

**Presentation by:** Dr. Asha Hegde, RID, IESNA, IDEC, LC.

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**Topic: Lighting for the Older Adults: Importance of Doing it Right**

**Date:** Wednesday, June 15, 2011

**Event:** NeoCon, 2011

**Location:** Merchandise Mart, Chicago, IL

### **Overview of the Presentation:**

Learn about the physiological changes that occur in the eyes of older people and their impact on the visual system. Then discover how lighting and color considerations can address those concerns. Visibility, safety and accessibility, within senior living areas and the consequences of inadequate or improper lighting are discussed. Learn to address issues including glare, flicker, shadows, color of light and luminance levels, all as they apply to lighting for living environments for older people.

### ***Lecture (main points to be covered)***

Facts about older population

The human eye (3 receptors)

How visual capabilities are affected by age?

Function of light (helps with visual and non-visual aspects)

What are the common visual changes encountered with aging? How can light compensate?

What are non-visual problems? How can light help?

### ***Facts about older population:***

The U.S. Census Bureau projects that the portion of the population over 65 will reach **20%** (app. 66 million) by the end of year 2030.

Seven-eighths of all our perceptions are through sight.

Age 40 is considered the demarcation between the young and the old eye

By age 60, the lens receives only one-third as much light as it did at age 20 (which affects the visual perception)

### ***The human eye:***

There are 3 receptors (rods, cones, and the blue light sensitive receptors).

- Rods and cones communicate the visual aspects to the brain.
- The blue-light sensitive receptor deals with the non-visual aspects. It sends neurological signals that help our biological clock to function effectively. The third receptor allows to achieve the so called non-visual, biological effects of light.

### ***Light serves us two functions:***

1. Visual (rods and cones)

## 2. Non visual Control of Circadian Rhythm (blue-light sensitive receptor)

### *Visual/Common visual changes encountered with aging:*

- Reduced accommodation
  - This is the eye's decreasing capacity to focus at close range.
- Inability to adapt to light level changes
  - Adaptation from light to darkness is prominent as the eye ages.
- Reduced retinal illuminance
  - The retina receives less light as one ages because **pupil size becomes smaller** (senile miosis) and the crystalline lens becomes thicker and more absorptive. It is estimated that for the same light level, a typical 60-year old receives about one-third the retinal illuminance of a 20-year old.
- Reduced contrast
  - The crystalline lens becomes less clear and, as a result, begins to scatter more light as one ages. This scattered light reduces the contrast of the retinal image. This effect also adds a "luminous veil" over colored images on the retina, thus reducing their vividness (saturation). Reds begin to look like pinks, for example.
- Impaired color vision
  - The older eye loses some sensitivity to short wavelengths ("blue light") due to progressive yellowing of the crystalline lens.

All these changes affect the older person's ability to negotiate the environment and are prone to accidents and fall within the interior spaces.

### *How to light to compensate for visual problems?*

See recommendations and illuminances from ANSI/IES RP-28-07 *Recommended Practices for Lighting and Visual Environment for Senior Living* (this is a must for all who design for the older population). Can purchase it from [www.iesna.org](http://www.iesna.org) ISBN: 978-0-87995-223-5

- Overview of the factors (disability glare; discomfort glare; flicker; light dark adaptation; contrast sensitivity; need for increased light levels; decreased ability to distinguish between colors and intensities of color; shadows and facial modeling) that affect visibility of the older adults and how you the designer can improve as listed by "ANSI/IES RP-28-07 *Recommended Practices for Lighting and Visual Environment for Senior Living*" will be shared with the participants.
- Lighting design examples will be shared to explain how to compensate for visual problems.

***Non visual: Ramifications if the human clock is out of sync***

- Seasonal depression
- Sleep disturbances
- Eating /carbohydrate cravings
- Confusion/poor coordination
- Poor mood (blues)
- Susceptible to disease

***How to light to compensate for non-visual issues?***

- During daytime – daylight or lamps with SPD in the visible spectrum
  - Spaces with no access to daylight can suffer from ‘biological darkness’
  - Light is so dim that melatonin is secreted (sleepy, lethargic, throws off the body rhythm)
  - Use non-glare, bright light that uses the full visible spectrum light
- During late afternoon – incandescent with very little blue
- During night – darkness or red light
  - Keep it dim
  - Eliminate blue wavelengths
  - Use light sources that have yellow and red wavelengths (halogen lamps)
  - TV....turned on during sleeping hours (not good. Can affect circadian rhythm)

***Conclusion:***

Light has direct impact on older adult’s visual capabilities & health.

- Light is more than just vision
- Light influences the way we feel
- Day light and artificial light has powerful effect on health, visibility, safety and accessibility of the older adult.

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