## **ALTIUS® Technology Research Overview**

## 27 March 2023 Update

## **RESEARCH RESULTS Summary:**

- Absorbs 100% of UV
- Absorbs >99% of the Blue Light
- Is a viable alternative for individuals with photosensitivity complaints
- Can withstand a minimum of 5x the force to create a corneal abrasion
- Improves dynamic visual fixation (moving target tracking)
- Reduces perceived visual stress in bright outdoor conditions
- Provides better speed of visual recovery in bright sunlight
- Provides superior contrast sensitivity (discrimination) in bright outdoor conditions
- Enhances absolute threshold low contrast visual acuity by an average of ~13% in bright outdoor conditions
- Provides superior low-contrast acuity versus eye black grease in bright outdoor conditions
- Enhances speed-of-recognition of low contrast visual acuity by an average of  $\sim$ 25% in bright outdoor conditions
- Allows ~20% greater pupillary response when transitioning from bright to dim light conditions
- Provides superior contrast sensitivity (discrimination) when alternating between bright and shaded targets in bright outdoor conditions
- Provides superior contrast sensitivity in moderately lit indoor conditions
- Provides better overall visual target conditions compared to clear lenses in bright and shadowed outdoor conditions
- Reduces straylight scattering to the retinal receptors (improves visual sensitivity)
- Low handicap golfers perceived superior visual comfort on the green
- Low handicap golfers judged their ability to read greens was improved
- Professional soccer goalkeepers perceived superior visual comfort in both bright and overcast outdoor conditions
- Collegiate baseball players within a team demonstrated dramatic improvements in batting statistics while wearing *SportSight*™ tinted soft contact lenses versus non-participating team members.
- Provides greater perceived visual performance compared to sunglasses in both indoor and bright outdoor conditions
- Reduces perceived image degradation caused by stray light compared to sunglasses and clear contact lenses in both indoor and bright outdoor conditions
- Reduces perceived image degradation caused by lens reflections compared to sunglasses in bright outdoor conditions
- Eliminates perceived visual field restrictions present in sunglasses
- Provides an average of 47% larger monocular visual fields in all meridians compared to sunglasses
- Provides ~42% larger binocular visual fields (2-eyed use for stereo sensitivity / depth perception) than sunglasses
- Provides ~11% better physical comfort compared to sunglasses in bright outdoor conditions

Page 1 3/27/2023

## **RESEARCH References:**

Citek K. *Use of Performance-Tinted Contact Lenses in Patients with Photosensitivity.* Performance Vision Technologies, Inc. White Paper, March 2023

Hou A, Jin M, Goldman D. *The Protective Effects of Soft Contact Lenses for Contact Sports: A Novel Porcine Model for Corneal Abrasion Biomechanics*. Eye and Contact Lens: Science & Clinical Practice 2022;48(5)228-30

Burnstein R, Noseda R, Fulton A. Neurobiology of Photophobia. J Neuro-Ophthal 2019;39:94-102

Horn F, Erickson G, Karben B, Moore B. *Comparison of Low-Contrast Visual Acuity between Eye Black and MaxSight*<sup>TM</sup> *Contact Lenses*. Eye and Contact Lenses 2011;37:3

Lovell-Patel R, Chitanda F, *The Effect of Sport-Tinted Contact Lenses on Visual Function*. Scientific Poster Presentation, AAO Mtg, San Francisco 2010

Erickson G, Horn F, Barney T, Pexton B, Baird R. Visual Performance with Sport-Tinted Contact Lenses in Natural Sunlight. Optometry and Vision Science 2009;86:5

Arvidson B, Vue Y. *Professional Soccer Goal Keepers Performance Enhancement: Study of Goal Keeping Performance with MaxSight*<sup>TM</sup> *Contact Lenses* (Pacific University College of Optometry Student Thesis Project 2007) Advisor: Erickson G.

Porisch E. Football Players' Contrast Sensitivity Comparison when Wearing Amber Sport-Tinted or Clear Contact Lenses. Optom 2007;78;5

Erickson G, Horn F, Barney T, Pexton B, Baird R. Contrast Discrimination with Nike MaxSight<sup>TM</sup> Contact Lenses in Natural Sunlight. Paper Presentation AAO 2006

Arritt K, Hornberger A. *The effects of Nike MaxSight™ Tinted Contact Lenses on Subjective and Objective Measures of Golf Putting Performance* (Pacific University College of Optometry Student Thesis Project 2006) Advisors: Erickson G, Horn F.

Barney T, Pexton B. *The Effects of Nike MaxSight Contact Lenses on Visual Performance in Bright and Shaded Conditions* (Pacific University College of Optometry Student Thesis Project 2006) Advisors: Erickson G, Horn F.

Citek K, Reichow AW, Caroline P. Visual Performance Comparisons of Performance Tinted Soft Contact Lenses and Tinted Spectacles, Poster Presentation, CLES 2005

Pearson J, Peterson T, Smith K. A Study Investigating a Season's Baseball Performance While Wearing SportSight<sup>TM</sup> Soft Contact Lenses: Phase III (Pacific University College of Optometry Student Thesis Project 2005) Advisors: Reichow A, Erickson G, Citek K, Bradley G Broadbent K.

Citek K, Reichow AW. Visual Performance Comparison of SportSight™ Soft Contact Lenses and Tinted Spectacles. Optometry and Vision Science 2004;81(Suppl):84.

Kempfer R, Schweitzer J. A Study Investigating a Season's Baseball Performance While Wearing SportSight<sup>TM</sup> Soft Contact Lenses; Phase IV (Pacific University College of Optometry Student Thesis Project 2004). Advisors: Reichow A, Citek K, Bradley G, Erickson G.

Broadbent K, Pearson J, Peterson T, Smith K. *A Study Investigating a Season's Baseball Performance While Wearing SportSight*<sup>TM</sup> *Soft Contact Lenses; Phase III* (Pacific University College of Optometry Student Thesis Project 2003). Advisors: Reichow A, Citek K, Bradley G. Erickson G.

Page 2 3/27/2023

Broadbent K, LeBreton R, Richardson M, Schroeder J. A Study Investigating a Season's Baseball Performance While Wearing SportSight<sup>TM</sup> Soft Contact Lenses; Phase II (Pacific University College of Optometry Student Thesis Project 2002). Advisors: Reichow A, Citek K, Bradley G. Erickson G.

Banta A, Berry C, Lum S, Oliver R. *A Study Investigating a Season's Baseball Performance While Wearing SportSight*<sup>TM</sup> *Soft Contact Lenses* (Pacific University College of Optometry Student Thesis Project 2002) Advisors: Reichow A, Citek K, Bradley G.

Banta A, Berry C, Lum S, Oliver R. *Comparative Study of Visual Performance with SportSight*<sup>TM</sup> *Soft Contact Lenses vs Clear Soft Contact Lenses and Tinted Spectacles Under Bright Outdoor Conditions; Phase II* (Pacific University College of Optometry Student Thesis Project 2002) Advisors: Reichow A, Citek K.

Broecker E, Hashimoto L, Waddell J. Comparative Study of Visual Performance with SportSight<sup>TM</sup> Soft Contact Lenses vs Clear Soft Contact Lenses and Tinted Spectacles Under Bright Outdoor Conditions; Phase I (Pacific University College of Optometry Student Thesis Project 2002) Advisors: Reichow A, Citek K, Caroline P.

Banta A, Berry C, Lum S, Oliver R. A Study Investigating a Season's Baseball Performance While Wearing SportSight<sup>TM</sup> Soft Contact Lenses (Pacific University College of Optometry Student Thesis Project 2001). Advisors: Reichow A, Citek K, Bradley G.

Banta A, Berry C, Lum S, Oliver R. Comparative Study of Visual Performance with Tinted Soft Contact Lenses Versus Clear Contact and Tinted Spectacle Lenses; Phase III (Pacific University College of Optometry Student Thesis Project 2001) Reichow A, Citek K, Bradley G.

Broecker E, Hashimoto L, Waddell J. *Comparative Study of Visual Performance with Tinted Soft Contact Lenses Versus Clear Contact and Tinted Spectacle Lenses; Phase I*" (Pacific University College of Optometry Student Thesis Project 2001). Advisors: Reichow A, Citek K, Caroline P.

Caggiano S, Ford A, Kikuchi J. *Effects of Tinted Rigid Gas Permeable Contact Lenses on Visual Performance* (Pacific University College of Optometry Student Thesis Project 2000). Advisors: Reichow A, Citek K, Caroline P.

Geis T, Hohns H, Perea S, Phillips L, Rossman A, Sifferman L. *Tinted Contact Lens Effects on Visual Performance; Phase I* (Pacific University College of Optometry Student Thesis Project 1999). Advisors: A Reichow, Citek K, Caroline P.

Caggiano S, Chin B, Elliott A, Hall Z, Kikuchi J, Lusk M, Olineck B, Reisler E, Russell J. *1999 SportSight SCL Visual Performance Study: Phase Ib* (Pacific University College of Optometry Student Thesis Project 1999). Advisors: Reichow A, Citek K, Caroline P.

Caggiano S, Chin B, Elliott A, Hall Z, Kikuchi J, Lusk M, Olineck B, Reisler E, Russell J. *1999 SportSight SCL Visual Performance Study: Phase I* (Pacific University College of Optometry Student Thesis Project 1999). Advisors: Reichow A, Citek K, Caroline P.

Caggiano S, Chin B, Elliott A, Hall Z, Kikuchi J, Lusk M, Olineck B, Reisler E, Russell J. *1999 SportSight GP Visual Performance Study: Phase Ib* (Pacific University College of Optometry Student Thesis Project 1999). Advisors: Reichow A, Citek K, Caroline P.

Caggiano S, Chin B, Elliott A, Hall Z, Kikuchi J, Lusk M, Olineck B, Reisler E, Russell J. *1999 SportSight GP Visual Performance Study: Phase* I (Pacific University College of Optometry Student Thesis Project 1999). Advisors: Reichow A, Citek K, Caroline P.

Caggiano S, Chin B, Elliott A, Hall Z, Kikuchi J, Lusk M, Olineck B, Reisler E, Russell J. *1999 SportSight GP fit study* (Pacific University College of Optometry Student Thesis Project 1999). Advisors: Reichow A, Citek K, Caroline P.

Page 3 3/27/2023