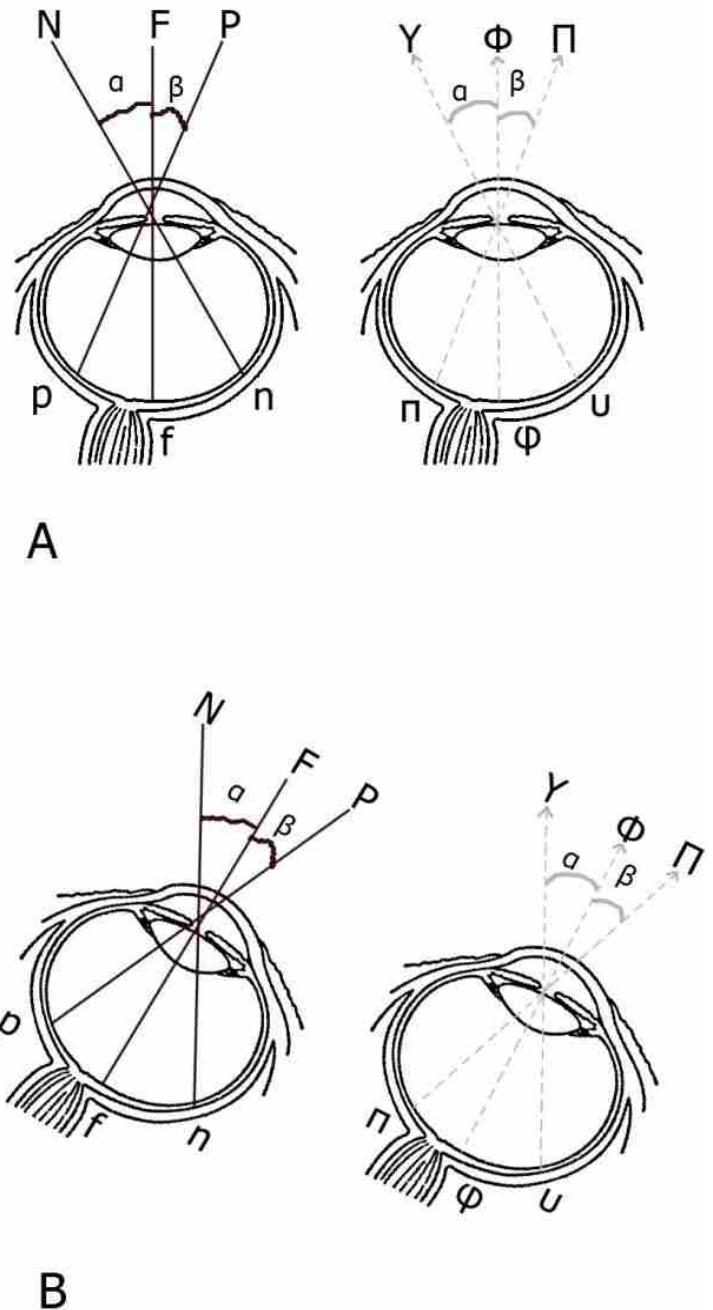
(B) the eye turned to the right.

The sheath of visual directions, indicated by the Greek letters in (A) and (B), right image, shifts with the position of the eyes.

Lines of direction: The lines which connect the object points (7) with the retinal elements are called lines of direction (8). They only determine which retinal element will be stimulated by the object point. They belong to the objective sphere. The position or subjective localization of that object point in space, i.e., where it will be seen, is determined by a subjective factor designated as the spatial value of the stimulated retinal element. That spatial value, or the direction in which the object point appears in subjective space, is called the visual direction.

Visual direction and lines of direction are **not** synonymous: visual directions are independent of the lines of direction.

If two receptors with different visual directions (7) are simultaneously stimulated by the same object, the object will appear in two different visual directions in space: diplopia, then, is the result. That applies in binocular fixation when two non-corresponding retinal areas are stimulated (binocular diplopia), as well as in monocular fixation when two receptors of separate retinal areas are stimulated (monocular diplopia). Therefore, for an object of regard to be seen as single in an eye, it should stimulate only one retinal area in that eye.

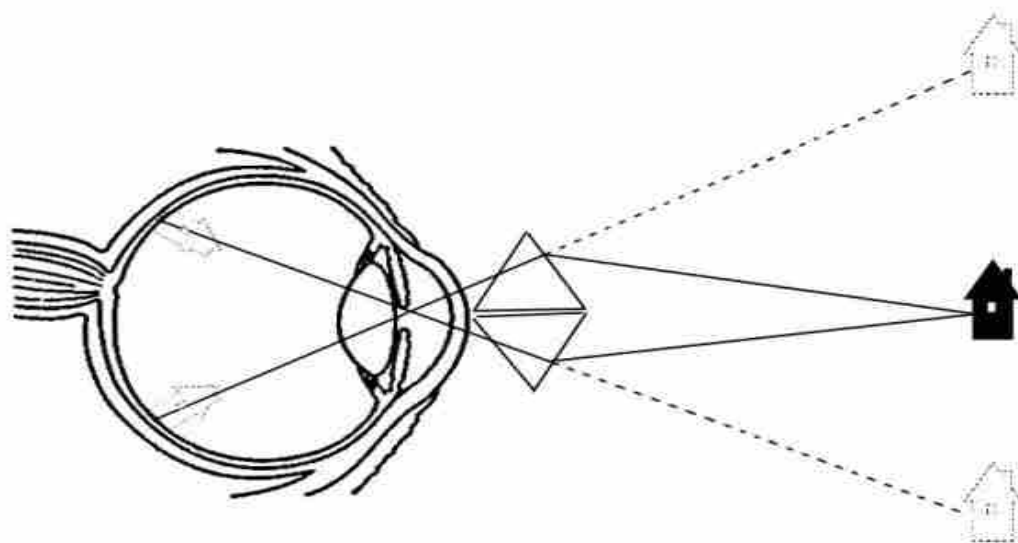


To clarify the correlation of monocular diplopia with the physiology and the arrangement of the visual directions of the retinal areas, let us consider the following experiment with prisms:

The relationship in an eye between principal and secondary visual directions is altered if a Maddox double base-to-base prism is placed before one eye. The rays of

light from a single object in space are deviated and made to fall upon two retinal areas in the same eye (**Figure 2**).

Figure 2 (Khawam): *Monocular diplopia of physical origin. Rays of light from a single object are divided by the base-to-base prisms and made to fall on two different retinal areas. Therefore the object is seen in two directions. Monocular diplopia results.*



When the fellow eye is closed, the eye behind the two base-to-base prisms will see the object as doubled. The rays of light are deviated by each prism towards its base (images deviated towards the apex of each prism). They fall on two different retinal areas. Since each retinal area has a different visual direction, the object is seen as double by that eye. Notice, the fovea of that eye is no longer stimulated by the object of regard, since its rays of light are deviated by each prism towards its base and toward two extrafoveal retinal areas. When the fellow eye is now open, the subject experiences triplopia: In addition to the diplopic peripheral images of the object of regard seen by the eye behind the prisms, the subject sees a third central

image seen by the fovea of the prism-free fellow eye.

So, in brief, in that experiment, 3 retinal areas with 3 different visual directions are stimulated: two extrafoveal retinal areas in the eye behind the prisms, and the fovea of the fellow eye: triplopia is the result if there is any binocular misalignment of the primary visual axes of the two eyes.

Monocular Diplopia/Binocular Diplopia in Patients with an Exposed Peripheral Iridotomy within the Palpebral Fissure

The intraocular mechanism of monocular diplopia due to a peripheral iridotomy (PI) pertains to the physiology and the arrangement of the visual directions of the retinal areas, and the fixed intrinsic relationship of the principal visual direction of the eye with the secondary visual directions for each position of gaze, described above.

Rays of light from an object O penetrate the eye with a PI through the pupil stimulating the fovea, along with rays of light bent by the prismatic effect of the tear film meniscus (2), that penetrate through the PI, stimulating in

that eye an extrafoveal area B. Since the extrafoveal area B has a different visual direction than the fovea, the eye with a PI develops monocular diplopia (**Figure 3**).

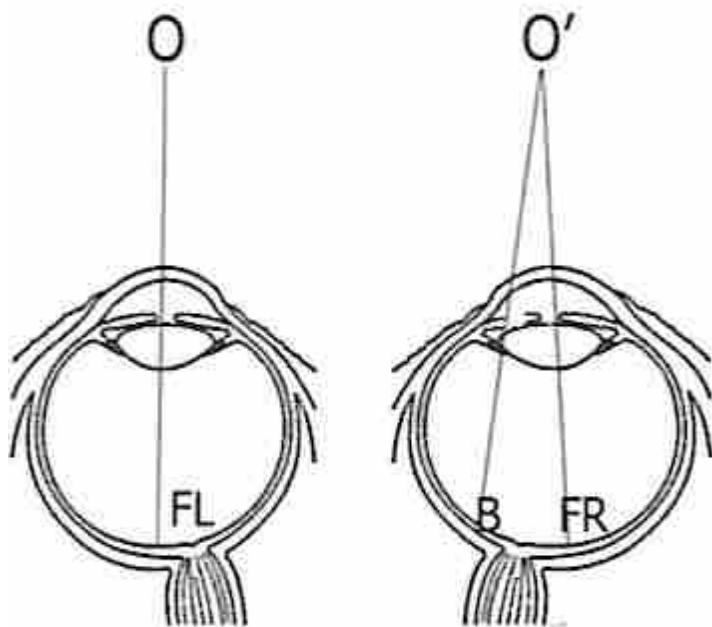


Figure 3 (Khawam): *Left eye with PI. Object O stimulates the two corresponding foveas FR and FL, and an extrafoveal area B in the eye with a PI. (FR = fovea of the right eye, FL = fovea of the left eye)*

In the presence of other wise normal single binocular vision, and the fellow eye is open, the patient will still see two images of the object O (binocular diplopia), since both foveas (which are two corresponding retinal areas with the same visual direction), see simultaneously (haplopia: single as opposed to double vision, i.e., normal) the object of regard O and localize it in the same visual space.

Should the eyes become binocularly misaligned, say by the manifestation of a heterophoria (a latent binocular misalignment or deviation of one eye) resulting in such a

case from the severe disturbance of binocular fusion by the binocular diplopia, the patient may suffer binocular tripplopia

So, in brief, the process of binocular/monocular diplopia following LPI, is due to stimulation of an extra-foveal retinal area in the eye with the LPI and stimulation of the corresponding foveas of the two eyes.

Monocular Diplopia/Binocular Tripplopia in a Patient with Thick Central Capsular Remnant Following Cataract Surgery

Similarly, in patients with central capsular remnant following cataract surgery, the physiology of monocular diplopia is due to stimulation of the two retinal areas in the aphakic eye by diffraction of the light rays on the posterior capsule. With both eyes open, the fovea of the fellow eye, which is deviated because central vision is so poor that binocular fusion cannot be maintained and latent heterophoria becomes manifest heterotropia, –which is not corresponding with the stimulated extrafoveal retinal areas or the fovea of the aphakic eye- sees a third central image of the same object of regard: tripplopia is the result.

So, in brief, in this last case, three retinal areas with three different visual directions are stimulated by an object of regard: two extrafoveal retinal areas in the aphakic eye and the non-corresponding fovea of the fellow phakic eye.

Monocular diplopia is a distressing, and often disabling condition. It may be caused by easily visible ocular disorders, such as irregular corneal surface, early cataract, subluxation of the lens, or a double pupil (10). It may also occur in the absence of visible abnormalities (4). It may occur as a simultaneous conscious appreciation of two systems of visual projection when a patient with strabismus adapts to a secondary anomalous retinal correspondence (ARC), whereby, in certain patients and under few circumstances, the normal and anomalous localizations occur simultaneously and, as a result, the stimulus is localized at the same time in two different directions. Monocular diplopia can also occur as a transient phenomenon after strabismus surgery. It may be produced by cerebral lesions. It may be caused by external devices, such as contact lenses (10).

We report here two patients who developed monocular diplopia following LPI in one patient, and an opacified, swollen, posterior capsule in the second patient following cataract surgery.

We believe the intraocular mechanism of monocular diplopia relates to the fixed, stable and intrinsic arrangement of the principal visual direction of the fovea, and the secondary visual directions of the extrafoveal retinal areas, for each position of gaze in these two patients. The monocular diplopia in our first patient was due to stimulation by an object of regard of two retinal areas in the eye with LPI, some penetrating through the pupil, and stimulating the fovea, and others penetrating through the LPI and stimulating an extrafoveal retinal area that has a different visual direction. No treatment was done since the patient was lost to follow-up.

The monocular diplopia experienced

by our second patient is due to diffraction and spreading of the light rays by the edge of the opaque posterior capsule, toward two extrafoveal retinal areas that have two different visual directions. Once the opaque material was surgically removed, diplopia was eliminated.

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Case Report

INTRASTROMAL CORNEAL TATTOOING AS TREATMENT IN A CASE OF INTRACTABLE Strabismic DIPLOPIA (Double Binocular Vision)

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ABSTRACT: We present the case of a 29-year old man complaining of intractable diplopia during the last 5 years. He had undergone several surgical procedures for the treatment of his infantile strabismus since age 6 years. After surgery, the patient had been treated on 4 occasions with Botox. He also performed antisuppression exercises to encourage binocular vision.

On our examination, the patient showed a 20/20 visual acuity in both eyes and a strabismic dysfunction with a slight alphabet pattern, which induced a disturbing constant diplopia. Several treatment options were considered for this patient as occlusion therapy or cosmetic contact lenses, but they were not used because they were not acceptable esthetically or not tolerated.

Finally, an optical penalization was induced by means of a black corneal tattooing placed at the centre of the cornea. The patient was followed for a period of 18 months, showing a complete elimination of diplopia with esthetical acceptance and no inflammatory signs.

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INTRODUCTION

Keratopigmentation or corneal tattooing has been used for centuries for different uses. One of the main applications of this surgical technique is to improve the cosmetic appearance of corneas after leukomas (1-3). Different kinds of substances have been used for such purpose as copper sulphate, uveal pigment of different eye animals, combinations of Chinese ink and gold dust, gold chloride, platinum, silver salts or titanium dioxide (1-3). Although initially the main indication for keratopigmentation was cosmetic, it has also shown its therapeutic effect in other situations as iris defects (4), opacities after amniotic membrane transplantation (5) or intractable diplopia (6-7). In these cases, the corneal tattooing is able to alleviate the disturbing visual phenomena occurring in these pathological conditions.

The aim of the current case report is to show the potential and benefits of intrastromal corneal tattooing using a lamellar pocket and a new generation pigment as a treatment for a severe diplopia that could not be treated by other conventional means.

CASE REPORT

A 29-year old man complaining of intractable diplopia during the last 5 years presented to our clinic. He had undergone several previous surgeries for the treatment of his infantile strabismus. With the aim of correcting his congenital esotropia he underwent his first surgery at the age of 6 years old. This surgery comprised both medial rectus recession (4.5 mm) and right lateral rectus resection (6 mm). At the age of 15 years, a new right medial rectus recession of 5 mm was performed. An additional strabismus surgery was done afterwards at the

age of 23, which consisted of a “Faden” posterior myopexy operation of both medial rectus, partial tenotomy of both superior obliques, a postoperatively adjustable resection of the right lateral rectus and adjustable recession of the right superior rectus. Afterwards, the patient was treated on 4 occasions with Botox and additionally he performed antipression exercises to encourage binocular vision.

On our clinical examination, the following clinical data was obtained: **Best spectacle-corrected visual acuity** of 20/20 in both eyes (right eye, -3.25 D (diopters) of sphere, -3.25 D of cylinder at 10°; left eye, -3.00 D of sphere, -0.25 D of cylinder at 20°).

Ocular motor study: Left eye dominance with exotropia of 7 prism diopters (with the refractive error corrected). When the patient was fixating with the right eye, a left eye hypertropia of 8 prism diopters (DVD, dissociated vertical deviation) could be measured whereas if the fixating eye was the left eye, a right eye hypertropia of 4-5 prism diopters could be detected. This strabismic dysfunction presented a slight alphabet pattern. The duction movement study showed a grade 1 limitation of the right eye abduction and of the left eye adduction. In addition, a latent nystagmus could be observed.

Ocular sensory study: Diplopia in all directions of gaze. Anomalous retinal correspondence. Significant fusional vergence limitation.

Prism adaptation test: It was not possible to eliminate the diplopia.

Intraocular pressure, anterior segment and fundus within the normal range.

After all surgeries, the patient was initially treated with occlusion therapy and ocular penalization with filters. This modality of treatment was not accepted by the patient due to esthetical reasons. Therefore, the use of a cosmetic contact lens in the right eye with an occlusive aim was intended. However, the contact lens was not well-tolerated. The presence of a dry eye syndrome was the justification for this contact lens intolerance (Schirmer test of 5 and 8 mm for each eye). A new treatment alternative was then considered: the use of Botox to induce a right eye

blepharoptosis, but it was not accepted due also to esthetical reasons.

As all the previous treatment alternatives had failed, intrastromal corneal tattooing in the right eye was considered as a potential solution for avoiding the diplopia. The patient was informed about the risks of the surgery and previously signed an informed consent in accordance with the Helsinki Declaration. The initial steps of the surgical procedure for corneal tattooing were as follows: topical anaesthesia of the right eye (Ocular topical anaesthesia, tetracaine 0.1% + oxybuprocaine 0.4%, Colircusi, Alcon Cusi S.A., Spain), pupillary centre mark, free-hand arcuate incision with a calibrated diamond knife at the level of the circumference of the pupil limit of the contralateral eye in mesopic conditions (measured with the Procyon Pupillometer P2000SA, Procyon Instruments Ltd, London, UK), and intrastromal dissection with a mini-crescent knife, creating a pocket of a 5-mm diameter at an approximately 170 microns depth (**Left, <Figure A**). After the creation of the intrastromal pocket, the pigment was applied (**Figure B**) with a 30G irrigation cannula and

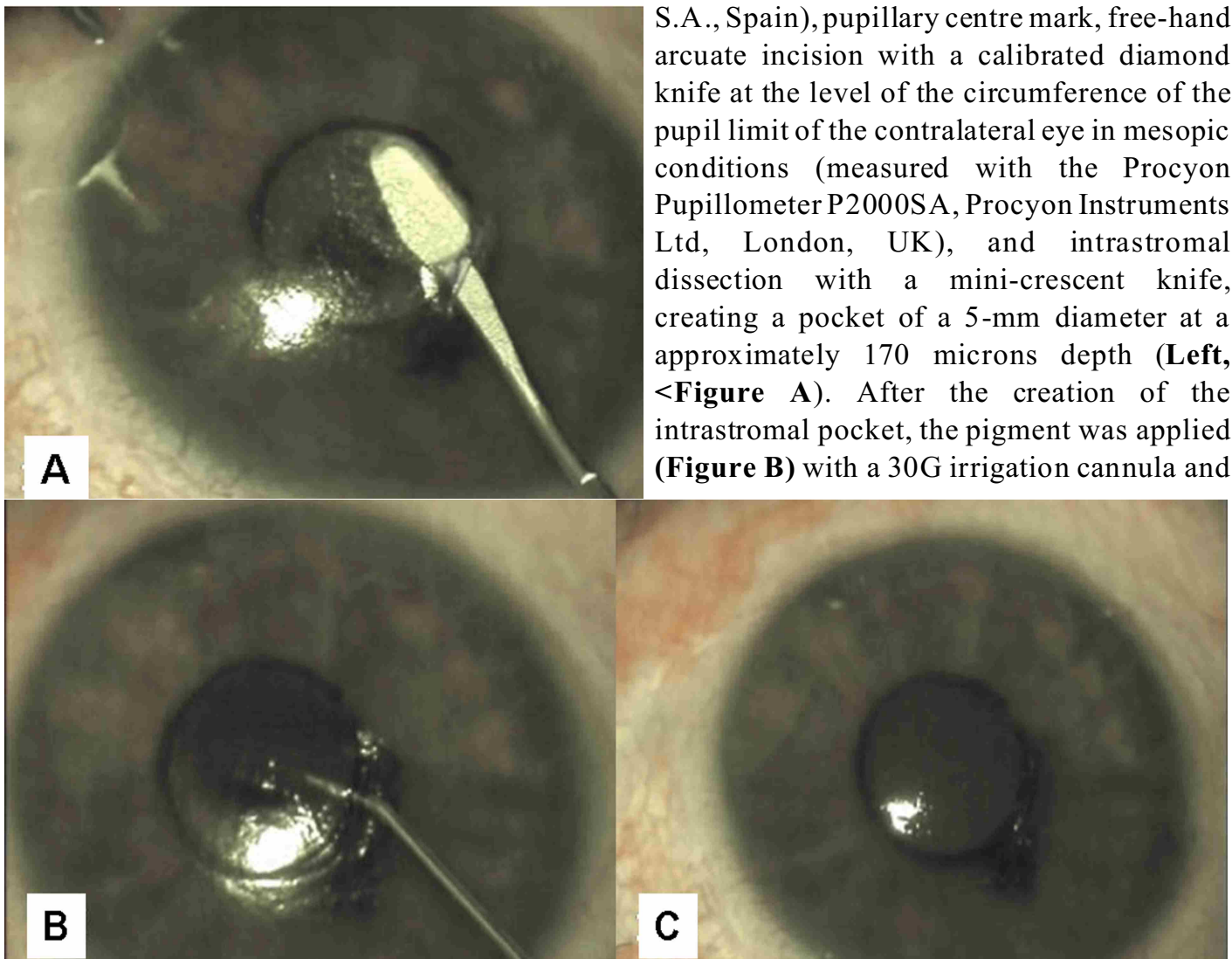


Figure (Laria): Steps of corneal tattooing performed for intractable diplopia. A. Creation of the intrastromal pocket. B. Pigment injection. C. Final outcome.

the eye was finally thoroughly washed with BSS irrigating solution (**Figure B, prior page**). The pigment used was a black iron oxide mineral micronized pigment (Registration No DGFPS 84-PH, Spanish Ministry of Health, 2001), based on 50% iron oxide (ferric oxide, CI 77499). An antibiotic and anti-inflammatory therapy was prescribed to be applied postoperatively, which consisted of 1% cyclopentolate drops every 8 hours for the first 48 hours after surgery and ciprofloxacin and diclofenac drops every 8 hours for 1 week.

As a result of the surgery, an optical penalization was induced due to the black corneal tattooing placed at the centre of the cornea (**Figure C, prior page**). This penalization was the responsible for the disappearance of the diplopia. No inflammatory signs were detected during the follow-up.

DISCUSSION

The ocular sensory analysis of this patient revealed the presence of an anomalous retinal correspondence in the context of a congenital esotropia. This esotropia had been treated previously by means of several surgical procedures, obtaining an excellent esthetical outcome but bad sensory results due to the perception of a constant diplopia. The patient performed antisuppression exercises after the surgical sequence of treatment, which were not optimal and probably they increased the perception of diplopia. It should be remembered that antisuppression exercises could be counterproductive in cases like this.

One alternative for the treatment of the diplopia in this specific case was the use of

optical penalizations by means of filters or ocular patches, but this option was not accepted by the patient. Another alternative was the induction of a chemical blepharoptosis by means of using the botulinum toxin, but this therapeutic option was not accepted either due to the esthetical compromise induced by the treatment. As commented previously, the possibility of adapting cosmetic contact lenses was evaluated, but it was ruled out due to the presence of a dry eye syndrome. Two other alternatives were also considered: the implantation of an occlusive intraocular lens and the performance of a corneal tattooing. The option of an occlusive intraocular lens was discarded because it was the most invasive option with several risks and limitations, as the loss of the accommodative ability of this young patient or the risk of endophthalmitis or uveitis as a consequence of the implant. The corneal tattooing is an extraocular surgical technique, which allows the preservation of the peripheral vision (1-7). It only blocks the central vision, allowing the fundus exploration in conditions of maximal mydriasis (not possible with the occlusive intraocular lens).

In this case, the option of corneal tattooing was finally preferred for treating this intractable diplopia because other less invasive techniques were unacceptable for the patient and this surgical option offers several advantages over other medical and surgical alternatives. The potential complications of corneal tattooing are bacterial infections, unnoticed corneal perforation, uveitis and pigment colouring or migration. These events were prevented by means of a postoperative prophylactic antibiotic and anti-inflammatory treatment, a meticulous microscopic control

and the use of an intrastromal technique for corneal tattooing, which supposes less inflammation as well as less pigment colouring or migration (2). The patient has been followed for a period of 18 months, showing a complete elimination of diplopia and a great satisfaction in the patient with his esthetical appearance, with no negative impact on his social or labour life.

CONCLUSION

Corneal tattooing using an intrastromal pocket for pigment deposition seem to be a useful therapeutic alternative with minimal complications in cases of intractable diplopia where other less invasive options are nor valid or not accepted by the patient. Future studies including several cases like this should be performed in order to corroborate this potential application of keratopigmentation, although it should be considered that this kind of cases are not common in the clinical strabology practice.

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MAJOR REVIEW

Management of Intermittent Exotropia Strabismus of the Divergence Excess Type

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ABSTRACT: A number of surgical and non-surgical options are available for patients with intermittent exotropia. This paper provides a review of this strabismus condition, particularly divergence excess type, with a particular emphasis on treatment. We highlight that there is a lack of evidence for best practice and a need for not only high-quality clinical studies but also a better understanding of current practice patterns among clinicians so as to inform future research.

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INTRODUCTION

Exotropia is a binocular misalignment of the eyes where an outward (i.e. divergent) deviation of the visual axes, prohibits normal binocular vision^[1-3]. Intermittent exotropia is the most common form of childhood exodeviation^[4-5] and is managed by means of non-surgical and/or surgical intervention. However, management of intermittent exotropia is contentious, particularly for the divergence excess type^[6-7] and is therefore likely to vary considerably between eye health care practitioners.

This paper provides a review of intermittent exotropia of the divergence

excess type with a particular emphasis on the management of the condition.

CLASSIFICATION

Traditional sub-classifications of intermittent exotropia have been based on the fixation distance at which the deviation manifests^[1,3,8-9]. Duane's 1897^[8,10] early nomenclature of:

'convergence insufficiency',

'divergence excess' and

'convergence insufficiency secondary to a divergence excess'

are perhaps more commonly referred to in the current literature as:

‘near or convergence weakness’,
‘distance or divergence excess’, and
‘nonspecific or basic (or mixed)
intermittent exotropia’,

which again refer to the fixation
distance at which the deviation manifests.

Burian^[3], and later with
Franceschetti^[11] additionally sub-divided
intermittent exotropia of the divergence
excess (or distance) type into ‘true’ and
‘simulated’, with the latter referring to an
intermittent exotropia that increases in size
for near to approximate the size of the
distance deviation after a period of
monocular occlusion, or after the
introduction of convex lenses^[5, 11-12]. The
implication being that the near exodeviation
is ‘hidden’ by adaptive fusional and/or
accommodative vergence mechanisms.
Conversely, in true divergence excess the
deviation remains larger at distance than
near, under all testing conditions^[5,11,13]. This
further sub-classification has supposedly
had influence over the choice of surgical
management demonstrating that correct
investigation and diagnoses are imperative
for deciding on the most appropriate
management^[1, 3, 14].

Later Kushner^[15] and Plenty^[8]
proposed an alternative nomenclature of
intermittent exotropia based on a patient’s
AC/A ratio. It is commonly believed those
with divergence excess type intermittent
exotropia have a high AC/A^[16], which can
also influence surgical planning and
outcomes. Le, Koklanis and Georgievski^[12]
on the other hand, suggest that simulated
and true deviations are possibly part of a
continuum whereby the sub-classification
may in fact be attributable to testing artefact,
in particular the near target used whilst

testing, rather than presence of a true sub-
classification itself. Others^[17] have also
discussed the inclusion of sensory
characteristics into the sub-classification of
intermittent exotropia.

Contemporary challenges, in the
research of intermittent exotropia, exist as
there are likely variations in the
classifications and/or sub-classes currently
utilised by clinicians and furthermore how
they are being determined. Care must be
taken as testing procedure itself may lead to
the mis-classification of patients^[12],
potentially hindering best management of
patients with intermittent exotropia, in
particular those of the divergence excess
type.

PREVALENCE

Intermittent exotropia has been
reported as occurring in almost 1% of the
general population^[2,18] and represents a
quarter of all cases of primary horizontal
strabismus treated by eye professionals^[2,5].
Clear gender differences exist in its
prevalence with females affected more
frequently^[19-21]. Nusz, Mohny and Diehl^[4],
for instance, reported a 64% female
predominance of newly diagnosed patients
with intermittent exotropia in their twenty
year retrospective study of medical records.

The reported prevalence of
exotropia is also suggested to vary around
the world with exodeviations occurring
more frequently in the Middle East, Africa
and Asia^[20]. It has been hypothesised that
proximity to the equator, race, sunlight
intensity and duration may all be
predisposing factors leading to an increased
prevalence of exotropia^[20, 23-24]. However,
the issue of racial and geographical
variations affecting the incidence of

strabismus has not been extensively documented in the literature, with many studies being undertaken on non- racially diverse populations [23, 25-26]. A retrospective analysis of 2704 patients in Hong Kong demonstrated intermittent exotropia to be the prevalent form of primary horizontal strabismus with 44.9% within their Chinese population [25]. Chia, Seenyen and Long [26] state a similar finding with 50% of paediatric strabismus cases presenting to Singapore National Eye Centre with intermittent exotropia. Similarly, a study conducted by the International Orthoptic Association found that Asians have the highest prevalence of exotropia in the seventeen countries surveyed, with Japan (54%) and Nepal (76.5%) reporting high prevalence compared to the European average of 23.4% [22].

NATURAL HISTORY AND AETIOLOGY

Von Noorden [20] states that contrary to common belief the onset of the majority of exodeviations is shortly after birth, with most agreeing that intermittent exotropia manifests within the first few years of life [4, 6-7, 19- 20]. The natural history of intermittent exotropia however remains somewhat unclear with some authors reporting variable progression with most deviations progressing with time [1,18,20,27], whilst others suggesting relative stability in terms of both size and control [3, 7, 26].

The aetiology of intermittent exotropia, whilst unconfirmed, has been proposed to relate to innervational and anatomical factors [5]. Duane [10] first described divergence excess exodeviations to be a result of active divergence whereby inactivity in the centre for convergence leads to an hyperactivity in the centre controlling divergence movements. Bielschowsky later

[28] queried Duane's theory feeling that hyperactivity alone did not sufficiently account for the diagnoses, surmising that the anomalous position of rest associated with exodeviations must also be considered [20,28].

Burian's published works from the 1960's and 70's propose a combination of static and dynamic aetiological factors, where the former refers to a basic misalignment of the eyes caused by mechanical and anatomical aspects and the later being innervational [9,11,20]. Burian supported Duane's basic innervational concept of divergence excess / convergence insufficiency, and postulated that innervational dynamic factors play a primary role in the gross alignment of the eyes [9,15]. This contrasts Bielschowsky's theory that anatomical and mechanical factors were the principal predisposing feature to exotropia. Burian further theorised that the convergence mechanism is stronger than the divergence mechanism making an intermittent exodeviation more likely than a constant one, as we have the ability to converge and regain ocular alignment [3,20]. He also concluded that this explains the changes to the deviating angle at different distances providing the break down of sub-groups of intermittent exotropia [3, 9, 11].

MANAGEMENT

Management of intermittent exotropia is aimed at reducing manifesting periods of exotropia, thereby enabling and extending periods of binocular alignment and binocular single vision [5,7,29]. Traditionally intermittent exotropia has been thought to be relatively difficult to manage with the treatment of choice still debated [7,13,19]. Lack of consensus relates to the effectiveness of simple observation [1,7], which Knapp [30] rather boldly termed

procrastination, orthoptic or non-surgical management and the type, amount and timing of surgical interventions.

Orthoptic / Non-Surgical Management

Although the treatment of intermittent exotropia is often thought to be primarily surgical [1,3,7], there are orthoptic or non-surgical options that might be considered first [30-31]. Orthoptic treatments for intermittent exotropia may consist of occlusion, minus lens therapy, prisms, or orthoptic exercises [5,7,32]. These treatment modalities, however, have limited use in the young cohort of patients presenting with intermittent exotropia as suitable understanding and compliance is required.

Occlusion therapy aims to reduce scotoma size and improve fusional amplitudes by limiting binocular stimulation and thus abnormal retinal correspondence and suppression [7]. Yoonae, Kyun-Hyung and Young-Woo [33] promote the use of occlusion therapy, finding that patients who underwent occlusion therapy pre- (and post) surgical intervention had a reduced occurrence of intermittent exotropia post surgery. Minus lens therapy, or over-minusing induces retinal blur, accommodation and thus accommodative convergence [3,7,19,34]. The prismatic effect of a minus lens also temporally displaces an image on the retina stimulating a convergence movement to re-fixate foveally [5,7]. Similarly, base out prisms can be used to promote a convergence movement [1,34]. However, controversy exists as to whether minus lens therapy is an advisable treatment for intermittent exotropia with concern that the increased accommodation effort can cause myopia [7,19,34]. Others [1,5] state there is minimal long term benefit after removal of minus lens glasses, adding most children

would prefer not to wear glasses that are otherwise not indicated. Conversely, Caltrider and Jampolsky [29] acknowledge its benefits as being a reversible management which provides a visibly cosmetic improvement in deviation, whilst noting especially beneficial to those already in glasses. Finally, orthoptic exercises in the form of anti-suppression and diplopia recognition activities [7,34] which enable a patient to be aware when they are exotropic and provide a stimulus for fusion and recovery of binocularity. Fusional exercises also improve control of an exodeviation by increasing fusional amplitudes [7].

Figueira and Hing [7] recently reported that surgery combined with orthoptic therapy resulted in greater success as compared to independent surgery, orthoptic therapy or observation alone. Within this study orthoptic therapy was defined as occlusion therapy, convergence exercises and diplopia awareness training. However, this was a retrospective analysis where treatment regimes were not randomised, but controlled by parental / patient preference. Despite this, all surgery types were the same and all measurements and surgery were performed by one single ophthalmologist. Similarly Sing, Roy and Sinha [35] found orthoptic treatment to successfully manage intermittent exotropia with significant functional and symptomatic improvement in over 64% of their 30 patients, although this was a cohort of convergence weakness type intermittent exotropia. Kushner [34] also reported that non-surgical management and in particular minus lens therapy in combination with occlusion and base out prisms is valuable. He further suggested orthoptic treatments may delay surgery, and in some cases prevent it [34].

In contrast others ^[1,20] state that orthoptic treatment is of limited value as an alternative to surgery, suggesting its main place is for over-corrections post surgery. Whilst an in depth appraisal is outside the scope of this review, it is clear that there is little consensus within the literature in regards to the efficacy of orthoptic treatment of intermittent exotropia. As noted by Zhang, Koklanis and Georgievski ^[32] it is difficult to draw conclusions from the current published scientific literature as variables are often not clearly defined in regards to a number of factors including compliance, the classification of intermittent exotropia, success criteria, and treatment definition. In order to address this, high quality research, with well defined variables, are required to provide evidence for best practice in the use of non-surgical methods.

Surgical Management

The surgical management of intermittent exotropia remains a challenge ^[36-37] with particular debate existing over its indication, type, timing and amount. Half of all patients with intermittent exotropia eventually require surgery ^[26] demonstrating the need again for the establishment of clinical guidelines. However, this is currently inhibited by the limited number of high quality studies investigating the outcomes of surgical management and the inconsistencies in the various criteria used between studies.

The definition of a successful post-operative outcome, for instance, varies greatly ^[19,31] with some studies ^[38-40] classifying 10 prism dioptres (pd) of manifest deviation as successful, others ^[38-39] only accepting orthotropia, and some ^[31] classifying in terms of a “favourable” motor alignment. For example, Ekdawi, Nusz,

Diehl and Mohny ^[40] found a 56% success rate when success was defined as <10pd of deviation, and only a 45% success rate when also requiring high-grade stereopsis, demonstrating that invariably definition of success influence the study findings.

Factors such as post-operative binocular functions, and follow up times also differ within the literature and very few studies have assessed motor and sensory post-operative outcomes over a long follow-up period ^[41]. This is a significant issue as it has been reported that studies with a shorter follow up period report higher rates of motor success when compared to studies with longer follow up intervals ^[42] whilst stability of a successful post-operative outcome is an important factor in determining “best practice” only a few studies have followed patients for more than 10 years ^[40-41, 43] and these have reported variable outcomes.

Indications for surgical interventions are not well defined ^[5-6, 44-45] and most likely vary between clinicians. The factors considered when determining the need for surgery are most often (i) reduction (i.e., loss) in ‘control’ of intermittent exotropia represented by deterioration in stereoacuity ^[46], or manifestation greater than 50% of the time ^[27, 37, 44], (ii) social concerns in regards to normal appearance, by the patient or parent, and (iii) decreased binocular functions ^[3,5,19,27,31].

In an attempt to assist clinicians in determining the need for surgical intervention and to standardise the surgical management of intermittent exotropia, the use of questionnaires has been advocated. Hatt, Leske, Adams, Kirgis, Bradley and Holmes ^[45] suggest that the ‘Health-Related Quality of Life’ [questionnaire] survey may be beneficial in clarifying indications for

surgical intervention and potential benefits of treatment to patients. Haggerty, Richardson, Hrisos, Strong and Clarke [6] on the other hand developed a questionnaire specifically for intermittent distance exotropia titled the 'Newcastle Control Score' (NCS). The NCS differentiates and quantifies the various measures of control into a grading system by incorporating criteria subjectively (home control) and objectively (clinical control at distance and near) into a rating scale. They conclude that the NCS is a reliable tool in determining the need for surgical intervention.

The specific surgery of choice for intermittent exotropia and its sub-classifications is discussed widely within the literature. In general bilateral lateral rectus recession is the recommended surgical treatment for an intermittent exotropia of the true divergence excess type [3,13,47-49] whilst a unilateral recess-resect procedure of the lateral and medial rectus muscles is the preferred option for both simulated and non-specific intermittent exotropia [3,11,49]. This suggests that it is of high importance to accurately determine the 'type' of intermittent exotropia to plan the most appropriate surgery, a notion strongly emphasised in Burian's works [3,9,11,37,49]. However, there is limited high quality evidence to suggest that this is best practice. Some studies [37] have reported greater success rates with unilateral as compared to bilateral surgery whilst others have suggested good success rates with bilateral surgery [38], or have found no significant difference in surgical outcomes between unilateral and bilateral treatment [50]. However, once again these findings are confounded by the types of participants included and/or the sub-classifications used or lack thereof.

The timing of surgery is controversial, with debate as to whether 'early' or 'late' is superior [5, 31] or conversely whether age is a predictor of successful surgery outcome at all [38,51-52]. Once again, difficulty exists in making comparatives within this discussion as the definition of 'early' and 'late' varies significantly within the literature. Ansons, Davis and Pratt-Johnson^[1]; Pratt-Johnson, Barlow and Tillson [39] for instance describe 'early' as earlier than four years of age, and late as after four years, whilst Chia et al [36] divide age into equal to or less than five years, five-eight years and greater than or equal to eight years. Some [30, 39] believe that early surgery should be performed before sensory adaptations are well established, whilst others [1, 53-54] advocate late surgical timing to allow for visual maturity, accurate pre-surgical testing and safe management of any under- or over-corrections of surgery. Those supporting late surgery also suggest there is increased risk of amblyopia and monofixation syndrome for patients operated in the early period within the cortically plastic period of development [1,39]. However, this is debatable as some studies have reported that delaying surgery until after four does not prevent the development of a monofixation syndrome [38].

On the other hand, there are a number of papers which have reported little or no significant difference in successful surgical outcomes between different age groups or more specifically late and early surgery [38, 51-52]. It is also important to note that it has also been suggested that the duration of the strabismus and not necessarily the age of the patient at time of surgery may influence surgical outcomes [55]. Abroms, Mohny, Rush, Parks and Tong [55], for example, reported that patients

with intermittent or constant exotropia may achieve superior sensory outcome with surgery performed before age seven, and before five years of strabismus duration, or whilst the deviation is intermittent.

Accurate measurement of strabismus is the first step in planning the amount of surgery to be performed [30]. Hypothetically surgery for intermittent exotropia is aimed at operating on the largest deviation, whether that be at far distance or after monocular occlusion [56]. Kushner [56] investigated this in his prospective clinical trial where the participants underwent surgery on either the size of the deviation measured at greater than six metres, after an hour of monocular occlusion, or at six metres. Kushner reported that operating on the largest angle provides a better surgical result. Whilst this may be the case the precise measurement of intermittent exotropia is difficult as the angle of deviation has been found to vary throughout the day, and not always worsening later in the day as generally postulated [44]. Multiple measurements prior to surgery are therefore as important as perhaps measuring the largest angle.

The desired immediate post-operative position of the eyes is also an important factor in planning surgery but continues to remain a subject of contention. Many surgeons strive for an initial over-correction aiming to stabilise long term results by leaving the eye slightly esotropic post surgery and allowing for a post-operative exotropic shift [19-20,42,57-59]. Others do not advocate the aim of initial over-correction with concern whether a period of post-operative esotropia can hinder long term potential for bifixation [31, 39]. Koo, Lee and Lee [52] analysed factors that may

influence the post-operative results in intermittent exotropia reporting the most important factor influencing surgical results as the angle of deviation during the initial post operative period. They concluded that over-correction of exotropia to some degree is required to reduce the recurrence of intermittent exotropia. Souza-Dias and Uesgui [58] expanded on this stating that an esodeviation of 10pd is the most effective initial post-operative outcome, whilst Clarke and Noel [60] postulated 10-15pd had best results. Similarly Oh and Hwang [59] concluded that the likelihood of a good post-operative surgical outcome was highest with an initial post-operative binocular alignment of less than 10pd of esotropia concurring with Koo et al [52] that early post-operative overcorrection was the only predictor of a successful long-term outcome after exotropia surgery. However, Hardesty, Boynton and Keenan [42] discussed the limitation to larger over-corrections finding an over-correction as large as 20pd frequently results in a persistent esotropia requiring further surgery. It must be noted that the follow up time post surgery in the above-mentioned studies is not longer than one year in most cases, and some [52,59-60] included more than one type of surgical procedure. Another complicating factor is that the distance and the condition under which the exotropic measurement was taken and the intention of surgical over-correction were not explicit.

It is clear that many questions remain unanswered in regards to surgical indication, timing, type and amount for intermittent exotropia. The current literature is laced with differences in definitions making comparisons very difficult. The limited number of high quality research also

limits the capacity to suggest practice guidelines.

CLINICAL PRACTICE PATTERNS

Over the last decade or so reviews of the intermittent exotropia literature [5,19,61] have continued to demonstrate a lack of uniformly accepted treatment strategies and a significant gap in evidence for the establishment of best practice guidelines. Given the lack of evidence it is of interest to better understand current clinical practice patterns for the management of intermittent exotropia. Whilst various surveys of clinicians' practice pattern have been undertaken in ophthalmology to date [62-64], the only known such survey in relation to intermittent exotropia was conducted and published by Romano and his colleagues [2, 65-66]. Romano et al surveyed ophthalmologists' surgical and non-surgical management of a case based scenario. Despite the lack of consensus in the literature Romano et al [2] found that the diagnostic and treatment practices of strabismologists world-wide were remarkably consistent. However, this consistency may be related to the fact that a single case study was used and that the participants were mostly American and experienced strabismologists (i.e. *strabologists -Ed*) as acknowledged by the authors themselves. In addition, whilst this provided insight into how strabismologists may manage a theoretical case its extrapolation to the clinical setting may, or may not be possible. Further research of current clinical practices for the management of intermittent exotropia is important to gain a better understanding of clinical decision making.

CONCLUSION

At present there is a lack of consensus on the most appropriate and effective treatment [5,7,19,61] for intermittent exotropia and current practice patterns remain relatively unknown. There is a need for further research into management of intermittent exotropia to help provide reliable evidence as to which treatment options provide best outcomes. An understanding of the present management of intermittent exotropia by clinicians is also important before conducting clinical trials. This will not only assist in determining the types of randomised controlled trials required but also provide a benchmark for comparison as the evidence for the management of intermittent exotropia emerges.

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Vision / Visual Acuity / Amblyopia

Laterality of Amblyopia. Repka M, Simons K, Kraker R, PEDIG. Am J Ophthalmol 2010; 150:270-274 [Authors conclusions]

Anisometropic amblyopia, with or without strabismus, occurs more often in left eyes than right eyes. This finding of amblyopia laterality may be related to microtropia, sighting dominance, or other forms of ocular dominance; developmental or neurological factors; laterality in the development of refractive error; or a combination thereof. (Dr. Repka, Jaeb Center for Health Research, 15310 Amberly Dr, Suite 350, Tampa FL 33647) [See also below]

A Randomized Trial comparing Bangerter Filters and Patching for the Treatment of Moderate Amblyopia in Children. Pediatric Eye Disease Investigator Group Writing Committee. Ophthalmology 2010; 117: 5:998-1004.e6 [Authors Conclusions]

Because the average difference in visual acuity improvement between Bangerter filters and patching was less than half a line, and there was lower burden of treatment of the child and family, Bangerter filter treatment is a reasonable option to consider for initial treatment of moderate amblyopia. (Robert P. Rutstein, OD, c/o Jaeb Center for Health Research, 15310 Amberly Dr, Suite 350, Tampa FL 33647. Email: pedig@jaeb.org)

Binocular Vision

The Effective Fusional Range for Words in a Natural Viewing Situation. Blythe HI, Simon P. Vision research 2010; 50:1559-1570 [Authors Abstract]

We investigated the effective fusional range for written stimuli in children and adults in a natural viewing situation. We recorded binocular eye movements in children and adults

during processing of stereoscopically presented words in a lexical decision task. The effect of disparity magnitude on ease of fusion caused decreased response accuracy, increasing numbers of fixations and increased trial viewing times when retinal disparity exceeded one character space. The data suggest that retinal inputs of a word that are disparate by up to one character (0.37 degrees) fall within the effective fusional range such that lexical decisions are not impaired. (Haxel Blythe. FAX: 44-23-8059-4597 - UK)

Strabismus Surgery

Strabismus Surgical Skills Assessment Tool: Development of a Surgical Assessment Tool for Strabismus Training. Pilling RF, Bradbury JA, Reddy AR. Am J Ophthalmol 2010; 150: 2:275-276.e2 [Authors Conclusions]

The strabismus surgery skill assessment tool is a structured quantitative instrument designed to aid surgical evaluation and training of ophthalmic surgical trainees. The Strabismus Surgical Skill Assessment Tool is a paper-based tool that is easy to use, provide the trainee with detailed feedback and a measure of progression of their surgical skills, and stimulates discussion between trainee and trainer to direct further training. (A R Reddy, Dept Ophthalmology, Royal Aberdeen Children's Hospital, 1st Floor, Westburn Road, Aberdeen AB25 2ZG, United Kingdom)

Your editor researched the selection of eye residency applicants and found the Dental Aptitude Test for dental schools to be very accurate in predicting such surgical skills BV2002:17:143.

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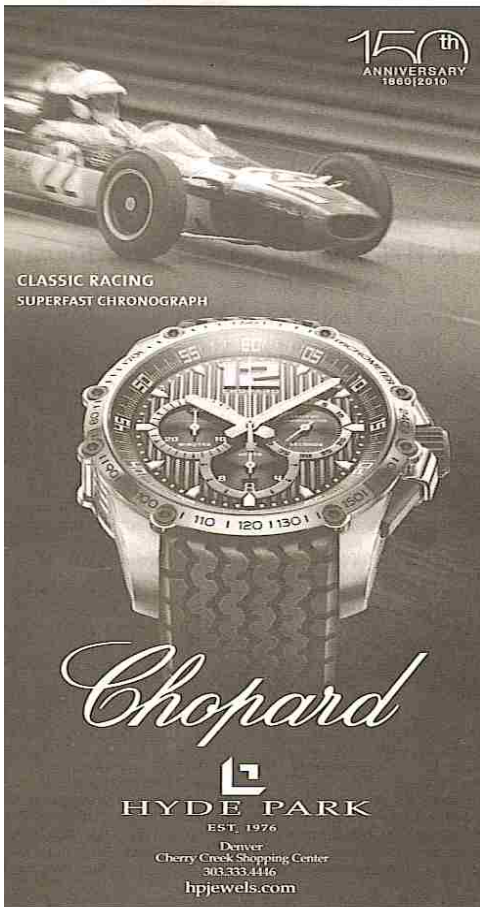
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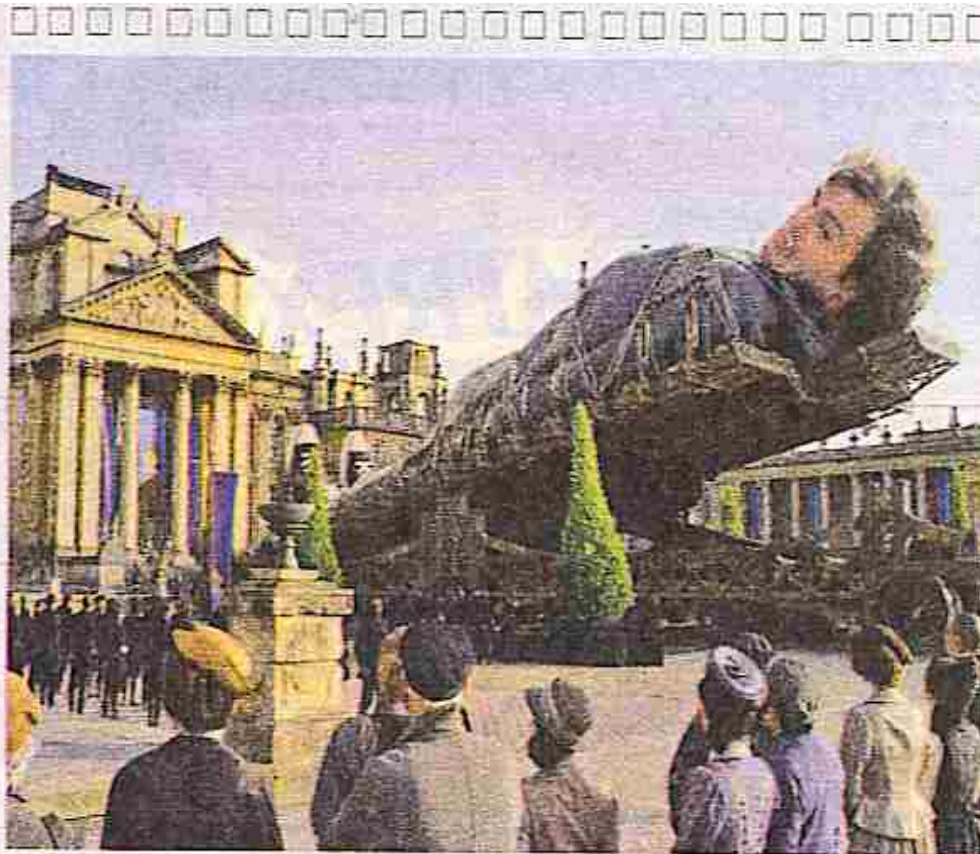
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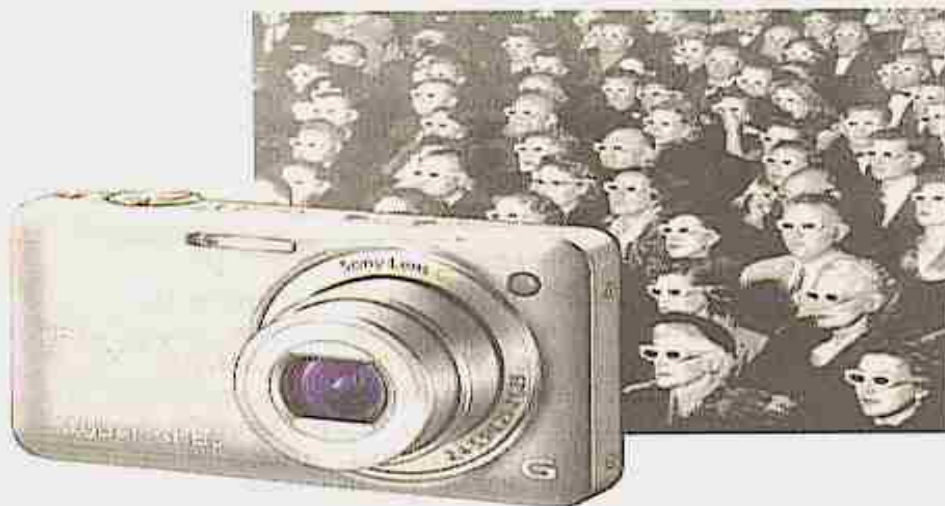
Holiday Movie Preview

★ **GULLIVER'S TRAVELS** (Dec. 22)
 Starring **Jack Black, Emily Blunt, Jason Segel** This 3-D reimagining of Jonathan Swift's 18th-century satire would never run on *Masterpiece Theatre*. "It's me-ish, now-ish," Black says of his take on Lemuel Gulliver, a mail-room hipster who finagles a travel-article assignment that brings him, via stormy seas, to the land of Lilliput. "To explain it, we had to go to a realm of wormholes and the Bermuda Triangle and alternate universes," Black adds, "because unlike when the book came out, we now know that there are no islands with tiny people on them."



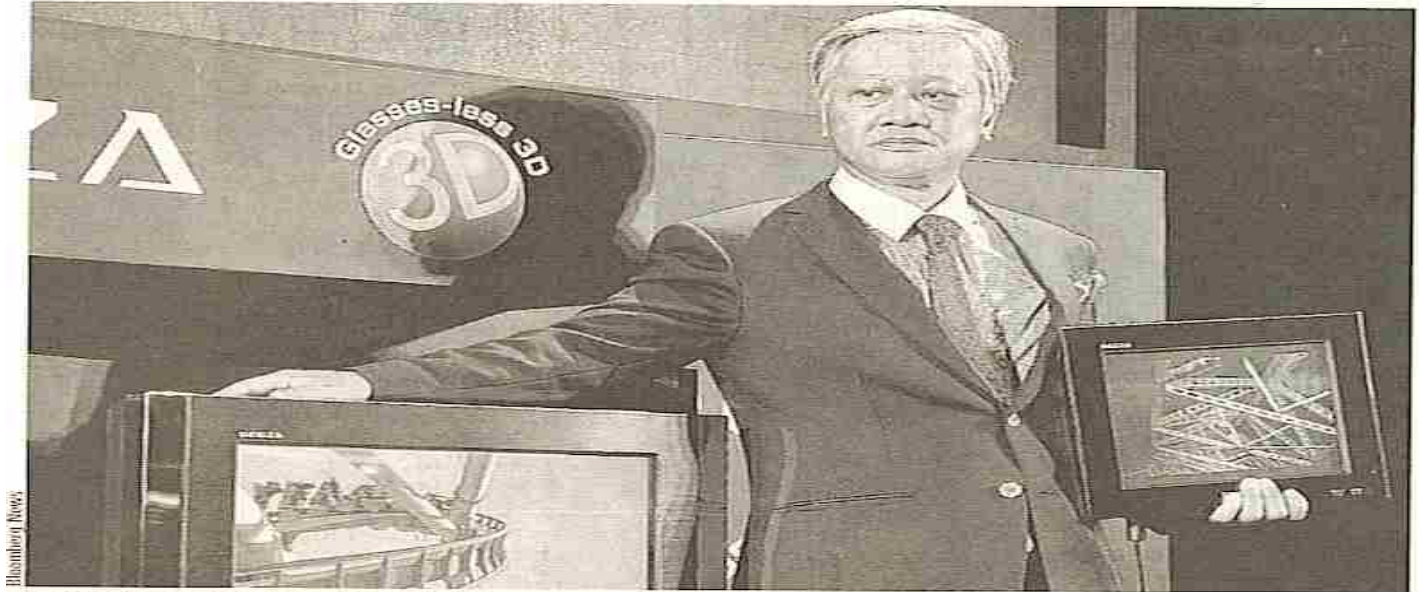
D6 | SATURDAY/SUNDAY • OCTOBER 9-10, 2010 | THE WALL STREET JOURNAL.

F. Martin Ramin for The Wall Street Journal (Bronx); Time-Life Pictures/Getty Images (audience)



SNAPSHOTS: THE NEXT DIMENSION

If Hollywood is slapping "3-D" on all its pictures, why shouldn't you? Point the svelte Sony Cyber-shot DSC-WX5 at your subject and let the camera calculate what the shot would like look from multiple angles. The images pop into 3-D relief when you tilt the display screen, or plug the camera into a 3-D TV set and don the glasses. There's also a setting for dusky scenes that takes a burst of shots at different exposures, then cobbles them into one well-lit image. That mode is called "Handheld Twilight," which Hollywood should note is also a terrible name for a sequel. \$300, sonystyle.com



Toshiba's Masaaki Oosumi unveiled the company's new 3-D TV set, which doesn't require 3-D glasses.

3-D TVs, Without Glasses

THE WALL STREET JOURNAL Tuesday, October 5, 2010 B5

BY DAISUKE WAKABAYASHI
AND JURO OSAWA

CHIBA, Japan—Toshiba Corp. said it plans to start selling the world's first glasses-free 3-D liquid-crystal-display television sets in December, less than a year after most set makers launched 3-D televisions that require the cumbersome eyewear.

It is the latest indication of the cutthroat nature of the television-set industry, marked by precipitous price declines every year and innovations that threaten to cannibalize promising technologies even before companies can cash in on years of research and development.

As 3-D content becomes more prevalent in movies and videogames, electronics companies are trying to shed the glasses that help create the illusion of depth. Nintendo Co. plans to introduce a portable game system next year that will play 3-D games without the need for glasses.

At a news conference ahead of this week's Combined Exhibition of Advanced Technologies, also known as CEATEC, in the outskirts of Tokyo, Toshiba said the new glasses-free TVs will be available in Japan in two screen sizes, 12 inches and 20 inches. There is no current plan for an overseas release.

The 12-inch model is expected to sell for about 120,000 yen (\$1,440) while the 20-inch model will carry a price tag of around 240,000 yen. Toshiba played down the commercial impact of

the new television sets since it is offering only a very small release of 2,000 units a month, compared with its 1.25 million LCD television-sets-a-month target for the fiscal year ending March 31, 2011.

"It's still not at a satisfactory level in terms of price or screen size," said Masaaki Oosumi, who heads the company's digital products division. "But if you take a long-term view of 3-D technology, the direction is ulti-

The new glasses-free TVs will be available in Japan in two screen sizes, 12 inches and 20 inches.

mately toward glasses-free."

New 3-D TVs are expected to be a major driver of sales this holiday season. Research firm DisplaySearch forecasts global shipments of 3.4 million 3-D television sets in 2010, accounting for roughly 5% of the total flat-panel-set market.

"If the marketing is not done well, it might confuse consumers. They might think 'If the set without the glasses is coming soon, then why buy the models with the glasses now,'" said Macquarie Securities analyst Damian Thong.

Most 3-D technologies create the illusion of depth on a flat screen by presenting different images to the left and right eye, using glasses. Creating the effect

using a display alone—a technology called autostereoscopic—is more difficult. One challenge is that the images can be blurry, especially if viewed from side angles.

Toshiba tackled the problem by placing a thin sheet over the display to make sure images meant for each eye, right and left, go to the intended eye. In conjunction, Toshiba also uses a powerful processor to render nine images from a single frame, so it can be viewed from multiple angles.

One drawback to this combined method compared with current high-definition 3-D television with glasses: The picture's resolution is reduced by more than 50%.

Toshiba seems to address another major problem facing 3-D television sets: lack of content. The company says that the sets can upgrade 2-D images to 3-D so content makers don't need to create content specific for 3-D, addressing the shortage of 3-D content. The new sets can also display regular 2-D video.

At CEATEC, Toshiba is also demonstrating a 56-inch version of its glasses-free 3-D television set, although company executives said there is no timetable for its release.

Another hurdle could be price. At 240,000 yen, the larger 20-inch model would be more expensive than a 40-inch 3-D model from Sony Corp., which is selling at a major electronics retailers in Japan for 227,500 yen including glasses.

▶ Exclusive: 3D TVs show quality differences

After evaluating 14 3D TVs over the past six months, we can tell you that 3D TV is the real deal—realistic, compelling, and exciting. However, the quality of 3D varied quite a bit among the models we saw; we've grouped them accordingly in the chart at right. We'll include 3D scores in the Ratings as soon as we complete our test protocols.

Attributes that affect regular picture quality also affect 3D, such as black level, brightness, and image detail. Another factor plays a big part in 3D quality: ghosting, or double images that are visible even through 3D glasses. This "crosstalk" occurs when the two images used to create 3D (one for each eye) aren't kept completely separate, a must for sharp 3D images with clean edges. Ghosting is most obvious in high-contrast scenes with bright objects against a dark background but can be visible in other scenes, too.

Plasma rules. Our tests show that plasma TVs display more realistic 3D images than LCD TVs do, primarily because they have less ghosting. Plasma's more consistent deep blacks and unlimited viewing angle also help bolster the sense of depth and dimension. But LCD TVs are brighter, a plus because 3D glasses dim the image considerably.

Models vary. Using test patterns we developed, Blu-ray movies, and broadcasts of sports, all in 3D, we found varying degrees of ghosting even within TV types. Panasonic plasma sets exhibited the least ghosting of any of the TVs we've tested, followed by the LG and

Samsung plasmas, which had slightly more. On the LG, 3D images looked a bit dimmer than on the others. Overall, the 3D on all the plasma TVs was enjoyable. Sony's LCD TVs came closest to the plasmas, with minimal ghosting when the viewer's head was level. But ghosting was severe when the head was tilted even slightly. On the LG and Samsung LCD TVs, images appeared to have dimension, but ghosting was distracting when apparent. The LG and Samsung sets showed significant ghosting in all types of content. All those LCDs are mostly fine as regular TVs, but they

wouldn't be our first choices for 3D.

Glasses

required. Active-shutter 3D glasses are pricey, about \$150 a pair, and

uncomfortable for some

viewers. At this point, you must use the glasses sold by each TV manufacturer, but "universal" glasses from third-party companies might be out by the time you read this. Some TVs come with one or two pairs, but others don't include any. We found the LG and Samsung glasses fairly light and comfortable. The Sony glasses were heavier; the Panasonic's were heavy and uncomfortable.

Caveat viewer. Some people might have trouble seeing 3D images or find that they develop headaches or eyestrain from watching 3D. Heed any warning from the TV manufacturer. Researchers are still studying the

potential effects of long-term viewing.

Buy or wait? There are some fine 3D TVs out now, so go for it if you're eager for a new experience. First choose a TV that did well in our full Ratings, then consider 3D quality. All the 3D TVs we tested had high scores for both overall performance and HD picture quality, except the Samsung LN46C750, which was so-so. If you're not in a rush, wait. You'll have more TVs to choose from, possibly at lower prices, and more 3D to watch.



Comparing 3D performance

*In alphabetical order, within quality groups.

Brand & model	Price	Size & type	3D glasses
BEST 3D Most effective, with least ghosting.			
Panasonic Viera TC-P50VT20	\$2,500	50-in. plasma	1 pair
Panasonic Viera TC-P50VT25	2,600	50-in. plasma	1 pair
Panasonic Viera TC-P54VT25	3,000	54-in. plasma	1 pair
BETTER 3D Effective, with minor ghosting.			
LG 50PX950 (in test)	2,000	50-in. plasma	none
Samsung PN50C8000	1,800	50-in. plasma	none
Samsung PN58C7000	2,300	58-in. plasma	none
Samsung PN63C8000	3,200	63-in. plasma	none
Sony Bravia KDL-40HX800*	1,700	40-in. LCD	none
Sony Bravia XBR-52LX900	3,600	52-in. LCD	2 pairs
LESS-SATISFYING 3D Obvious ghosting detracted from 3D effect.			
LG Infinia 55LX6500	2,500	55-in. LCD	none
Samsung UN46C7000	2,000	46-in. LCD	none
Samsung UN46C8000	2,200	46-in. LCD	none
Samsung UN55C8000	2,900	55-in. LCD	none
Samsung LN46C750	1,400	46-in. LCD	none

*Requires optional \$50 sync transmitter.

Comparing 3D performance

In alphabetical order, within quality groups.

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BEST 3D Most effective, with least ghosting.

Panasonic Viera TC-P50VT20	\$2,500	50-in. plasma	1 pair
Panasonic Viera TC-P50VT25	2,600	50-in. plasma	1 pair
Panasonic Viera TC-P54VT25	3,000	54-in. plasma	1 pair

BETTER 3D Effective, with minor ghosting.

LG 50PX950 (in test)	2,000	50-in. plasma	none
Samsung PN50C8000	1,800	50-in. plasma	none
Samsung PN58C7000	2,300	58-in. plasma	none
Samsung PN63C8000	3,200	63-in. plasma	none
Sony Bravia KDL-40HX800*	1,700	40-in. LCD	none
Sony Bravia XBR-52LX900	3,600	52-in. LCD	2 pairs

LESS-SATISFYING 3D Obvious ghosting detracted from 3D effect.

LG Infinia 55LX6500	2,500	55-in. LCD	none
Samsung UN46C7000	2,000	46-in. LCD	none
Samsung UN46C8000	2,200	46-in. LCD	none
Samsung UN55C8000	2,900	55-in. LCD	none
Samsung LN46C750	1,400	46-in. LCD	none

*Requires optional \$50 sync transmitter.

1B Related technology: OLEDs are (see next page top for ?what's that) now available for small screens on back of cameras, and maybe soon also for cell phones... OLEDs greatly enhances resolution ability..... at "great" expense so we may someday be able to read this very electronic journal on your cell phone- (magnification may be required!)... more challenges for us.....

See this current Nikon ad below

3.5" Ultra Hi-Res OLED Touch Screen

S80

14.1
MEGA
PIXELS

5X WIDE
OPTICAL
ZOOM

3.5" HI-RES
OLED TOUCH
DISPLAY

Nikon
HD
MOVIE

WAS \$329⁹⁵**
NOW \$299⁹⁵**

AFTER \$30
INSTANT
SAVINGS*






Organic light-emitting diode

From Wikipedia, the free encyclopedia

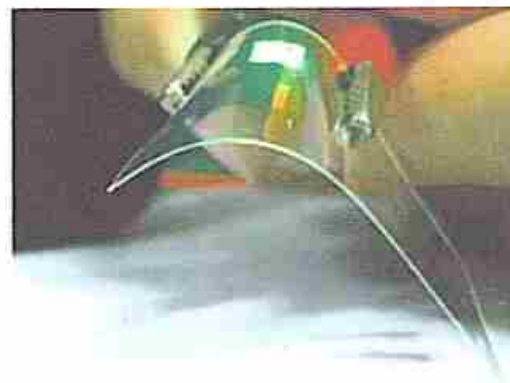
(Redirected from [OLED](#))

An **organic light emitting diode (OLED)** is a **light-emitting diode (LED)** in which the **emissive electroluminescent** layer is a film of **organic compounds** which emit light in response to an electric current. This layer of **organic semiconductor** material is situated between two electrodes. Generally, at least one of these electrodes is transparent.

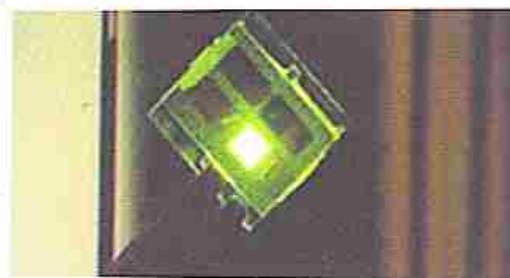
OLEDs are used in **television** screens, **computer monitors**, small, portable system screens such as **mobile phones** and **PDA**s,

An OLED display functions without a **backlight**. Thus, it can display deep **black levels** and can also be thinner and lighter than established **liquid crystal displays**. Similarly, in low ambient light conditions such as dark rooms, an OLED screen can achieve a higher **contrast ratio** than an LCD screen using either **cold cathode fluorescent lamps** or the more recently developed **LED backlight**.

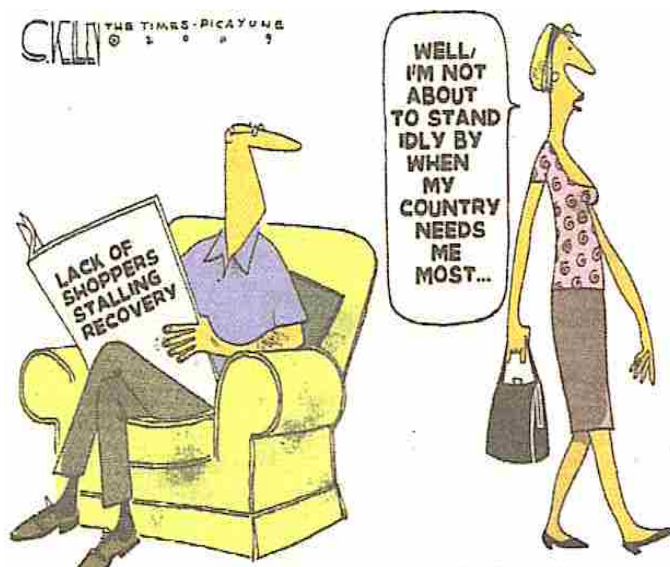
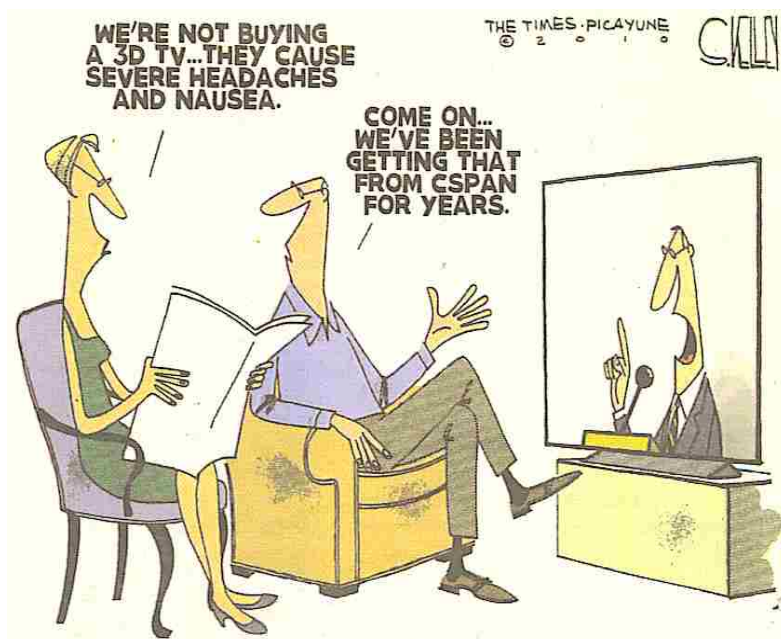
active-matrix addressing schemes. Active-matrix OLEDs (**AMOLED**) require a **thin-film transistor** backplane to switch each individual pixel on or off, and can make higher resolution and larger size displays possible.



Demonstration of a flexible OLED device



A green emitting OLED device



2.Vision- seeing and not seeing: SPECTACLES, wearing them just for fashion purposes, are currently “in vogue” for people, especially for blond human females who need the implied IQ boost to offset their spectacular oft distracting good looks (*see prior Hyde Park about a year ago reference*). From current ads man’s best friend is only slightly behind (see below). For “wild” animals for whom specs may not be available, they can simulate spectacle wear with dark markings, like the red panda below and racoons (or is that a robber’s mask?). When your ed was a teen his folks adopted a cute white terrier who had spectacle frame-like markings behind both eyes. We named her “Specky” for her be-spectacled appearance!



5 Visit 4

that actually love cold weather: tigers, snow leopards, and red pandas (like the cute guy above).

ILLUSTRATION BY OLIVER MUNDAY
A MORTON/DAVID/COOPER



Ratings Eyeglass chains

In order of reader score.



Retailer	Cost	Reader score	Survey results						
			Quality	Frame selection	Care taken to fit glasses	Employee expertise	Price	Speed	Follow-up service (if applicable)
Costco Optical ¹	\$157	86	⊖	○	○	○	⊖	○	⊖
Independent local eyeglass shop	211	84	⊖	⊖	⊖	⊖	⊖	⊖	⊖
Private doctor's office	212	83	⊖	⊖	⊖	⊖	⊖	○	⊖
Kaiser Permanente ²	166	80	○	○	⊖	⊖	○	○	⊖
Empire Vision Centers	155	79	○	○	⊖	○	○	⊖	⊖
For Eyes Optical	167	79	○	○	○	○	○	○	○
Doctors Vision Center	199	79	○	⊖	○	○	⊖	○	○
Davis Vision	129	79	○	○	○	○	⊖	○	⊖
Sam's Club ¹	201	79	○	○	○	○	⊖	○	○
ShopKo Eyecare Center	194	78	○	○	○	○	○	○	○
Sears Optical	183	78	○	○	○	○	○	○	○
Walmart Vision Center	182	77	○	○	○	○	○	○	○
Target Optical	187	77	○	○	○	○	○	○	⊖
BJ's Optical	191	76	⊖	⊖	○	○	⊖	○	○
LensCrafters	244	76	○	○	○	○	⊖	⊖	⊖
Pearle Vision	228	74	○	○	○	○	⊖	○	○
EyeMasters	205	74	○	○	⊖	⊖	○	○	○
Visionworks	182	73	⊖	○	⊖	⊖	○	⊖	⊖
America's Best Contacts & Eyeglasses	161	71	⊖	⊖	⊖	⊖	○	⊖	⊖
JCPenney Optical	177	71	⊖	⊖	⊖	⊖	○	⊖	⊖

Guide to the Ratings

Ratings are based on the 2009 Consumer Reports Research Center Annual Questionnaire of 31,059 subscribers to CONSUMER REPORTS who reported their experiences purchasing eyeglasses from January 2007 to June 2009. **Reader score** represents overall satisfaction with the retail experience but is not limited to the factors listed under survey results. If all respondents were completely satisfied, the reader score would be 100. A score of 80 indicates that respondents were "very satisfied" on average; 60, "fairly well satisfied." Differences of fewer than 5 points are not meaningful. **Cost** represents the median amount paid for eyeglass frames and lenses. **Quality, frame selection, care taken to fit glasses, employee expertise, price, speed, and follow-up service** reflect the percentage of respondents who were highly satisfied on each respective factor. Ratings blobs are relative, not absolute, measures and represent the retailer's performance in comparison with the median of all retailers rated on each attribute. Ratings are based on the experiences of subscribers to CONSUMER REPORTS, who might not be representative of the general U.S. population. Some optical chains operate only in select regions or states; check company websites for locations.

¹ Membership required to purchase glasses at the chain's optical shops. ² Kaiser Permanente runs a nonprofit HMO and has its own hospitals and pharmacies, including optical centers. Nonmembers can buy glasses in some Kaiser Permanente locations. Call ahead to check.

3. strabology© Keeping up with the medical and science news, it seems never a day goes by that we do not hear of BOTOX being used successfully in another area of medicine. (For example, see the clippings below) And indeed if you check PubMed for what is in the NIH Library of Medicine on the topic of Botox, their list (see next page for most recent listing) has a mere **4786 articles**.

We (editorially) would **propose that Alan Scott (and Art Jampolsky) be nominated for a Nobel Prize in medicine for taming and domesticating Botulinum Toxin..** It has become one of the most useful tools and is virtually the miracle drug of the last quarter century.

Even your editor now is seeking a botox shot for his pyruiformis butt muscle syndrome after a year of good PT, but it ain't cured yet. Seems I will have to undergo a stereotactic guided steroid shot first (including electrical stimulation of the muscle for ID... then a Botox shot p.r.n. We admit that the recommendation that we consider this treatment is what seeded this proposal.

IA Member Communications To: perxbvq@colorado.net
Oct. 14, 2010: US Hispanics Outlive Blacks And Whites, CDC Report Says

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Pharma & Device Update

FDA approves trial of Botox to treat vaginal spasms.

The Orange County Register (10/14, Stewart) reports, "The US Food and Drug Administration has approved a clinical trial of Botox as a treatment for vaginal spasms that can block sexual intercourse and gynecological examinations." Lead investigator Dr. Peter T. Pacik of Manchester, N.H., said that "in the past five years, before getting the official FDA approval...he has treated more than 70 vaginismus sufferers with a combination of Botox injections, local anesthesia and a vaginal dilator, applied gradually." Meanwhile, "the FDA website ClinicalTrials.gov also lists a similar study that already is under way at the University of Tehran in Iran. The researchers there said injections of botulinum toxin cured 75 percent of 23 vaginismus patients."

AMA Member Communications To: perxbvq@colorado.net
Subject: Oct. 18, 2010: FDA Approves Botox As Treatment For Chronic Migraines

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FDA approves Botox as treatment for chronic migraines.

On the front page of its Business Day section, the New York Times (10/15, B1, Singer) reported, "The Food and Drug Administration on Friday approved Botox, the anti-wrinkle shot from Allergan, as a treatment to prevent chronic migraines, a little more than a month after the company agreed to pay \$600 million to settle allegations that it had illegally marketed the drug for unapproved uses like headaches for years." Botox "had worldwide sales last year of about \$1.3 billion, divided equally between medical and cosmetic uses." But Allergan said "sales of Botox for chronic migraine and other medical uses would soon eclipse sales of the drug as a wrinkle smoother."

The Los Angeles Times (10/15, Healy) "Booster Shots" blog reported, "The FDA's decision expands the potential market for Botox, which burst upon the American cosmetic scene in the late 1980s, to 12% of the US population -- the proportion of Americans thought to suffer from the throbbing, pulsating pain of migraine headaches." The approval allows Allergan "to advertise to consumers and promote to doctors the use of Botox for chronic migraine." The FDA "underscored Friday that Botox does not appear to be useful in treating or preventing less frequent migraines, or headaches that are not caused by the activation of nerve fibers within the brain's blood vessels--the definition of migraine headache."

The AP (10/15) reported, "For the new use, doctors are directed to inject patients in the neck or head every 12 weeks to dull future headaches." The FDA "approved the new use based on two company studies of more than 1,300 patients who received either a Botox injection or a dummy injection." Those "who received Botox reported slightly fewer 'headache days' than patients given the sham treatment. In the more significant of the two studies, patients on Botox reported about two fewer headache days than patients who didn't receive the drug."

Bloomberg News (10/15, Peterson) reported, "On Oct. 5 the company settled a 2 1/2-year investigation of its Botox marketing that analysts said held up FDA approval for the migraine treatment." Allergan "pleaded guilty and was ordered by a judge to pay \$375 million to resolve Justice Department allegations it promoted Botox for headache, pain and juvenile cerebral palsy from 2000 to 2005 without FDA approval."

CNN (10/15, Watkins) reported, "The drug -- whose generic name is onabotulinumtoxinA -- has not been shown to work against migraines that occur 14 days or fewer per month, nor has it been shown to work for other forms of headache." The Wall Street Journal (10/15, Rockoff, Solsman) also reported the story.

Thu 25 Nov 2010 7:34:40
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Botox Search Clear

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Anyone second the motion? And Then what do we do?

3.5 ELSEWHERE in ophthalmology :3D and 3D tests spread as everywhere as in science and commerce and our society.

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Three-Dimensional Imaging of the Macular Retinal Nerve Fiber Layer in Glaucoma with Spectral-Domain Optical Coherence Tomography
 Atsushi Sakamoto, Masanori Hangai, Masayuki Nukada, Hideo Nakanishi, Satoshi Mori, Yunko Kotera, Ryo Inoue, and Nagahisa Yoshimura
 Invest. Ophthalmol. Vis. Sci. 2010;51:5062-5070
<http://www.iovs.org/cgi/content/abstract/51/10/5062>
Three-dimensional imaging of the macular retinal nerve fiber layer (RNFL) using spectral-domain optical coherence tomography was effective in detecting RNFL defects and their severity (complete loss versus RNFL thinning) in eyes with glaucoma.

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(Investigative Ophthalmology and Visual Science.)
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CT Based Three-Dimensional Measurement of Orbit and Eye Anthropometry

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Abstract

Purpose: To measure eye and orbit anthropometric variation within the normal population using CT images, and investigate the effects of age and gender on eye and orbit anthropometry. Quantification of eye and orbit anthropometric variation within the normal population and between persons of different age and gender is important for the prediction and prevention of eye injury.

Methods: A systematic method was developed to three-dimensionally align head CT images and measure ocular and orbital parameters for 39 subjects. Twenty-four measurements along the orbital rim were collected to quantify orbital aperture. Protrusion of the brow and the eye were measured, along with relative distance measurements to describe location of the eye within the orbit.

[Display Settings:](#) Abstract

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[Invest Ophthalmol Vis Sci.](#) 2010 Nov 18. [Epub ahead of print]

Three-Dimensional Imaging of Macular Inner Structures in Glaucoma by Using Spectral-Domain Optical Coherence Tomography.

Kotera Y, Hangai M, Hirose F, Mori S, Yoshimura N.

Ophthalmology and Visual Sciences, Kyoto University Graduate School of Medicine, Kyoto, Japan.

Abstract

Purpose: To profile macular thickness changes in glaucoma by using 3-dimensional spectral-domain optical coherence tomography (3D-SD-OCT). **Methods:** The study included 30 eyes with suspected and preperimetric glaucoma (SGPPG) and 35 healthy eyes. The macular thickness, including those of the total retina, nerve fiber layer (NFL), and combined inner retinal

4. Elsewhere in Medicine

from *The Wall Street Journal* November 2, 2010 by Amol Sharma in New Delhi and Ben Worthen in San Francisco. **Worries Emerge Over Outsourcing of Electronic Medical Records.** “Indian technology companies want to participate in a coming wave of U.S. spending to digitize health care records. But sensitivity over outsourcing and resistance by American hospitals to sending medical information overseas could thwart efforts to win big contracts. The U.S. government next year will begin to dole out billions of dollars to health care providers who adopt electronic medical records. Doctors also face a federal mandate to upgrade software as the U.S. switches to a new system of insurance billing codes. ... The flurry of health related tech spending in the U.S. is ‘like another Y2K opportunity’....

5. Alternate careers for medical personnel

from *The Wall Street Journal* November 8, 2010 by Anna Wilde Mathews. **Fewer Practices Are Doctor Owned.** “The traditional model of doctors hanging up their own shingles is fading fast, as more go to work directly for hospitals that are building themselves into consolidated health care providers. ... the share of responding practices that were hospital owned last year hit 55%, up from 50% in 2008 and around 30% five years earlier. The biggest U.S. physician recruiting firm, Merritt Hawkins, a unit of AMN Healthcare Inc., said the share of its doctor searches that were for positions with hospitals hit 51% for the 12 months ended in March, up from 45% a year earlier and 19% five years ago. ... Many doctors have become frustrated with the duties involved in practice ownership, including wrangling with insurers, dunning patients for their out-of-pocket fees and acquiring new technology. ... seeking the sometimes more regular hours of salaried positions. ...”

(My own thoughts on my career 40 years were along these lines. It has taken forty years for Obama to bring us close to the socialized medicine I thought was “just around the corner” back then. No regrets. Creating has always been what I enjoy most and administration least.)

5. Careers: professional alternate, retirement type etc.

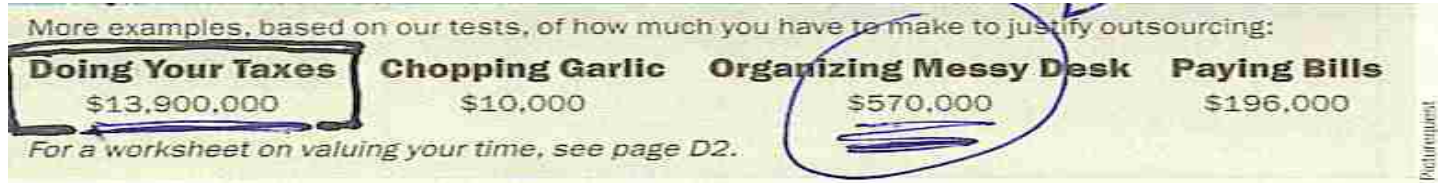
ALTERNATE CAREERS

With the passage of ObamaPelosicare this section has increased significance, especially since part of OPC is to cut the throats of any MDs who still take Medicare. (see news page 70 in this issue) As a no longer independent Medicare patient myself, I am frankly quite scared. My recent experiences are not reassuring with long waits for care for me, even as an old M.D., to see everybody I needed to for recent problems.

Best employment idea. Government is

horrible but you can't beat them so JOIN THEM! OPC plans to make all MDs and medical workers FT government employees sooner or later. All California cops are effectively multimillionaires anyway even retiring early (Forbes). Government these days always takes care of itself and its own FIRST. Taxpayers are just peasants..... in their eyes.....

7.. YEAR END Money Saving Plus and Minus (and Taxes).... Encore:



A reminder from last spring: \$\$\$ MONEY\$\$\$.? WHAT is...
This is one of the best pieces of advice that we have every seen. Doing our own taxes forever has been a significant contributor to what wealth we have accumulated from time to time. So we agree! And this is seven years old, so the justification number for this is at least \$15 million now. I don't know personally anyone that well off. I also like the "messy desk" limit. Good spousal defense!!!

The avoidance of taxes is the only intellectual pursuit that carries any reward.
 —John Maynard Keynes

TAXES: As we approach the end of the year and potential major changes in the country's tax structure and for each of us, especially income type tax..

*Advice One piece I will dare to give you. **STUFF YOUR ROTH and pay the taxes NOW (actually NOT right now, but over the next two years) Take advantage of the temporary and maybe last time you can spread this year's contributions or conversion over the NEXT two years, before taxes really go out of sight. Paying zero tax on your gains forever feels SO GOOD:***

So let us first review our guiding principles re taxation and review what we traditionally post here each tax season....

MORE MOTIVATION FOR YOU:

from *the Wall Street Journal* November 22, 2010 by Stephen Moore and Richard Vedder. **Higher Taxes Won't Reduce the Deficit.** "... **If history is any guide, however, that won't happen. Instead, Congress will simply spend the money.** ... The \$1.58 study that found that every new dollar of new taxes led to more than one dollar of new spending by Congress. ... higher tax collections never resulted in less spending. History shows that when Congress gets more revenue, the pols spend it. ... late economist Milton Friedman said of Congress many years ago: 'Politicians will always spend every penny of tax raised and whatever else they can get away with.'" *Mr. Moore is senior economics writer for the Wall Street Journal editorial page. Mr. Vedder is a professor of economics at Ohio University and an adjunct scholar at the American Enterprise Institute.*

AND MORE:

MESSAGE FOR GOVERNMENT AT ALL LEVELS:

from *The Wall Street Journal* November 17, 2010
"Opinion" by J.L. Schroer **Our Brains Signal Love of Fairness, Not Higher Taxes.** (*since taxes levied by our taxers are so often grossly unfair, for example: non deductibility of investment losses and (just like) gambling losses; failure to adjust so many things for inflation which is actually really an annual huge government tax on your net worth every year of life: the "alternate minimum tax" extended to so many middle class people,, and failure to adjust so many things for the last two, or or the special tax breaks that Congress grants itself and its various buddies.....SO CAN EXPECT ONLY HATE AND NEVER LOVE WHENEVER YOU TAX US. -PER*)

"... Studies [also] suggest that about 60% of children born to parents in the bottom quintile of earnings climb the economic ladder, while 60% of

children born to parents in the top quintile drop to lower quintiles. ..."

MOTIVATION:

Mean, ugly, unfair, unethical, immoral or even illegal U.S. taxes
(magnify and post on your wall facing where you do your taxes:)

Non deductibility of investment losses and (just like) gambling losses; the 50% limit and after that, time limits on charitable deductions to offset taxable income; failure to adjust so many things for inflation which is actually really an annual huge government tax on your total net worth including debts every single year of life, regardless of your income or anything else...: Now officially set at NOT LESS than 2 ½% per year, the "alternate minimum tax" extended to so many middle class people, and failure to adjust so many things for the last two, or or the special tax breaks that Congress grants itself and its various buddies.

Notable & Quotable

The Cato Institute's Chris Edwards commenting on the institute's Web site about a new report on federal employee pay levels from the U.S. Bureau of Economic Analysis:

The George W. Bush years were very lucrative for federal workers. In 2000, the average compensation (wages and benefits) of federal workers was 66% higher than the average compensation in the U.S. private sector. The new data show that average federal compensation is now more than double the average in the pri-

vate sector. . . . It's time to put a stop to this. Federal wages should be frozen for a period of years, at least until the private-sector economy has recovered and average workers start seeing some wage gains of their own. At the same time, gold-plated federal benefit packages should be scaled back as unaffordable given today's massive budget deficits. There are many qualitative benefits of government work—such as extremely high job security—so taxpayers should not have to pay for such lavish government pay packages. *WLR ed/ist*

Famous Judge Learned Hand Quote

"Anyone may arrange his affairs so that his taxes shall be as low as possible; he is not bound to choose that pattern which best pays the treasury. There is not even a patriotic duty to increase one's taxes.

7.5 investment: what to do with any money you may have left after the government is tries to take ALL your assets. **Don't put your money in bonds**, especially municipal bonds.....

Local insanity: Our local town of Dillon, on the shore of Lake Dillon has decided they need to help the local marina so they want to raise \$ 2

million bucks of muni bonds to pay for a renovation-upgrade of the marina (so that even more Denver front rangers will milk the equity in their homesto buy a boat and jam interstate 70 all weekend in the summer (the skiers already do that all winter..... They wouldn't dare put that to a vote, so they are mortgaging the town hall.

New Risks Emerge in Munis

Debtholders Are Left Steamed as Some Cities Forgo Repayment Promises

BY MICHAEL CORKERY

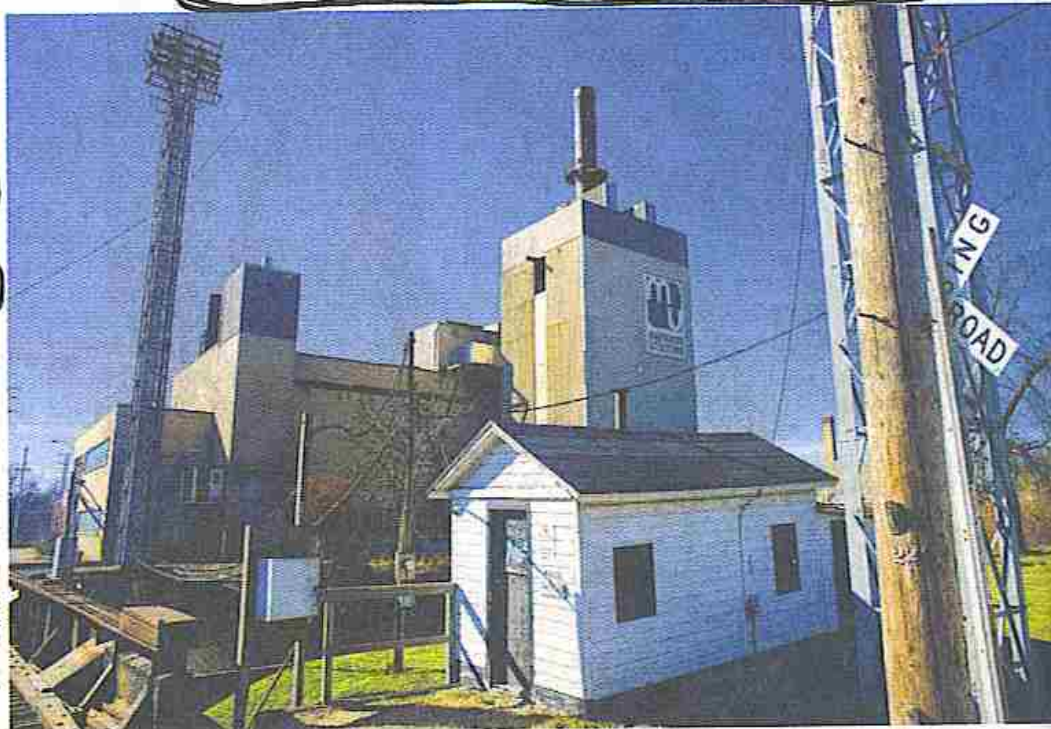
THE HOUSING CRISIS WAS fueled by cash-strapped homeowners who walked away from their mortgages. Some analysts and investors now are worried about the same problem happening with debts of cities and towns.

For more than a year, Menasha, Wis., hasn't paid back about \$23 million in principal for short-term notes tied to a failed steam plant, even though the deal's offering documents include a statement that the city would use tax revenue to cover any debt payments, if needed.

But that statement was no guarantee to repay the debt, says Edward Fuhr, a lawyer for Menasha, a small industrial city that has spent an average of \$80,000 a month to fight investor lawsuits in three courts over the notes, which matured in September 2009.

The tangle underscores concern in the municipal-debt world about the longstanding assumption that local governments will do whatever it takes to repay their debts—including raising taxes—because failing to do so would make it more expensive or even impossible to turn to investors for future financing.

Such cases are rare but could increase in number as municipal governments struggle to meet



Menasha, Wis., hasn't repaid \$23 million in principal on debt on a failed steam plant, shown here Saturday.

their obligations on projects that have run into trouble. The greatest default risk is in small municipalities with overleveraged projects buffeted by the recession. Those places also might need to access credit markets less in the future than big cities, making it easier to walk away from their debt.

Cost overruns doomed Menasha's steam plant, which was shuttered in the fall of 2009 after the debt more than doubled to about \$40 million. In Harris-

burg, Pa., an incinerator project has forced the city to weigh a potential bankruptcy filing.

Another trouble spot for investors: Buena Vista, Va., a city of about 6,200 on the edge of the Blue Ridge Mountains that didn't appropriate money in its 2011 budget to make debt payments on \$10 million in bonds that financed a municipal golf course, according to Moody's Investors Service.

Moody's downgraded Buena Vista's credit rating in June to

junk from "low credit risk," citing "uncertainty about the city's willingness to meet its obligations." The city's lawyer couldn't be reached for comment.

Of 54 defaults on Moody's-rated municipal debts from 1970 to 2009, about 78% were in stand-alone housing and health-care projects. Defaults like the Menasha steam plant are some-

Please turn to the next page

■ Municipal-bond dealers fight an increase in fees C17

8. Male and Female: the Sexes

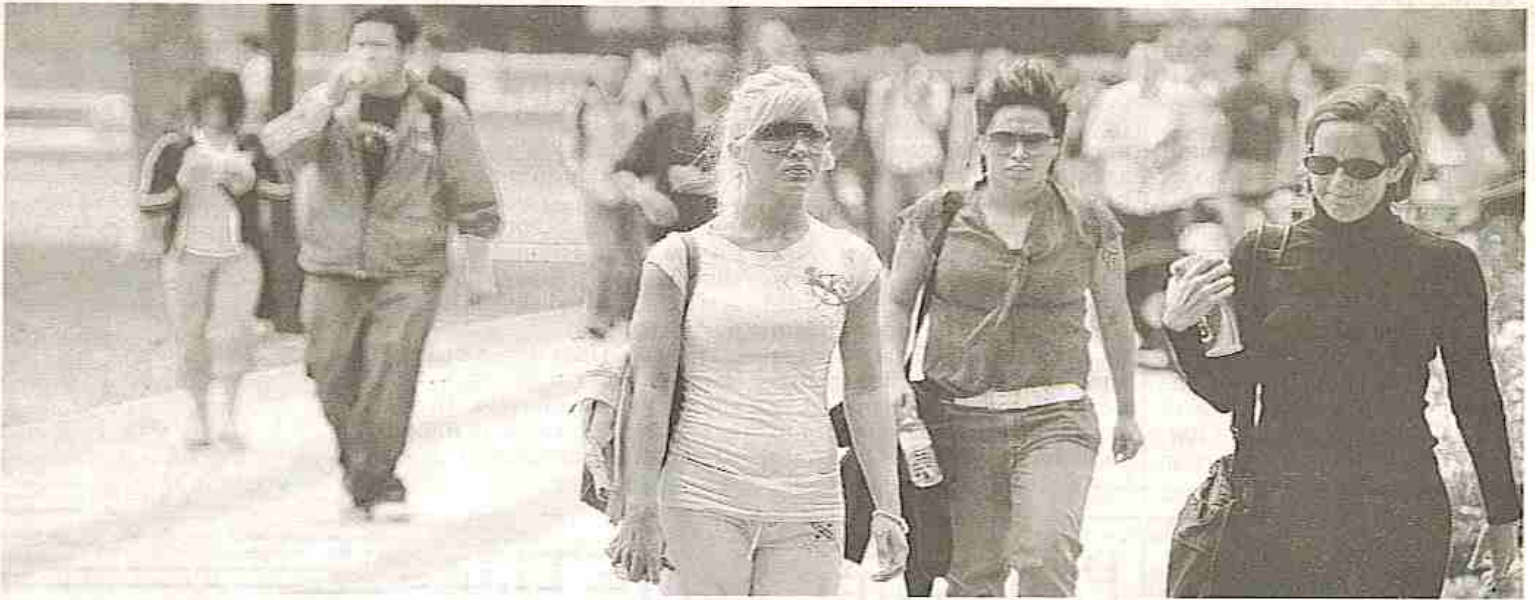
BAU Thursday, November 4, 2010

THE WALL STREET JOURNAL.

BUSINESS EDUCATION

Harvard Works at China India

B-School Bulletin



The business school at the University of California-Los Angeles is launching a Latin America-focused joint M.B.A. program. Above, UCLA students.

Wow. Great photo- especially of that shapely lady heading right for the camera. So what has this got with “*Business Education*”. Do we have to have pictures of business students going to business school????

Is that news worthy ???

No this is in fact a “figure” (is that a Pun?)
Illustrative of

TWO major business principles:

1. SEX SELLS AND
2. “IF YOU’VE GOT IT, FLAUNT IT !”

PUBLIC HEALTH

DO NOT try to neutralize your booze with coffee.

It doesn't work and is dangerous because the coffee does not counter the motor effects of alcohol and its stimulation may mask them to your appreciation of just how intoxicated you are.... we told you about this last year.

Now even the government is outlawing all those drinks that combine serious alcohol with stimulants: like JOOSE and its competitors. Avoid them if you can still find them

PUBLIC HEALTH AUTOS

New: Women Drag Crash [Test] Results Down

from *The Wall Street Journal* October 6, 2010, by Josh Mitchell. **Crash Tests Dent Car Safety Scores.** "Tougher government crash tests for the 2011 model year are making it harder for car makers to win coveted '5-star' safety ratings for their vehicles, which they widely tout in ads. ... launched a more rigorous system. ... for the first time gives vehicles one overall safety rating, as well as various subratings **with one star for the worst and five stars for the best.** ... too many vehicles were getting top scores on the government's previous crash tests, so regulators made the tests harder. For the first time, the tests use crash test dummies to gauge the impact of a crash on women not just men. ...

"[Now] ratings for vehicles from the 1990 through 2010 model years won't be comparable with those issued under the new **more demanding system.** ... Of the 33 tested so far, only two achieved an overall score of five stars: BMW AG's BMW 5 Series and Hyundai Motor Co.'s Sonata. That compares with 99 models from the 2010 model year that received 5 stars in both the front and side crash tests. ... vehicles ... largely the same for 2011 as... 2010 will get lower scores. ...

"'We're just trying to make the manufacturers stretch even more to make cars safer', said David Strockland, chief of the National Highway Traffic Safety Administration. ... 'It's like in high school, when every student gets an A. You want to switch the test ... the intent was to further help consumers differentiate among vehicles. ...'"

TIPS

[When to Sell Your Car]

from *The Wall Street Journal* October 29, 2010 "Me & My Car, by Jonathan Welsh. "... if you still love [it] you should keep it. You'll know it's time to let it go when seeing it in the morning makes you cringe instead of smile."

Tips from the Editor (retired semi-pro race car driver member, 200 mph "club")

safe driving: one of the biggest driver **distractions** which may result in an accident is **drinking coffee** (or any beverage) that fits in your many many cupholders. Your editor cannot get a regular cup up to his lips while driving to drink it without spilling a major quantity on his shirt and lap....

There are a couple of solutions we've found:

1. Make sure it is not **so hot** enough to burn your lips and your mouth. Train your nose to sense and measure the temperature of the coffee. Steam arising from the liquid says **THINK!STOP!** Pick up an ice cube from the soft drink machine and drop it in. or stop in the head and add a little cold water...

2. Limit yourself to fast food coffee cups with effective lids that control full cups; like Mickey D's and Burger K's. Watch out for some lids which may not fit tight enough to prevent leakage when tilted.

3. Or if you use your private insulated non disposable coffee cup, **stick a common STRAW in the hole** on the top and you will never again have to tilt it far enough to spill on you. If the drink hole won't allow it, drill it out with a one quarter inch drill, or drill a separate quarter inch new hole.

Your editor has done this on the several insulated containers he has bought to keep his **desk** coffee warm enough. Haven't spilled coffee on my computer keyboard (which can destroy the whole computer as well as the keyboard) since I started doing this!

The future is here! (Or as of January` 2011) when Chrysler will start delivering its **cute Fiat 500 micro minicar**. They plan to offer it, starting at \$ 15K in:

14 COLORS

6 WHEEL STYLES

and with an INFINITE NUMBER OF BODY DECALS to chose from and order for and to be applied at the factory or dealer for you as you wish to make your car truly **unique**.

There will be **half a million possible combinations** so

EVERY BUYER can have a distinct unique personalized appearing personal vehicle.

YOU NOW CAN BE SURE NOBODY

ELSE HAS EXACTLY THE SAME LOOKING CAR YOU DO! In fact since they expect to sell only 50,000 a year here, rather, you may have to wait for your special combination ordered uniqueness to arrive. It may well not be "in stock" now or ever or even here yet or never. Smart drivers are making \$ 500 deposits NOW !

We keep learning....

We just recognized this driving hazard or rather we tripped over it! ...

Thanks to our recent trip to Chicago for Ken Wrights ISOP pre pre AAO meeting (it was great, as usual- we recommend it highly as a plus great experience combining learning and ambience, a function of its comfortable size.

Anyhow, we had the good fortune of staying with some very old friends who live in the Huge John Hancock Building skyscraper.... every one knows that great tapering silhouette with black cris-crossed by huge black girders, a vertical triple XXX on each side.. Chi Town's tallest until the Sears Tower.

The garage for the residents there is the second or so four or so stories of the tower and to enter there on the lowest sixth floor is an adjacent round tower circular parking ramp... The ONLY way in and out...

The circular car ramp is itself maybe fifteen feet wide- the support core of the ramp is maybe twenty feet wide and there is a four feet high wall around the outside edge to keep you off the streets below.

But that is a constantly pretty tight curve for, it seems, at least a quarter of a mile up and down. Each way

Well heading up it one afternoon, we managed to scrape the inside right side of our “mini”van rather hard. You cannot stop on that ramp unless you are really disabled. It is truly “blind” all the way up and it would only be a few seconds before at least one car would rear end you. So we kept driving and then looked when we found a parking space. OMG (OhMyGod), we really did grind about a square meter of paint off- but we didnt hit the tire or the wheel, so we said - “fix it when we get home”

But we had both erred in not seeing it coming. So we thought about it.

You know, it is so easy and how often it happens when you leave a curbed driveway, and the inside rear wheel cuts the curve and goes kerthunk over it.... Too often? right, but rarely damaging anything...



Why? We finally figured it out: Because the rear end of your vehicle ALWAYS CUTS the CORNER and you drive and steer only the FRONT END. Always, right? (Hook and Ladders don't have these problems because they have someone steering the rear as well as the front. Or one of those watch a me call it high four wheel drive trucks.

And that is all we did except on the inside we hit a wall instead of a curb.

THEY NEED TO PUT A GOOD FAT curb, OR the Foot of a Jersey barrier ON THE INSIDE OF THAT PARKING RAMP !!!!

At the same time, to avoid this you must really set your mind to think, as when you are pulling the usual 7 or eight foot trailer or eight and a half foot , MY REAR END IS in effect, MUCH BIGGER THAN MY FRONT END- ALWAYS DRIVE WIDE AROUND CORNERS!!!! wider than you need for the front end....

MOST WOMEN HAVE TO DO THIS ALL THE TIME THANKS TO THE WONDERS OF FEMALE ANATOMY, BUT WE NEED TO APPLY THAT TO DRIVING...ALL THE TIME.... TOO

But when you drive up the ramp like that don't try to gauge how much room you have in the rear- which you can only see through your weird offside rear view mirror. What you need to and must do is to put the outside front fender as close to the outside wall as you comfortably can.... and keep it there all the way up and down... Then if you sideswipe your rear, you just have to get closer to the outside wall.

You can see it in San Diego in March. We maybe should fix it, (BUT when we sell it, we would legally have to admit to a big repair job the cause for which was no longer evident and therefore suspicious... , especially as the entire car (metallic paint) would have to be repainted making it look much worse than it is!) Maybe we will just paint over it with lettering that says “Souvenir of the John Hancock Tower, Chicago” !

Hope to see you all there, to help us celebrate the anniversary of our 25 years of continuous publication.... -per