Stress is the physical and psychological effects we experience as a result of the way we react to changes in the surrounding environment. ~ Pavel Stoyanov
1980: Computers become mainstream
1997: Backlight LED screens enter
Viewing distance of 2-4 feet
This new demand on the eyes leads to a new syndrome:
“Computer Vision Syndrome”
The Smart Phone – Our Personal Device

- July 2007: First iPhone released
- A personal media device
- Held at 8-14 inch from eyes
- Backlit display
- Gaming, Texting, Tweeting
- Surfing, E-mailing.
- Apps for everything!
- 75% of Americans own a Smartphone
The Tablet Revolution

- April 2010: First iPad released
- A family portable computer
- Held at 12-18 inched from eyes
- Backlit display
- Moving into schools
- Outselling computers
- Same apps as the Smartphones
- Easier to read than an iPhone
- 45% of Americans own a tablet
Rapid & Unprecedented Adoption and Growth of Technology

Global Internet Device Sales

BI INTELLIGENCE

Units 1,500,000,000

Source: Gartner, IDC, Strategy Analytics, company filings, BI Intelligence estimates
**SIMULTANEOUS USAGE INSIGHTS**

**Tablets and TV**
- **Skews Older**
  - Age groups 25-34 and 55-64 are the most likely to use their tablets multiple times per day while watching TV.
- **TYPICAL ACTIVITIES**
  - **Seeking Information**
    - 36% of people 35-54 and 44% of people 55-64 use their tablets to dive deeper into the TV program they are currently watching.
  - **Surfing and e-Mailing**
    - 55-64 are the heaviest web surfers and email checkers on tablets during commercial breaks and programs.
  - **Sport Scores**
    - Nearly a third of all tablet users aged 25-64 check sports scores on their tablets while watching TV.
- **85%** of tablet/smartphone owners use their device while watching TV at least once a month with 40% of them doing it daily.

**Smartphones and TV**
- **Skews Younger**
  - Nearly half of 18-24 year olds use their smartphones while watching TV at least once per day.
- **TYPICAL ACTIVITIES**
  - **Social Media**
    - 44% of 18-24 year olds and close to 50% of 25-34 year olds are visiting social networking sites on their smartphones during both commercials and programs while watching TV.
  - **e-Mailing**
    - is the heaviest simultaneous smartphone activity across all demos, with over 50% of users checking during commercials and programs.
  - **Shopping**
    - 29% of 25-34 year olds shop on their smartphones while watching TV.

Source: Nielsen
The Balancing Act!

Short people (KIDS) have short arms and hold things closer to their eyes!

Tablets are moving into schools, as 25% of students using a tablet daily.

40% of college students are using tablets as their main computer.

Older people have less accommodation and want a further distance to their eyes.

Older adults (>60 y.o) find reading on a tablet easier than reading on paper.

40% of tablet users are 35 to 65 years old.

45% of the US population has a tablet and 75% have smartphones.

Tablets are the Future Desktops and Smartphones are the Future Laptops
The New World of Digital Eye Strain

• The closer we view an object, the more we have to accommodate
• We can not lock our focus on a back lit screen
• Our eye searches for a point of focus
• The longer we spend using backlit devices, the more fatigued our accommodation system becomes

The closer we are to these devices, the more stressed out our eye’s become!
Symptoms of Digital Eye Strain

• Fluctuation in Vision
• Tired Eyes
• Headaches
• Overall Body Fatigue
• Decreased Concentration
• Decreased Night Vision
• Dry Eyes
• Light Sensitivity
• Rubbing of Eyes
Sync

Not a solution looking for a problem…

Real physiological problems, Sync is a solutions

It is a big market and getting bigger

Can’t get Sync on the Internet or at big boxes

Differentiate your brand
Easy to share patient benefits
• Edge to edge distance clarity
• Radial + vertical aspherizing
• ‘Pop’ of plus.
• No corridor, no distortions
• Edge to edge distance and near powers

Hoya Sync 8
+0.88D

Hoya Sync 5
+0.55D
Relaxing the Refraction:
Blur +2.00, when the 20/50 line can be read, add retinoscopy lens for 3-5 seconds, remove retinoscopy lens and continue alternating adding minus with relaxation of retinoscopy lens.

Use single vision relaxing lenses:

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<th>Brand</th>
<th>Model</th>
<th>Power</th>
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</thead>
<tbody>
<tr>
<td>Hoya</td>
<td>Sync 8</td>
<td>+0.88D</td>
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<tr>
<td>Hoya</td>
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</tr>
<tr>
<td>Essilor</td>
<td>Anti-fatigue</td>
<td>+0.60D</td>
</tr>
</tbody>
</table>

Focus on the patients symptoms, digital device use and hobbies. Prescribe to relax, overminusing in this new world of digital devices will only cause more visual stress!
What Doctors Need to Understand

• Our visual demands are shifting!
• With the advent of these new backlit devices held at such close distance to our eyes, we are elevating “Computer Vision Syndrome” to a new level for the eyes.
• Doctors need to know the frequency of their patients digital device use.
• Being aware of the key symptoms of Digital Eye Strain.
What Doctors Should ASK

• How many hours of sleep do you get on average?______
• Do you have a hard time falling asleep at night?_______
• Do you use a: Smartphone______, Tablet (iPad or Android)_______ or e-Reader______.
• How many hours spent daily viewing a Smartphone or Tablet?______. e-Reader?_______. (Distance 12-24 inches)
• How many hours a day do you spend viewing a computer screen?______. (18-36 inches away)
• Do you alternate focus between distances? If so, what do you alternate between?
  • TV & Smartphone?______, TV & Tablet?______, TV & e-Reader______
  • Computer & Smartphone?______ Computer & Tablet?______
  • Other?___________________________________________________
• Hobbies?_________________________________________________
The Free Form Lens Product Choices

- **Sync** - Accommodative relaxing lens with +.88D and +.55D choices. Edge to edge clarity. Prefect for the accommodative stressed from 8-38 y.o.

- **Lifestyle 2 Clarity** - Customized progressive with minimal distance vision distortion. Perfect for young, active presbyopes needing a progressive.

- **Lifestyle 2 Harmony** - Customized progressive with fantastic vision at all viewing distances. Perfect for the mature presbyope with heavy near demands.

- **MyStyle** - The only true personalized lens that take into account the wearing parameters, lifestyle activities, previous lens worn and prescription success. Perfectly personalized on both surfaces of the lens.
• Use the 20/20/20 Rule
• Physically remember to blink more often.
• Adjust lighting to reduce reflections and glare.
• Take breaks more often from digital devices.
HOYA is all about Light
Misconceptions on Light

Which light is most harmful to the eye?

UV Light?  Visible Light?

Which type of light is more likely to cause BLINDNESS?
The Electromagnetic Spectrum
In reality, rarely do any of these lead to blindness in the United States...

UV light causes:

- Cancers of ocular adnexa
- Pterygia
- Pinguecula
- Photokeratitis
- Cataract

In fact, the cornea and lens block UV light, only visible light is incident on the retina

Ocular UV Protection
sunlight, artificial light sources

- UV-C (100-280 nm) (blocked by atmosphere)
- UV-B (280-315 nm)
- UV-A (315-400)

- UV radiation below 295 nm blocked by cornea
- UV radiation below 400 nm blocked by lens

- very young human lens transmits small window of UV at 320 nm
- mature lens (age?) only visible light, above 400 nm reaches the retina

In general, UV light does not cause retinal damage, i.e. AMD
High Energy Visible (HEV) Light

- Scatter, haze
- Associated with AMD
- Sleep patterns/Circadian rhythm

Blue Light
400 - 500 nm
Glare and Haze

Frequency Dependent
Visual Performance

Light

Chromatic Aberration

550nm
640nm
460nm
No Blue Photoreceptors in the Fovea

~ 65%
~ 33%
~ 2%
Chromatic Aberration Effects on Vision

Visual Acuity

Glare

Contrast Sensitivity

Blue Light Hazard and AMD

Cumulative Lifetime Exposure
Age Related Macular Degeneration (AMD)

- Genetic in nature
- Diet dependent
- Supplements are important
- Smokers are at greater risk
- HEV light accumulation is a factor
HEV Light and AMD

There is a growing body of evidence that cumulative lifetime exposure to visible light, in particular blue wavelength light, increases the risk of AMD.
Blue Light >> Photo-oxidation >> Lipofuscin >> Drusen
Where Does Blue Light Come From?

- The sun!
- LED back lit screens (smartphones, tablets, computer screens)
- OLED screens
- CFL bulbs
- Fluorescent bulbs
- LED bulbs
2014: More Mobile Connected Devices than People
LIGHT EMITTING DIODE (LED)

- Associated with AMD
- Melatonin suppression/Circadian rhythm

Spectra from Common Sources of Visible Light
Who Is at the Greatest Risk of the Blue Light Hazard?

- Short arms, holding digital devices close to eyes
- Large pupils, allowing more light to enter the eyes
- Very clear, pristine lenses to allow light to enter at full strength

Our Youth!

Kids 8-18 years old are spending 7.5 hrs. a day viewing LED back lit screens!
Aging Eyes:

*Nature’s Wisdom*

- Age leads to brunescence or yellowing of our natural lens, absorbing blue light
- Smaller pupil sizes let less light into the eye
- Further viewing distances, reducing the photon radiation to the eye
Ocular Lens Pigment

The human lens contains the chromophore 3-OH-Kynurenine that absorbs UV-B and UV-A protecting the retina (GOOD) but allows HEV light to pass through (BAD) as it is normally transparent until ~ age 40…

Light $\rightarrow$ oxidative polymerization $\rightarrow$ 3-OH-Kynurenine $\rightarrow$ OLP

OLP forms after the retina has been exposed to damaging Blue Light from childhood through early adult life

“When patients develop cataracts, the development of brunescence is a slow, multi-decade process that allows for chronic blue light exposure that results in irreversible cumulative damage, that leads to the progression and development of macular degeneration” – Michael Tolentino, MD
What are the Long Term Effects of These New Light Sources?

WE DON’T KNOW!
What Can We Do to Help?

A great first line defensive measure to help reduce HEV lights long term effects
Most Complete Protection Available

- Contains OLP to provide selective wavelength filtration
- Filters harmful blue light without affecting color perception
- Combats blue light hazard indoors and out

BluTech Lenses

Incandescent

Fluorescent / LED

HOYA
The Blue Light Hazard & Our Circadian Rhythm

Light ALL Night
“Just as the ear has two functions (hearing and balance) so too does the eye”

• First, rods and cones enable sight
• Second, photosensitive retinal ganglion cells containing the photopigment melanopsin enables photic resetting of the circadian clock
The Circadian Rhythms

For Millennia We Have Had The Same Sleep Pattern
Blue Light Dangers – 459-484 nm
HEV Light and Melatonin Suppression

Scatter, haze

Associated with AMD

Sleep patterns/Circadian rhythm

Blue Light
400 - 500 nm
In Just the Last 8 Years!!
New light sources have entered our world
Disruption of Our Circadian Rhythm Effects

- Reduced immune responses
- Obesity- diabetes & heart disease
- Depression and mood changes
- Slower thinking
- Impulsivity
- Greater risk of cancer
Our Youth are at Great Risk

- Daytime somnolence
- Impaired memory & concentration
- Impaired motor skills
- Poor academic performance
- Mood disturbances (mood lability, poor emotional control, irritability)
- Disruptive behavior (aggressiveness, impulsivity, hyperactivity)
Introducing...........

**RECHARG**

A *preventative* lens treatment

**Blutech Lenses**

A *preventative* lens material
Glare and Haze

- **RECHARG** reflects blue light using Anti-Reflective Technology enhancing clarity and contrast

- **Blutech Lenses** filters blue light using Ocular Lens Pigment (OLP) enhancing clarity and contrast
Why is RECHARGE such an Important Product?

- It reduces haze and glare
- It improves contrast and clarity
- It reduces HEV light from entering the eye, slowing the long term effects of HEV light
- It’s main focus is on the 430-450nm wavelengths, reflecting 10% of the damaging rays
- It has the same significant benefits that EX3 has as an anti-reflection coating
- It adds relaxation to the focusing system, allowing greater comfort on digital devices
Other Important Factors:

- Lens materials will absorb an additional 20% of the HEV light
- Perfect coating for digital eye strain and computer vision syndrome patients
- Enhancing AR for sunglasses, improving contrast
- Will not affect the circadian rhythm
- Our youth are at greatest risk of HEV light
1. **Post Cataract Patients:**
   - Ocular Lens Pigment removed with surgery
   - Protection back to the state of a “child”

2. **Patients with AMD or High Risk:**
   - Family History of AMD
   - Low MPOD
   - Smokers
   - High BMI
   - Light complexion

3. **Children under age 18:**
   - No Ocular Lens Pigment
   - No Blue Light Protection
   - Limited UV Protection
Blutech Lenses

2 Lenses in 1
- Blocks UV / Filters Blue **without** altering color perception

Protection Built “Inside the lens”
- OLP infused in lens Monomer

Unique **High Impact** Lens material with **ANSI Safety Approval**
- 60% Better Visual Clarity Than Polycarbonate (46 abbe)
- Indoor: Electronic device usage, Fluorescent light (CFL) exposure
- Outdoor: Polarized, yet maintain electronic screen visibility

Availability:
- Plano
- Single Vision Finished, Semi-finished
- FT 28
- Digital Back surface progressives
The only Trusted Partner who empowers independent Optometrists through science, technology, and innovation