Evaluating Altius Tinted Contact Lenses as an Option Managing for Post-Concussion Visual Syndrome

Principal Investigator:
Yueren Wang, OD, FAAO, FIACLE

Co-Investigators:
Patrick Fiddler, OD
Madison Bailey, OD
Megan Patterson, OD
Sara Andreola, O.D. Candidate Class of 2029

Last Modified: April 28, 2026

Southern College of Optometry
1245 Madison Ave.
Memphis, TN 38104
ywang@sco.edu

Background and Rationale:

Concussions frequently result in debilitating visual symptoms.[1] The most prevalent symptom of post-concussion syndrome (PCS) is post-traumatic headache accompanied by significant photophobia.[2,3]

Currently, the primary therapeutic approach for managing post-traumatic light sensitivity and migraines involves tinted spectacle lenses.[4,5] These colored filters help by improving contrast sensitivity, controlling brightness, and reducing the discomfort of photophobia.[6,7] Research has shown that tinted glasses can provide substantial relief, with colors like green, blue, and red being particularly effective.[8] However, spectacles have limitations, including cosmetic or social concerns, and "stray light" that can leak behind the frames.[9]

To address these limitations, tinted prosthetic contact lenses have been utilized.[10] A retrospective study on the Orion Biosport prosthetic lens (featuring rose, amber, or grey tints) demonstrated a significant reduction in photophobia in general activities of daily living and in fluorescent lighting.[9] Subjects in this study reported a clear preference for contact lenses over spectacles for work, rehabilitation, and social activities due to enhanced cosmetics, unobstructed vision, and symptom relief.[9]

While prosthetic lenses are effective, they are not designed for daily replacement, often requiring quarterly or longer wear cycles.[10] This creates a clinical need for a daily disposable tinted lens like the ALTIUS® performance-tinted contact lens for the following reasons:

- Clinical Evidence for Symptom Relief: Altius lenses are already used for patients with photosensitivity associated with migraines and other systemic conditions.[11,12] A recent case report found the Altius Green-Gray tint specifically beneficial for providing migraine relief.[13] This is highly relevant as posttraumatic headache and photophobia are the hallmarks of PCS.[2,3]
- Superior Hygiene and Dry Eye Management: Unlike quarterly-replacement prosthetic lenses, Altius is a single-use, daily disposable lens.[11,12] This format is ideal for managing dry eye symptoms, as it prevents the build-up of proteins and debris common in longer-wear lenses. [14,15]
- Convenience and Occasional Use: For patients who primarily use tinted glasses but desire an occasional alternative, such as for sports, social events, or rehabilitation sessions, a daily replacement lens offers unparalleled convenience without the maintenance required for traditional prosthetic contact lenses.[9]
- Enhanced Comfort and Performance: Research comparing tinted soft contact lenses to tinted spectacles has shown that contact lenses lead to increased subjective visual comfort under bright conditions.[16,17]
- Addressing the Social and Physical Gap: By utilizing a lens like Altius, patients can achieve the same social acceptability and elimination of stray light found with prosthetic lenses while benefiting from the safety and convenience of a daily replacement schedule.[10,18]

Presently, the only publication on managing post-concussion syndrome with daily replacement tinted contact lenses is reported by Dr. Citek. Both patients were fitted with ALTIUS® lenses and reported significantly improved visual comfort.[12] This pilot study seeks to evaluate if the ALTIUS® performance-tinted contact lenses can serve as a practical and effective alternative to tinted spectacles for the management of post-concussion visual symptoms.

Study Objective

To evaluate whether Altius daily tinted contact lenses provide a comparable alternative to currently worn tinted spectacles in adults with post-concussion visual syndrome, and to assess patient preference for ongoing or occasional use.

Study Design

Prospective, double-arm trial with within-subject comparison.

Inclusion Criteria:

- Age ≥18 years regardless of gender or race.
- History of concussion with ongoing visual symptoms consistent with post-concussion visual syndrome.
- Baseline BIVSS (Brain Injury Vision Symptom Survey) score ≥ 31.[19,20]
- Currently using tinted spectacle lenses with self-reported symptom improvement.
- Eye exam within 1 year.

Exclusion Criteria:

- Refractive error outside the Altius soft lens parameter range.
- Inability to safely handle, insert, or remove contact lenses.
- Active ocular disease contraindicating contact lens wear.
- History of contact lens intolerance.

Subject recruitment:

- Students and staff at Southern College of Optometry, who have been previously fitted in tinted spectacles for post-concussion vision syndrome, will be screened against inclusion and exclusion criteria.
- If needed, additional subjects who suffer from post-concussion vision syndrome will be recruited via email, offered the opportunity to be fitted with tinted spectacle lenses, prior to enrolling in this study.

Sample size:

- This is a pilot study with an estimated sample size of 10 subjects within the institution. If a significant result is found, then a broader cohort of subjects will be recruited for clinical trial.

- This study will comply with the tenets of the Helsinki Declarations and will be approved by the Institutional Review Board.

Study Procedures

Initial screening:

- Complete BIVSS survey score without lenses prior to tinted spectacle fitting. Or if the subject has already been fitted in tinted spectacles, obtain their previous BIVSS survey score prior to tinted spectacle fitting.
- Record spectacle tint characteristics (color, transmission). The typical tinted lenses used in our clinic are FL41, E-blue (Chadwick optical), TCI 19.
- Complete BIVSS survey while wearing their habitual tinted spectacles, prior to contact lens fitting.
- Flippers that match the spectral profiles of the Altius lenses, Amber and Grey-Green, will be made for subjects to compare preference for either tint. Presently, the Amber lens has been tint matched almost exactly. The Grey-Green lens is in the refinement stage.
- Collect subject's most recent updated glasses prescription (< 1 year) for contact lens trial lens order.

Research visit:

1. Review and sign consent forms.
2. Entering visual acuity at distance and near
3. Brief anterior segment evaluation
4. Altius lens fitting
    - Visual acuity at distance and near
    - Over-refraction (if VA is one line or more worse than entering visual acuity)
    - Lens fit assessment
5. If adjustments are necessary, order additional trial lenses and dispense the new lenses over the counter.

Trial Period:

- Provide one box of daily disposable Altius lenses for each eye.
- Lens trial duration: one week.
- Participants wear lenses as tolerated in normal environments.

Post-Trial Evaluation:

- Complete BIVSS survey wearing the Altius lenses.[20]
- Complete a patient preference questionnaire (See page 10).

Outcome Measures:

- Primary Outcome
    - Change in BIVSS score between habitual tinted spectacles and Altius tinted contact lenses
- Secondary Outcomes
    - Patient preferences for lens use (regular, occasional, or none).
    - Reported comfort and vision quality with contact lenses.
    - Comparison of tint preference

Potential Significance:

This study will be the first known evaluation of tinted contact lenses for post-concussion visual symptoms. Results may:

- Demonstrate whether Altius lenses offer symptom relief comparable to tinted spectacles.
- Provide an alternative option for patients who prefer contact lenses for sports, events, or cosmetic reasons.
- Contribute to clinical guidelines for managing post-concussion photophobia.

Potential benefits to subject/others:

Participation in this study may benefit subjects and others with post-concussion visual syndrome by exploring an alternative method for managing visual symptoms associated with photophobia and visual discomfort. Specifically, this study evaluates a daily disposable tinted contact lens as a potential option for patients who are currently managed with tinted spectacle lenses but desire a contact lens alternative for occasional or situational wear.

The use of daily replacement tinted contact lenses may offer additional benefits for individuals who experience dry eye symptoms, seasonal allergies, or discomfort with extended-replacement contact lenses. Results from this study may contribute to clinical knowledge regarding patient tolerance, symptom management, and preferences for tinted contact lenses in populations with post-concussion–related visual symptoms.

Potential risks to subjects:

Subjects may experience risks commonly associated with wearing FDA-approved soft contact lenses. These risks are generally rare but may include eye irritation, dryness, blurred vision, discomfort, redness, allergic reactions, corneal abrasion, ulceration, infection, and, in rare cases, temporary or permanent loss of vision.

Additionally, while wearing Altius tinted contact lenses, subjects may experience inadequate relief of post-concussion visual symptoms compared to their habitual tinted spectacles. This may include visual fatigue, increased light sensitivity, altered depth perception, reduced

peripheral awareness, or general visual discomfort. Subjects will be instructed to discontinue lens wear and notify the study team if significant discomfort or worsening of symptoms occurs.

BIVSS Symptoms Survey[20]

BIVSS CHECKLIST (Brain Injury Vision Symptom Survey)

Patient Name: _____ Today's date: _____

My brain injury was: ____ years ago My age is: ____ years today's date: _____

☐ I have had a medical diagnosis of brain injury (check box if true) Cause of injury: _____

☐ I sustained a brain injury without medical diagnosis (check box if true) _____

☐ I have NOT ever sustained a brain injury (check box if true)

Please check the most appropriate box, or circle the item number that best matches your observations. All information will be held in confidence. Thank you for your help!

SYMPTOM CHECKLIST ***Circle a number below:***

Please rate each behavior. **How often does each behavior occur?** (circle a number)	Never	Seldom	Occasionally	Frequently	Always
EYESIGHT CLARITY					
Distance vision blurred and not clear -- even with lenses	0	1	2	3	4
Near vision blurred and not clear -- even with lenses	0	1	2	3	4
Clarity of vision changes or fluctuates during the day	0	1	2	3	4
Poor night vision / can't see well to drive at night	0	1	2	3	4
VISUAL COMFORT					
Eye discomfort / sore eyes / eyestrain	0	1	2	3	4
Headaches or dizziness after using eyes	0	1	2	3	4
Eye fatigue / very tired after using eyes all day	0	1	2	3	4
Feel "pulling" around the eyes	0	1	2	3	4
DOUBLING					
Double vision -- especially when tired	0	1	2	3	4
Have to close or cover one eye to see clearly	0	1	2	3	4
Print moves in and out of focus when reading	0	1	2	3	4
LIGHT SENSITIVITY					
Normal indoor lighting is uncomfortable – too much glare	0	1	2	3	4
Outdoor light too bright – have to use sunglasses	0	1	2	3	4
Indoors fluorescent lighting is bothersome or annoying	0	1	2	3	4
DRY EYES					
Eyes feel "dry" and sting	0	1	2	3	4
"Stare" into space without blinking	0	1	2	3	4
Have to rub the eyes a lot	0	1	2	3	4
DEPTH PERCEPTION					
Clumsiness / misjudge where objects really are	0	1	2	3	4
Lack of confidence walking / missing steps / stumbling	0	1	2	3	4
Poor handwriting (spacing, size, legibility)	0	1	2	3	4
PERIPHERAL VISION					
Side vision distorted / objects move or change position	0	1	2	3	4
What looks straight ahead--isn't always straight ahead	0	1	2	3	4
Avoid crowds / can't tolerate "visually-busy" places	0	1	2	3	4
READING					
Short attention span / easily distracted when reading	0	1	2	3	4
Difficulty / slowness with reading and writing	0	1	2	3	4
Poor reading comprehension / can't remember what was read	0	1	2	3	4
Confusion of words / skip words during reading	0	1	2	3	4
Lose place / have to use finger not to lose place when reading	0	1	2	3	4

BIVSS_28.item.clinical.use._[09/14_Hannu Laukkanen] Predictive score = ≥ 31 **total score for all 28-items:** _____

Patient Preference Questionnaire

1. **How many days did you wear the Altius tinted contact lenses during the trial period?**
    - ☐ 1–2 days
    - ☐ 3–4 days
    - ☐ 5–7 days
    - ☐ More than 7 days
2. **Average number of hours worn per day:**
    - ☐ <2 hours
    - ☐ 2–4 hours
    - ☐ 4–6 hours
    - ☐ 6–8 hours
    - ☐ >8 hours
3. **Lens comfort throughout the day:**
    - ☐ Very uncomfortable
    - ☐ Uncomfortable
    - ☐ Neutral
    - ☐ Comfortable
    - ☐ Very comfortable
4. **Dryness while wearing the lenses:**
    - ☐ Severe dryness
    - ☐ Moderate dryness
    - ☐ Mild dryness
    - ☐ No dryness
5. **Would you consider the lenses comfortable enough for everyday tasks?**
    - ☐ Yes
    - ☐ No
    - ☐ Sometimes
6. **How would you describe the brightness and comfort of the tint you preferred?**
    - ☐ Too light
    - ☐ Just right
    - ☐ Slightly too dark
    - ☐ Much too dark

7. **In which situations did the Altius lenses help most?** *(Select all that apply)*
    - ☐ Bright outdoor environments
    - ☐ Indoor lighting
    - ☐ Computer use
    - ☐ Driving
    - ☐ Crowded or visually busy environments
    - ☐ Sports or exercise
    - ☐ None of the above

8. **In which situations did the lenses perform worse than your tinted glasses?**
    - ☐ Bright outdoor environments
    - ☐ Indoor lighting
    - ☐ Computer use
    - ☐ Driving
    - ☐ Crowded or visually busy environments
    - ☐ Sports or exercise
    - ☐ None of the above
9. **Which option provided the best overall symptom relief?**
    - ☐ My tinted glasses
    - ☐ Altius tinted contact lenses
    - ☐ Both were the same
10. **How likely are you to continue using Altius tinted contact lenses?**
    - ☐ Very unlikely
    - ☐ Unlikely
    - ☐ Unsure
    - ☐ Likely
    - ☐ Very likely
11. **How would you prefer to use the lenses moving forward?**
    - ☐ Regular daily wear
    - ☐ Only during symptom flare-ups
    - ☐ Only for bright environments
    - ☐ Only for sports or special occasions
    - ☐ I prefer to stay with glasses only

Open-Ended Questions (optional)

12. **What did you like most about the Altius tinted contact lenses?**
    Open response

13. **What did you like least about the lenses?**
    Open response

14. **Is there anything that would make you more likely to use these lenses in the future?**
    Open response

15. **Any additional comments or feedback for the study team?**
    Open response

References:

1. Fraser, C. L. & Mobbs, R. Visual Effects of Concussion: A Review. *Clin. Exp. Ophthalmol.* **50**, 104–109 (2022).
2. Mares, C., Dagher, J. H. & Harissi-Dagher, M. Narrative Review of the Pathophysiology of Headaches and Photosensitivity in Mild Traumatic Brain Injury and Concussion. *Canadian Journal of Neurological Sciences* **46**, 14–22 (2019).
3. Master, C. L. *et al.* Vision and Concussion: Symptoms, Signs, Evaluation, and Treatment. *Pediatrics* **150**, (2022).
4. Adhan, I. K. & Gunton, K. B. Optimal Diagnostic Strategies for Concussion-Related Vision Disorders: A Review. *Eye Brain* **17**, 27–36 (2025).
5. Bansal, S. & Green, K. Application of Colored Filters in Patients Post-Traumatic Brain Injury: A Review. *NeuroRehabilitation* **50**, 321–330 (2022).
6. Ahadi, M., Ebrahimi, A., Abbasi, A. & Matkarimov, A. K. An Overview of the Therapeutic Applications of Tinted Lenses Spectacles. *Korean Journal of Ophthalmology* **39**, 550–565 (2025).
7. Abusamak, M. & Alrawashdeh, H. M. Post-concussion Syndrome Light Sensitivity: A Case Report and Review of the Literature. *Neuro-Ophthalmology* **46**, 85–90 (2022).
8. Clark, J., Hasselfeld, K., Bigsby, K. & Divine, J. Colored Glasses to Mitigate Photophobia Symptoms Posttraumatic Brain Injury. *J. Athl. Train.* **52**, 725–729 (2017).
9. Greenspan, L. Prosthetic Contact Lenses in Post-Concussion Photophobia. *Invest. Ophthalmol. Vis. Sci.* **56**, (2015).
10. Malooley, M. Colored Contact Lenses. *Contact Lens Spectrum* vol. 33 22–28 (2018).
11. Citek, K. & Aao, D. *Use of ALTIUS® Single-Use Performance-Tinted Contact Lenses During Water Activities*. https://altiusvision.com/wp-content/uploads/Water-Sports-and-ALTIUS-May-2024.pdf (2024).
12. Citek, K. & Aao, D. *Use of ALTIUS® Performance-Tinted Contact Lenses in Patients with Photosensitivity Due to Migraine and Other Visual and Systemic Conditions: Update Since June 2024*. https://axonoptics.com/pages/axon-optics-vs-fl-41. (2024).
13. Mac, A. Shady Business: Tinted Soft Contact Lens for Migraine Relief. in (GSLS 2026, Las Vegas, 2026).
14. Ichijima, H., Karino, S., Sakata, H. & Cavanagh, H. D. Improvement of Subjective Symptoms and Eye Complications When Changing From 2-Week Frequent Replacement to Daily Disposable Contact Lenses in a Subscriber Membership System. *Eye Contact Lens* **42**, 190–195 (2016).

15. Wagner, H. The How and Why of Contact Lens Deposits. *Review of Cornea and Contact Lenses* https://www.reviewofcontactlenses.com/article/the-how-and-why-of-contact-lens-deposits (2020).

16. Borgholthaus, J. L., Demeerleer, J. R., Heller, J. L. & Shreck, W. R. Visual Performance with Tinted Contact Lenses. (Pacific University, 1991).

17. Banta, A. M., Berry, C. J., Lum, S. W. & Oliver, R. C. Comparative Study of Visual Performance with Tinted Soft Contact Lenses vs. Clear Soft Contact Lenses and Tinted Spectacles under Bright Outdoor Conditions; Phase II. (Pacific University, 2002).

18. Chalmers, R. L., Hickson-Curran, S. B., Keay, L., Gleaso, W. J. & Albright, R. Rates of Adverse Events With Hydrogel and Silicone Hydrogel Daily Disposable Lenses in a Large Postmarket Surveillance Registry: The TEMPO Registry. *Invest. Ophthalmol. Vis. Sci.* **56**, 654–663 (2015).

19. Weimer, A., Jensen, C., Laukkanen, H., Hayes, J. R. & Saxerud, M. Test-Retest Reliability of the Brain Injury Vision Symptom Survey. *Vis. Dev. Rehabil.* **4**, 177–185 (2018).

20. Laukkanen, H., Scheiman, M. & Hayes, J. R. Brain Injury Vision Symptom Survey (BIVSS) Questionnaire. *Optometry and Vision Science* **94**, 43–50 (2017).