YELLOW IOLs: DO WE REALLY NEED THEM?

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We know that prolonged exposure to short wavelength light (blue light) is harmful. Also, the normal, clear crystalline lens of the eye turns yellow as we get older. Is it a natural, protective way against the blue, short wavelength light?

In the recent past, there has been an upsurge in the use and marketing of yellow tinted IOLs. What are the potential advantages and disadvantages of these IOLs? Ophthalmologists should be aware of both sides of the coin and be judicious in choice of IOL for their patients.

Potential advantages of Yellow IOLs

Yellow IOL is postulated to reduce the glare disability after IOL implantation (1). It is attributed to Rayleigh's Law, which essentially states that when shorter wavelengths are blocked, scatter is reduced, thereby reducing the glare.

Study by Yuan et. Al. (2) postulated that yellow IOLs are preferable to ordinary IOLs in preserving spatial contract sensitivity and cause lesser photophobia and cyanopsia. The blue light filtering IOLs are also more effective in protecting the Retinal Pigment Epithelium (3) and (4). Although these have been mainly in the animal studies and not supported in epidemiological studies in AMD pathogenesis. Marshall (5) advocated the protective effect of UV blocking IOLs against the proliferation of human uveal melanoma cell lines.

Potential disadvantages of Yellow IOLs

It has been postulated that blue light is beneficial in scotopic light conditions. In fact, blue light provides 35% scotopic sensitivity. This is due to the Purkinje Shift. Hence blocking of blue light might result in decreased mesopic contrast acuity and scotopic short wavelength sensitivity. Some studies also report alteration in colour perception with the use of yellow IOLs. However, these were statistically insignificant and have been reported as anecdotal (6).

Disturbed circadian rhythm is another potential drawback of the yellow IOLs. In the retinal ganglion, photosensitive cells are responsible for entrainment of the circadian clock for light-dark cycles. These photopigments, specially melanopsin and cryptochrome, are most active in the blue light spectrum upto 430 to 480nm and the concern is that these photopigments cannot be active if the blue light is blocked. Consequently, the light dark cycles get disrupted resulting in daytime sleepiness. This is because melatonin suppression reduces daytime sleepiness and 55% suppression of melatonin is due to blue light and yellow IOL blocking the blue light is postulated to increase the daytime sleepiness. Hence blockage of UV light with transmission of blue light may prove to be selectively more beneficial (7)

References

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