Refraction: Basis of Diagnosis and Treatment

In the past or currently I have been a paid consultant for Alcon, Allergan, Visx, Essilor and B and L.

James D. Colgain, O.D.

The Eye Traumatic

What's the diagnosis for 95% of eye doctors?

Referral !

Optimizing Vision

Examples:
WAVE technology, AR, Aspheric Lenses
Treatment of Dry eye, Newest generation of IOLs, Thin & Lite, Precise optical measurements, Digital surfacing, Proper fitting and dispensing, Contact lenses, Biometry, Scleral Lenses

This part of the program starts at 5:00...

The Traumatic Eye

Sexy... but Uncommon
Anti Reflective Lens Treatment Enables

- 3% More light to the eye
- 5% More light to the eye
- 7% More light to the eye
- 10% More light to the eye

Oh yeah… and the Refraction ??

Name five ways to obtain objective information on the refraction?

What are some ways we Refract?

- Visual Acuity…..
- Retinoscopy
- Ophthalmoscopy
- Auto – Refraction
- Over-refraction
- Keratometry - Topography
- Wave Front Guided Refraction
- Change the position of glasses

Which window will your patient look through for the next two years…you choose…

The Satisfaction of Knowing
You are prescribing the Best Refractive Treatment

- The average lens RX provides 600 Days of visual correction
- Vision is the Window to the world of work, learning and recreation for your patient
- Which window will you choose for your patient?
- Does the “brand” matter?
- Optimized Vision may take more than one RX
Let’s Face it…
Lenses don’t get any Respect

Polycarbonate is:
• 3 x Stronger than CR-39
• 5 x Stronger than CR -39
• 10 x Stronger than CR - 39
• It was not on the test in Ophthalmic Optics

The 600 Day RX
It's OK to Recommend Lens Treatments

Lens Recommendation

Identify when the “Full” RX may not be the Best RX?
• Early Presbyopic Myope
• Spherically corrected CL wearer
• High Hyperope/ High astigmat
• Computer Vision Worker
• First RX

Yeah…
The REASON I am in the military so I don’t have to sell eyewear!

Common Errors in Prescribing
Optometric Management Dec 2002
• Did not communicate new technology
• Options not discussed, unless asked
• “One year” - follow up
• CVS not discussed
• Rarely discuss RX sunglasses
• Never discussed spare pair, fashionable frames… if no RX change
Why Refract a Patient?
Every day... All day....

• Determine whether they see 20/20
• Determine BSCVA
• Set a baseline of vision
• Determine etiology for decreased Vision
• Assure the patient has their best vision for daily tasks

I am not surprised “refractively when”

The First time myope
• Lower RX than UCVA
• Only fuzzy at night
• Mild complaints
• Has tried someone else’s glasses

The Early presbyope
• “No Problems”
• I just need more light doc
• Everything’s great except the little stuff
• I have a harder time focusing when looking up and down
• It’s fuzzier later in the day
• Yeah...but if I do like this it’s perfect.

Learning and Education

• How much to RX
• Better may be better than best?
• When were you first told you needed Glasses?
• Do you currently wear your glasses?
• An RX in the pocket is not worth anything
• Managing Patient’s expectations

We know they need new Glasses when....

• MVA or Vocation says they do?
• Current glasses: “Medicine does not work anymore”
• Can’t wear their contacts and now need glasses...it’s an emergency!
• Borrowed someone’s RX and saw better
• Can no longer perform their vocational or avocational tasks with clarity and comfort

Which is better, 1 or 2, might not be sexy but it’s critical to our patients

Some Stats

Military Individuals Wearing Glasses

45% of the UsAF is nearsighted
50% of the USA
46% of the USN
Which patient Group will have the largest growth in the next 10 years?

- 21 – 30 Yrs
- 30 – 45 Yrs
- 45 – 65 Yrs
- 65 – 85 Yrs

What’s Missing from this RX?

Dr. CT Optometrist

Fluoroquinolone

NOTE: This RX cannot be filled inside the US

There is no road map to care!

What’s Your RX?

Dr. CT Optometrist

+ 4.00 – 1.50 x 180
+ 3.75 – 1.00 x 180
+ 1.50 Add

NOTE: This RX cannot be filled inside the US

Without the complete RX There is no GPS to Lens Treatment!

TV Technology Advances

So does spectacle and refractive Technology

The Optometric Challenge

- Our success is based on meeting the needs of our patients
- Most patient needs will NOT be met by med/surgery
- The Family Eye Doctor embraces the routine but also diagnoses and cares or refers for the less common
Refractive Cases

Man with Gun wants his best performance
When refraction helps 20/15 UCVA

- 37 y.o. male Olympic Military marksman
- Having problems seeing the rear sight
- Eye Fatigue during competition
- Never wore glasses
- Will blue blockers or Shooting glasses help?

Man with Gun wants to enhance performance

- VA Distance 20/15 O.U.
- RX - +0.50 OU
- Final RX? If any?

Man with Gun wants to enhance performance

- + 0.75 Sph OD cyclo
- + 1.50 Sph OS cyclo
- Prescribed in the lane
- Used Trial frame
- Target slightly blurred
- Did not win the gold

Prescribing for the Patient’s Needs

Critical Near Vision Tasks in all directions at zero G
Fishing Editor and Polarized Lenses: No Fish Story!

Some Reflections Enhance our lives

Some Professions (Avocations) Require No Reflections

- Pastors/Rabbi
- Teachers
- Attorneys
- Computer workers
- Patient care professionals
- Others?

Glare, night driving can be difficult

- Glare increased by annoying reflections
- The dirty film inside the windshield
- Senile lens changes and increasingly miotic pupils cause less light to reach the visual system

Killer Refractions

OD: -0.25 -0.25 x 180

OS
Dry: +1.00-1.50 x 053
UCVA -20/25
Corrected Dry: 20/20 – Wet:
+2.75 – 3.25 x 053
20/20 –

UCVA – 20/20+

Killer Refractions

OD: Auto-refraction: OS: Auto-refraction
+0.25 - 3.75 x 180 +0.50 – 4.00 x 178
UCVA – 20/25 UCVA: 20/25 –
Killer Refractions

OD: Manifest
+5.25 – 0.50 x 180
UCVA – 20/70
Cylo +8.00 – 0.50 x 180

OS: Manifest
+5.50 – 0.75 x 180
UCVA: 20/70
Cylo +8.25 -0.75 x 180

Visual Complaints

-1.00 Sphere
I am blind without my glasses or contacts

-2.50 Sphere
It's blurry at night, when driving...I think I need glasses....because my friend’s RX....

-3.00 Sphere
It's clearer without my glasses

My Left eye is Blind

- OD
  20/20
  +0.75 SPH

- OS
  LP
  NO Reflex

- Auto-refraction: OD +0.25
  OS – No reading

- Dilated
  OD NL
  OS – Laquer Cracks

- Retinoscopy + 1.25
  OS – No Reflex

Have you ever Been able to see with that Eye ?

NO

Light perception and Projection

Your diagnosis...

Auto-Refraction: No Reading
Keratometry: Same as OD
Pupil Reaction: Sluggish, NO APD
Colors: Able to appreciate OU
Retinoscopy: Reflex Brighter on - 9.00

Options….DDX

Trust your Gut !
Everyone looked at the Right eye

Patient was:  - 19.00 -1.75 x 180

Vision Was 20/70 with Refraction
Contact lenses brought him to 20/50
He was happy to know he had a “spare”

Posterior Staphyloma

Posterior staphyloma
Ectasia of the contents of the posterior pole
High myopia

Pathologic Myopia:
Axial Elongation of the Globe

Thinning of retinal layers
Fovea
Posterior staphyloma

High Myope and Staphyloma OU

What (seems) to Delay Presbyopia?

- Myopia
- Unilateral Myopia
- Uncorrected astigmatism
- Small Pupils
- Less near demands
- The computer further away with larger font type
- Wal-Mart’s OTC Readers

Point # 1
“They Don’t Understand”

52 y/o Attorney
47 y/o Wind-surf er
48 y/o accountant
55 y/o Optometrist
Listen to the Patient

Because of varying cockpit panel distance, not all 45-year-old aviators will need a spectacle prescription to fly. But by age 50, almost all pilots and others will need a visual aid for near especially during night flying.

Pilot’s Complaint with New Glasses
“I can’t see my Gauges with these Sunglasses”

What about Double D Lenses?

When 20/20 is not enough
Even at Near!

Near tasks
Marksmanship
Critical Night vision

Presbyopes: Too much Plus?

- 51 y.o. male has been using OTC Readers
- 6’ 4” Sales person
- Distance vision now a little fuzzy
- VA: 20/25 OD + 1.25 - 0.25 x 180
  20/30 OS + 1.75 - 0.50 x 180
- Current RX + 1.50 OTC Readers
- What’s your RX

Some Patients need improvement: Not Perfection:
44 yo…“Mild strain at near but I don’t need reading glasses”

Cycloplegic:
+ 2.25 Sph
+ 2.50 Sph

Dry Refraction:
+1.00
+1.25
Presbyopic Choices

- Questions:
  - How much does distance bother him?
  - Is the main issue RX at near?
  - What is his interest in Progressive Lenses

- Final RX? Options?
- Future RX

45 y.o. Pilot USAF

Symptoms:

Sometimes it’s easier to see at distance and sometimes easier to see at near...

Now I can Read, Now I can’t...

I am really tired after reading but other times I can read with ease?

Refraction: Plano OD -0.25 OS
VA 20/15 20/20-

Are you on any Medications
Anything unusual happening with your body?

Lost some weight in the last 2 months... and I needed to lose weight
Fatigue, and I can’t hold my water...
LTC Syndrome?
**Diabetic**

BS Reading  Over 400  
Refractions  +1.00 to – 1.00 RX  
Hospitalized to stabilize on insulin, HbA1c

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**What’s Important and What’s Important**

68 y.o. male with ARMD followed by Prestigious Ophthalmology University eye hospital – TX for ARMD

VA cc :  
20/70 OD  
20/80 OS  
Refraction:  +3.00 + 1.75 x 090  
+2.50 + 2.25 x 075

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**Other factors**

Trace PSC – 2+ NS O.U. and cortical Cataracts  
Otherwise normal eye health exam  
Killer Refraction: For Doctor and Patient  
Refraction:  +1.75 + 1.50 x 075  20/30  
+1.25 + 2.50 x 085  20/40

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**So I have “Stigmatism”?**

- Common Description  
  - Cornea shaped like a football  
  - Cornea shaped like a spoon  
  - Different RX North and South  
  - Most people have astigmatism  
  - Two different focal points.....

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**Determining Astigmatism?**

- Patient squints and see’s better  
- Yes...the Retinoscope still works  
- Auto-Refration, Auto Keratometry  
- Wave-front Abberometer  
- Using the Twist and Turn technique  
- Topography

- RX to provide to patient with 2.5 D of Astigmatism
Oblique Astigmatism

With the Rule Astigmatism

What is the diagnosis?

• 34 y.o. Male – Tom
• Routine Evaluation
• Never had great vision
  \( +4.00 - 4.50 \times 038 \) 20/40 o.u.
• I don’t drive at night anymore- my vision at night is “shitty”
• Glasses are 5 years old
• Last doctor drew some pictures
• Transition from light to dark environments

What is the diagnosis?

• No cataracts
• CCT 546
• Cylinder on the cornea
• Normal pupillary reflexes
• No family HX of eye problems
RP
- Pale “waxy” disc
- Attenuated vessels
- Bone spicules & PSC’s
- 1.8% of “Blind people”

Retinitis Pigmentosa
1. Inheritance
   - Sporadic (23%)
   - Dominant (43%)
   - Recessive (20%)
   - X-linked recessive (8%)
   - Uncertain (6%)
2. Presents - usually prior to 30 years
3. Prognosis - dominant worst, x-linked best
4. ERG - Reduced 100% of the time in infancy

34 yo Helicopter Pilot
Recent recognition by spouse of decreased night vision awareness
Strong FM HX of RP
Not dilated for 14 years

What disease is demonstrated here?
- Chorioretinitis

I am not surprised “refractively when”
The Low myope/high astigmat
- Has much more cylinder
- Has much less “minus”
- More cylinder does not make them much clearer
- Is there refractive amblyopia

The Hyperope – and young
- “No Problems”
- Cyclo only shows you the future and helps you design the path
- Manifest – less -0.25
- Is there a problem here?
- Help to predict the future correct the present
- Consider CL’s?

Acute Hyperopia?
- Dilated and Cyclo-plegic Refraction
- Advantage of past medical record
**Fluorescein Stages**

- Choroidal Flush
- Arteriolar Phase
- Arteriovenous Phase
- Venous Phase
- Late Phase

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**Central serous retinopathy (CSR)**

- Self-limiting disease of young or middle-aged men
- Usually unilateral
- Localized, shallow detachment of sensory retina at posterior pole
- Often outlined by glistening reflex

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**FA of central serous retinopathy (1)**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early hyperfluorescent spot</td>
<td>Late dye passage into subretinal space and vertical ascent</td>
</tr>
<tr>
<td></td>
<td>Subsequent lateral spread until entire area filled</td>
</tr>
</tbody>
</table>

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**FA of central serous retinopathy (2)**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early hyperfluorescent spot</td>
<td>Ink-blot appearance - less common</td>
</tr>
<tr>
<td></td>
<td>Subsequent concentric spread until entire area filled</td>
</tr>
</tbody>
</table>

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**Treatment of central serous retinopathy**

Most cases are self-limiting and do not require treatment

- Laser photocoagulation to RPE leak

- 4 months should elapse before considering treatment
- Treatment induces resolution and lowers recurrence rate
- Does not influence final visual outcome

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**42 y.o. female with gradually decreasing vision OD**

- Refractive error changed from –1.25 to +2.00, BSCVA 20/30 OD... can’t read at near..
- EOM’s intact
- 1+ APD OD, Normal disc and SVP
- This is what I saw (Choroidal Folds)
- 10% Red De-saturation OD (Red Cap Test)
What’s Wrong Here?

### Causes of Choroidal folds

<table>
<thead>
<tr>
<th>Bilateral in hypermetropic patients</th>
<th>Orbital mass</th>
<th>Thyroid ophthalmopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choroidal tumour</td>
<td>Posterior uveitis</td>
<td>Severe uveal hypotony</td>
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### Acquired Hyperopia?

**Retinal folds**

Acquired hyperopia from choroidal folds, secondary to an orbital tumor with early Papilledema

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### Visual Correction’s Holy Grail

**Improved Quality of Vision**

- Easy adaptation
- Improved vision quality
- Improved comfort
- Satisfied patients

### The OD’s Dilemma:
**Will My Patients Like the New Lens?**

**Hopes**

- Easy adaptation
- Improved vision quality
- Improved comfort
- Satisfied patients

**Fears**

- Difficult adaptation
- Little improvement
- Old lens was good enough
- Dissatisfied patients
The Ophthalmic Team & The Hand-Off

Transfer authority... introduce your lens expert to the patient.
Continuing the eye exam process.
Reduces walking prescriptions.

Lowest Price Guarantee!

Trust