



# Blue Light and Digital Eye Strain

Educating Patients and Providing Solutions

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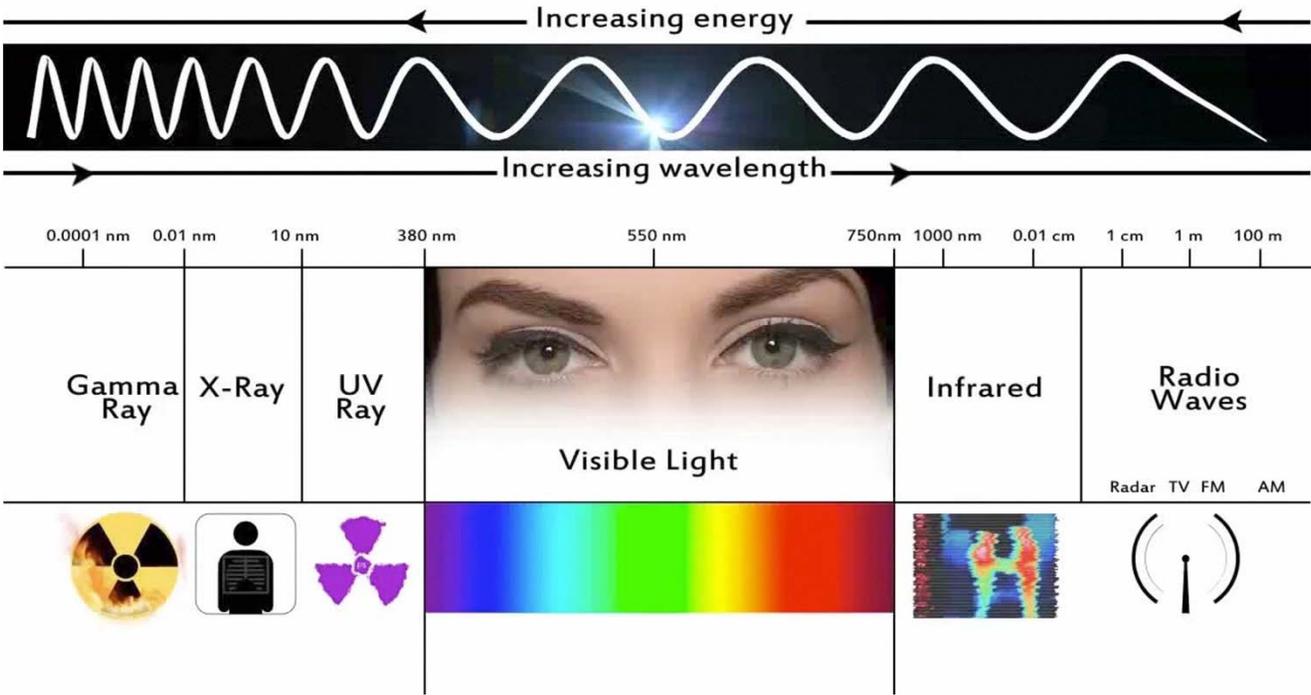
# *Dangers of Blue Light*

- ▶ *Dangers of blue light*
  - ✓ *Ocular discomfort*
  - ✓ *Interruption of sleep patterns and circadian rhythms*
  - ✓ *Link between blue light exposure and macular degeneration*
- ▶ *Increased prevalence of blue light*
- ▶ *Solutions for Protection*



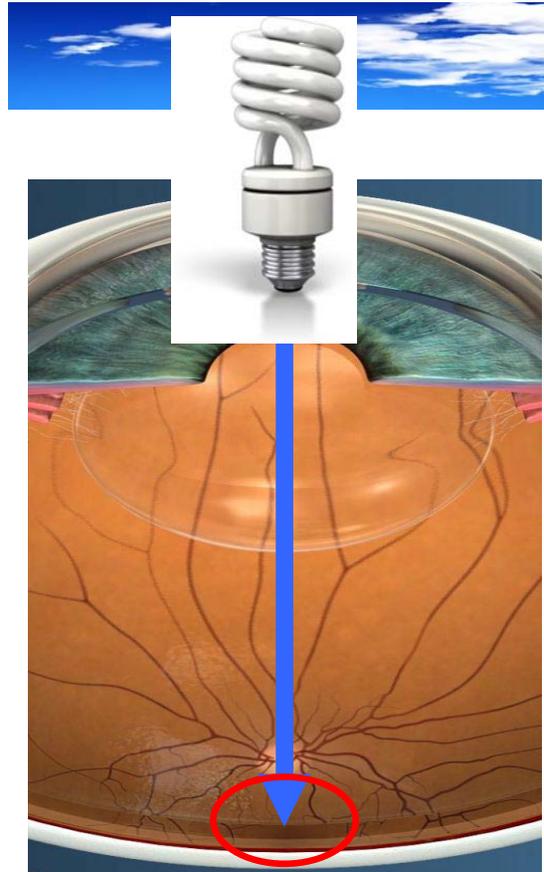
# What Is Blue Light?

Visible Light Spectrum 390 nm to 750 nm



Blue Light  
380 nm - 500 nm  
High Energy Visible  
HEV

# Blue Light is All Around Us

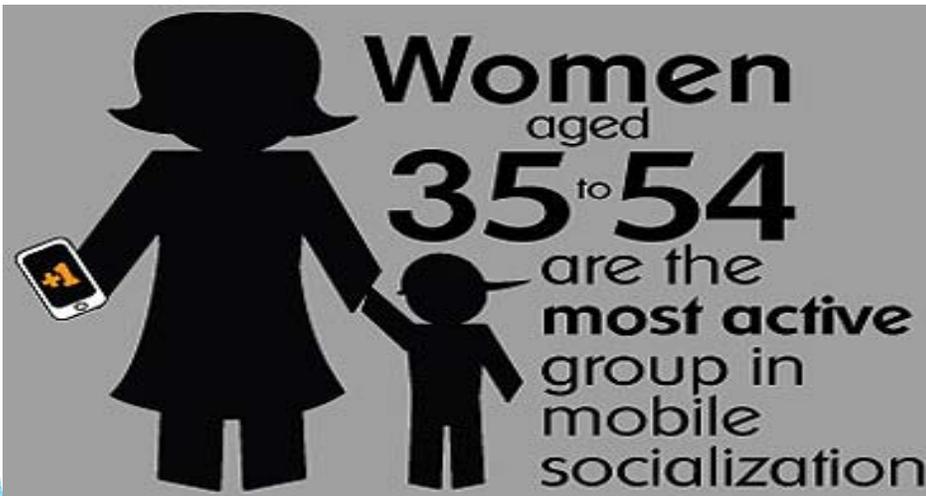
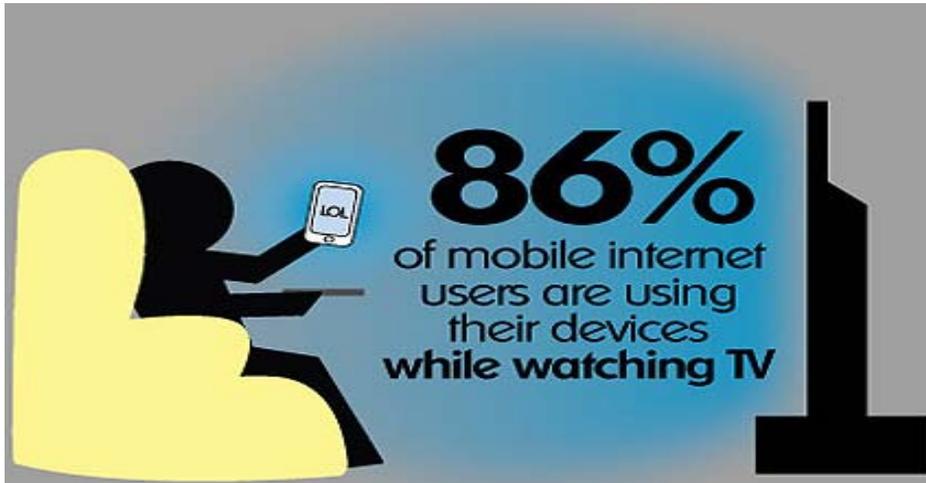


# The Tablet Revolution

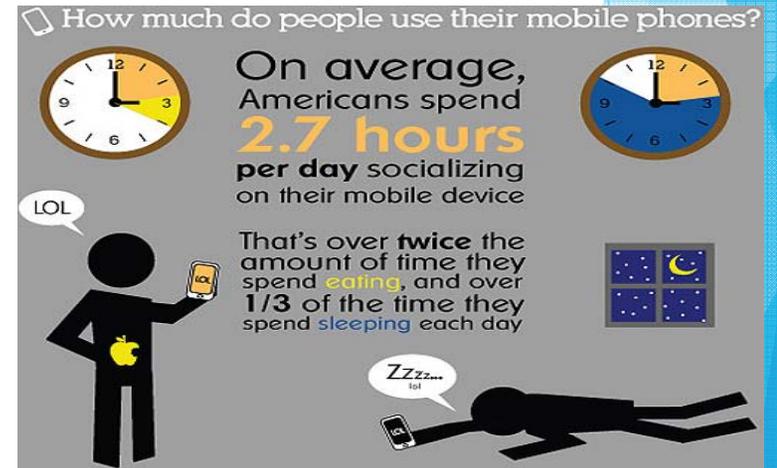
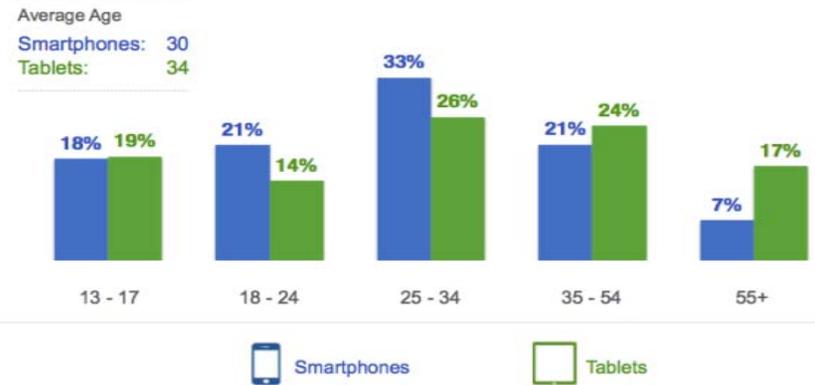
- ▶ April 2010: First iPad released
- ▶ A family portable computer
- ▶ Held at 12-24 inches from eyes
- ▶ Backlit display
- ▶ Moving into schools
- ▶ Outselling computers
- ▶ Same apps as the Smartphones
- ▶ Easier to read on than iPhone
- ▶ 35% of Americans own a tablet



# Digital Usage

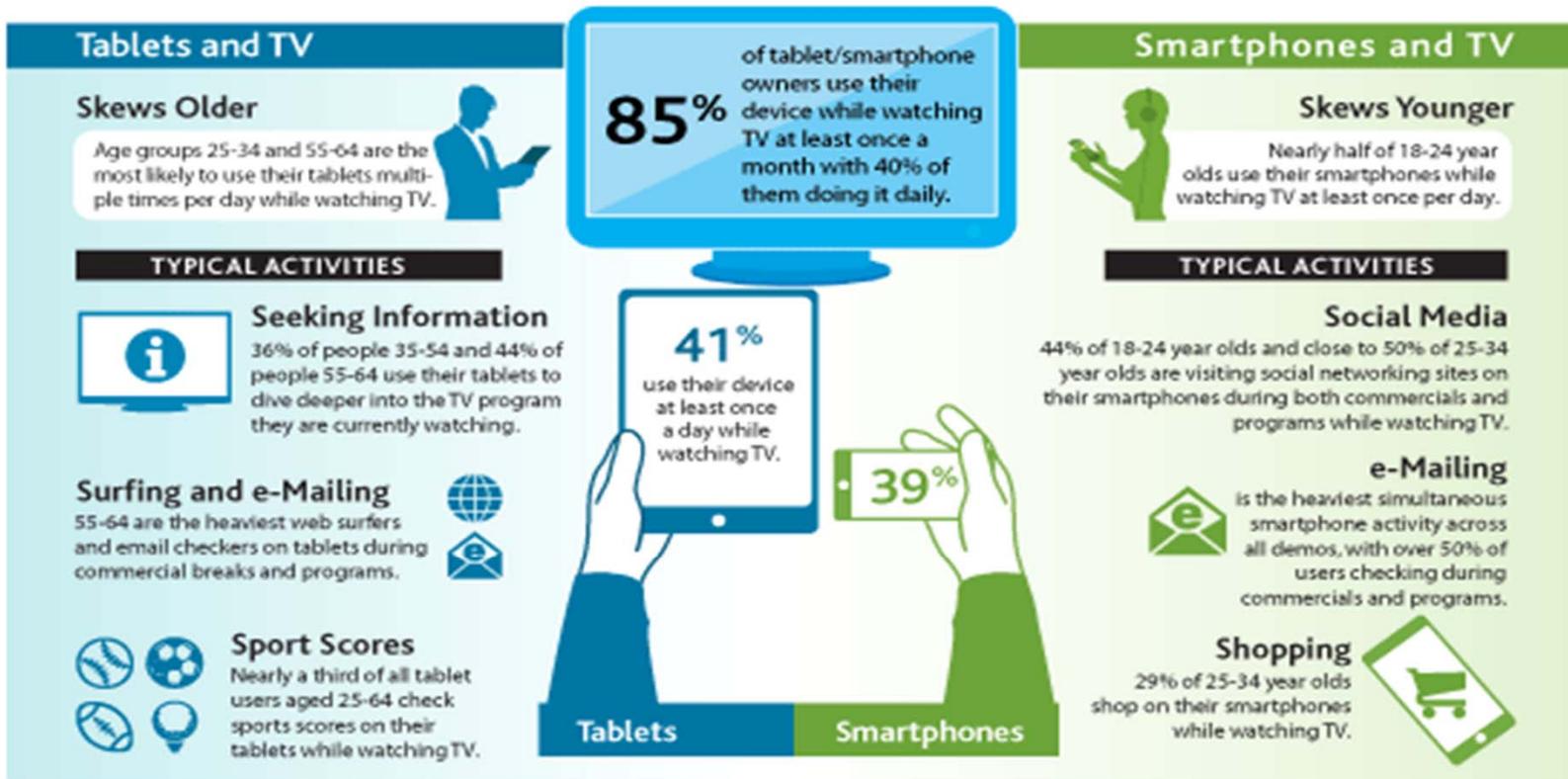


Age Distribution, Smartphones versus Tablets



# The Age of Digital Devices

## SIMULTANEOUS USAGE INSIGHTS



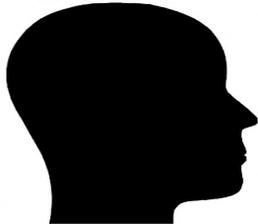
Source: Nielsen

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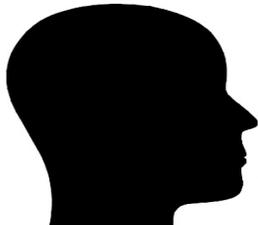
# Typical Viewing Distances for New Media Devices



2 to 4 ft



12 to 24 in



12 to 18 in



**As the day progresses..we actually move closer to the back lit devices**

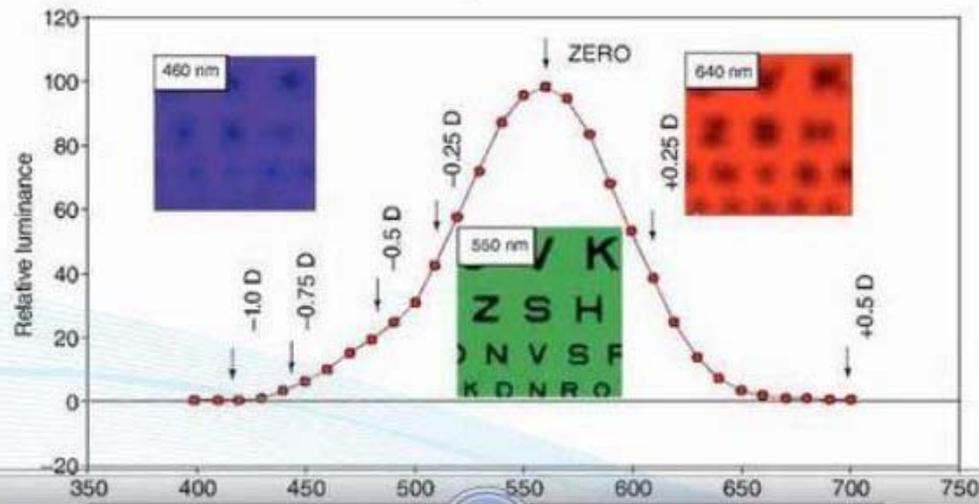
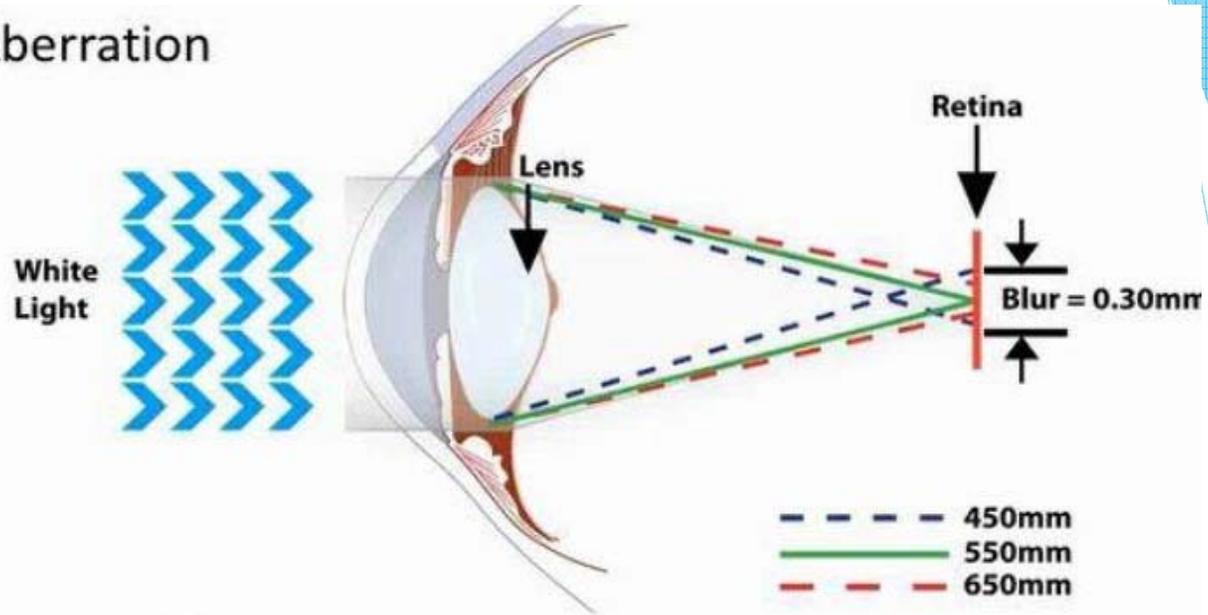
**because our focusing system begins to 'lock-up'...bringing the device closer in order to keep the muscle in focus..... In turn, adding even more stress!**

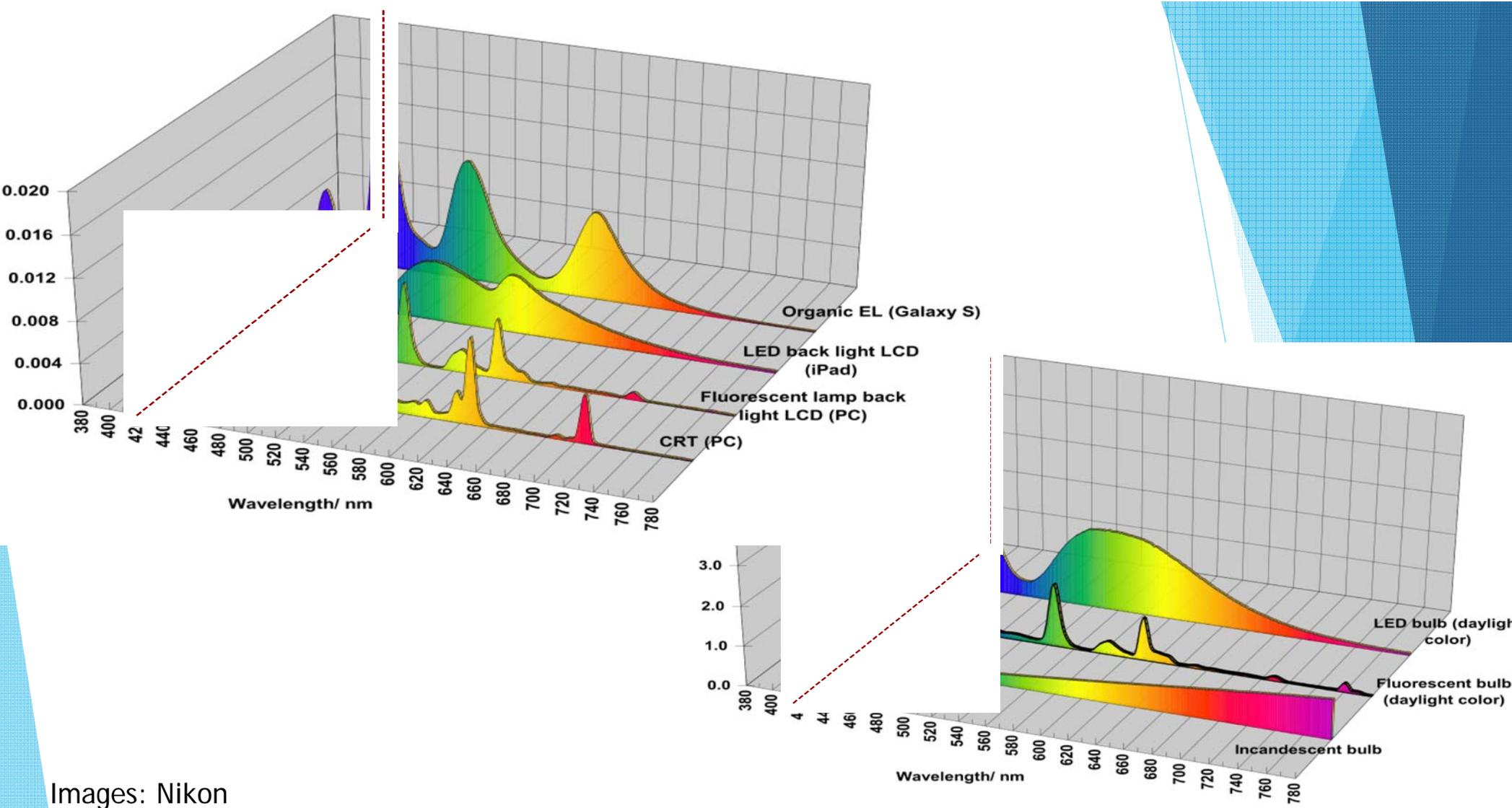
# Effects of Chromatic Aberration

- ▶ **When light from a small white object is refracted by a prism, it is dispersed into its monochromatic constituents, the blue wavelengths being deviated more than the red**
- ▶ **To an eye viewing through the prism, the image of the object appears fringed with blue on the apex side of the prism**



# Chromatic Aberration

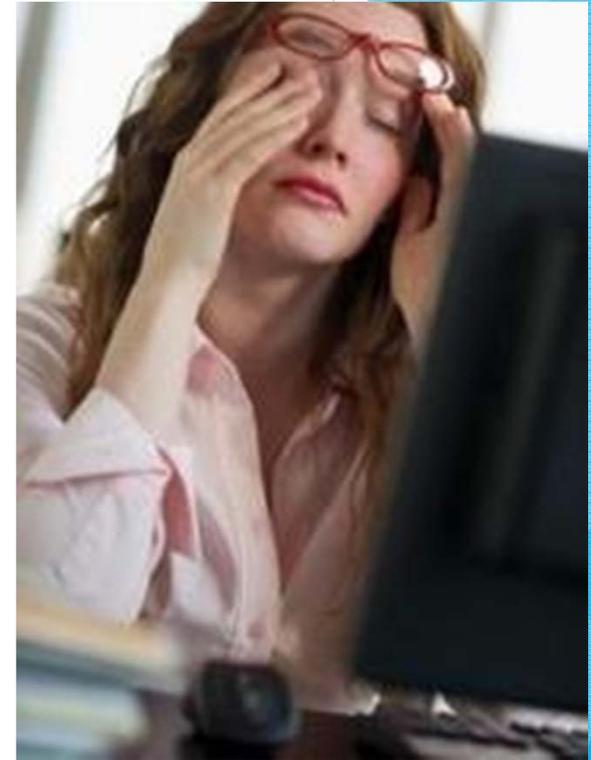




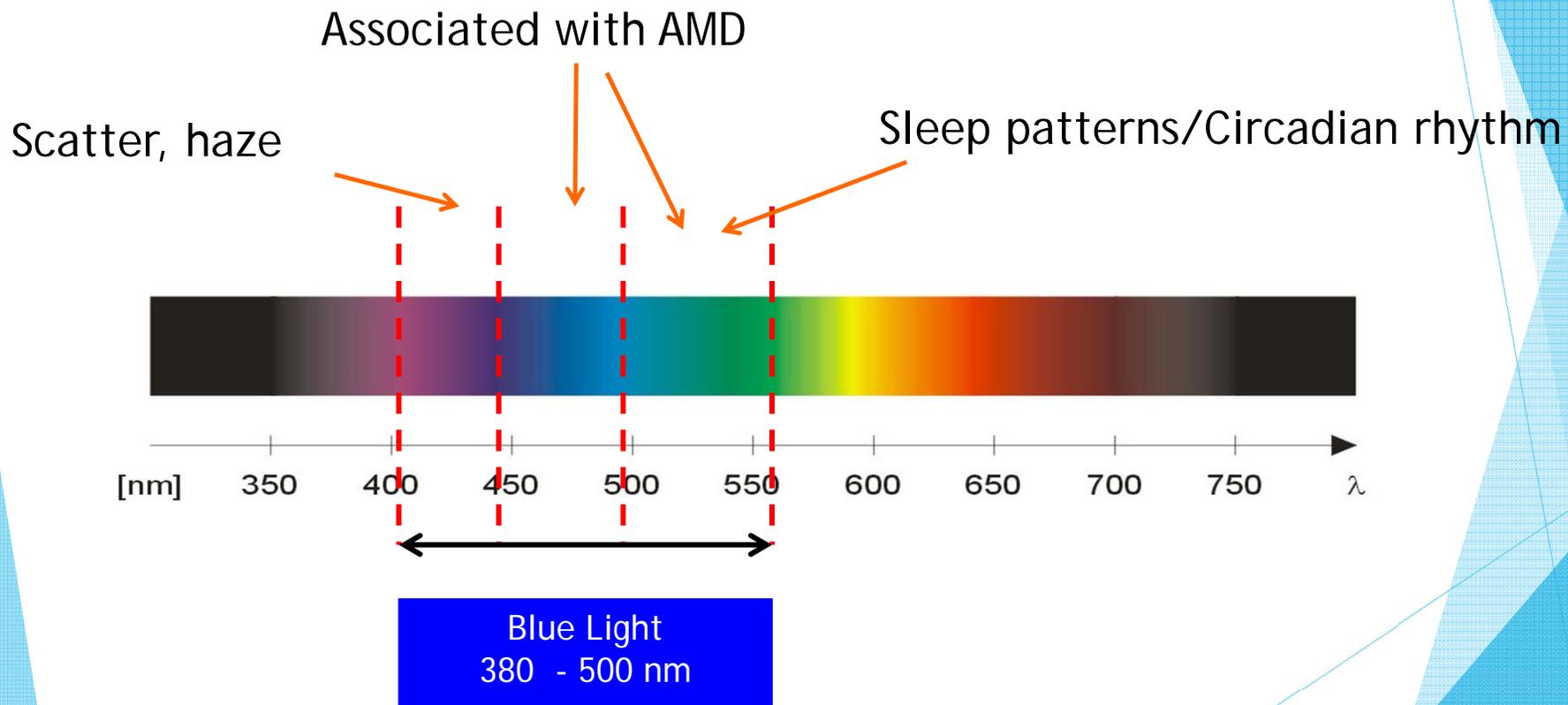
Images: Nikon  
 Courtesy of Mark Mattison-Shupnick

## Our Eyes and Digital Devices

- ▶ Our eyes can properly focus on images and print on back-lit digital devices.
- ▶ The closer an object, the more the eye has to focus or accommodate.
- ▶ When we view a backlit surface, our eyes try to focus on the screen, fluctuating focus behind and in front of the plane of light.
- ▶ The focusing muscle fatigues, trying to find where in space to lock focus on.
- ▶ Over time the focusing muscle spasms and ocular symptoms begin.



# “Bad blue/good blue” light radiation



Adapted from Mark Mattison-Shupnick

# Blue Light

- ▶ Some blue light is necessary
  - ▶ Sleep patterns
  - ▶ Melatonin regulation
  - ▶ Pupillary light reflex
  - ▶ Mood
  - ▶ Memory



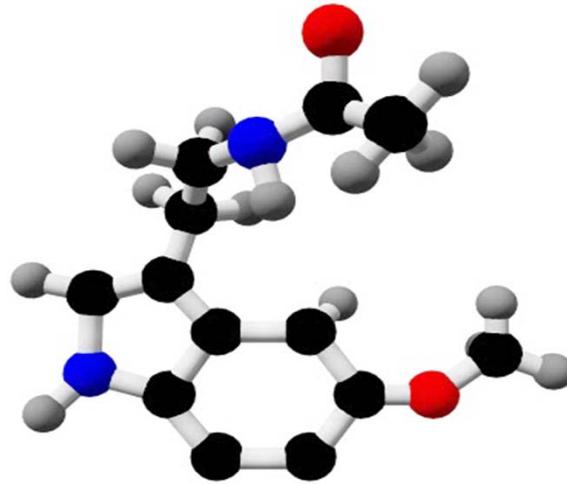
## Blue light and Melatonin

- ▶ Blue light suppresses Melatonin production, which is important to the sleep cycle
- ▶ Night time viewing of back lit devices stimulate the brain to stay awake and not prepare for sleep
- ▶ Over time, prolonged amounts of artificial Blue light can have effects on the immune system

# Circadian Sleep Patterns



Blue Light



Melatonin



Sleep Pattern

What is the link?

## How it works



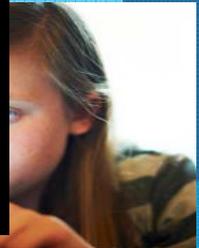
When blue light is present...



## Sleep Patterns in Turmoil?



Night time viewing of back lit devices stimulates the brain to stay awake and not prepare for sleep



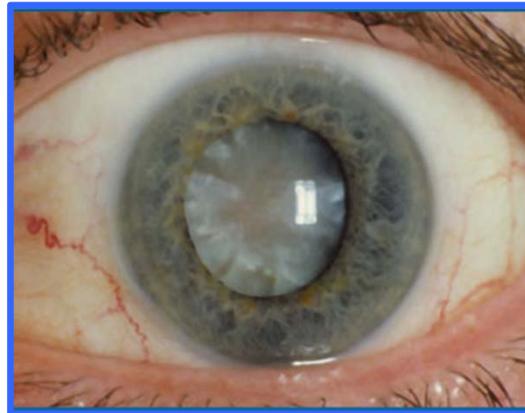
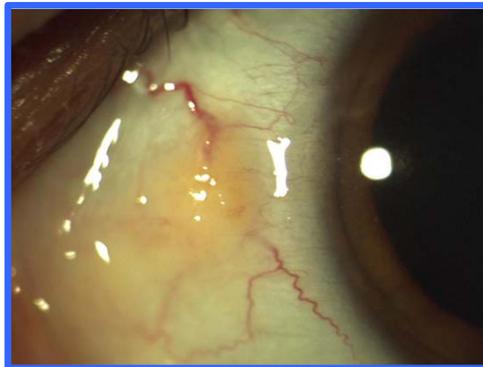
Blue light suppresses the production of melatonin - in turn, disrupting sleep / wake cycles



We are all aware of the need to protect our eyes and skin from UV:



UV damages the anterior structures of the eye (and the skin) because it is absorbed by those tissues

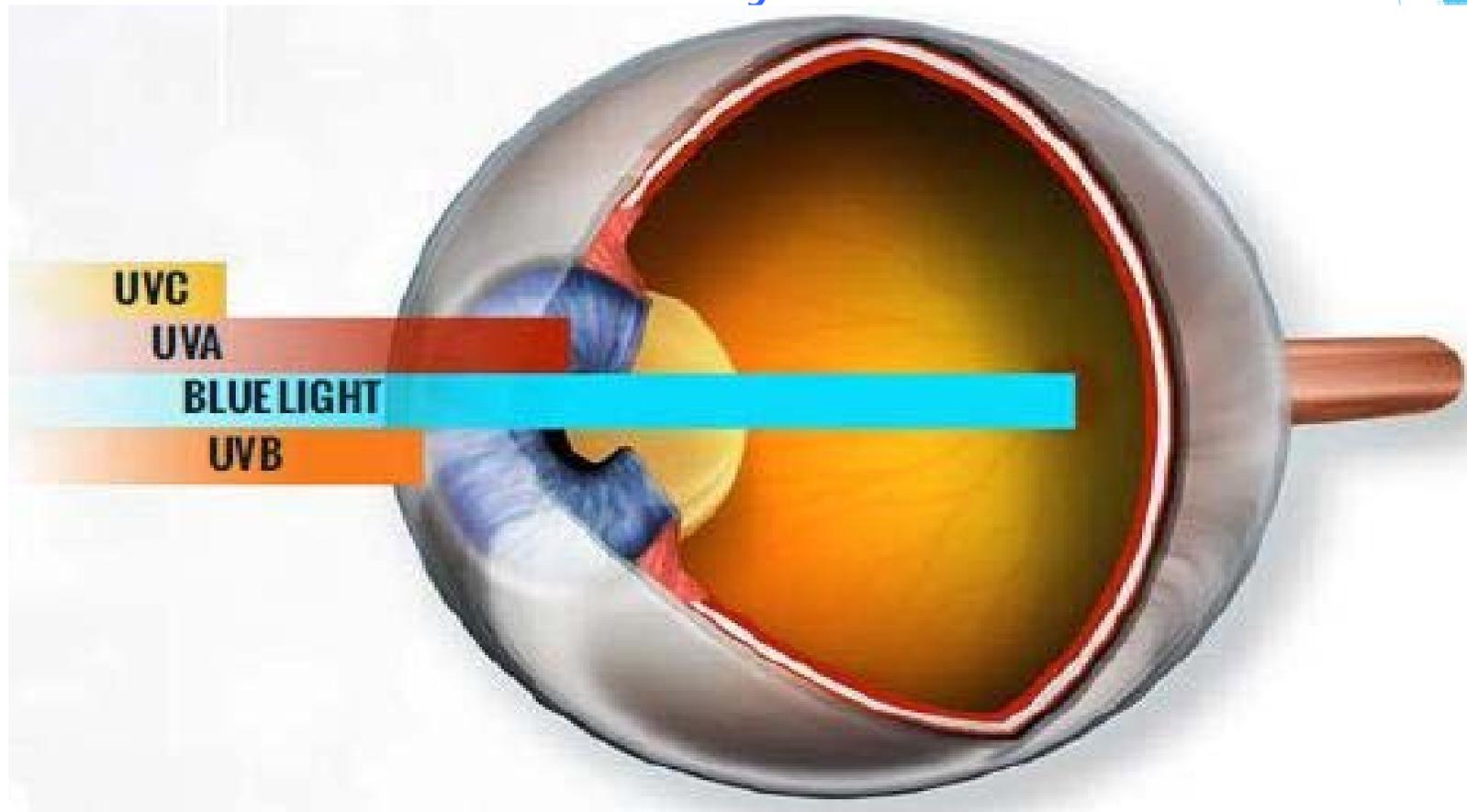


## Blue Light and AMD



There is a growing body of evidence that cumulative lifetime exposure to visible light, in particular blue wavelength light, increases the risk of AMD

The visible wavelengths - which include the harmful blue wavelengths - pass right through the pupil and are absorbed by the retina



## Why is blue light harmful to the retina?

- ▶ Blue light is short wavelength visible light and generates the highest energy of all visible light
- ▶ Unlike UV light which is absorbed by the cornea and crystalline lens, when blue light enters the eye it reaches the retina
- ▶ When blue light hits the retina, its high energy mixes with oxygen creating a destructive force that destroys photoreceptor and retinal pigment epithelium cells (RPE)
- ▶ Over time, this process can lead to Age-related Macular Degeneration, (AMD)

## Children and Blue Light: Are Children at greater risk?

- ▶ Exposed to digital devices at a very early age
- ▶ Shorter arms - shorter working distance
- ▶ No natural protection - crystal clear crystalline lenses!



# The Age of Digital Devices



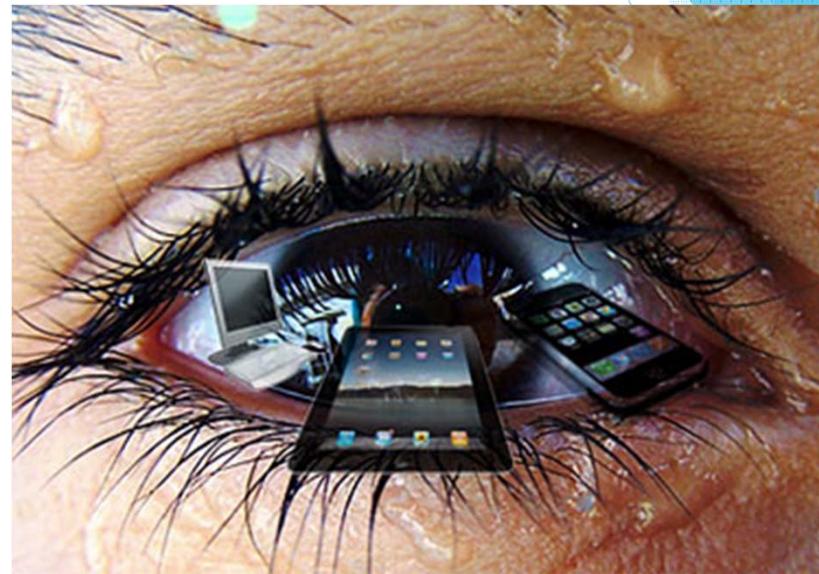
## Pixels

- ▶ Thousands of tiny dots
- ▶ Lack uniform density and defined borders
- ▶ Less distinct than printed page

# The Age of Digital Devices

## Vision Watch Survey 2012 and 2013

- ▶ 70% of American adults experience some form of digital eye strain
- ▶ 6-9 hours a day
- ▶ Number of adults spending 10+ hours rose 4%
- ▶ Digital eye strain is the most common computer-related repetitive strain injury



# Symptoms of Digital Eye Strain

- ▶ Eye redness or irritation
- ▶ Dry eyes due to reduced blinking
- ▶ Blurred vision
- ▶ General fatigue
- ▶ Back pain
- ▶ Neck pain
- ▶ Headaches



# Symptoms of Digital Eye Strain

- ▶ How many of the symptoms do your patients complain about?
- ▶ Do they willing volunteer information?

# Education of the Patient

## Sample Eye Exam/Pre-exam Questions

- ▶ How much time are you spending on smartphones, tablets, laptops, e-readers, computers, etc?
- ▶ Is that more or less than the last time we talked?
- ▶ Are you experiencing any issues (eye fatigue or stress, dry eye, headaches, trouble sleeping)?
- ▶ Do you notice a correlation between your use of electronics and any of the issues you mentioned?
- ▶ What other activities do you engage in that may be affecting your vision?

# Education of the Patient

## Patient Questions to better understand Digital Media use.....

Do you use a: Smartphone\_\_\_\_, Tablet (iPad or Android)\_\_\_\_ or e-Reader\_\_\_\_\_

How many hours a day are you awake or are your eyes opened?\_\_\_\_\_

What part of your day are you looking at something at any distance?\_\_\_\_\_

How many hours are you spending viewing a.....

Smartphone or Tablet?\_\_\_\_\_. E-Reader?\_\_\_\_\_ (Distance 12-24 inches)

How many hours are you spending viewing a computer?\_\_\_\_\_ (Distance 18-36 inches)

Do you alternate focus between distances? \_\_\_\_ If so, what do you alternate between?

TV & Smartphone\_\_\_\_, TV & Tablet\_\_\_\_, TV & e-Reader\_\_\_\_ or Other?\_\_\_\_\_

Hobbies?\_\_\_\_\_





How can we help  
protect our patients  
from the dangers of  
blue light and provide  
relief from Digital Eye  
Strain?

# Educating the Patient

## Hoya Vision Care consumer research study

- ▶ Respondents had either never heard of blue light or only associated it with sleep patterns, rather than eye health
- ▶ Respondents said dispensing opticians tend to focus only on frame selection
- ▶ Respondents wondered why their eye doctors weren't informing them about the harmful effects of blue light
- ▶ Respondents said they would listen to their eye doctor's recommendations with regard to blue light protection



# Education of the Patient

Introduce blue light related issues

- ▶ The latest electronic devices all emit blue light waves
- ▶ Blue light is a natural part of the light spectrum
- ▶ Overexposure can cause eyestrain, fatigue, headaches, and trouble sleeping



# Education of the Patient

## How to discuss blue light

- ▶ Negative reaction to messaging that positioned blue light as extremely harmful
- ▶ Scare tactic not compelling reason
- ▶ Associate message with current symptoms
- ▶ Validation of information

# Digital Media Solutions

- ▶ Products for digital device use
- ▶ With or without prescription
- ▶ Help the eye adjust to intermediate distance objects
- ▶ Selective Anti-reflective treatments



# Digital Media Solutions

- ▶ Lens options
  - ▶ Single Vision
  - ▶ Progressive Addition Lenses
  - ▶ Computer or “Work-Specific” Lenses

# Digital Media Vision Solutions



- ▶ Single vision lens
- ▶ Aspheric design plus additional support for visual demands at various distances
- ▶ Reduces eye strain and fatigue
- ▶ Easy adaptation

# Digital Media Vision Solutions

- ▶ Tact Progressive Lenses
- ▶ Specifically for prolonged near visual tasks
- ▶ Wider intermediate with full distance Rx at top of lens

TACT



Standard Indoor Progressive Lens

## Blue Light Solutions

An anti-reflective treatment that reduces blue light that reaches the eyes emanating from tablets, smartphones and other back lit devices, as well as the new energy-efficient bulbs and the sun.

**RECHARGE** 

# Blue Light Solutions

## Present benefits

- ▶ “What this means to you” factor
- ▶ Take notes and refer back to them
- ▶ Help them tell the story



# Conclusion

- ▶ Ask
- ▶ Educate
- ▶ Respond



Thank you!

Hoya Vision Care

