

# Specialty Tinted Soft Contact Lenses to Alleviate Severe Photophobia Secondary to Traumatic Brain Injury

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### BACKGROUND

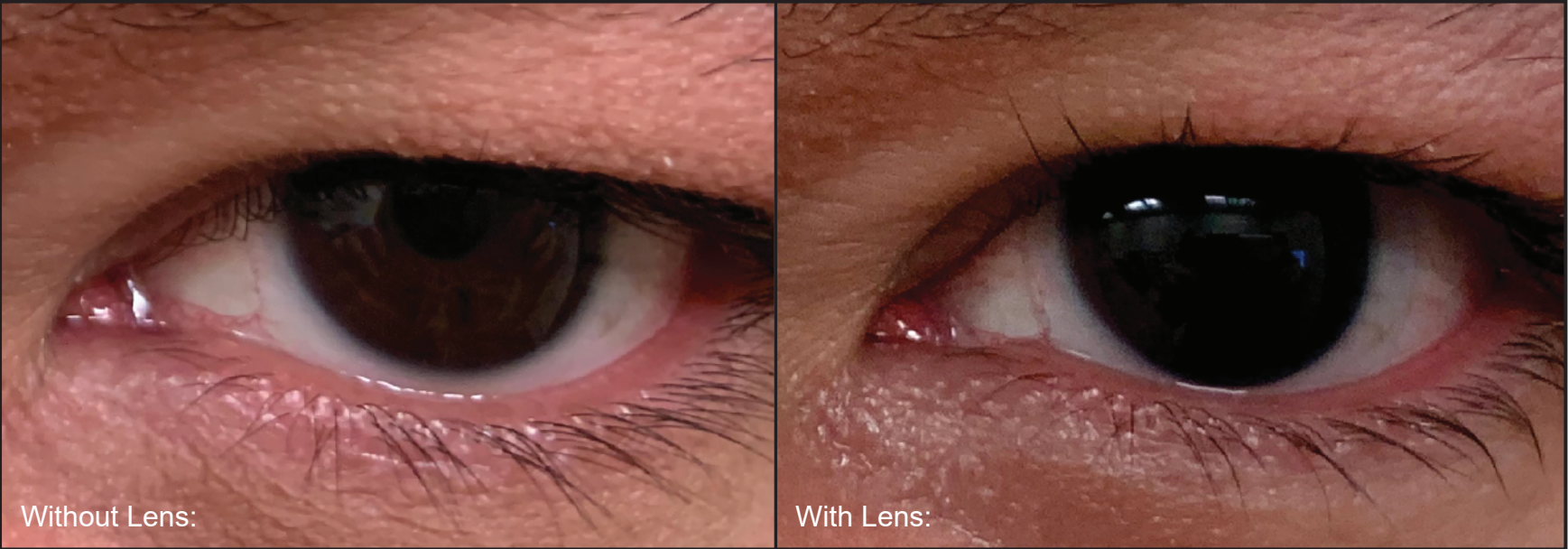
Traumatic brain injury (TBI) can cause a myriad of ocular and visual symptoms. One of the most common visual symptoms after TBI is photophobia, or increased sensitivity to light in the absence of other ocular infection or inflammation. Patients who experience this phenomenon may report eyestrain and eye fatigue, headache, nausea, dizziness, and increased sensitivity to motion of visual stimuli. These symptoms may be incredibly debilitating for some patients, especially given the increased use of computers and smart phones in daily life, as well as the widespread use of fluorescent lighting in commercial and workplace settings. This case report investigates the successful use of a tinted therapeutic contact lens in order to minimize photophobia in a veteran after TBI.

### CASE DESCRIPTION

A thirty-nine-year-old male was referred to the specialty contact lens clinic at the Veterans Affairs Hospital in Houston for debilitating light sensitivity following a traumatic brain injury. While in service, the patient was exposed to an improvised explosive device, which had hit the bulletproof windshield of the vehicle the patient was riding in. He reported loss of consciousness for 30-40 seconds. Since this event, the patient has suffered from light sensitivity, both indoors and outdoors, and migraines triggered by light. His ocular history was unremarkable for any other ocular conditions. His personal medical history included post-traumatic stress disorder, joint pain, and major depression. To help address his photophobia, the patient was previously prescribed specialty polarized sunglasses, with which he had partial relief of his symptoms, however he also desired other options to further reduce his photophobia. Thus, we recommended a Kontur Precision soft contact lens with grey 2 tint. This helped to alleviate his symptoms indoors, especially while using electronic devices, and was beneficial for tandem use with his sunglasses outdoors.

### EXAM FINDINGS

Entering uncorrected visual acuities were 20/20 OD and 20/20 OS. Pupils, extraocular motilities, and confrontation visual fields were unremarkable. Anterior segment, intraocular pressures, and dilated posterior segment findings were also normal. The patient was initially fit in non-prescription glasses with a grey 1 tint for indoors and non-prescription polarized sunglasses with a grey 3 tint. However, the patient still noted photophobia indoors in fluorescent lighting and was still bothered by sunlight outdoors. Thus, we recommended a tinted contact lens for indoor use which could also be used in conjunction with his sunglasses for outdoors.



### CONTACT LENS TRIAL

The patient was fit with a Kontur Precision Sphere Lens with plano prescription, a 8.6 base curve, and 15.0 diameter, and grey #2 tint. When trialing the lenses in office, the patient noted a significant subjective improvement in his photophobia with fluorescent lighting indoors. He also noted an improvement in his photophobia outdoors in sunny conditions when the lenses were layered with sunglasses. After trying the lenses for one month, the patient noted a vast benefit from the lenses, which allowed him to better and more comfortably continue his activities of daily living. He specifically noted a reduction in ocular pain, squinting indoors, and watering eyes in response to normal or bright lighting conditions. Additionally, the patient noted reduced frequency of migraine headaches, which were commonly triggered by glare from certain lighting. Overall, the patient was very satisfied with his tinted ocular devices and was recommended to return in 1 year for his annual contact lens examination.

### DISCUSSION

Over 3.8 million people in the United States experience a concussion every year<sup>1</sup>. Of patients who experience visual symptoms, as many as 76% may have photophobia, which can dramatically affect their ability to continue performing activities of daily living. Normal lighting conditions, which are perceived to be excessively bright in patients following traumatic brain injury, can also trigger migraines. Studies show that 30-60% of migraines attacks are triggered by light or glare, and of patients with TBI, 57.8% suffer from headaches after head injury<sup>2</sup>. Currently, it is hypothesized that the etiology of photophobia is related to the activation of intrinsically-photosensitive retinal ganglion cells (ipRGCs), which use a melanopsin signaling system to control light aversion<sup>3</sup>. The relationship between these ganglion cells and higher neural pathways has yet to be elucidated, although it is suspected that ipRGCs are connected to the trigeminovascular system, which may also explain the connection between photophobia and migraines<sup>3</sup>. Because the central pathways relating to light sensitivity and glare have yet to be discovered, there is no-known cure for photophobia. However, it has been shown that up to 85% of patients may find relief of photophobia through tinted lenses (including glasses and contacts)<sup>1</sup>. While current research suggests that certain yellow or rose tinted lenses may perform better than neutral density filters at reducing light sensitivity and migraines<sup>2-3</sup>, our patient was fully satisfied with his Grey 2 tint. In addition, an added benefit of tinted contact lenses over tinted spectacles is enhanced social acceptability and full field of view in indoor settings<sup>4</sup>. Ultimately, the best solution regarding coloration of tint and type of tinted device is largely based on the patient's visual needs, subjective response, and lifestyle.

### CONCLUSION

Successful fitting of a tinted therapeutic contact lens is dependent on understanding of the patient's lifestyle, patient education, proper lens selection, and management of patient expectations. Due to the subjective nature of symptoms, it may be necessary to explore multiple visual corrective options or trial several tints to best minimize symptoms and maximize the patient's quality of life.

### REFERENCES

1. Clark, J., Hasselfeld, K., Bigsby, K., & Divine, J. (2017). Colored glasses to mitigate photophobia symptoms posttraumatic brain injury. Journal of athletic training, 52(8), 725-729.
2. Digre, K. B., & Brennan, K. C. (2012). Shedding light on photophobia. Journal of neuro-ophthalmology: the official journal of the North American Neuro-Ophthalmology Society, 32(1), 68.
3. Albilali, A., & Dilli, E. (2018). Photophobia: when light hurts, a review. Current neurology and neuroscience reports, 18(9), 62.
4. Greenspan, L. D. (2015). Prosthetic Contact Lenses in Post-Concussion Photophobia. Investigative Ophthalmology & Visual Science, 56(7), 3081-3081.

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