

## Macular Degeneration – Macular Edema – Retinal Disease

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### **Low-level laser therapy improves vision in patients with age-related macular degeneration.**

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Abstract Objective: The objective of this study of a case series was to examine the effects of low-level laser therapy (LLLT) in patients with age-related macular degeneration (AMD). Background Data: AMD affects a large proportion of the elderly population; current therapeutic options for AMD are limited, however. Patients and Methods: In total, 203 patients (90 men and 113 women; mean age 63.4 +/- 5.3 y) with beginning ("dry") or advanced ("wet") forms of AMD (n = 348 eyes) were included in the study. One hundred ninety-three patients (mean age 64.6 +/- 4.3 y; n = 328 eyes) with cataracts (n = 182 eyes) or without cataracts (n = 146 eyes) were treated using LLLT four times (twice per week). A semiconductor laser diode (780 nm, 7.5 mW, 292 Hz, continuous emission) was used for transconjunctival irradiation of the macula for 40 sec (0.3 J/cm<sup>2</sup>) resulting in a total dose of 1.2 J/cm<sup>2</sup>. Ten patients (n = 20 eyes) with AMD received mock treatment and served as controls. Visual acuity was measured at each visit. Data were analyzed retrospectively using a t-test. Results: LLLT significantly improved visual acuity (p < 0.00001 versus baseline) in 162/182 (95%) of eyes with cataracts and 142/146 (97%) of eyes without cataracts. The prevalence of metamorphopsia, scotoma, and dyschromatopsia was reduced. In patients with wet AMD, edema and bleeding improved. The improved vision was maintained for 3-36 mo after treatment. Visual acuity in the control group remained unchanged. No adverse effects were observed in those undergoing therapy. Conclusion: In patients with AMD, LLLT significantly improved visual acuity without adverse side effects and may thus help to prevent loss of vision

[Retina.](#) 2008 Apr;28(4):615-21.

### **Large-spot subthreshold infrared laser to treat diabetic macular edema.**

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**PURPOSE:** To evaluate the efficacy of a large-spot subthreshold infrared laser protocol to treat diabetic maculopathy. **METHODS:** In a prospective, fellow eye, controlled case series, all patients had clinically significant diabetic macular edema (DME) treated with a single application of subthreshold infrared (810 nm) laser. If bilateral disease was present, the fellow eye was treated with conventional macular laser. The study was to include 20 patients. Visual acuity and central macular thickness (CMT) measured by optical coherence tomography (OCT) were assessed in the study and fellow eyes at baseline and 6 months, and any changes were compared. **RESULTS:** The 11th patient developed a choroidal infarct with subsequent profound loss of vision immediately after treatment. The study was terminated prematurely at this point. For the remaining 10 patients, there was a trend toward improvement in visual acuity in the study eye compared with the fellow eye at the 6-month follow-up (median change: +1.5 letters for study eye vs -6.5 letters for fellow eye;  $P = 0.08$ ). There was also significant improvement in OCT-measured CMT in the study eye (mean decrease, 117 microm) compared with deterioration in OCT-measured CMT in the fellow eye (mean increase, 24 microm;  $P = 0.02$ ). **CONCLUSION:** This subthreshold infrared laser protocol led to improvement in OCT-measured CMT and stabilization of vision in most subjects. The current protocol is however unpredictable and should not be used in the treatment of DME without further modification.

[Ophthalmology](#). 2006 Dec;113(12):2237-42. Epub 2006 Sep 25.

## **Subthreshold grid laser treatment of macular edema secondary to branch retinal vein occlusion with micropulse infrared (810 nanometer) diode laser.**

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**PURPOSE:** To compare the effectiveness of subthreshold grid laser treatment (SGLT) with an infrared micropulse diode laser with that of threshold grid laser treatment (TGLT) for macular edema secondary to branch retinal vein occlusion (BRVO). **DESIGN:** Randomized clinical trial. **PARTICIPANTS:** Thirty-six patients (36 eyes) were randomized either to infrared SGLT (17 eyes) or to krypton TGLT (19 eyes). **METHODS:** Complete ophthalmic examinations, including determination of visual acuity (VA) with Early Treatment Diabetic Retinopathy Study charts, optical coherence tomography (OCT), and fluorescein angiography, were performed at the time of the study entry and at 6-month intervals, with a planned follow-up of 24 months. **MAIN OUTCOME MEASURES:** Primary: decrease in mean foveal thickness (FT) on OCT. Secondary: changes of the total macular volume (TMV) over the follow-up, proportion of eyes that gained at least 10 letters (approximately  $\geq 2$  lines of VA gain) at the 12- and 24-month examinations, and timing of macular edema resolution. **RESULTS:** Changes in mean FT and TMV from the initial values were statistically significant for TGLT from the 6-month examination ( $P < 0.001$ ) and for SGLT from the 12-month examination

( $P < 0.001$ ). After 1 year, there was no difference in mean FT and TMV between the 2 groups. At the 12-month examination, 10 patients of the SGLT group (59%) and 11 of the TGLT group (58%) gained at least 10 letters (2 lines) in VA. At the 24-month examination, this gain was achieved by 11 patients (65%) of the SGLT group and 11 (58%) of the TGLT group. Moreover, at the 24-month examination 59% and 26% gained 3 lines in the SGLT and TGLT groups, respectively. **CONCLUSIONS:** Resolution of macular edema and VA improvement are similar to those obtained with conventional TGLT, but SGLT is not associated with biomicroscopic and angiographic signs. A multicenter randomized clinical trial would be needed to ascertain the real efficacy and the most appropriate settings of SGLT for macular edema secondary to BRVO.

[Vestn Oftalmol.](#) 2004 Nov-Dec;120(6):5-8.

### **[Dependence of the efficiency of low-intensity laser therapy in involution chorioretinal dystrophy on a used wavelength]**

[Article in Russian]

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Seventy-five patients (75 eyes) with central involution chorioretinal dystrophy (non-exudative type at the progression stage) were followed up. All of them received low-intensity laser therapy. Irradiation of 890 nm, 644 nm and 500 nm was used in groups 1, 2 and 3, respectively. The study purpose was to compare the efficiency of wavelengths. Visual acuity and retinal sensitivity were determined. The results were evaluated immediately after treatment and in 3 months. The maximal improvement in visual acuity and retinal sensitivity was in those who received 890 nm laser therapy; 500 nm irradiation--a less pronounced effect and 640 nm--the lowest one. We attribute such distribution of efficiency to a proliferation type of each irradiation range in the macular zone.

[Ophthalmology.](#) 1999 Nov;106(11):2082-90.

### **Therapeutic benefits of infrared (810-nm) diode laser macular grid photocoagulation in prophylactic treatment of nonexudative age-related macular degeneration: two-year results of a randomized pilot study.**

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**OBJECTIVE:** This pilot study collected preliminary information on the effectiveness and safety of infrared (810-nm) diode laser macular grid photocoagulation in patients with nonexudative age-related macular degeneration (AMD). Results from this pilot study were used in designing a larger, multicenter, randomized clinical trial. **DESIGN:** A multicenter, randomized, controlled, clinical trial. **PARTICIPANTS:** A total of 229 eyes of 152 patients with AMD were enrolled in the pilot study. Seventy-five patients with 1 eye eligible (75 eyes) were enrolled in the unilateral arm of the study; 77 patients with both eyes eligible (154 eyes) were enrolled in the bilateral arm of the study. In the unilateral study arm, 32 eyes were randomized to the observation group, 27 eyes were treated with visible endpoint burns, and 16 eyes were treated with invisible endpoint (subthreshold) lesions. In the bilateral study arm, 77 eyes were in the observation group, 36 eyes were treated with visible burns, and 41 eyes were treated with subthreshold (invisible) lesions. **INTERVENTION:** Eyes were treated with infrared (810-nm) diode laser macular grid photocoagulation using either visible burns or subthreshold (invisible) lesions and compared to eyes receiving no treatment. **MAIN OUTCOME MEASURES:** Reduction of drusen, change in visual acuity, and rate of choroidal neovascularization (CNV) membrane formation. **RESULTS:** At 12 months after treatment, 62% of eyes treated with visible burns had a clinically significant reduction in drusen, whereas this proportion (65%) was reached in 18 months for eyes treated with subthreshold lesions. At 24 months' follow-up, treated eyes had a significant reduction in drusen compared to observation eyes ( $P < 0.0001$ ). Visual acuity was significantly improved in treated eyes at 12, 18, and 24 months compared to observation eyes ( $P < 0.001$ ). Choroidal neovascularization formation was similar in treated and observation eyes through 24 months' follow-up. Complications included CNV associated with six eyes treated with visible burns and a juxtafoveal laser scar in one eye treated with visible burns. **CONCLUSIONS:** Infrared (810-nm) diode laser macular grid photocoagulation in patients with nonexudative AMD significantly reduces drusen levels ( $P < 0.0001$ ) and significantly improves visual acuity ( $P < 0.001$ ) when either visible endpoint burns or subthreshold endpoint lesions are used. Complications were fewer using subthreshold endpoint lesions. A larger, multicenter, prospective clinical trial with longer follow-up is needed to determine the efficacy of treatment in reducing the rate of CNV formation. Data from this clinical pilot study have been used to design the Prophylactic Treatment of AMD Trial (PTAMD), a multicenter, randomized, prospective clinical trial currently in progress comparing subthreshold (invisible) treatment to observation in eyes with nonexudative AMD.

[Ophthalmology](#). 1997 Dec;104(12):2030-8.

## **The treatment of macular disease using a micropulsed and continuous wave 810-nm diode laser.**

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**OBJECTIVE:** The purpose of the study is to determine whether the 810-nm diode wavelength using a rectangular waveform is clinically effective in the treatment of choroidal neovascularization from age-related macular degeneration and to determine whether macular edema secondary to branch vein occlusion or diabetic retinopathy can be effectively treated with this laser using the micropulse waveform. **DESIGN:** Review of consecutive nonrandomized patients whose eyes were treated with the diode laser over a 30-month period. **PARTICIPANTS:** Fifty-three patients with an initial presentation of choroidal neovascularization located subfoveally (77%), extrafoveally (17%), and juxtafoveally (6%); 14 patients with macular edema from a branch vein occlusion; and 59 patients with diabetic macular edema, 40 of which were treated for the first time. **INTERVENTION:** Ablative rectangular wave laser photocoagulation was applied to the choroidal neovascular membranes and very light threshold treatment was applied in a macular grid to treat retinal edema. Microaneurysms were not targeted. **MAIN OUTCOME MEASURES:** Anatomic resolution of macular edema or choroidal neovascularization and visual acuity. **RESULTS:** Sixty percent of eyes treated for choroidal neovascularization had no persistence or recurrence at 6 months, and 72% achieved visual stabilization. In 8% of eyes, some localized bleeding occurred during photocoagulation. Clinical resolution of macular edema from branch vein occlusion occurred by 6 months in 92% of eyes, and 77% had stabilization of visual acuity. At 6 months, 76% of newly treated patients with diabetic macular edema and 67% of previously treated patients had clinical resolution of their edema. Vision was improved or stabilized in 91% and 73% of newly treated and retreated patients at 6 months, respectively. **CONCLUSIONS:** The micropulsed 810-nm diode laser is clinically effective in the treatment of macular edema from venous occlusion and diabetic retinopathy, and the rectangular (normal) mode diode laser can be used in many eyes with choroidal neovascularization.

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### **[New method of atherosclerotic macular dystrophies treatment]**

[Article in Russian]

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The authors analyze the results of treating atherosclerotic maculodystrophies by direct laser phoresis. The method consists in insertion of a collagen infusion system in Tenon's space. Drugs (nicotinic acid or xanthinol nicotinate) are delivered to the posterior compartment of the eye through this system. Then a light guide is inserted in the tube and a 2-min session of low-intensity He-Ne laser exposure is performed at a wavelength of 630 nm, and 10 mWt/cm<sup>2</sup> flow power density (7 to 10 sessions per course). Clinical studies showed that vision acuity increased by an average of 0.08 diopters, or by 40% of the initial level, in 72% of cases. The peripheral visual field extended by an average of 51.4 degrees for 8 meridians in 95% of patients. The index of critical frequency of flashings fusing and the frequency-contrast characteristics improved in 85% of cases. The

rheography improved by 34.5% of the initial level. A stable improvement was observed for 12 months after a course of direct laser phoresis in 97.5% of patients. Hence, the new method is simple and recommended for the treatment of atherosclerotic maculodystrophies.