My Assumptions
- There is rarely a single “correct” Rx; there is typically a range of lenses that provide appropriate assistance
- Most standard prescriptions are stronger than necessary for their proposed use.
- Most standard prescriptions are inappropriate for the majority of the activities for which they are worn.
- Presbyopia begins around age 12.
- When confronted with any given individual, statistics are, at best, useless.

My Practice
- Solo practice almost 30 years
- Referral only
- Mostly VT
- No therapists
- No computers

Why bother?
- Myopia of “epidemic” proportions in parts of Asia (Rose, et al 2008)
- By 2020: projected 1.6-2.5B people w/ myopia (Holden, et al 2008)
- Myopia remains a major cause of blindness
- Do you have any better ideas?

Etiology of Myopia
Genetic factors
- How important is heredity?
- How do genetic factors manifest?
Etiology of Myopia

Environmental factors
Near point stress
Accommodative aspects
- John Barlowfield 2004 Accommodation and myopia: are they really related?
- Gallop, B., Huang, A. 2011 Prospective Data from a Randomized Longitudinal Study of Ortho-K Orthokeratology and Convergence Training as a Potential Method of Myopia Control in Children

Binocular aspects
Sympathetic/parasympathetic conflicts
Sedentary lifestyle
Importance of movement
Importance of distance viewing
Diet

Primary Care Optometry News
July 2011
Study: Overnight ortho-K in children significantly reduces peripheral myopia

“The 16 study children ranged in age from 11 years to 16 years (median age 12.7 years), and the range of myopia was -0.56 D to -3.94 D.”

Etiology of Myopia
Axial length
peripheral retinal involvement
- Smith et al. 2007
- Mutti et al. 2000
MiSight lenses

Etiology of Myopia
Retinal defocus
George K. Hung, Ph.D., Kenneth J. Giffredo, O.D., Ph.D. 2004 Incremental Retinal-Defocus Theory Predicts Experimental Effect of Under-Correction On Myopic Progression
George K. Hung, Ph.D., Kenneth J. Giffredo, O.D., Ph.D. 2005 Constant Light Effect on Myopic Incremental Retinal-Defocus Theory Predicts Experimental Effect of Constant Light on Myopic Progression

E. Complicating factors
1. strabismus
2. amblyopia
3. accommodative dysfunction
4. pursuit/saccade dysfunction

Etiology of Myopia
Complicating/Risk factors
- pursuit/saccade dysfunction
- strabismus
- amblyopia
- accommodative dysfunction

High definition lenses
- Ultra-maximum acuity
- Corneal aberrations
  - Analogous to micro-saccades?
- Limited wear time?
  - unsustainable
- Long-term side effects?
My Prescribing Assumptions

- Compensating lenses should not be a first resort
- Avoid cylinder whenever possible
- One Rx is almost never good for all tasks
- Avoid prescribing only one Rx unless it’s strictly therapeutic
- Use balanced lenses whenever possible
- Start at near and work from there

A Philosophy of Prescribing

Always try to provide the greatest benefit with the least amount of interference. Try to impinge on the natural state as little as possible when compensating. And try use the lowest power possible therapeutically to achieve or provide the conditions for the desired movement. If that doesn’t work, then consider dialing things up a bit.

I want my first move to be perceived as not creating any interference if possible. I have had consistently good experiences working in this way. For me it is about implementing a device (lens, prism, filter, occluder) that provides the least possible physical alteration of the incoming light while simultaneously provoking the most acceptable, useful, developmentally desirable internal changes in processing and responding to input. If that doesn’t work, then I consider dialing things up a bit.

Bruce Wolff, OD

- Bruce Wolff believed it was our responsibility to determine the lenses that would support, enhance and/or lead the direction we wished the process to take with each person.
- Prescribe with the idea of guiding the person where you want them to go.
- Prescribe with the development of the visual process in mind.

Lenses are medicine.

Medicine n. 1. any substance, drug, or means used to cure disease or improve health.

Lenses change the instructions to the brain.

- To improve acuity
- To improve binocularity
- To improve spatial processing
- To reduce stress and promote positive change
Compensating Lenses & Refractive Error vs.
Therapeutic Lenses & Refractive Status

What's so great about 20/20?
or
The plight of refractively-challenged individuals

- My Story
- Sodium Pentothal for the refractively deranged
- My bicycle ride

What if...?

"...matter, even though it behaves, when you're looking at it, when you're measuring it, as individual particles, when you're not measuring it, matter is diffuse. It spreads out; it doesn't have a finite form in the universe...The Universe gives you what you are looking at when you look at it. When you are not looking at it, it's not necessarily there."

Rich Terrell, from the NASA Jet Propulsion Laboratory, California Institute of Technology

Prescribing based solely on acuity lacks imagination

Prescribing based solely on acuity has little to do with the person who will be wearing the lenses

The exam

- Autorefraction
  - what it tells us
  - what it doesn't tell us
- Retinoscopy
  - distance
  - near
  - stress point
- Eye movements
- Binocular testing
- Ranges
  - ductions
  - lens ranges
  - plus/minus
  - distance/near
- Analyzing/synthesizing findings
- Weighing visual needs
Patient education

Explaining differing philosophies
- the allopathic/medical model
- the behavioral/developmental model
- the visual process
- prescribing lenses
- using lenses
  - full-time wear
  - task-specific wear

What is myopia reduction?

- From what are we reducing it?
  - What was the old Rx?
  - Why was the old Rx?
- What are we reducing it to?
  - 20/20?
  - 20/40?
  - 20/Happy?
- Why are we changing measurements, processing or performance?
- Why are we reducing it?
  - Because it's fashionable?
  - Because it's there?
  - Because it's part of a bigger picture?

A good starting point?

Optimal acuity should be thought of as a result of a well-functioning visual process, not a prerequisite. I have found that vision therapy often leads to improved distance acuity. I think this is because the person becomes able to make better use of the available information as the visual process becomes more sophisticated and effective as a result of vision therapy and/or a more strategic, dynamic use of lenses.

Why bother?

- Myopia of “epidemic” proportions in parts of Asia (Rose, et al 2008)
- By 2020: projected 1.6-2.5B people w/ myopia (Holden, et al 2008)
- Myopia remains a major cause of blindness
- Prevalence of myopia in those 40 or older increased from 30.5% to 34.12% between 2000 and 2010 (3.7% increase) (Prevent Blindness America)
- Do you have any better ideas?

High definition lenses

- Super-ultra-maximum acuity
- Corneal aberrations
  - Analogous to micro-saccades?
- Limited wear time?
  - Unsustainable?
- Long-term side effects?
Etiology of Myopia

Genetic factors

How important is heredity?
How do genetic factors manifest?

Etiology of Myopia

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George K. Hung, Ph.D., Kenneth J. Ciuffreda, O.D., Ph.D., 2005
Constant Light Effect On Myopia: Incremental Retinal-Defocus Theory Predicts Experimental Effect of Constant Light on Myopic Progression

Environmental factors

Accommodative aspects
- Mark Rosenfeld 1994 Accommodation and myopia: are they really related?
- Goss DA, Rainey BR. 2009 Prospective Data from a Randomized Longitudinal Study of Accommodation and Convergence Training as a Potential Method of Myopia Cessation in Children

Binocular aspects
- Sympathetic/parasympathetic conflicts
- Sedentary lifestyle
- Importance of movement
- Diet
- Importance of distance viewing

Near point stress

Sudden-onset Myopia Reduction

Iatrogenic Myopia

Accommodative spasm treated as myopia
Prescribing minus lenses based on autorefraction
Improper use of minus lenses
Primary Care Optometry News
July 2011
Study: Overnight ortho-K in children significantly reduces peripheral myopia

“The 16 study children ranged in age from 11 years to 16 years (median age 12.7 years), and the range of myopia was -0.56 D to -3.94 D.”

Here are some more recent examples:

- Review Of Optometry - February 15, 2010: Bifocals Slow Myopia in Children
- Primary Care Optometry News - July 2011: Study: Overnight ortho-K in children significantly reduces peripheral myopia. By Helen A. Swarbrick, PhD, FAAO, Earl L. Smith III, OD, PhD
- Primary Care Optometry News - February 2012: Education level may influence myopia in adults: New data suggest that environmental factors can affect the degree of myopia. Li Deng, PhD
- Primary Care Optometry News - March 2012: Researchers work to address increasing incidence of myopia. Brien A. Holden, PhD, DSc, LOSc, Glenn More, global head of innovation at Alcon, Earl L. Smith III, OD, PhD, Helen A. Swarbrick, PhD, FAAO

The goal of Peripheral Defocus: “What we want is a lens that optimizes the image in the central retina, but then we want to incorporate power profiles in the periphery of the lens without compromising vision in the central retina.” Earl Smith

Are there any side effects?

MyoVista by Zeiss
A breakthrough spectacle lens that halts myopia progression by 20%

MyoStigmatism?
Here are some more recent examples:

- **Optometry Times - April 2012**: Contact lenses may be best bet for controlling progressive myopia. Compared with atropine drops, CL options - especially in children - may be most effective. By Cheryl Guttman Krader; reviewed by Jeff Walline, OD, PhD
- **Optometry Times - June 2012**: Study sheds new light on childhood myopia. By James Knaul; reviewed by Marc B. Taub, OD, MPH, PhD
- **Primary Care Optometry News - July 2012**: Study results suggest soft contacts should slow myopia progression. In turn, spectacle wear might be expected to exacerbate it, a researcher says. John Phillips, MCOptom, PhD
- **Optometry Times - August 2012**: Juvenile myopia reasonably predicted by one-time measurement of refractive error. By Cheryl Guttman Krader; reviewed by Karla Zadnik, OD, PhD
- **Optometry Times - August 2012**: Research suggests ways to slow myopia. By Jeffrey S. Eisenberg; reviewed by Jeffrey Cooper, OD, MS
- **Contact Lens Spectrum - October 2012**: Current and Future Developments in Myopia Control. By Jeffrey J. Walline, OD, PhD, FAAO


- **Spectacle Correction**
  - Bifocals and Multi-focal lenses
  - Under correction
- **Contact Lenses**
  - Single vision soft contact lenses
  - Multi-focal soft contact lenses
  - Orthokeratology
- **Atropine**

Some Random quotes...

The etiology, pathogenesis, and treatment of myopia have been debated for decades, and the exact mechanism of the development of myopia still remains unclear.

Angie and Wissman found that near work explained only a small part of the variance in teenagers, and thus concluded that genetics is the most important factor in determining the development of myopia.

Zylberman, while studying children in religious schools, noted that the incidence of myopia was much higher in Orthodox Jewish males who spent approximately 16 hours per day studying as compared to Jewish females who did not study as much.

Some Random quotes...

“If myopia is to be controlled during development, the rate of eye growth must be slowed. The rate of myopia progression is highest for young children with an average age for stabilization of childhood myopia at 16 years of age.”

Thank goodness the paragraph ended with:

“However, this does not completely explain the role of genetics since parents share both genetic and environmental factors with their offspring.” (Cooper, et al. AOA Journal online)
Suaad D.  
February 11, 2012

- 25 y.o.
- Frequent asthenopia/headaches
- Intermittent diplopia
- Frequent dry eyes
- Frequent red eyes
- Decreased DVA
- Discomfort at the computer

Pursuits: 100%
Saccades: 100% not always crisp
Z-axis: 100%
NPC: 11/18 16/17

Cover Test:
Distance: ortho
Near: exo

VA
OD  20/20-1
OS  20/30+1
20/25 OU

Retinoscopy:
Distance: +1.00 unsteady
Near: PL - 0.50 x 180
Stress Point Retinoscopy: 18/20”
  w/ +0.50 8-12”
NPC w/ +0.50 - 7/12 (x 2)

Maddox Rod (near)
<1 R hyper / 7-8 exo

Prism Bar Ranges
Distance: BO 10/12/6 BI 8/2
Near: BO 16/20/16 BI x/8/2

Treatment Plan
- Loaned +0.50 while having hers made
- Start vision therapy
  –Did one VT session
- Do something about punctal plugs
February 25, 2012

- Almost no eye fatigue
- No more headaches
- No more diplopia

March 19, 2012

(phone follow-up)

- Continued improvement
- Punctal plugs “fell out”
- No more dry eye

November 25, 2012

- Almost no eye fatigue
- No more headaches
- No more diplopia

Alaa G.

- wanted to stop/reverse myopia
- absolutely no other complaints

- First seen Jan 2011
  - 20/40- OU, OD, OS
  - CI
  - Poor Z-axis saccades
  - Reduced stress-point; improved w/ +0.50
  - 20/20 w/ -1.00
  - Rx’d +0.50 NVO

- Next seen Jan 2012 - using +0.50 consistently
  - 20/40- OU, 20/50 OD, OS
  - No CI, improved Z-axis saccades
  - 20/20 w/ -1.50
  - Rx’d VT

- Next seen Jan 2013 - using +0.50 consistently, started VT Jun 2013
  - 20/30 OU, OD, 20/40- OS
  - 20/20 w/ -1.00

Prevention

- Appropriate near lenses
- Appropriate other lenses
- Vision Therapy
- Visual hygiene
  - posture
  - working distance
  - lighting
  - taking breaks
  - sufficient outdoor time

My favorite VT procedures for reducing nearsightedness

- My standard VT program, including new R’s for distance and near
- Plus and minus lenses
  - Peg wheel
  - Kraskin’s Bifocal Rock sequence
- Yoked Prisms – walking rail, bean bags
- Walking Rail/Hart Chart
- Ball bounce/Hart Chart
Other cases...

- Steve G
- Tom K
- Elizabeth G

Compensation/remediation

Spectacles
- multi-focal lenses
- PALs
- flat top

Contact lenses
- ortho K
- ortho K + cross corneal linking
- RGPs
- multi-focals

Atropine
Refractive surgery

Compensation/remediation

I'll take VT and near lenses any day.

Those who say it cannot be done should not interrupt the person doing it.

Elbert Hubbard