



THE LUTEIN ANTIOXIDANT SUPPLEMENTATION TRIAL

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KEY CONCLUSIONS

- *Supplementation with 10 mg/day of FloraGLO® Lutein –significantly increased MPOD in this study.*
- *Visual function was improved in this study with FloraGLO Lutein supplementation alone or together with other nutrients.*
- *This study provides evidence that atrophic AMD may be a lutein responsive disorder.*

Based on the article by Richer S, Stiles W, Statkute L, Pulido J, Frankowski J, Rudy D, Pei K, Tsipursky M, and Nyland J. Double-masked, placebo-controlled, randomized trial of lutein and antioxidant supplementation in the intervention of atrophic Age-Related Macular Degeneration: the Veterans LAST study (Lutein Antioxidant Supplementation Trial), *Optometry* 2004; 75:216-230.

INTRODUCTION

For the past decade there has been substantial scientific research showing the benefits of the dietary carotenoid lutein in Age-Related Macular Degeneration (AMD) [1-3]. Efficacy and safety studies have justified the scientific basis behind free-lutein supplementation and reduction of AMD risk [4, 5]. Additionally, state-of-the-art ophthalmologic techniques [6] as well as new methods of measuring surrogate biomarkers for lutein action in human macula [7] are largely contributing to new discoveries in this field, yielding results consistent with previous findings, thus supporting the large consensus regarding the suitability of lutein in reducing the risk of human macular health conditions. In this context, the evidence of effectiveness of lutein in AMD is enhanced with the publication of the peer-reviewed article known as the Lutein Antioxidant Supplementation Trial (LAST, 8). In this study the data regarding the benefits of lutein supplementation on atrophic AMD – the most common type of AMD – is extensively described.

OBJECTIVE

The objective of this study was to assess the effect of lutein alone and in combination with a set of additional carotenoids, antioxidants, vitamins, and minerals on the macular pigment and on the main ophthalmic parameters that evaluate central vision integrity in atrophic AMD.

STUDY DESIGN

This prospective, placebo-controlled, randomized and double-blind clinical trial was performed during 12 months, with a crossover design for 4 additional months. The details are summarized in **Table 1**. Basically, 90 predominantly male veterans with objective signs and symptoms of atrophic AMD were selected by an ophthalmologist and randomly assigned to one of three groups. Ten mg of FloraGLO Lutein were administered daily in the supplemented groups using a twice-a-day administration regimen in the form of capsules. Subjects in group 1 were supplemented with FloraGLO Lutein alone, subjects in group 2 with a more complete nutritional supplement that also contained FloraGLO Lutein.

The ingredients in the supplement given to group 2 included (but are not limited to) vitamins A, C, E, D₃ and B complex, Zn, Cu, Se, Mn, L-Glutathione and Taurine. Patients in group 3 received a placebo capsule.

Table 1. Summary of LAST Design

| LAST Design | |
|--------------------------|--|
| Type of Study | <ul style="list-style-type: none"> ⇒ Twelve months with a crossover design for four additional months ⇒ Prospective, randomized, double-blind, placebo controlled |
| Patients Assigned | <ul style="list-style-type: none"> ⇒ Ninety predominately male veterans with atrophic AMD diagnosed by a retinologist ⇒ Age: 74 +/- 7.1 years |
| Treatment | <ul style="list-style-type: none"> ⇒ Group 1 (n=29): 10 mg FloraGLO Lutein (5mg twice daily); ⇒ Group 2 (n=30): 10 mg FloraGLO Lutein plus antioxidants ⇒ Group 3 (n=31): Placebo |
| Measurements | <ul style="list-style-type: none"> ⇒ Macular Pigment Optical Density (MPOD); ⇒ Photo-Stress Recovery ⇒ Contrast Sensitivity Function ⇒ Visual Acuity |

Significant inter-group differences did not exist at baseline regarding age, years diagnosed with AMD, smoking, caffeine/alcohol use, iris color, multivitamin use, and dietary lutein and iron intakes. There were also no differences in cataract or ocular lens opacification parameters, visual acuity, glare recovery, contrast sensitivity, or absence of scotomas on Amsler grid testing.

Ophthalmic tests were performed at baseline and revisited every 4 months until the end of the study. State-of-the-art ophthalmologic techniques were used to measure the results: Heterochromatic flicker photometry was used to assess the *macular pigment optical density* (MPOD) both foveally and extra-foveally. The time needed to read a low-contrast line of print following an intense temperature light, focused on the eye of each subject, was used to test *glare recovery*. Random presentation of distance Snellen letters on a computer screen, under low-light conditions, was used to measure *distance visual acuity* whereas low and high contrast SKILL test targets assessed *near visual acuity*. A special system evaluating the least amount of contrast needed to detect visual stimuli measured *contrast sensitivity*, an early function of selective retinal abnormalities. Amsler test, a grid with a standard pattern of straight lines, was performed to assess defects of central vision such as distortions of lines, known as *metamorphopsias* and visual spots, known as *scotomas*. Finally, VFQ-14 questionnaires, the same rating scale used by the National Eye Institute measured activities of *daily living*, *night driving* and *glare adaptation disturbance* associated with AMD.

A complete statistical analysis was performed to disregard bias factors such as inter-group differences in dietary factors, the group differences in the main ophthalmic outcome variables or the influence of time and intrinsic error of the method.

RESULTS

One of the most important results obtained was the increase in MPOD, 36 and 43%, in groups 1 and 2, respectively ($p=0.03$ between baseline and final visit). Additionally, lutein supplementation showed significant improvements in objective visual function parameters, which are summarized in **Table 2**.

Table 2. Summary of the LAST Results

| Parameter | Group 1 | Group 2 | Group 3 |
|-----------------------------------|---|---|--|
| | Lutein | Lutein + Antioxidants | Placebo |
| MPOD | 36% Increase | 43% Increase | Decreased slightly |
| Time for Photo-Stress Recovery | Recovery time decreased by 23.7 seconds | Recovery time decreased by 34.7 seconds | Recovery time decreased by 22.7 seconds |
| Function of Contrast Sensitivity | Significant improvement | | NSSC |
| Visual Acuity | Near (Both eyes) | Increased 5.4 Snellen equivalent letters (about 1 line of visual acuity on SKILL test target) | Decreased 0.2 Snellen equivalent letters |
| | Distance (Right eyes) | -0.10 LogMAR | -0.14 |
| | Distance (Left eyes) | -0.03 log MAR | +0.05 |
| Quality of Vision (VFQ-14) | Trend in subjective visual improvements | | NSSC |
| Visual Improvements (Amsler grid) | Significant improvement | Net improvement, but not significant | NSSC |
| Side Effects | No significant adverse effects reported | | |

NSSC-No statistically significant change

MAR – Minimal angle of resolution. Negative numbers of LogMAR denote improvement

CONCLUSIONS

The authors of the LAST study conclude that the improvements seen in this study may be due to the protective role of lutein as a blue light filter and as an antioxidant, quenching the triplet state of photosensitizers and singlet oxygen. The LAST study indicates what scientific evidence has been unveiling for many years now: lutein may play an important role in eye health as a useful bioactive agent in reducing the risk of AMD. Using MPOD as a biomarker of macular health (9), significant increases in MPOD were observed in the lutein supplemented groups. Low MPOD has been associated with increased AMD risk. Therefore, the results from this study strongly suggest that AMD may be a lutein responsive disorder. Moreover, the specific and extensive battery of ophthalmic tests performed in the LAST study - measuring objective central vision outcomes - are consistent with the increase in MPOD, suggesting a link between MPOD and visual function.

Finally, the wealth of scientific literature supporting the role of lutein in eye health, in conjunction with the observations of the LAST study suggests that lutein supplementation may be beneficial to people without atrophic AMD as well, because it may increase MPOD and reduce AMD risk.

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