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14. ABSTRACT
The purpose of this study is to validate the Neuro-Ophthalmic Device (NODe) test battery that provides the highest sensitivity and specificity for the detection of oculomotor and high order visual processing dysfunctions on a large population of Warfighters with acute mTBI as compared to healthy age-matched controls. This study also will demonstrate that a comprehensive combination of biomarkers will be more specific to mTBI than any one test alone and that the tests within the NODe test battery can serve as objective biomarkers for acute mTBI. Two hundred acute mTBI (•72 hrs post injury) and 200 age-matched non-TBI (controls) military personnel will be recruited from the patient population at Womack Army Medical Center (WAMC). The central hypothesis is that a NODe test panel evaluating visual function can detect neurological and ophthalmological changes induced by acute mTBI compared to age-matched controls.

15. SUBJECT TERMS
mild traumatic brain injury, mTBI, objective biomarkers, Neuro-Ophthalmic Device, NODe

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Table of Contents

Page

1. Introduction…….4

2. Keywords…….4

3. Accomplishments……..……..……4

4. Impact……...……9

5. Changes/Problems...…..……9

6. Products…….…….…….……..…..9

7. Participants & Other Collaborating Organizations……...10

8. Special Reporting Requirements……..11

9. Appendices…….....11

INTRODUCTION:
The DOD reported that 333,169 cases of traumatic brain injury (TBI) were confirmed since 2000, with mild TBI (mTBI) accounting for 82.4%. The diagnosis of mTBI has been a challenge for the military primarily because of the lack of objective assessment tools, overlap of symptoms in co-morbid conditions such as post-traumatic stress disorder (PTSD), and the interpretation of signs and symptoms by healthcare providers relies on self-reported symptoms from the injured Warfighters. Somatosensory disruptions following mTBI can include impairments of vision, equilibrium, smell, hearing, taste, and somatosensory perception. These sensory disruptions are frequently caused by trauma to the sensory organs or their projections through the brain stem to central processing systems. Several studies have identified oculomotor dysfunctions (OMDs) (i.e., version, vergence, and accommodation) to be the most common visual deficits associated with mTBI. Because of the prevalence of vision-related problems after TBI and their consequences for functional performance, experts recommend screening for vision deficits early in patients' recovery. However, the absence of standardized methodology to complete ocular and vision testing among military eye-care providers (e.g., primary care, occupational therapists, optometrists and ophthalmologists) may lead to no diagnosis or misdiagnosis of post-mTBI-related vision problems. The purpose of this study is to validate the Neuro-Ophthalmic Device (NODe) test battery that provides the highest sensitivity and specificity for the detection of oculomotor and high order visual processing dysfunctions on a large population of Warfighters with acute mTBI as compared to healthy age-matched controls. This study also will demonstrate that a comprehensive combination of biomarkers will be more specific to mTBI than any one test alone and that the tests within the NODe test battery can serve as objective biomarkers for acute mTBI. Two hundred acute mTBI (≤72 hrs post injury) and 200 age-matched non-TBI (controls) military personnel will be recruited from the patient population at Womack Army Medical Center (WAMC). The central hypothesis is that a NODe test panel evaluating visual function can detect neurological and ophthalmological changes induced by acute mTBI compared to age-matched controls.

KEYWORDS:
mild traumatic brain injury, mTBI, objective biomarkers, Neuro-Ophthalmic Device, NODe

ACCOMPLISHMENTS:

- **What were the major goals of the project? / What was accomplished under these goals?**

Specific Aim 1: Clinical Study Data Collection - Collect NODe data for n = 200 controls and n = 200 personnel with a diagnosis of mTBI during the acute phase (< 72 hrs) of presentation.

Major Task 1: IRB/HRPO approval and hiring/identification of required study personnel.
Subtask 1: Obtain IRB/HRPO approval for the proposed study. **COMPLETED**
There was significant delay in getting protocol processed and approved. While the original protocol was submitted to the WAMC Institutional Review Board (IRB) on 16 Sep 2015, the WAMC IRB experienced significant processing delays caused by Defense Health Agency (DHA) inactivation of IRBNet on 29 Sep 2015. The study protocol received initial approval from WAMC IRB on 28 Dec 2015 with an Addendum correction dated 8 Jan 2016. The protocol also received initial USAMRMC Human Research Protection Office (HRPO) approval on 3 Mar 2016. After initial approvals were received, significant changes were needed to accommodate the requirements by the Federal Interagency Traumatic Brain Injury Research (FITBIR) reporting regarding the collection of

personally identifiable information (PII) required to create the unique identifier for subjects. The final approval by USAMRMC HRPO was received on 17 May 2016. The WAMC IRB and USAMRMC HRPO approved study Annual Continuing Review on 1 Nov 2016 and 10 Nov 2016, respectively. The WAMC IRB approved study Closure Report on 24 Apr 2017. Study closure was requested from USAMRMC HRPO on 24 Apr 2017.

Subtask 2: Hire personnel required at WAMC and study personnel training: **COMPLETED**
The Ophthalmic Assistant (also serving as Study Coordinator) was hired on 1 Oct 2015. In mid-November 2015, the research Optometrist required for the study was conditionally hired by the Geneva Foundation and initiated in-processing at WAMC. However, due to significant delays in getting the government background check processed, the employee opted to find another employment. A Research Optometrist was hired and started working on the project on 1 Apr 2016.

Subtask 3: Data management and implement NINDS CDE data compatibility and FITBIR sharing processes: **COMPLETED**
FITBIR compatible database templates were created and as of 26 Apr 2017, all collected data was uploaded into FITBIR database.

Major Task 2: Data collection (n = 400 subjects).
Subtask 1: Subject recruitment through DBIM and Department of Optometry: **INCOMPLETE**
The approved number of subjects for the study was 200 with acute mTBI and 200 controls. A total of 143 subjects were enrolled in the study, but only 124 completed data collection. Nineteen subjects were excluded due to: not meeting the inclusion criteria (6); declining participation after consenting (4); recruitment deviation (6). All study deviation were reported to WAMC IRB.

Subtask 2: Data collection with the NODe and other evaluation tools: **INCOMPLETE**
Complete data sets were collected for 124 subjects (32 acute mTBI and 92 Controls).

Subtask 3: Data archiving and storage, batch data analysis and mining for results: **COMPLETED**
Data collected for the 124 subjects have been analyzed and uploaded into FITBIR, as required by the award.

Specific Aim 2: Data analysis for Sensitivity and Specificity of the NODe mTBI Test Panel.

Major Task 1: Evaluate sensitivity and specificity of the NODe.
Subtask 1: Statistical analysis of NODe data from controls and mTBI patients: **COMPLETED**

Data Processing:
Automated data analyses are available for all NODe metrics for the pupil response (RAPD) test, the saccadic clock (Clock) test, and the accelerating circle (Circle) test. All data was analyzed using the NODe View 0.9.2u analysis software and stored in a MySQL database for data sanitization and aggregation.

In the RAPD (Flashes) test, the software presents one or both eyes with a white screen “flash” (the stimulus display is white for a short period of time). Pupil diameter is measured by fitting an ellipse to the pupil and calculating the average of the major and minor axis length. Constriction latency is defined as the time between stimulus onset and the start of pupil constriction, defined as the time when pupil constriction velocity is greater than a threshold. Constriction and Dilation velocity (deg/s) maximum values are calculated as the maximum rate of change of the pupil diameter as it constricts

or dilates. Constriction and Dilation max velocity "latencies" are the time from constriction or dilation onset (defined as a change in pupil diameter above a threshold velocity) to maximum constriction or dilation velocity.

In the Saccadic Clock test, the patient is instructed to follow a white dot when it jumps to one of 4 directions (outward motion) and then jumps back to the center of the field (inward motion). Metrics are calculated separately for each of the 4 clock hours and for the outward and inward saccades. Latency (ms) is the time from stimulus start to the initiation of the saccade. Saccade initiation is defined as the point in the eye movement data in which the rate of change increases over a velocity threshold. Duration (ms) is the duration of the saccade from initiation until the gaze angle trace slope decreases below a threshold. Amplitude is the distance travelled in the saccade from the saccade initiation time to the initiation time plus the Duration. Velocity (deg/s) – Max is the maximum velocity during the saccade.

In the Accelerating Circle test, the patient is instructed to follow a white dot that starts in the center of the field, jumps to a point on the circumference of a circle, and then smoothly traces the circumference of the circle, first at a constant velocity and then at a constant acceleration. Average accuracy is defined as the average deviation from the stimulus radius in degrees. Smooth pursuit breakdown velocity is the velocity of the stimulus target when smooth pursuit lags behind the accelerating target by an amount greater than a threshold. Velocity standard deviation is the standard deviation of the velocity over the smooth eye movements before smooth breakdown. Smooth pursuit error is calculated as the number of saccades in the smooth pursuit test.

Statistical Analysis:

All instrument data was entered manually into spreadsheets formatted for the FITBIR repository. No sufficient data has been collected for the acute mTBI group at the time the study was terminated to have sufficient sample size power for a final comprehensive data analysis. Only 32 acute mTBI subjects were paired with age-matched controls (1 – 7 years age difference, average 0.9 years). TBI and control metrics were evaluated using Welch's *t*-test assuming unequal variances and a two-sided hypothesis test. The R Studio software package was used for statistical analysis.

Results:

The only NODE variable that showed significant between group difference was the saccade error ($p = 0.028$). Appendix A shows the NODe's variable with no significance in sample means ($p > 0.05$) between mTBI and control populations.

Discussion:

The original power analysis determined that, when comparing all NODe metrics as independent variables between control and mTBI groups using Welch's t-test for independent variances, an effect size of 0.59 required 63 controls and 63 mTBI patients for an α of 0.05 and statistical power of 95%. Consequently, we did not have sufficient sample size to achieve adequate analytical power; therefore possibly rendering some variable inadequate to differentiate groups. The study shows that saccade error was the only NODe variable able to differentiate between groups. A further review of the NODe metrics comparing mTBI and controls shows that the relative differences between average values for the mTBI and control groups may yield many additional metrics that are significant in larger population. Appendix A includes NODe metrics in which the difference in sample averages is greater than 25%, and all metrics trend in the direction expected (e.g. latencies increased in the TBI population, standard deviations – STD's – increased in the acute mTBI population). The "Trend Match" column indicates whether the mTBI difference from controls is trending in the right direction,

e.g. if the average mTBI pupil response latency is higher than the average control pupil response latency, then the "Trend Match" column is TRUE.

Subtask 2: Define the clinical mTBI diagnosis as the gold standard and evaluate NODe metrics for sensitivity and specificity to diagnosed mTBI. Evaluate the likelihood of developing a bimodal threshold for mTBI screening assuming one or more clustered NODe metrics from the metrics in Table 7 of the Project Narrative: **INCOMPLETE**
The study was terminated before a complete data set required to accomplish this subtask was collected.

Major Task 2: Evaluate sensitivity and specificity of the NODe Establish relationship with existing clinical tools.
Subtask 1: Measure NODe's clinical performance. Measure how well NODe's test results correlate with the clinical diagnosis in the intended use populations. Specifically, how well clinical report results (e.g., clinical data and ANAM) of the mTBI diagnosis correlate with NODe's test results: **COMPLETED**

Additional test instruments used in the study include the Automated Neuropsychological Assessment Metrics (ANAM), Military Assessment of Concussion Evaluation (MACE version 02/2012, Form B), Womack mTBI Symptom Survey (version 20, Sports Concussion Assessment Tool (SCAT-3), November 2015), Convergence Insufficiency Symptom Survey (CISS), and the Womack Eye Exam.

Statistical Analysis:
All instrument data was entered manually into spreadsheets formatted for the FITBIR repository. No sufficient data has been collected for the acute mTBI group at the time the study was terminated to have sufficient sample size power for a final comprehensive data analysis. Only 32 acute mTBI subjects were paired with age-matched controls (1 – 7 years age difference, average 0.9 years). TBI and control metrics were evaluated using Welch's *t*-test assuming unequal variances and a two-sided hypothesis test. The R Studio software package was used for statistical analysis.

Results:
Appendix B includes the results of the additional test instruments *t*-test comparison between mTBI and control data. Shaded cells indicate variables that showed significant difference in the sample population means ($p < 0.05$).

Discussion:
The results show that all ANAM subcomponents, except for math processing, are reduced in the mTBI population compared to controls. In contrast, only time orientation, delay recall and total score of the MACE were affected in the mTBI population. Most symptoms evaluated by the WAMC mTBI Symptoms Questionnaire and the CISS show a significant difference between the groups. Similarly, most of the symptoms surveyed by the SCAT-3were affected in the mTBI population, but the SCAT-3 balance subtest showed no significant between group differences. Finally, the comprehensive eye exam performed by a neuro-optometrist was only significant for near point of convergence, negative accommodation, accommodation amplitude, distance vertical phoria, fixation disparity, Northeastern State University College of Optometry (NSUCO) and saccade accuracy. The latter is in agreement with the saccadic error that was found to be affected using the NODe. There was no significant change in visual field between group as determine by the Frequency Doubling Technology (FDT) field analyzer.

Subtask 2: Provide recommendations for integration of the NODe into the existing mTBI screening and injury recovery paradigm. Manuscript generation: **COMPLETED**

Conclusions: The study was terminated before a complete data set required to accomplish this subtask was collected. Current analysis of the data indicates that many data points being collected may be significant in differentiating mTBI from controls. While only one NODe data metric was significant, this was from the three NODe tests evaluated, and the number of TBI data sets evaluated was low. Increasing the number of acute mTBI patients and the number of NODe tests evaluated is likely to quickly produce data that will show significant differences between mTBI and control populations. Unfortunately, all NODe research has been halt by their manufacturer (Brian Holden Vision Diagnostic (BHVD)), therefore a new device will need to be developed to provide the promising testing capacity delivered by the NODe.

Specific Aim 3: NODe Data Sharing and DoD Strategic Roadmap Development. The data collected from the NODe system will be shared as per the Data Management and Data and Research Resources Sharing Plan documents. NODe data will not integrated with information systems at WAMC or other locations within the DoD in the proposed study. However, a roadmap for future required steps and insertion points for collected NODe data into outpatient (e.g., Armed Forces Health Longitudinal Technology Application [AHLTA]) and operational (e.g., Joint Trauma System) and other TBI-relevant databases (e.g., Federal Interagency Traumatic Brain Injury Research [FITBIR]) will be reported.

Major Task 1: Customized DoD-focused report generation.
Subtask 1: NODe results are translated into an operator-defined set of reports based on the NODe battery metrics that are most indicative of mTBI. The NODe reports will support provider decision-making in clinical and operational settings, as well as serving as a useful adjunct for guiding additional functional assessments or additional screening (e.g., advanced neuroimaging).
INCOMPLETE
The study was terminated before a complete data set required to accomplish this subtask was collected.

Major Task 2: Data research and resource sharing plan.
Subtask 1: Data collected will be compatible with the National Institute of Neurological Disorders and Stroke (NINDS) Common Data Elements (CDE). Provide quarterly datasets into FITBIR.
COMPLETED
Data collected for the 124 subjects have been analyzed and uploaded into FITBIR, as required by the award.

Major Task 3: NODe DoD transition plan and DoD strategic roadmap development.
Subtask 1: Delineate a phased innovation plan to move the NODe and future iterations of this technology to forward echelons of operational healthcare. **INCOMPLETE**
The study was terminated before a complete data set required to accomplish this subtask was collected.

Subtask 2: Develop DoD-focused documentation for operator-specific training purposes.
INCOMPLETE
BHVD stopped NODe development. The study was terminated before a complete data set required to accomplish this subtask was collected.

Subtask 3: Develop a DoD Strategic Roadmap for insertion of NODe data into AHLTA and other systems (Joint Trauma System). Evaluate the required technology translation capabilities (intended use in DoD locations, IM/IT insertion points, NODe operationalization, and telemedicine support) to create a roadmap of next steps within the final study report. IM/IT consultant (TBD) will provide guidance. **INCOMPLETE**
The study was terminated before a complete data set required to accomplish this subtask was collected. BHVD stopped NODe development.

- **What opportunities for training and professional development has the project provided?**

Nothing to Report

- **How were the results disseminated to communities of interest?**

Nothing to Report

- **What do you plan to do during the next reporting period to accomplish the goals?**

Nothing to Report

- **What was the impact on the development of the principal discipline(s) of the project?**

Nothing to Report

- **What was the impact on other disciplines?**

Nothing to Report

- **What was the impact on technology transfer?**

Nothing to Report

- **What was the impact on society beyond science and technology?**

Nothing to Report

IMPACT
Nothing to Report.

CHANGES/PROBLEMS
This study was terminated prior to completion for the following reason: On 20 February 2017, BHVD, the company providing the NODe, notified the PI that the parties interested in the BHVD assets were no longer pursuing the clinical trials or the NODe hardware. On 23 February 2017, BHVD notified all collaborators that their Research Agreement with Geneva would be terminated, effective 27 March 2017. On 10 April 2017, the PI received official notification from the USAMRAA Grants Officer indicating that it is in the best interest of the government to begin the close-out process for the subject award, and that the revised Statement of Work (SOW) "is outside the originally proposed SOW, which was selected for funding after it was evaluated for scientific merit and programmatic relevance."

PRODUCTS

- **Journal publications.**

Nothing to Report.

- **Books or other non-periodical, one-time publications.**

Nothing to Report

- **Other publications, conference papers, and presentations.**

Nothing to Report

- **Website(s) or other Internet site(s)**

Nothing to Report

- **Technologies or techniques.**

Nothing to Report

- **Inventions, patent applications, and/or licenses.**

Nothing to Report

- **What was the impact on technology transfer?**

Nothing to Report

- **Other Products?**

Nothing to Report

PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

- **What individuals have worked on the project?**

Name:	LTC Jose E. Capo-Aponte**,** O.D., Ph.D.
Project Role:	Principal Investigator (PI); Research Optometrist
Nearest person month worked:	7
Contribution to Project:	Provided overall study oversight, protocol development and amendments, ensuring adherence to the protocol, reporting any deviations from protocol, and reports preparation.
Funding Support:	Womack Army Medical Center

Name:	Wesley R. Cole, Ph.D.
Project Role:	Associate Investigator; Neuropsychologist
Nearest person month worked:	1
Contribution to Project:	Assisted with study oversight, protocol and amendments development, ensuring adherence to the protocol, reporting any deviations from protocol, recruiting, informed consent, and reports preparation.
Funding Support:	Defense and Veterans Brain Injury Center (DVBIC)

Name:	Barbara A. Wujciak, O.D., M.P.H.
Project Role:	Research Optometrist
Nearest person month worked:	14
Contribution to Project:	Assisted with amendments development, ensuring adherence to the protocol, recruiting, informed consent, data collection.
Funding Support:	Award

Name:	Joseph Dumayas, M.S.
Project Role:	Ophthalmic Assistant; Study Coordinator
Nearest person month worked:	19
Contribution to Project:	Coordinated research activities between team members of the Optometry Department and the Department of Brain Injury Medicine. In addition, conducted recruiting, consenting and data collection.
Funding Support:	Award

Name:	Jacques Arrieux, M.A.
Project Role:	Research Assistant
Nearest person month worked:	2
Contribution to Project:	Assisted with recruiting, consenting and data collection.
Funding Support:	Defense and Veterans Brain Injury Center (DVBIC)

Name:	Brad Bower, Ph.D.
Project Role:	Research Assistant
Nearest person month worked:	6
Contribution to Project:	Installed the NODe devices, trained research team in NODe administration, assisted with report preparation as well as FITBIR data entry and reporting
Funding Support:	Brien Holden Vision Diagnostics (BHVD) / Award

- **Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?**

Nothing to Report

- **What other organizations were involved as partners?**

Organization Name: Defense and Veterans Brain Injury Center (DVBIC)
Location: Womack Army Medical Center
Partner's contribution to the project: Collaboration.

Organization Name: Brien Holden Vision Diagnostics (BHVD)
Location: Womack Army Medical Center
Partner's contribution to the project: Collaboration. Also provided two NODe devices in-kind and associated training.

SPECIAL REPORTING REQUIREMENT
Nothing to Report

APPENDICES:
A – NODe – Non-significant NODe Results
B – Additional Test Instruments – *t*-test Comparison Between mTBI and Control

APPENDIX A
NODe – Non-significant NODe Results

NODe Metric	NODe Test	Control	mTBI	% Diff	Trend Match
STD Response Latency (ms)	Pupil Response	11.86	15.19	28	TRUE
STD Constriction Max Velocity (deg/ms)	Pupil Response	0.39	0.50	27	TRUE
STD Dilation Max Velocity Latency (ms)	Pupil Response	122.79	166.79	36	TRUE
Additional Saccades in Trial	Saccadic Clock	0.50	0.92	83	TRUE
STD Saccade Final Amplitude (deg)	Saccadic Clock	1.03	1.40	36	TRUE
Average Saccade Error (deg)	Saccadic Clock	1.30	1.65	27	TRUE
STD Saccade Error (deg)	Saccadic Clock	0.77	1.17	52	TRUE
STD Saccade Max Velocity (deg/ms)	Saccadic Clock	0.07	0.09	31	TRUE
Average Mean Error (deg)	Circle	1.22	3.06	152	TRUE
Average Velocity STD (deg/s)	Circle	10.85	39.38	263	TRUE
STD = standard deviation					

APPENDIX B
Additional Test Instruments – *t*-test Comparison Between mTBI and Control

Table 1. ANAM	*p*-value
Simple Reaction Time	4.60E-05
Simple Reaction Time Repeat	0.000520156
Procedural Reaction Time	0.002377814
Code Substitution Learning	0.006418175
Code Substitution Delayed	0.002534553
Math Processing	0.099382065
Match to Sample	0.004264635

Table 2. MACE	*p*-value
Orientation - Month	0.325052733
Orientation - Date	0.160568634
Orientation - Weekday	0.083098751
Orientation - Time	0.043548121
Immediate Memory	0.755831211
Concentration	0.051115918
Delayed Recall Total Score	0.009743908
Total Score	0.002742625

Table 3. mTBI Symptoms Questionnaire	*p*-value
Blurry vision at a distance	0.002566544
Blurry vision at near	0.001392693
Difficulty transitioning between distance and near	0.013729343
Pressure or pain behind or around eyes	0.004533737
Covering / closing one eye to see more clearly	0.200247166
Double vision	0.050557606

Fatigue / eyes feel tired with reading or computer	0.008011869
Headaches when reading / performing visual tasks	0.001695913
Losing your place when reading	0.00681285
Dizziness	0.00044125
Loss of balance	0.000269665
Difficulty in busy visual environments, i.e., mall, supermarket	0.002455707
Restricted field of vision / reduced peripheral vision	0.044880776
Difficulty with night time driving	0.246525091
Sensitivity to light	0.00798334
Burning, itching, redness or tearing	0.222895734

Table 4. SCAT-3	***p*-value**
Headache	3.22E-12
Pressure in Head	6.79E-10
Neck Pain	4.42E-07
Nausea or Vomiting	4.51E-05
Dizziness	5.00E-05
Blurred Vision	0.013727443
Balance Problems	0.013792319
Sensitivity to Light	0.000331218
Sensitivity to Noise	6.01E-05
Feeling Slowed Down	6.45E-07
Feeling like in a Fog	6.75E-05
Don't Feel Right	6.80E-07
Difficulty Concentrating	2.04E-08
Difficulty Remembering	4.44E-05
Fatigue or Low Energy	1.21E-05
Confusion	0.000142228
Drowsiness	0.000218043
Trouble Falling Asleep	0.044237143
More Emotional	0.00269436
Irritability	2.33E-05
Sadness	0.086573062
Nervous or Anxious	0.215787703
Symptoms get worse with Physical Activity	0.009366671
Symptoms get worse with Mental Activity	9.70E-07
Balance Error Scoring System - Double leg Stance Error	0.289048363
Balance Error Scoring System – Single leg Stance Error	0.451357755
Balance Error Scoring System – Tandem Stance Error	0.871089923
Balance Error Scoring System – Total Error	0.586241168

Table 5. CISS	***p*-value**
Eyes feel tired	0.001275563
Eyes feel uncomfortable	0.002606079
Headaches	0.001846038
Feel sleepy	0.026742823
Lose concentration	0.019927103
Trouble remembering what was read	0.031628822

Double vision	0.001420932
Words move, jump, or appear to float on the page	0.03358359
Feel read slowly	0.296858458
Eyes hurt	0.002337988
Eyes feel sore	0.005217738
Feel “pulling” around the eyes	0.009511568
Words blurring or coming in and out of focus	0.063246803
Lose place while reading	0.128195959
Need to re-read the same line of words	0.147049656
Total Score	0.008387581

Table 6. Eye Exam	***p*-value**
Distance Visual Acuity Uncorrected – Right Eye	0.37858266
Distance Visual Acuity Uncorrected – Left Eye	0.536833332
Distance Visual Acuity Corrected – Right Eye	0.325052733
Distance Visual Acuity Corrected – Left Eye	0.325052733
Near Visual Acuity Uncorrected – Right Eye	0.978810076
Near Visual Acuity Uncorrected – Left Eye	0.803788875
Near Visual Acuity Corrected – Right Eye	0.738204732
Near Visual Acuity Corrected – Left Eye	0.083098751
Near Point Convergence	0.000171995
Cover Test Distance	0.553546849
Cover Test Near	0.845101536
Negative Relative Accommodation	0.048774513
Positive Relative Accommodation	0.106365092
Accommodation Amplitude	7.98E-08
Distance Lateral Phoria	0.45795641
Near Lateral Phoria	0.087028362
Distance Vertical Phoria	0.043946794
Near Vertical Phoria	0.347292138
Near Base In Break	0.30046347
Near Base In Recovery	0.335517692
Near Base Out Break	0.280808584
Near Base Out Recovery	0.149215905
Wesson Fixation Test	0.048847111
NSUCO Saccade Ability	0.056166936
NSUCO Saccade Accuracy	0.030218852
NSUCO Saccade Head Movement	0.479915509
NSUCO Pursuit Ability	0.055972771
NSUCO Pursuit Accuracy	0.055972771
NSUCO Pursuit Head Movement	0.43132938
FDT Mean Deviation – Right Eye	0.272436686
FDT Pattern Deviation – Right Eye	0.494845013
FDT Mean Deviation – Left Eye	0.761761653
FDT Pattern Deviation – Left Eye	0.549470007