# Photobiomodulation as a new treatment for Dry Age Related Macular Degeneration.

Results from the Toronto and Oak Ridge Photobimodulation study in dry AMD (TORPA)

*Graham Merry 1, Robert Dotson 2, Robert Devenyi 3, Samuel Markowitz 3, Sophia Reyes 3.*

1: Photospectra Health Sciences Inc., Toronto, Ontario, Canada.

2: Photospectra Health Sciences Inc., Oak Ridge,Tennessee, U.S.A.

3: Department of Ophthalmology, University of Toronto, Toronto, Ontario, Canada.

**Purpose:** Evaluation of Photobiomodulation as a new treatment for dry age related macular degeneration. This is the first study globally to use low powered

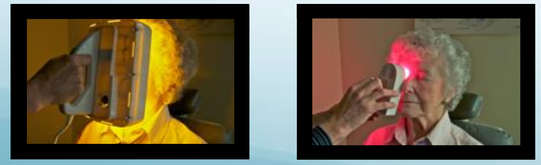
Light Emitting Diodes (LEDs) in AMD.

**Methods:**
IRB approved, prospective study. Subjects with dry AMD were consented and enrolled according to the protocol and outcome measures were assessed before and after the intervention. ETDRS Visual Acuity, Contrast Sensitivity and Fixation Stability (Bivariate contour elliptical area method) were assessed pre treatment, immediately post treatment and at 4, 6 and 12 month intervals.

Devices used were:
Warp10 (Quantum Devices) and Gentlewaves (Light Bioscience).

**Treatment Parameters:**
Warp10: 670nm +/- 15nm at 50-80 mW/cm2, 4-7.68 J/cm2, for 88 +/- 8 seconds.
Gentlewaves: 590nm +/- 8nm at 4mW, 790nm +/- 60nm at 0.6mW, for 35 seconds.
Subjects treated 18 times over a six week period with

both devices.



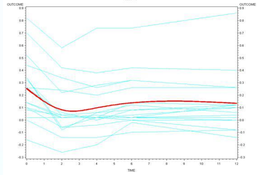
Subject undergoing treatment with the two devices

**Results:** The treatment protocol was completed in 18 eyes. Changes in visual acuity ($p<0.0001$) and contrast sensitivity ($p<0.0001$ at 3 cycles/degree and $p<0.0032$ at 1.5 cycles/degree) were positive and significant. There were no significant changes in

fixation stability parameters.

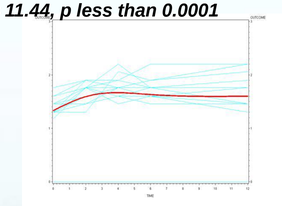
***Repeated measures ANOVA for ETDRS Visual Acuity (logMAR):***

***F(4,68) = 18.86, p less than 0.0001***



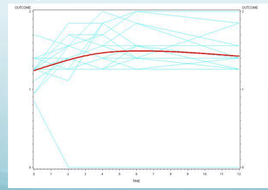
***Repeated measures ANOVA for Contrast sensitivity (3cycles/degree):***

***F(4,68) = 11.44, p less than 0.0001***



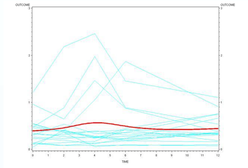
***Repeated measures ANOVA for Contrast Sensitivity (1.5 cycles/degree):***

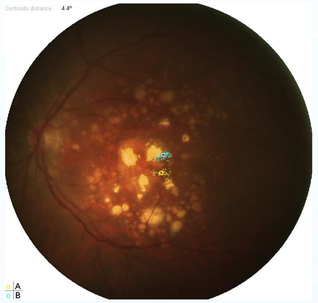
***F(4,68) = 4.39, p less than 0.0032***



***Repeated measures ANOVA for Fixation Stability (BCEA):***

***F(4,68) = 0.90, p less than 0.4661***





Fixation stability map showing BCEA and preferred retinal locus before and one year after treatment.

***Correlation analysis between Fixation Stability and ETDRS VA showed a Pearson R value of***

***0.6776, p less than 0.001***

**CONCLUSIONS:**

Within the cell, there is strong evidence to suggest that LLLT acts on the mitochondria to increase adenosine tri-phosphate (ATP) production , modulation of reactive oxygen species (ROS), and the

induction of transcription factors.

These transcription factors then cause protein synthesis that triggers further effects down-stream, such as increased cell proliferation and migration, modulation in the levels of cytokines, growth factors

and inflammatory mediators.

The precise biochemical mechanisms underlying the therapeutic effects of LLLT are not yet well established, however we have shown both clinically and significant improvement in visual acuity and

contrast sensitivity.

PBM is extremely well tolerated, there is no discomfort and the individual treatments are easily

dispensed taking less than 5 minutes per eye.

We believe the results obtained warrant further evaluation of PBM as an important, simple, safe and effective treatment in this potentially devastating disease where there are no proven treatments to

date.

*Author Disclosure Information:*
*Graham Merry, Photospectra Health Sciences Inc. (E)*
*Robert Dotson, US Patent 7479136 (P)*
*Robert Devenyi, None*
*Samuel Markowitz, None*

*Sophia Reyes, None*