


**RETINOPATHY of PREMATURITY**

<b><i>Laser Indirect Photocoagulation</i></b>	
<b>ROP-LI1 Laser Photocoagulation for Stage 3+ Retinopathy of Prematurity</b> McNamara A, Tasman W, Brown G, Federman J. Ophthalmology 98:576-580, 1991	Twenty-two infants with "threshold" stage 3+ retinopathy of prematurity were entered into a prospective, randomized clinical trial to compare the efficacy of transscleral cryotherapy versus laser photocoagulation delivered by the indirect ophthalmoscope. The results suggest that laser therapy is as effective as cryotherapy in the treatment of ROP.
<b>ROP-LI2 Laser Photocoagulation for Threshold Retinopathy of Prematurity</b> Iverson D, Trese M, Orgel I, Williams G. Arch Ophthalmol 109:1342-1343, 1991	Twelve eyes were randomized to photocoagulation or cryotherapy for treatment of threshold stage 3 (TS 3) ROP. The mean number of freezing applications was 51, ranging from 46 to 61. The mean number of photocoagulation burns was 410, ranging from 138 to 655. Regression was evident within 7 to 10 days after a single treatment with either modality in 10 of 12 eyes. All eyes undergoing photocoagulation appeared less inflamed and had less conjunctival chemosis in the period immediately after therapy. Although longer follow-up is required, laser therapy appears at least as effective as cryotherapy in inducing regression of TS 3 ROP.
 <b>ROP-LI3 Diode Laser Photocoagulation for Retinopathy of Prematurity</b> McNamara A, Tasman W, Vander J, Brown G. Arch Ophthalmol 110:1714-1716, 1992	In a prospective, randomized clinical trial comparing transscleral cryotherapy with laser photocoagulation in the treatment of "threshold" stage 3+ ROP, 32 infants were treated with 810 nm diode laser photocoagulation in one eye. The results suggest that diode laser photocoagulation is as effective as cryotherapy in the treatment of ROP.
<b>ROP-LI4 Photocoagulation with the Laser Indirect Ophthalmoscope for Retinopathy of Prematurity</b> Benner J. Seminars in Ophthalmology 7:177-181, 1992	A comparison of argon and diode infrared laser photocoagulation using the LIO for ROP was found to be equally effective for treating threshold ROP. This article also discusses the technique for LIO photocoagulation.
<b>ROP-LI5 Transient Punctate Lenticular Opacities as a Complication of Argon Laser Photoablation in an Infant with Retinopathy of Prematurity</b> Drack A, Burke J, Pulido J, Keech R. Am J of Ophthalmol 113:583-584, 1992	Twin girls were diagnosed with ROP 6 weeks after birth. One twin received bilateral peripheral laser photoablation with the diode laser through an indirect ophthalmoscope delivery system. The other twin received argon laser photoablation using an indirect delivery system. Results: Laser treatment is easier to perform than cryotherapy on infants with posterior disease. However, the cataractogenic effect of argon wavelengths should be considered when using this treatment modality for ROP.
<b>ROP-LI6 Comparison of Photocoagulation with the Argon, Krypton, and Diode Laser Indirect Ophthalmoscopes in Rabbit Eyes</b> Benner J, Huang M, Morse L, Hjelmeland L, Landers M. Ophthalmology 99:1554-1563, 1992	Photocoagulation was performed with argon green, krypton red, and diode infrared laser indirect ophthalmoscopes in a grid pattern within one sector of the same eye of 14 Dutch-belted rabbits. Results showed photocoagulation with the argon green, krypton red, or diode infrared laser indirect ophthalmoscopes is a safe and effective method of retinal ablation.

<p><b>ROP-LI7 Diode Laser Photocoagulation for Prethreshold, Posterior Retinopathy of Prematurity</b> Fleming T, Runge P, Charles S. Am J Ophthalmol 114:589-592, 1992</p>	<p>Nine infants with posterior ROP were treated by using the 810 nm diode laser through an indirect ophthalmoscopic delivery system. Treatment was commenced as soon as plus disease (defined as tortuosity and dilation of posterior vessels) developed. Laser burns were applied to the avascular retina for 360 degrees, all the way to the ora serrata. Spots were placed one half burn width apart by using a dull gray-white laser photocoagulation mark as the endpoint. Both eyes of each patient were treated in the same session. All 18 eyes showed complete regression of the plus disease.</p>
<p><b>ROP-LI8 Diode Laser for Retinopathy of Prematurity - Early Outcome</b> Goggin M, O'Keefe M. Br J Ophthalmol 77:559-562, 1993</p>	<p>Twenty-one eyes received diode laser retinal photocoagulation using an 810 nm IRIS Medical OcuLight SL diode laser system within 36 hours of the observation of threshold disease. Follow-up examination was carried out by 1 week after laser treatment and later frequency of examination depended on the response to treatment. Regression was noted, on average, 5 days after application of laser therapy. This study confirms diode laser photocoagulation is an effective treatment for threshold ROP and further controlled trials are needed to refine it.</p>
<p><b>ROP-LI9 Comparison of Cryotherapy and Diode Laser Indirect Ophthalmoscope (LIO) Photocoagulation for Stage 3+ Retinopathy of Prematurity</b> Tiwari R, Lerebours F, Kilmanjaro H. [ARVO Abstract]. Invest Ophthalmol Vis Sci. 34(4): 837. Abstract nr 667, 1993</p>	<p>Twenty eyes were treated with cryotherapy and 12 eyes were treated with 810 nm diode photocoagulation. The diode laser was performed with the setting of 200-300 mW power and 0.2 sec. duration with a 20D lens. Sixteen of the 20 (80%) of cryotherapy treated eyes and 12 of 12 (100%) diode laser treated eyes had a favorable outcome. Post operatively, the diode laser treated eyes did not have conjunctival chemosis or lid edema. After a minimum follow-up of 6 months, results suggest that diode laser photocoagulation is an effective modality in preventing blindness in neonates with threshold Stage 3+ ROP.</p>
<p><b>ROP-LI10 Laser Treatment for Retinopathy of Prematurity</b> McNamara A. Current Opinion in Ophthalmology 4:76-80, 1993</p>	<p>The author compares a multicenter trial of cryotherapy with a separate 810 nm diode laser photocoagulation study to determine whether laser photocoagulation is as effective as cryotherapy in reducing the likelihood of an unfavorable result in threshold, stage 3+ ROP and to determine any differences in the incidence of complications between the two modes of therapy. Laser photocoagulation has been shown to decrease the likelihood of an unfavorable outcome in the treatment of threshold stage 3+ ROP, is particularly useful in the management of posterior ROP, and should be applied at an earlier stage of disease when ROP involves zone I or posterior zone II.</p>
<p><b>ROP-LI11 A Comparison of Argon and Diode Photocoagulation Combined with Supplemental Oxygen for the Treatment of Retinopathy of Prematurity</b> Benner J, Morse L, Hay A, Landers M. Retina 13:222-229, 1993</p>	<p>The efficacy of argon and diode laser photocoagulation of the avascular peripheral retina for threshold ROP was compared in a prospective trial. The study group included nine premature infants (17 eyes). One eye was treated with the 810 nm diode laser indirect ophthalmoscope and the fellow eye was treated with the argon LIO. The mean duration of the follow-up period was <math>9.7 \pm 2.6</math> months. Two patients sustained burns of the tunica vasculosa lentis and anterior lens capsule in the argon laser treated eye but not in the fellow diode treated eye. All 17 eyes had complete regression of ROP and favorable outcomes. The diode and argon LIO appear to be equally effective in treating threshold ROP. The diode LIO appears to have advantages over the argon LIO systems for treating advanced ROP.</p>

<p><b>ROP-LI12 Diode Laser Photocoagulation for Threshold Retinopathy of Prematurity. A Randomized Study</b> Hunter DG, Repka MX. Ophthalmology 100:238-244, 1993</p>	<p>Patients were enrolled under a prospective, randomized protocol. One eye of each patient with symmetric, threshold ROP was treated with an 810 nm diode laser, while the other eye was treated with cryotherapy. Compared with cryotherapy, the diode laser was more convenient, technically easier to administer, and better tolerated by the patient. Diode laser peripheral retinal ablation appeared to be as effective as cryotherapy for the treatment of threshold ROP.</p>
<p><b>ROP-LI13 Diode Laser Photocoagulation for Zone 1 Threshold Retinopathy of Prematurity</b> Capone A, Diaz-Rohena R, Sternberg P, Mandell B, Lambert M, Lopez P. Am J Ophthalmol 116:444-450, 1993</p>	<p>The 810 nm diode LIO was used to treat 17 infants (30 eyes) with zone 1 threshold ROP. Diode laser photoablation of the peripheral retina was found to be an effective treatment for threshold ROP located in zone 1. The authors note that some advantages of the diode laser system are its portability and ease of use, precision of treatment, and minimal post-procedural adnexal inflammation.</p>
<p><b>ROP-LI14 Argon Laser-induced Cataract in an Infant with Retinopathy of Prematurity</b> Pogrebniak A, Bolling J, Steward M. Am J Ophthalmol 117:261-262, 1994</p>	<p>Ablation of peripheral retina with an argon laser indirect ophthalmoscope was recommended to treat a 10 1/2 week old boy with stage I, posterior zone II ROP in the right eye and stage 1, zone 1 ROP in the left eye with plus disease in both eyes. By 2 weeks after treatment, a fibrin clot had appeared in the anterior chamber and a cataract was detectable in the right eye. The treatment parameters for the right eye were 2,552 applications, 0.70- to 1.00-W power, and 0.2- second duration. The authors believe that absorption of laser energy may have resulted in rupture of the lens capsule and in the development of a mature cataract with associated intraocular inflammation. This case demonstrates the need for considering the risk of cataract in determining the role of laser photocoagulation for treatment of ROP.</p>
<p><b>ROP-LI15 Treatment of the "Rush Form" ROP: Diode Laser - Interferon vs. Cryotherapy</b> Gagliano C, Scuderi A, Di Pietro M, Saporito N, Tina G, Reibaldi A. Institute of Ophthalmology, Univ. of Catania, Italy [ARVO Abstract]. Invest Ophthalmol Vis Sci. 35(4): 1440. Abstract nr 861, 1994</p>	<p>Eight newborns (16 eyes) with ROP "rush form" were observed and randomized into two treatment groups to compare the efficacy of the diode laser treatment in association with interferon (IFN) therapy and cryotherapy in "rush form" ROP. The first group (8 eyes) was treated with 810 nm diode laser in the peripheral retina anteriorly to the ridge and medical treatment was started with IFN alfa 2b at variable dosage according to body surface for 10 weeks. The second group (8 eyes) was treated with cryotherapy. Favorable outcome was observed in five eyes (62.5%) in the first group and in two eyes (25%) in the second group. Analysis of the unfavorable outcome for each infant revealed that diode laser-IFN therapy reduces the risks of new hemorrhages, retinal detachment and retinal fold. Conclusions: The association of diode laser and IFN therapy could have efficacy in the "rush form" ROP treatment but the small number of cases due, to the infrequency of the disease, needs a multicenter study to establish the validity of this therapy.</p>
<p><b>ROP-LI16 Indirect Diode Laser Photocoagulation for Threshold and Posterior Pre-threshold Retinopathy of Prematurity</b> Margolis T, Duker J, Reichel E, Puliafito C. Vitreoretinal Service, New England Eye Center, Tufts Univ. School of Medicine, Boston, MA [ARVO Abstract]. Invest Ophthalmol Vis Sci. 35(4): 1443. Abstract nr 877, 1994</p>	<p>One hundred and twenty infants were screened for ROP of which 13 (22 eyes) underwent 810 nm diode laser treatment to determine if indirect diode laser photocoagulation is effective in producing a favorable outcome in infants with severe ROP. The mean gestational age at birth was 26 weeks with a mean birthweight of 792 grams. Eight eyes (36%) had posterior prethreshold disease at the time of treatment while 14 (64%) had reached threshold. Patients were followed for an average of 12 weeks after laser treatment. Of five eyes requiring</p>

	<p>retreat-ment, two had unfavorable outcomes. Overall, five eyes (23%) had unfavorable outcomes including one (12%) in the prethreshold group and four (28%) in the threshold group. No complications were associated with any of the treatments. Conclusion: Diode laser photocoagulation for severe ROP appears to be as effective as cryotherapy in preventing unfavorable outcomes and offers several advantages in terms of safety, side effects, and cost.</p>
<p><b>ROP-LI17 Diode Laser Indirect Ophthalmoscope Treatment of Threshold Retinopathy of Prematurity</b> Reibaldi A, Biondi P, Di Pietro M, Scuderi A. Video Presentation V37. XXVIIth ICO. Toronto, Canada June, 1994</p>	<p>Fourteen premature newborns (28 eyes) with threshold ROP (five contiguous or eight cumulative 30° clock hours of stage 3 ROP in zone I or II, with plus disease), were treated with the 810 nm diode laser indirect ophthalmoscope with topical anesthesia in zone 1. The patients were followed for 6 to 12 (average 7.4) months. In 24 eyes (86%), regression of the ridge and plus was noted, while in 4 eyes (14%) an unfavorable outcome was observed (stage 4 ROP treated with scleral buckling in 1 eye, macular fold in 1 eye, stage 5 ROP treated with open-sky vitrectomy in 1 eye, and stage 5 ROP in 1 eye, which was not treated because of the poor visual prognosis). Our results suggest that the efficacy of diode laser treatment in ROP is comparable to that of cryotherapy, but the diode laser is less aggressive to the sclera.</p>
<p><b>ROP-LI18 Laser Therapy for Retinopathy of Prematurity</b> The Laser ROP Study Group Arch Ophthalmol 112:154-156, 1994</p>	<p>The Laser ROP Study Group was formed to complete a meta-analysis of three published, randomized laser ROP trials and one unpublished, nonrandomized ROP trial. Two hundred ninety-three eyes from the four studies were reviewed. All eyes in each series had threshold stage 3+ ROP with threshold criteria of five contiguous or eight accumulated clock hours of extraretinal fibrovascular proliferation. Argon or 810 nm diode laser treatment was applied to the avascular retina, and minimum follow-up was 3 months. Results are summarized in two tables: Table 1 details the odds ratio between cryotherapy and laser therapy, Table 2 details results of treatment in infants randomized to receive laser treatment in one eye and cryotherapy in the fellow eye. Both analyses indicate that laser therapy is at least as effective as cryotherapy.</p>
<p><b>ROP-LI19 Refractive Outcome Following Diode Laser versus Cryotherapy for Eyes with Retinopathy of Prematurity</b> Algawi K, Goggin M, O'Keefe M. Br J Ophthalmol 78:612-614, 1994</p> <p><i>See ROP-LI32 for 3 Year Follow-up Results.</i></p>	<p>The refractive error in 15 eyes with threshold retinopathy of prematurity treated with 810 nm diode laser photocoagulation was compared with 25 eyes with the same disease severity treated by cryotherapy. Mean follow-up was 13 months. Myopia was present in 6 eyes (40%) of the first group ranging from -1.50 to -3.50 diopters, while 23 eyes (92%) showed myopia which ranged from -0.50 to -8.00 diopters in the cryotherapy group. Nine eyes (60%) were hypermetropic at less than +3.0 diopters in the laser group, while only 2 eyes (8%) of the cryotherapy group showed hypermetropia. There was no significant difference in astigmatism between the two groups. Eyes with threshold disease treated with diode laser photocoagulation developed significantly less myopia than those treated with cryotherapy.</p>
<p><b>ROP-LI20 Cataracts in Infants Treated with Argon Laser Photocoagulation for Threshold Retinopathy of Prematurity</b> Christiansen S, Bradford JD. Am J Ophthalmol 119:175-180, 1995</p>	<p>The records of 51 consecutive patients (100 eyes) treated only with argon laser photocoagulation for threshold ROP were reviewed. Patient characteristics and treatment variables were compared between infants who developed cataracts and those who did not. Complete opacification of the lens nucleus and cortex developed in 6 eyes of 4 patients between 19 and</p>



<p><i>For Response, See following listing: ROP-LI21.</i></p>	<p>99 days after laser therapy. Eyes that developed permanent cataracts were noted to have a prominent anterior tunica vasculosa lentis at the time of treatment. After laser therapy, these eyes developed hyphema, shallowing of the anterior chamber, corneal edema, and progressive opacification of the lens. When compared with eyes that did not develop cataract, no statistically significant difference in number of burns, zone or clock hours of extraretinal proliferation, birth weight, gestational age, or age at treatment was found.</p>
<p><b>ROP-LI21 Cataract in Infants Treated with Argon Laser Photocoagulation for Threshold Retinopathy of Prematurity</b> Campolattaro B, Lueder G. Am J Ophthalmol (Letter) 120:264-265, 1995</p> <p><i>Response to letter. See previous listing, ROP-LI20.</i></p>	<p>The authors agree that possible causes of cataract when treated with the indirect argon laser photocoagulation is a frequent association of a prominent tunica vasculosa lentis in affected patients with ROP. They also share a recent experience that suggests another possible mechanism for the development of cataracts in infants treated with photocoagulation for retinopathy of prematurity: Their hypothesis for the development of cataract in their patient was a nanophthalmic left eye that was predisposed to the development of uveal effusion after indirect diode laser treatment. The left eye received 1,151 burns, and the right eye received 1,164 burns with the power setting at 200 mW and the duration at 200 msec. The uveal effusion resulted in anterior rotation of the ciliary body and shallowing of the already narrow anterior chamber. The cataract developed because of corneal-lenticular apposition. The absence of choroidal effusions and other complications in their patient's normally sized right eye, supports their hypothesis.</p>
<p><b>ROP-LI22 Effectiveness of Diode Laser Photocoagulation for Zone I Threshold Retinopathy of Prematurity</b> Redens TB,<sup>1</sup> Kooragayala LM,<sup>2</sup> Pramanik A,<sup>3</sup> Schulman JA.<sup>4</sup> Departments of <sup>1,2,4</sup>Ophthalmology and <sup>3</sup>Pediatrics, Louisiana State Univ.; Medical Center of Shreveport, LA [ARVO Abstract]. Invest Ophthalmol Vis Sci. 36(4): 569. Abstract nr 335, 1995</p>	<p>Between 1992 and 1994, 24 consecutive eyes (16 patients) with zone I threshold ROP were entered into this prospective study. New infrared diode laser treatment was performed in 22 of 24 eyes within 24 hours of diagnosing threshold ROP. Follow-up ranged from 4 to 33.2 months with a mean of 19.1 months. Twenty-three of 24 eyes achieved favorable anatomical results. Six eyes required re-treatment; and treatment complications occurred in five eyes. The incidence of unfavorable outcome in zone I threshold ROP eyes (4.2%) is much lower in this small series compared to the Cryo-ROP study (75%). These results suggest diode laser photocoagulation is an effective method for treatment of zone I threshold ROP eyes.</p>
<p><b>ROP-LI23 Diode Laser Photocoagulation for Stage 3+ Retinopathy of Prematurity</b> Seiberth V, Linderkamp O, Vardarli I, Knorz M, Liesenhoff H. Graefe's Arch Clin Expo Ophthalmol 233:489-493, 1995</p>	<p>To evaluate the efficacy and safety of diode laser photocoagulation, the authors included 42 eyes with stage 3+ ROP of 24 preterm infants in a prospective clinical study. Photocoagulation treatment was performed using an 810 nm diode laser with a laser indirect ophthalmoscope delivery system. Follow-up ranged from 3 to 16 months. In 39 eyes (93%), ROP regressed after a single laser treatment and the outcome was a flat, attached retina. One eye (2%) had a second laser session and another eye (2%) had additional retinal detachment surgery, resulting in the regression of ROP and a flat, attached retina. Another eye (2%) failed treatment and ROP progressed to stage 5, although additional retinal detachment surgery was performed. The success rate was 41 (98%) out of 42 eyes. Neither lenticular opacities nor cataract formation were encountered. Diode laser photocoagulation for stage 3+ ROP showed only minor side effects and was at least as effective as cryotherapy treatment.</p>



<p><b>ROP-LI24 Diode Laser Photocoagulation for Threshold Retinopathy of Prematurity in Eyes with Tunica Vasculosa Lentis</b> Seiberth V, Linderkamp O, Vardarli I, Knorz M, Liesenhoff H. Am J Ophthalmol 119:748-751, 1995</p>	<p>In a prospective clinical study, threshold retinopathy of prematurity was treated in 14 eyes of 7 consecutive preterm infants with tunica vasculosa lentis by using the 810 nm diode laser indirect ophthalmoscope. Laser power ranged from 200 to 400 mW (mean <math>260 \pm 52</math> mW). Duration of a single spot was 200 msec. Number of burns ranged from 1,060 to 2,132 (<math>1,556 \pm 315</math>). There were neither lenticular opacities nor cataract formation. Retinopathy of prematurity regressed in all eyes, and the outcome was a flat, attached retina. Diode laser photocoagulation with the laser indirect ophthalmoscope can be used safely in eyes with tunica vasculosa lentis.</p>
<p><b>ROP-LI25 Transscleral versus Transpupillary Diode Laser Photocoagulation for Stage 3+ Retinopathy of Prematurity</b> Seiberth V, Vardarli I, Knorz MC, Liesenhoff H. Presentation. D.O.G. Meeting Heidelberg. Mannheim/Heidelberg September 1995. German J Ophthalmol 1(Suppl):127, 1995  <i>Also listed as ROP-TS1.</i></p>	<p>Twenty eyes of 10 infants (gestational age 24-27 weeks, mean <math>25.7 \pm 0.9</math> weeks; birth weight 480-908 g mean <math>777 \pm 175</math> g) with ROP stage 3+ were treated with diode infrared laser photocoagulation. One eye of each infant was treated transsclerally while the fellow eye had transpupillary coagulation using the laser indirect ophthalmoscope. Follow-up ranged from 2 to 14 months (mean <math>7.5 \pm 2.3</math> months.) In 10 (100%) eyes treated transpupillary and in 9 (90%) eyes treated transsclerally, ROP regressed after a single or a second laser treatment and the outcome was a flat, attached retina. One eye (10%) with zone I disease failed after transscleral laser treatment and ROP progressed to stage 4 A with a retinal fold and partially attached retina, although additional retinal detachment surgery with an encircling band was performed. No adverse side effects occurred as a result of retinal/preretinal bleeding in the ridge in five eyes (25%). There were no adverse side effects. Conclusion: Transscleral diode laser coagulation for treatment of ROP stage 3+ proved to be as effective and safe as transpupillary diode laser photocoagulation.</p>
<p><b>ROP-LI26 Threshold Retinopathy of Prematurity. Transition from Cryopexy to Laser Treatment</b> Hammer M, Pusateri T, Hess J, Sosa R, Stromquist C. Retina 15:486-489, 1995</p>	<p>Seventy-six eyes in 41 patients were treated for acute retinopathy of prematurity from January 1991 to April 1994. Fifty-six eyes in 30 patients had zone 2 disease. Of these 30 patients, 11 received laser treatment (810 nm diode or argon) and 20 received cryopexy treatment; there was at least one anatomically successful eye in each patient. Twenty eyes in 10 patients had zone 1 disease. Seven patients had bilateral laser treatment (four 810 nm diode, three argon). Three patients had bilateral cryopexy. None of the three eyes with zone 1 disease treated with cryopexy were successful. Laserpexy and cryopexy are of equal efficacy in treating zone 2 disease. For the treatment of zone 1 disease, laserpexy is more effective than cryopexy, and diode and argon laser are of equal efficacy. Transition from cryotherapy to laser therapy can be accomplished easily by an experienced retinal surgeon. Excellent results can be obtained in zone 2 disease. Although zone 1 disease presents special problems, good results can be obtained. The laser is more precise than cryopexy in treating the retina. The increased precision of the laser allows the surgeon to treat closer to the vascular ridge with reduced risk of vitreous hemorrhage relative to cryopexy. Treatment close to the ridge is thought to be important in causing regression of the disease. Also, cryopexy is more traumatic than laser treatment, which may stimulate proliferative factors, increasing the risk of stage 3, 4, or 5 anatomic outcome.</p>

<p><b>ROP-LI27 Fotocoagulación con Láser de Diodo en la Retinopatía del Prematuro «umbral»</b>                  Peralta Calvo J, Abelairas Gómez J, Fonseca Sandomingo A.                  St. Ophthalmology 14:215-219, 1995</p> <p>Abstract - English                  Article - Spanish</p>	<p>Fourteen infants (24 eyes) with threshold ROP were treated to assess the efficacy and safety of diode laser photocoagulation. The avascular retina was photocoagulated if it showed at least 5 contiguous (150°) or 8 cumulative (240°) clock hours of stage 3+ in zone I or II. General anesthesia was used; noncontiguous applications were used. The anterior segment was explored with a portable slit lamp after the procedure. Twenty-one (87.5%) eyes obtained total regression of the disease. The three eyes with unfavorable outcomes were those of severe stage 3+ in central zone II, and progressed to stage 5. Every case was followed for 2 months or longer. The complications noted were two mild preretinal hemorrhages attributable to accidental photocoagulation of the ridge. Conclusion: Diode laser photocoagulation is effective in the treatment of threshold ROP, mainly in the cases without severe proliferation, and lack of serious complications.</p>
<p><b>ROP-LI28 Diode Laser Photocoagulation to the Vascular Retina for Progressively Advancing Retinopathy of Prematurity</b>                  O'Keefe M, Burke J, Algawi J, Goggin M.                  Br J Ophthalmol 79:1012-1014, 1995</p>	<p>The purpose of this study was to estimate the effectiveness of 810 nm laser photocoagulation of the retina posterior to the ridge in eyes with ROP. Diode laser photocoagulation was applied (using the OcuLight SL photocoagulator) posterior to the fibrovascular ridge in stage 4a ROP in six eyes of four infants and in advancing stage 3+ in two eyes of one infant. Seven eyes had previously been unsuccessfully treated with diode laser photocoagulation anterior to the ridge. The laser power used varied between 300 and 100 mW and the duration between 200 and 500 ms. Increased power and duration were required to elicit a visible burn in areas where subretinal fluid was present. Six eyes of four children had total regression; two eyes of two children had flat macula with residual peripheral tractional detachment and maintained vision. The preliminary results indicate that diode laser photocoagulation posterior to the ridge may be a useful treatment in late stage 3 and stage 4A ROP following failed laser treatment to the avascular retina in threshold stage 3 disease. The specific advantages of this treatment modality are the ability to carry out treatment without general anesthesia, the facility to respond rapidly to advancing disease and thus titrate the "dose" of treatment to the individual eye, avoidance of lesions to the sclera and the external eye surface, and perhaps the minimization of myopia in later life.</p>
<p><b>ROP-LI29 Significant Ocular Complications Following Diode Laser Treatment for Retinopathy of Prematurity</b>                  Mills M,<sup>1</sup> Schulman JA,<sup>1</sup> Kooragayala LM,<sup>1</sup> Pramanik A,<sup>2</sup> Tseng P.<sup>3</sup>                  Depr of <sup>1</sup>Ophthalmology and <sup>2</sup>Pediatrics, Louisiana State Univ. Medical Center, Shreveport, LA, <sup>3</sup>Department of Pediatrics, Willis Knighton Hospital, Shreveport, LA                  [ARVO Abstract]. Invest Ophthalmol Vis Sci. 37(3): S127. Abstract nr 606, 1996</p>	<p>Seventy-one consecutive eyes (45 infants) with threshold ROP treated with diode laser photocoagulation were followed for the development of significant ocular complications. Thirty-seven eyes had zone I threshold ROP. Sixty-nine of 71 eyes (97.2%) achieved favorable anatomical results. Follow-up ranged from 5.53 to 50.2 months with a mean of 22.87 months. Significant ocular complications following diode laser photocoagulation for threshold ROP occurred in 5 of 71 (7%) eyes. Complications observed post-operatively (each in an individual eye) included corneal opacification hyphema, scleral abscess, cataract (caused by pigment dispersion from accidental clipping of iris) and a dense preretinal hemorrhage.</p>

<p><b>ROP-LI30 The Effectiveness of Diode Laser Treatment in Achieving a Favorable Anatomical Outcome in Eyes with Zone I Threshold Retinopathy of Prematurity</b> Schulman JA, Kooragayala LM, Redens TA. Department of Ophthalmology, LSU Medical Center, Shreveport, LA [ARVO Abstract]. Invest Ophthalmol Vis Sci. 37(3): S128. Abstract nr 613, 1996</p>	<p>Thirty-seven consecutive eyes (23 infants) with zone I threshold ROP were treated with binocular indirect ophthalmoscope (BIO) diode laser photocoagulation to determine the effectiveness of BIO diode laser photocoagulation in producing a favorable anatomical outcome in infants with zone I threshold retinopathy of prematurity. An unfavorable anatomical outcome was defined as a retrolental mass obscuring the posterior pole, a retinal detachment involving zone I, or retinal fold involving the macula. Thirty-five of 37 eyes (94.6%) demonstrated a favorable anatomical outcome. Follow-up ranged from 5.53 to 47.53 months with a mean of 26.13 months. All but four eyes were treated within 24 hours of threshold determination. Eleven eyes required retreatment. Despite laser treatment, two eyes progressed to stage 4A, and scleral buckling was performed on both eyes. One eye progressed to stage 5 while the retina reattached in the second eye. A third eye, following treatment developed a hyphema, precluding fundus examination for 2 weeks. The eye had progressed to stage 5 when the fundus became visible. Conclusion: BIO diode laser treatment for eyes with zone I threshold ROP appears to be more effective than cryopexy in preventing unfavorable anatomical outcomes.</p>
<p><b>ROP-LI31 Transscleral versus Transpupillary Diode Laser Photocoagulation for Threshold Retinopathy of Prematurity</b> Sieberth V, Vardarli I, Jendritza W, Knorz MC, Liesenhoff H. University Eye Clinic, Klinikum Mannheim, Germany [ARVO Abstract]. Invest Ophthalmol Vis Sci. 37(3): S695. Abstract nr 3176, 1996</p> <p><i>Also listed as ROP-TS2.</i></p>	<p>The 810 nm diode laser wavelength makes lens-sparing transscleral coagulation of the retina possible, and to evaluate the efficacy and safety of transscleral diode laser coagulation for threshold ROP, the authors performed a controlled clinical study. Forty eyes of 20 preterm infants (gestational age 24-29 weeks, mean <math>26.8 \pm 1.6</math> weeks; birth weight 540-1200 g, mean <math>859 \pm 163</math> g) with threshold ROP were treated with diode laser photocoagulation. One eye of each infant was treated transsclerally while the fellow eye had transpupillary coagulation using the laser indirect ophthalmoscope. Follow-up ranged from 4 to 22 months (mean <math>10.5 \pm 6.3</math> months). Main outcome measure was the regression of acute ROP and the incidence of adverse treatment effects. In 20 (100%) eyes treated transpupillary and in 19 (95%) eyes treated transsclerally ROP regressed after a single or a second laser treatment and the outcome was a flat, attached retina. One eye (5%) with zone I disease failed after transscleral laser treatment and ROP progressed to stage 4B with a partially attached retina, although retinal detachment surgery with an encircling band was performed. No adverse side effects as a result of diode laser treatment were noted except for a small amount of retinal/preretinal bleeding in the ridge in 9 (45%) transsclerally and in 5 (25%) transpupillary coagulated eyes. There were no adverse side effects (e.g. bleeding, cataract formation) in the anterior segments of the eyes. Conclusion: The results suggest that transscleral 810 nm diode laser coagulation for treatment of threshold ROP is as effective and safe as transpupillary diode laser photocoagulation.</p>
<p><b>ROP-LI32 Refractive Outcome in Eyes with Retinopathy of Prematurity Treated with Cryotherapy or Diode Laser: 3 Year Follow-up</b> Knight-Nanan DM, O'Keefe M. Br J Ophthalmol 80:998-1001, 1996</p> <p><i>See ROP-LI19 for initial study.</i></p>	<p>This study compared the refractive error of 43 infant's eyes 1 to 3 years after either cryotherapy or 810 nm diode laser treatment for threshold retinopathy of prematurity. Seventeen eyes were treated with cryotherapy; 26 eyes were treated with 810 nm diode laser. Mean follow-up for cryotherapy was 5 years (range 4 to 9 years); mean follow-up for 810 nm diode laser was 2.5 years (range 1 to 4 years). All infants underwent cycloplegic refraction during follow-up. In the diode laser treated group,</p>





	<p>there was no trend towards increasing myopia; the refraction in these eyes stabilized after 1 year. In the cryotherapy treated group, there was a significant increase in the degree of myopia between 1 and 3 years of follow-up. No significant difference was found in the degree of astigmatism between cryotherapy and diode laser treatment groups. Results showed there were significantly fewer myopes in the diode laser treated group than the cryotherapy treated group up to 3 years after the procedure.</p> <table border="1" data-bbox="760 499 1458 695"> <thead> <tr> <th rowspan="2">Treatment</th> <th rowspan="2"># of eyes</th> <th colspan="3">Percentage of Eyes with Myopia Follow-up</th> </tr> <tr> <th>1 year</th> <th>2 years</th> <th>3 years</th> </tr> </thead> <tbody> <tr> <td>Cryotherapy</td> <td>17</td> <td>88.2%</td> <td>88.2%</td> <td>94%</td> </tr> <tr> <td>810 nm Diode Laser</td> <td>26</td> <td>38.5%</td> <td>42.9%</td> <td>46%</td> </tr> <tr> <td>Difference</td> <td></td> <td>49.8%</td> <td>45.4%</td> <td>48.7%</td> </tr> </tbody> </table>	Treatment	# of eyes	Percentage of Eyes with Myopia Follow-up			1 year	2 years	3 years	Cryotherapy	17	88.2%	88.2%	94%	810 nm Diode Laser	26	38.5%	42.9%	46%	Difference		49.8%	45.4%	48.7%
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<p><b>ROP-LI33 Visual Outcome of Bilateral Threshold Stage 3 Retinopathy of Prematurity (ROP) Randomized to Laser or Cryotherapy</b>                  Ross RD, Page TP, Trese MT.                  Royal Oak, MI                  Poster 295. AAO. Chicago, IL October, 1996</p>	<p>In a masked evaluation, the authors compared visual outcomes of 6 patients, 6 years after randomization treatment with laser photocoagulation in one eye and cryotherapy in the fellow eye. In cryotherapy treated eyes, the average distance was 20/150, visual acuity (spherical equivalent -6.75 diopters) (6 eyes); significant fundus findings included retinal pigment epithelial mottling temporally (2 eyes), pre-phthical changes (2 eyes), and normal (2 eyes). In laser treated eyes, the average distance was 20/40 (spherical equivalent -4.90 diopters) (6 eyes); significant fundus findings included normal (5 eyes) and macular dragging (1 eye). Laser may have fewer side effects than cryotherapy for threshold ROP.</p>																							
<p><b>ROP-LI34 Retinal Sliding with High Myopia Occurs Following Laser Treatment for Severe Retinopathy of Prematurity</b>                  Mintz-Hittner HA, Kretzer FL.                  Houston, TX                  Free Paper. AAO. Chicago, IL October, 1996</p>	<p>Anatomic outcome at greater than 1 year was reviewed for 110 eyes of 56 preterm infants weighing &lt;1250 grams at birth who were treated with diode laser. Anatomic success rate was 94.6%. ROP severity correlated with retinal sliding (in disc diameters on fluorescein angiograms), and with myopia (in diopters). Retinal sliding along Bruch's membrane with high myopia occurs in severe ROP treated by laser.</p>																							
<p><b>ROP-LI35 Cryotherapy and Laser Treatment for Acute Retinopathy of Prematurity: Refractive Outcomes, a Longitudinal Study</b>                  Laws F, Laws D, Clark D.                  Br J Ophthalmol 81:12-15, 1997</p>	<p>This study focused on the refractive error at 3 and 12 months of 19 patients who underwent cryotherapy and 15 patients who underwent laser (either argon or diode) treatment for threshold ROP. Results showed that laser therapy is associated with lower degrees of myopia than cryotherapy during the first year of life, which is clinically significant in terms of visual performance and development. At 3 months and at 1 year, the cryotherapy group had a statistically significant higher degree of myopia in both eyes (<math>p &lt; 0.05</math> at 3 and 12 months). The myopia increased at a greater rate in the cryotherapy treated infants over the 9 month study period. There was a trend to higher levels of astigmatism in the cryotherapy treated infants, but this did not reach statistical significance. Disease location, whether anterior or posterior, appeared to have some influence on the incidence of myopia. The more posterior the disease, the more severe the myopia and the trend was for more myopia in those treated with cryotherapy; however, there were more eyes with posterior disease in the cryotherapy treated group which may have influenced these results.</p>																							



<p><b>ROP-LI36 Randomized Comparison of Diode Laser Photocoagulation Versus Cryotherapy for Threshold Retinopathy of Prematurity: 3 Year Outcome</b>                  White JE, Repka MX.                  J Pediatr Ophthalmol Strabismus 34:83-87, 1997</p>	<p>Nineteen patients were entered into a prospective randomized treatment protocol, in which one eye received cryotherapy and one eye received diode laser photocoagulation. Asymmetric eyes were randomly assigned. Two patients have died and five patients are no longer available for 3 year outcome exams. Seven males and five females participated with a mean birth weight of 638 grams and a mean gestational age of 24.9 weeks. Two patients had asymmetrical disease and received laser photocoagulation. Two discordant structural outcomes were present among the 10 symmetrical cases. The laser-treated eyes had the favorable outcome; the cryotherapy-treated eyes had the unfavorable outcome. The geometric mean visual acuity after laser photocoagulation was 20/52; after cryotherapy, it was 20/91 (p=0.046). The mean refractive error was -6.60 diopters (D) after laser photocoagulation and -7.62 D after cryotherapy. Seven patients (58%) have developed strabismus. Laser photocoagulation appears to have an outcome comparable to cryotherapy when the patients are examined 3 years following therapy. These data, including visual acuity and refractive error, suggest that laser photocoagulation may have a minimal advantage over cryotherapy in the treatment of ROP.</p> <table border="1" data-bbox="760 814 1446 972"> <thead> <tr> <th></th> <th>Laser Photocoagulation</th> <th>Cryotherapy</th> <th>p value</th> </tr> </thead> <tbody> <tr> <td>Number of eyes treated</td> <td>13</td> <td>11</td> <td></td> </tr> <tr> <td>Geometric mean visual acuity</td> <td>20/46</td> <td>20/72</td> <td>0.05</td> </tr> <tr> <td>Mean refractive error</td> <td>-5.97 D</td> <td>-7.06 D</td> <td>NS</td> </tr> <tr> <td>Favorable structural outcome</td> <td>13/13</td> <td>9/11</td> <td>NS</td> </tr> </tbody> </table>		Laser Photocoagulation	Cryotherapy	p value	Number of eyes treated	13	11		Geometric mean visual acuity	20/46	20/72	0.05	Mean refractive error	-5.97 D	-7.06 D	NS	Favorable structural outcome	13/13	9/11	NS
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<p><b>ROP-LI37 Mild Diode Laser Treatment for Retinopathy of Prematurity</b>                  Melki SA, Chrousos GA, Wagner DG.                  Center for Sight, Georgetown Univ., Washington DC                  [ARVO Abstract]. Invest Ophthalmol Vis Sci. 38(4): S745. Abstract nr 3439, 1997</p>	<p>The authors performed a serial retrospective study of 56 eyes (of 33 infants) which developed threshold ROP and were treated with indirect diode laser photocoagulation. All eyes were treated to a mild endpoint with near confluent burns completely covering the avascular retina with topical anesthesia with intravenous sedation in the NICU. Laser parameters averaged 1400 spots, 268 mW, 0.4 second duration per eye. Follow-up ranged from 3 to 32 months: 54/56 (96.4%) of the eyes had complete regression of extra-retinal vascularization and plus disease with laser treatment; 56/56 (100%) of the eyes had no cataract after laser treatment; 2/56 eyes (3.6%) of one infant developed progressive tractional detachments involving the macula and underwent surgery with one eye developing a macular fold while the other eye had a normal appearing macula. Mild near confluent indirect diode laser treatment of threshold ROP in the NICU may offer significant benefit in ROP.</p>																				
<p><b>ROP-LI38 Influence of Treatment Modality on Refractive Outcome in Retinopathy of Prematurity</b>                  Smyth KL, Haigh PM, O'Donoghue EP.                  Royal Eye Hospital, Manchester, UK                  [ARVO Abstract]. Invest Ophthalmol Vis Sci. 38(4): S746. Abstract nr 3446, 1997</p>	<p>In a sequential study, the authors compared early refractive changes in 3 consecutive groups of infants treated with either laser therapy or cryotherapy for threshold ROP. All groups were comparable in terms of gestational age, birthweight and age at treatment. The first group, Group A, N = 8, were treated with bilateral cryotherapy. The third group, Group C, N = 6, were treated with bilateral laser therapy. The second group, Group B, N = 8, were treated during the unit's transition from cryo to laser and were managed with cryotherapy to one randomly selected eye and laser to the fellow. Subsequent outpatient follow-up involved full ocular examination and cycloplegic refraction. At a mean age of 11 months, significant differences in refractive error between the groups were found.</p>																				



	<p>The mean spherical equivalent refractive error in Group A was - 3.9 DS, whereas that in Group C was +0.57 DS. The asymmetrically treated group, Group B, had a high incidence of anisometropia with 5 of the 8 babies having a refractive difference between the two eyes greater than or equal to 1.5 DS. In 7 of the 8 babies in this group, the more myopic eye was that which had been treated with cryotherapy. These early results suggest that cryotherapy for ROP is associated with a greater degree of myopia.</p>															
<p><b>ROP-LI39 Pain and Stimulation in Laser Treatment for Retinopathy of Prematurity</b>                  Li HK,<sup>1</sup> Norcross-Nechay K,<sup>2</sup> Marquez BA,<sup>2</sup> Dejean BJ,<sup>1</sup> Khorrami AM,<sup>1</sup> Richardson J.<sup>3</sup>  <sup>1</sup>Department of Ophthalmology &amp; Visual Sciences, <sup>2</sup>Department of Neurology, <sup>3</sup>Department of Pediatrics, Univ. of Texas Medical Branch Galveston, TX                  [ARVO Abstract]. Invest Ophthalmol Vis Sci. 38(4): S974. Abstract nr 4515, 1997</p>	<p>Eight infants with threshold ROP were randomized to four groups of diode or argon laser photocoagulation using either midazolam or fentanyl. Continuous sixteen-channel EEGs were recorded before, during and after laser treatment. Infant behavior, respiratory excursions, vital signs and oxygen saturation were also monitored. Results: Baseline EEGs showed age-appropriate patterns of awake, active sleep and quiet sleep. In all infants, administration of midazolam or fentanyl produced the “discontinuous” pattern of quiet sleep during argon green or diode laser photocoagulation. Abrupt arousal patterns appeared in the EEG accompanied by distressed behavior whenever a scleral depressor was applied to the midazolam groups. No or minimal distress was observed in the fentanyl groups. Conclusions: Laser treatment using argon green or diode wavelength laser may not cause pain in preterm infants with ROP. Fentanyl, but not midazolam, produces adequate analgesia and anesthesia for stimulation and pain associated with scleral depression.</p>															
<p><b>ROP-LI40 Transscleral vs. Transpupillary Diode Laser Photocoagulation for the Treatment of Threshold Retinopathy of Prematurity</b>                  Seiberth V, Linderkamp O, Vardarli I.                  Arch Ophthalmol 115:1270-1275, 1997   <i>Also listed as ROP-TS3.</i></p>	<p>To evaluate the efficacy and safety of transscleral diode laser photocoagulation for acute proliferative ROP, the authors performed a controlled clinical study in 25 preterm infants with threshold ROP in both eyes: One eye of each infant was treated transsclerally with the OcuLight and DioPexy Probe and the fellow eye was treated transpupillary using the OcuLight and laser indirect ophthalmoscope.</p> <p><u>Treatment Parameters</u></p> <table border="1" data-bbox="808 1325 1386 1472"> <thead> <tr> <th></th> <th><u>Transsclerally</u></th> <th><u>Transpupillary</u></th> </tr> </thead> <tbody> <tr> <td>Spot size</td> <td>1000 µm</td> <td>480 µm</td> </tr> <tr> <td>Power</td> <td>250 - 600 mW</td> <td>160 - 450 mW</td> </tr> <tr> <td>Duration</td> <td>200 - 600 ms</td> <td>200 ms</td> </tr> <tr> <td>Number of Burns</td> <td>153 - 877</td> <td>329 - 2078</td> </tr> </tbody> </table> <p>Follow-up ranged from 2 to 22 months. After transpupillary coagulation, ROP regressed in all 25 of the eyes; after transscleral coagulation, ROP regressed in 24 of the 25 eyes. Transscleral diode laser coagulation is as effective in the treatment of threshold ROP as transpupillary diode laser photocoagulation.</p>		<u>Transsclerally</u>	<u>Transpupillary</u>	Spot size	1000 µm	480 µm	Power	250 - 600 mW	160 - 450 mW	Duration	200 - 600 ms	200 ms	Number of Burns	153 - 877	329 - 2078
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<p><b>ROP-LI41 Follow-Up After Transscleral Diode Laser Photocoagulation For Retinopathy of Prematurity Stage 3+</b>                  Akkoyun I<sup>1</sup>, Seiberth V<sup>1,2</sup>, Jendritza W<sup>1</sup>, Vögele C<sup>1</sup>, Liesenhoff H<sup>1</sup>. <sup>1</sup>University Eye Clinic, Klinikum Mannheim, D-68135 Mannheim, Germany;</p>	<p>To evaluate the safety of transscleral diode laser treatment for ROP stage 3+, the authors prospectively examined 30 eyes of 30 very low birth weight infants (gestational age 23 to 31 weeks, mean ± SD 26.6 ± 1.8; birth weight 510-1200, 855 ± 170) quarterly after regression of acute ROP. Examinations included assessment of anterior segment, fundus, vision, refractive</p>															

<p><sup>2</sup>Department of Ophthalmology, Marienhospital Osnabrueck, D-49074 Osnabrueck, Germany [ARVO Abstract]. Invest Ophthalmol Vis Sci. 39(4): S819. Abstract nr 3792, 1998</p> <p><i>Also listed as ROP-TS4.</i></p>	<p>error and biometry. Follow-up ranged from 10 to 48 months (29.6 ±11.2). Control group consisted of the 30 fellow eyes treated transpupillary using the laser indirect ophthalmoscope. In 29 of 30 eyes (97%) of transscleral and all (100%) transpupillary treated eyes, the outcome was a flat and attached retina. There were no anterior segment abnormalities (e.g., iris burns, syneciae, cataract) in all eyes of both groups. Visual acuity, refractive error and biometry showed no significant differences between the transpupillary and transscleral treated eyes. These results indicate that transscleral diode laser photocoagulation can safely be used for the treatment of ROP stage 3+.</p>																								
<p><b>ROP-LI42 A Comparison of Laser Photocoagulation with Transscleral Cryotherapy in the Treatment of Threshold Retinopathy of Prematurity</b> Connolly BP, McNamara JA, Sharma S, Regillo C, Tasman W. Ophthalmology 105:1628-1631, 1998</p>	<p>This study evaluates an average of 5.8 years follow-up (range 4.3 – 7.6 years) of 25 infants with bilateral threshold ROP, from previously reported clinical studies in which one eye was randomized to cryotherapy and the other eye to laser treatment (argon or infrared). The goals of this study were 1) to determine whether there was a significant difference between the visual outcomes of eyes treated with cryotherapy vs. laser treatment, and 2) to compare the refractive status of eyes treated with laser to their cryotherapy-treated counter-parts. Both the laser- and cryotherapy-treated groups had similar preoperative characteristics.</p> <p>1) Visual Outcomes (based upon reliable Snellen or illiterate e-chart visual acuities obtained from 21 children)</p> <table border="1" data-bbox="760 968 1422 1121"> <thead> <tr> <th><u>Treatment Modality</u></th> <th><u>Good Vision 20/50 or Better</u></th> <th><u>Poor Vision 20/60 or Worse</u></th> <th><u>Total</u></th> </tr> </thead> <tbody> <tr> <td>Laser</td> <td>17 (81%)</td> <td>4 (19%)</td> <td>21</td> </tr> <tr> <td>Cryotherapy</td> <td>8 (38%)</td> <td>13 (62%)</td> <td>21</td> </tr> <tr> <td>Total</td> <td>25</td> <td>17</td> <td>42</td> </tr> </tbody> </table> <p>2) Refractive Outcomes (only 23 eyes were available for follow-up)</p> <p>Laser-treated eyes were less myopic than cryotherapy-treated eyes, the difference being statistically significant.</p> <table border="1" data-bbox="760 1304 1218 1434"> <thead> <tr> <th><u>Laser compared to cryotherapy</u></th> <th><u>Mean SE</u></th> </tr> </thead> <tbody> <tr> <td>Laser-treated (argon and diode)</td> <td>-3.05 D</td> </tr> <tr> <td>Cryotherapy-treated counterpart</td> <td>-5.08 D</td> </tr> <tr> <td colspan="2">p = 0.0072</td> </tr> </tbody> </table> <p>This study suggests that laser photocoagulation was more likely to result in a good visual outcome with less myopia compared to cryotherapy treatment. The odds that an eye treated with laser had a good visual outcome were 6.91 times greater than for eyes treated with cryotherapy (95% confidence interval, 1.70-28).</p>	<u>Treatment Modality</u>	<u>Good Vision 20/50 or Better</u>	<u>Poor Vision 20/60 or Worse</u>	<u>Total</u>	Laser	17 (81%)	4 (19%)	21	Cryotherapy	8 (38%)	13 (62%)	21	Total	25	17	42	<u>Laser compared to cryotherapy</u>	<u>Mean SE</u>	Laser-treated (argon and diode)	-3.05 D	Cryotherapy-treated counterpart	-5.08 D	p = 0.0072	
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<p><b>ROP-LI43 Treatment Outcomes in Fellow Eyes after Laser Photocoagulation for Retinopathy of Prematurity</b> Brooks SE, Johnson M, Wallace DK, Paysse EA, Coats DK, Marcus DM. Am J Ophthalmol 127:56-61, 1999</p>	<p>The authors reviewed records from 103 patients undergoing bilateral 810 nm diode laser peripheral retinal photocoagulation with LIO delivery for ROP at three academic medical centers. The goal of treatment was essentially confluent ablation of the avascular retina up to, but not including, the ridge. Laser variables were available in 101 of the 103 cases. There was no significant difference in average laser power or number of</p>																								

	<p>applications per eye among the three study centers. Mean minimum laser power used was 271 mW; mean maximum laser power used was 307 mW; mean number of laser applications per eye were 1,151; and pulse duration typically used was 300 mw. The data were analyzed to determine the rate of successful structural outcomes among all eyes as well as the interocular outcome concordance. Unfavorable structural outcomes were categorized by macular dragging judged clinically significant enough to adversely affect visual function, retinal fold involving the macula, or retinal detachment involving the macula. Outcomes were otherwise categorized as structurally favorable. A successful structural outcome was observed in 182 (88%) of 206 eyes. Eighty-eight patients (85.4%) had bilateral favorable outcomes. Nine patients (8.7%) had bilateral unfavorable outcomes, and 6 patients (5.8%) had one favorable and one unfavorable eye. No cataracts were observed in any of the 206 eyes treated. The outcome was concordant between fellow eyes in 94.2% of patients. This rate was higher than predicted if fellow-eye outcomes were truly independent (<math>p &lt; .00001</math>) and did not depend on study center, laser settings or location of the ROP. Serious complications related to treatment were uncommon. Complications included limited vitreous hemorrhage in 8 eyes of 5 patients; small, localized subretinal hemorrhages in 5 eyes of 3 patients; episodes of apnea and/or bradycardia during treatment in 2 cases; bilateral hyphema in 1 infant; and conjunctival tear in 1 infant. Conclusions: These data confirm the overall effectiveness of diode laser photocoagulation in preventing unfavorable structural outcomes in eyes with threshold ROP. The high rate of success, even in eyes with posterior disease, coupled with the apparent low rate of acute complications supports the role of bilateral 810 nm, diode laser treatment in cases of bilateral threshold ROP.</p>
<p><b>ROP-LI44 Anterior Segment Changes in Newborn Rabbit Eyes with a Tunica Vasculosa Lentis After Argon Green and Diode Red Laser</b>  Rao PK,<sup>1</sup> Mitra R,<sup>2</sup> Rhee P,<sup>1</sup> Wirostko W,<sup>1</sup> Pulido J.<sup>3</sup>  <sup>1</sup>Medical College of Wisconsin,  <sup>2</sup>Retina Associates of Cleveland,  <sup>3</sup>University of Illinois, Chicago  [ARVO Abstract]. Invest Ophthalmol Vis Sci. 40(4): S293. Abstract nr 1550, 1999</p>	<p>Transpupillary retinal photocoagulation using the argon green (6 eyes) or diode red (13 eyes) lasers was performed on 19 newborn pigmented rabbits' eyes. Treatment was placed unilaterally to allow the fellow eye to serve as the control. Anterior segment changes were evaluated with slit lamp biomicroscopy and light microscopy using H&amp;E and PAS stains for 21 days after treatment. Results: Anterior lenticular opacities developed in one of six eyes treated with argon green laser. No opacities developed in diode laser treated or control eyes. Tunica vasculosa lentis persistence beyond 14 days after treatment occurred in 4 of 4 (100%) eyes treated with argon laser as compared to 0 of 4 untreated eyes (<math>p &lt; 0.05</math>). Similarly, a tunica vasculosa lentis was seen at 7 days after treatment in 11 of 12 eyes (92%) treated with diode laser as compared to 2 of 12 (17%) untreated eyes (<math>p &lt; 0.01</math>). No eye treated with diode laser demonstrated tunica vasculosa lentis at day 14. Conclusions: Transpupillary argon laser may cause lenticular opacities in eyes with a tunica vasculosa lentis. Both argon and diode laser delays regression of the tunica vasculosa lentis. Argon laser may cause a greater delay in regression of the tunica vasculosa lentis than the diode laser.</p>

<p><b>ROP-LI45 Phthisis Bulbi Following Retinopathy for Threshold Retinopathy of Prematurity</b>                  Cingle KA, Capone, Jr. A, Drack AV, Lambert SR.                  Emory Eye Center, Emory University, Atlanta, GA                  [ARVO Abstract]. Invest Ophthalmol Vis Sci. 40(4): S478. Abstract nr 2520, 1999</p>	<p>The authors reviewed nine eyes of eight patients who had undergone prompt indirect infrared diode laser retinopathy for threshold ROP and had developed post-laser cataracts and other complications. The clinical course following laser treatment was remarkable for marked anterior segment inflammation including corneal opacification in some cases. Within a time span of 1-2 weeks, cataract formation was noted in the treated eye when the inflammation subsided. Other subsequent findings included iris atrophy with depigmentation, heterochromia (when unilateral), pigmented membrane across the iris, ciliary body depigmentation and hypotony. In one case, a ruptured posterior lens capsule was noted intraoperatively during cataract surgery. The patient went on to develop hypotony and phthisis bulbi. Conclusion: The authors report a clinical scenario following laser retinopathy for ROP consisting of dramatic ocular inflammation, leading to hypotony and phthisis bulbi. An indolent subacute pharmacophalactic endophthalmitis is postulated to be the etiology of this uncommon symptom complex. Examination within 72 hours post-laser treatment, aggressive topical steroid therapy and prompt lensectomy are recommended. Conclusion: Phthisis bulbi may develop in some infantile eyes that develop cataracts following laser retinopathy for ROP.</p>
<p><b>ROP-LI46 Visual Outcomes after Laser Photocoagulation for Threshold Retinopathy of Prematurity</b>                  Connolly BP, McNamara A, Regillo CD, Tasman W, Sharma S. Ophthalmology 106:1734-1738, 1999</p>	<p>A retrospective, noncomparative case series of 35 infants with threshold ROP treated with 810 nm diode laser photocoagulation from 1991 to 1996 was studied to determine the long-term visual acuity (VA). After bilateral laser treatment, 14 (56%) of 25 patients who were capable of accurate VA testing had 20/50 or better best-corrected visual acuity (BCVA) in at least 1 eye with 11 (44%) of 25 patients having at least 20/50 BCVA in both eyes. After unilateral treatment, 4 (40%) of 10 had 20/50 or better BCVA in the treated eye while 5 (50%) of 10 laser-treated eyes had a BCVA at least equal to the untreated fellow eye. Compared to eyes with 4 or more diopters (D) of myopia, those with less than 4 D of myopia were 6.4 times more likely to achieve 20/50 or better BCVA (95% confidence interval, 1.7 – 22.7). The average age at follow-up was 3.7 years. Conclusion: After laser photocoagulation for threshold ROP, 29 (48%) of 60 eyes had 20/50 or better VA. Eyes with 4 or more D of myopia were significantly less likely to achieve 20/50 or better VA than eyes with less than 4 D of myopia.</p> <p><i>Note:</i> After 5 1/2 years of follow-up, the Cryo-ROP investigators reported that 13% of cryotherapy-treated eyes achieved 20/40 or better VA. In contrast, 17% of the eyes randomized to observation were 20/40 or better. Cryotherapy, it was suggested, may have some detrimental effect on the ultimate visual potential. In contrast, laser photocoagulation does not appear to have such an adverse effect on visual potential and may result in better final BCVA. In the current report, 26 (43%) of 60 eyes from 35 patients were 20/40 or better, which is considerably better than both the treatment and control groups from the 5 1/2 year Cryo-ROP data.</p>

	<p>Comparison of Laser and Cryotherapy</p> <table border="1"> <thead> <tr> <th></th> <th><u>Laser</u></th> <th><u>Cryo</u></th> </tr> </thead> <tbody> <tr> <td>Surgical Trauma</td> <td>Minimal</td> <td>Great</td> </tr> <tr> <td>Discomfort</td> <td>Minimal</td> <td>Great</td> </tr> <tr> <td>Reaction</td> <td>Clearly visible</td> <td>Not as clear as laser</td> </tr> <tr> <td>Subretinal hemorrhage or bands</td> <td>Rare</td> <td>Occasional</td> </tr> <tr> <td>Portable</td> <td>Yes (diode)</td> <td>No</td> </tr> <tr> <td>Tunica Vasculosa Lentis</td> <td>May be troublesome (argon)</td> <td>Not problematic</td> </tr> <tr> <td>Elevated Ridge in Periphery</td> <td>Laser application to the peripheral retina may be blocked</td> <td>Not problematic</td> </tr> <tr> <td>Mild Vitreous Hemorrhage</td> <td>Difficult to treat</td> <td>May be treatable if not dense</td> </tr> <tr> <td>Retinal Detachment</td> <td>Ineffective</td> <td>May be effective if it is shallow</td> </tr> <tr> <td>Restless babies</td> <td>Nearly impossible</td> <td>May be possible and quicker</td> </tr> </tbody> </table>		<u>Laser</u>	<u>Cryo</u>	Surgical Trauma	Minimal	Great	Discomfort	Minimal	Great	Reaction	Clearly visible	Not as clear as laser	Subretinal hemorrhage or bands	Rare	Occasional	Portable	Yes (diode)	No	Tunica Vasculosa Lentis	May be troublesome (argon)	Not problematic	Elevated Ridge in Periphery	Laser application to the peripheral retina may be blocked	Not problematic	Mild Vitreous Hemorrhage	Difficult to treat	May be treatable if not dense	Retinal Detachment	Ineffective	May be effective if it is shallow	Restless babies	Nearly impossible	May be possible and quicker
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<p><b>ROP-LI47 A Comparison of Dense versus Less Dense Diode Laser Photocoagulation Patterns for Threshold Retinopathy of Prematurity</b>                  Banach MJ, Ferrone PJ, Trese MT. Ophthalmology 107:324-328, 2000</p>	<p>A retrospective, nonrandomized, comparative trial (Group 1: n = 12 patients) and a prospective, randomized, clinical trial (Group 2: n = 46 patients) was conducted to determine if the density of 810 nm diode laser photocoagulation for the treatment of zone 1 or zone 2 threshold ROP affects the rate of progression of the disease. A total of 107 eyes from 58 patients were treated within 72 hours of diagnosis and observed for at least 3 months after treatment with two different diode laser photocoagulation procedures: a dense, near confluent laser pattern or a less dense pattern with burns spaced 1 to 1.5 burn widths apart. For analysis, the retrospective and randomized outcome data were grouped. Results: The rate of progression to stage 4 or 5 ROP in cohort 1 (the near confluent laser treatment group) was 2 of 56 eyes (3.6% overall, 0% of zone 1 eyes, and 3.8% of zone 2 eyes). The rate of progression in cohort 2 (the less dense pattern) was 15 of 51 eyes (29% overall, 44% of zone 1 eyes, and 21% of zone 2 eyes). The difference between the overall rate of the two groups was highly significant (P = 0.0003). Mean time to retreatment was 16 days in cohort 1 and 24 days in cohort 2. Retreatment was performed if skipped areas were identified and plus disease persisted for 2 weeks or more after the initial treatment. Conclusion: A dense pattern of 810 nm diode laser treatment for threshold ROP and prompt retreatment for residual plus disease significantly reduces the rate of progression in eyes with zone 2 disease (P = 0.02) and may be beneficial in eyes with zone 1 disease.</p>																																	

<p><b>ROP-LI48 Outcome after Laser and Surgical Treatment for Retinopathy of Prematurity</b>                  Kychenthal A,<sup>1,3</sup> Katz X,<sup>2,3</sup>                  Dorta P.<sup>3</sup>                  Clinica Alemana de Santiago,                  Santiago, Chile,<sup>1</sup> Clinica Las Condes,                  Santiago, Chile,<sup>2</sup> Hospital del Salva-                  dor, Santiago, Chile.<sup>3</sup>                  [ARVO Abstract]. Invest Ophthalmol                  Vis Sci.41(4): S336. Abstract nr                  1761, 2000</p>	<p>To study the structural outcome after laser and surgical treatment in a series of infants with zone I and II ROP, 32 consecutive eyes in 16 infants with zone I ROP and 65 eyes in 35 infants with zone II ROP were treated with indirect diode laser. Additionally, five eyes with retinal detachment secondary to ROP were surgically treated. Structural outcome was evaluated at 3 months. Results: In the laser group 14 out of 32 eyes (43.8%) with zone I ROP had unfavorable outcome compared with 6 out of 65 eyes (9.2%) with zone II ROP (p=0.001). Treatment age was significantly less (p=0.005) for zone I group than for zone II group (35.7 vs. 37.5 weeks). In the surgery group 2 out of 5 eyes (40%) had a favorable outcome. Conclusion: Laser for Zone I ROP is not as effective as for Zone II. Zone I eyes need earlier treatment. Surgery can effectively attach the retina in some cases.</p>
<p> <b>ROP-LI49 Diode Laser Treatment of Posterior Retinopathy of Prematurity</b>                  Axer-Siegel R, Snir M, Cotlear C,                  Maayan A, Frilling R, Rosenbaltt I,                  Weinberger D, Kremer I, Sirota L.                  Br J Ophthalmol 84:1383-1386, 2000</p>	<p>Forty-eight eyes of 25 premature babies with threshold ROP in zone I (23 eyes) and posterior zone II (25 eyes) were treated with the infrared IRIS Medical OcuLight and LIO. Confluent burns were applied to the avascular retina. In 18 eyes, an additional row of laser burns was added posterior to the ridge. Follow-up ranged from 3 to 25 months (mean 14 months). Results: Favorable anatomical results were noted in 41 eyes (85.4%). ROP stage 5 developed in 2 eyes; ROP stage 4A developed in 4 eyes, and ROP stage 4B in 1 eye. Three of the eyes with stage 4A were successfully buckled; the fourth was not operated on and remained demarcated by laser scars. The only intraoperative ocular complication was a small local preretinal bleeding in 2 patients.</p> <p><u>Treatment Parameters</u>                  Tight scatter of laser applications was performed, with a half burn diameter between burns, from the ridge up to the ora serrata. The whole circumference of the avascular retina was treated with moderate white burns.</p> <p>Power: 0.3 to 0.5 W                  Duration: 0.2 - 0.5 seconds                  Number of applications: 800 – 1550 (average 1243)                  Retreatment: 11 eyes (23%) Retreatment rate decreased from 29% during the first 2 years to 12% in the third year.</p> <p>Conclusions: The infrared diode laser was found to be a safe and effective treatment for posterior ROP.</p>
<p> <b>ROP-LI50 Outcomes After Laser Therapy for Threshold Retinopathy of Prematurity (ROP)</b>                  Foroozan R, Connolly BP, Tasman W.                  AAO Scientific Poster 262.                  Dallas, TX, 2000</p>	<p>To determine the incidence of regressed threshold ROP after laser treatment, 120 eyes of 81 patients were followed for a minimum of 12 months to assess anatomic outcomes. Unfavorable outcomes were defined as retinal detachment and retinal fold. Results: One-hundred-nine eyes (91%) had a favorable outcome. Zone 1 eyes appeared to be 3.3 times more likely to have an unfavorable outcome compared to Zone 2 eyes, but the 95% confidence interval (0.8 – 14.5) did not support this statistically. Conclusions: Laser therapy is effective for threshold ROP.</p>



<p><b>ROP-LI51 Clinical Outcome of Confluent Laser Photoablation for Retinopathy of Prematurity</b>  Aaberg, Jr TM; Fallaha N; Drack AV; Lambert SR.  Emory Eye Center, Emory University, Atlanta, GA.  [ARVO Abstract] Invest Ophthalmol Vis Sci. 42(4): S681. Abstract nr 3666, 2000</p>	<p>The authors conducted a retrospective study of 29 patients (56 eyes) with ROP treated with confluent diode laser photoablation. Three main outcomes were evaluated: 1) the rate of progression; 2) the timing and frequency of laser retreatment; and 3) postoperative complications. Eyes received a mean of 1935 ± 968 (range, 963 to 4535) laser burns administered in a confluent pattern. Results: Eight eyes (14%) progressed to a stage 4 disease. One eye (1.8%) underwent a second treatment for persistent stage 3 disease. Postoperative complications included: corneal edema (n=2), hyphema (n=2), anterior segment ischemia (n=2), posterior synechiae (n=2), cataract (n=2), vitreous hemorrhage (n=5), and macular ectopia (n=2). Conclusions: The infants in this series received significantly more laser burns than infants reported in the literature receiving scatter (mean, 500 to 1200 burns) or near confluent (mean, 693 burns) laser photoablation. While confluent laser photoablation almost eliminated the need for supplemental treatment (1.8% compared to 35%), it was associated with a high rate of post-operative complications and a rate of progression to stage 4 or 5 disease comparable to that reported with scatter treatment (0 to 29%). Near confluent photoablation has been reported to have a lower rate of progression (3.6%). Confluent laser photoablation lowers the rate of supplemental treatment, but is associated with a higher rate of complications. The rate of progression appears to be no better than that reported with near confluent treatment. Based on these findings, the authors do not recommend using confluent laser photoablation to treat threshold ROP.</p>
<p><b>ROP-LI52 Iris Atrophy, Cataracts, and Hypotony Following Peripheral Ablation for Threshold Retinopathy of Prematurity</b>  Kaiser RS, Trese MT.  Royal Oak, MI.  Arch Ophthalmol 119:615-617, 2001</p>	<p>The authors report on 8 eyes of 5 patients following confluent treatment for threshold ROP. None of the eyes demonstrated a retinal detachment at the time the anterior segment changes were identified, which the authors feel is representative of an anterior segment ischemia including cataracts, iris atrophy, hypotony, and corneal haze. Six of the 8 eyes underwent lensectomy and vitrectomy with a fluid-air exchange and still went on to develop phthisis. Two of the 8 eyes underwent lensectomy and vitrectomy and received silicone oil instead of fluid-air exchange. These eyes had a beneficial anatomic result from this therapy.</p> <p>Clinical examination of all eyes revealed confluent anterior retinal treatment, regression of threshold ROP, and the absence of a retinal detachment. The ciliary body was not accidentally treated in any of the cases reported. A possible mechanism for developing anterior segment ischemia following treatment of ROP can be made by comparing laser treatment in proliferative diabetic retinopathy with laser treatment in ROP. The major difference in treating these diseases is the location and con-fluence of the laser burns. Treatment of proliferative diabetic retinopathy tends to spare the far peripheral portions of the retina, whereas treatment of ROP includes the entire anterior avascular retina from the edge of the pars plicata back to the anterior edge of the ridge of proliferative retinopathy covering the entire circumference of the far peripheral retina. In addition, during treatment of ROP there is significant scleral depression, which could impair the circulation in the long posterior ciliary arteries.</p>

	<p>A potential treatment to preserve the physical structure of the eye after this reported complication is with the use of silicone oil. The 2 eyes in which silicone oil was placed maintained normal anatomic structure (at 6 months follow-up) compared with the eyes that only had a fluid-air exchange and went on to become hypotonous. This report should not discourage physicians from being aggressive with the treatment of ROP but instead should prompt investigation to further advance our methods of treatment and our understanding of its complications.</p>
<p><b>ROP-LI53 Diode Laser Photocoagulation for Retinopathy of Prematurity: A Histopathologic Study</b> Park P, Eagle Jr RC, Tasman WS. Ophthalmic Surg Lasers 32:63-66, 2001</p>	<p>This case describes the ocular histopathologic findings of a pair of eyes in a severely premature infant treated with diode laser photocoagulation for bilateral stage 3 ROP for 360° in zone 1 with severe plus disease. 1473 laser burns were applied to the right eye, and 1407 to the left eye. The right eye responded to treatment; the left eye developed persistent vitreous hemorrhage and total retinal detachment. At 9 months postpartum, the infant died from renal and hepatic failure. The eyes were sent to Wills Eye Hospital where they were processed routinely for light microscopy.</p> <p>The histopathologic examination of laser burns in the right eye disclosed segmental areas of chorioretinal scarring with retinal atrophy and gliosis, loss of RPE and extensive atrophy of the choroid and its vasculature. The left eye had iris neovascularization, a chronic organized vitreous hemorrhage and a totally detached retina. These results resembled those reported after transscleral cryotherapy; however, the degree of chorioretinal atrophy and scarring found in the eye treated with diode laser photocoagulation appears to be slightly less severe than cryotherapy. Compared to cryotherapy, laser therapy is relatively simple and may be safer, i.e. general anesthesia, sedation, and conjunctival incisions are not required.</p>
<p><b>ROP-LI54 Randomized Comparison of Diode Laser Photocoagulation versus Cryotherapy for Threshold Retinopathy of Prematurity: Seven-Year Outcome</b> Shalev B, Farr AK, Repka MX. Am J Ophthalmol 132:76-80, 2001</p>	<p>To report the structural and functional outcomes at a minimum of 7 years postmenstrual age after randomized treatment of threshold ROP with laser ablation or cryotherapy, 19 patients were entered into a prospective, randomized protocol, in which 1 eye received cryotherapy, while the other eye received diode laser photocoagulation. Asymmetric eyes were randomly assigned. Two patients have died, and 7 were no longer available for 7-year outcome examinations, leaving 10 children for analysis. There were 8 symmetrical cases treated in both eyes. Of these, there were 6 concordant and 2 discordant structural outcomes. Results: The laser-treated eyes had the favorable outcome in each instance. The geometric mean VA of the paired eyes after laser photocoagulation was 20/33, and after cryotherapy it was 20/133 (P=.03). The mean refractive error was -6.50 diopters after laser photocoagulation and -8.25 diopters after cryotherapy (P=.27), although one of the cryotherapy eyes could not be refracted because of phthisis. All 10 eyes receiving laser photocoagulation had a favorable structural outcome at 7 years follow-up. In the cryotherapy group of 8 eyes, 6 had favorable retinal structures, and 2 had an unfavorable structural outcome (1 was phthisical after total retinal detachment, and the other had a retinal fold that involved the</p>


	<p>macula). There was no instances of cataract developing during the entire follow-up period. Conclusions: Laser photocoagulation appears to be associated with a structural and functional outcome at least as good as cryotherapy 7 years after therapy. VA and refractive error data suggest that laser photocoagulation may have an advantage over cryotherapy.</p>
<p><b>ROP-LI55 Laser Therapy for Retinopathy of Prematurity</b>                  Banach MJ, Berinstein DM                  Curr Opin Ophthalmol 12:164-170, 2001</p> <p><i>Also listed as ROP-TS8.</i></p>	<p>In this review, the most recent advances of ROP and its accurate diagnosis are discussed. All current aspects of laser photocoagulation are discussed, including the indications for treatment, equipment, anesthesia, treatment techniques, complications, postoperative care, and structural outcomes. Systemic parameters that may affect ocular outcomes are also addressed. Some highlights:</p> <p><u>Laser Treatment Technique</u>                  Laser treatment should be instituted within 72 hours of the diagnosis of threshold disease. The authors use the 810 nm OcuLight laser with an indirect delivery system to apply laser treatment to avascular retina immediately anterior to the ridge of extraretinal fibrovascular proliferation and extending to the ora serrata for 360° in all cases. A moderately intense, gray-white burn is the desired target intensity. Laser settings to achieve the desired lesion intensity vary, but often range from a power of 150 mW to 400 mW and duration of 0.2 to 0.3 seconds. The mean number of burns have ranged from 410 to 1556 in these reports, but this can vary considerably depending on the posterior extent of the ridge and the resultant spot size.</p> <p>Complications: Laser photocoagulation using the indirect delivery system has potential immediate ocular complications that include inadvertent macular burns, and both vitreous and choroidal hemorrhage. Thermal injuries to the cornea, iris, and lens can also occur. Cataracts are well described following indirect laser treatment for ROP.</p> <p>Postoperative care: Immediately after laser treatment, steroid drops or ointment may be applied. Follow-up examinations are performed weekly until the regression of plus disease and fibrovascular proliferation occurs, then every 2 to 4 weeks until 3 months of age (corrected).</p> <p><u>Transscleral Retinal Photocoagulation</u>                  Transscleral diode lasers are also available for treating ROP. The transscleral probe is applied to the external surface of the sclera and has a diode aiming beam that allows the targeted retina to be visualized using an indirect ophthalmoscope. To achieve a grayish, white burn, the authors used powers between 500 and 750 mW and a pulse duration of 2 to 3 seconds. Advantages of transscleral treatment when compared with transpupillary treatment include the reduced risk of thermal injury to the iris and lens, and the ability to treat through media opacities such as vitreous hemorrhage and miotic pupils. Disadvantages include the technical difficulty in treating zone 1 disease just anterior to the ridge without conjunctival incisions. Although the vast majority of infants can be safely treated with transpupillary laser applications, transscleral diode laser may play a role in select cases.</p>

	<p>Conclusions: The management of ROP has changed dramatically over the past 15 years. Peripheral retinal ablation is the standard treatment for threshold ROP. Although cryotherapy remains a viable option, laser photocoagulation with the indirect delivery system has become the treatment of choice for threshold ROP.</p>
<p><b>ROP-LI56 A Comparison of Laser Photocoagulation with Cryotherapy for Threshold Retinopathy of Prematurity at 10 Years. Part 1. Visual Function and Structural Outcome</b>                  Ng EYJ, Connolly BP, McNamara JA, Regillo CD, Vander JF, Tasman W.                  Ophthalmology 109:928-935, 2002</p>	<p>An extended follow-up of a randomized controlled clinical trial of 118 eyes of 66 patients, randomly assigned to receive either cryotherapy or laser photocoagulation for threshold ROP, was conducted to assess visual and structural outcomes after laser photocoagulation and transscleral cryotherapy for threshold ROP after 10 years. Of the 25 patients who returned for the 10 year follow-up, 19 had undergone bilateral treatment, and 6 had undergone unilateral treatment. Detailed examinations were performed on a total of 23 laser-treated eyes and 21 cryotherapy-treated eyes.</p> <p>Cryotherapy and/or laser photocoagulation was administered within 72 hours of the diagnosis of threshold ROP. The first 29 laser treatments performed before October 1990 were performed in an operating room using a liquid cooled argon ion laser. In October 1990, the infrared OcuLight diode laser became available and was used in the remaining treatments.</p> <p>Results:  <u>Visual Outcome</u> - Eyes treated with laser had a mean BCVA of 20/66 (Snellen equivalent), whereas cryotherapy-treated eyes had a mean BCVA of 20/182 (Snellen equivalent) (P=0.015, n=42). Compared with eyes treated with cryotherapy, eyes treated with laser photocoagulation were 5.2 times more likely to have a 20/50 or better BCVA (95% confidence interval, 1.37-19.8, n=42). Eyes treated with cryotherapy were 7.2 times (95% confidence interval, 1.54-33.6, n=33) more likely to develop retinal dragging compared with laser treatment. By linear regression analysis, ETDRS VA was inversely proportionate to the degree of retinal dragging in both laser (r= -0.637, P= 0.006) and cryotherapy (r = -0.517, P=0.040) treated eyes.</p> <p><u>Anatomic Outcome</u> - Of the 21 eyes treated with cryotherapy, 4 (19%) eyes had unfavorable outcomes (2 eyes developed stage 5 ROP, 1 eye developed stage 4B ROP, and the other eye developed a macular fold). There were 2 (10%) unfavorable outcomes among the 23 eyes treated with laser; both developed stage 5 ROP. Among the 21 patients with favorable outcomes in both eyes, 13 had strabismus (62%) and 6 had received amblyopia therapy (29%). Ptosis, loss of cilia, and cortical cataract were among probably treatment-related complications that were noted in this study.</p> <p>Conclusions: The 10-year follow-up results of this study suggested that laser photocoagulation used in the treatment of ROP resulted in better visual and anatomic outcome and was associated with less long-term morbidity than cryotherapy treatment.</p> <p>Although this trial was smaller than the Multicenter Trial of Cryotherapy for ROP, it is unlikely that another trial of similar</p>



	<p>scale with be undertaken to compare cryotherapy with laser photocoagulation. Note: Although both laser treatment and cryotherapy are ablative treatments, the type of tissue damage differs. Transscleral cryotherapy to the developing sclera causes retinal, choroidal, and scleral disruption and may perpetuate disorganized scar tissue formation. The photocoagulation burns produced by a transpupillary diode laser (810 nm) produce retinal and choroidal changes. Compared with comparable argon laser spots, diode laser burns show more of an effect in the choroid.</p>
<p><b>ROP-LI57 A Comparison of Laser Photocoagulation with Cryotherapy for Threshold Retinopathy of Prematurity at 10 Years. Part 2. Refractive Outcome</b>                  Connolly BP, Ng EYJ, McNamara JA, CD Regillo, Vander JF, Tasman W. Ophthalmology 109:936-941, 2002</p>	<p>An extended follow-up of a randomized controlled clinical trial of 118 eyes of 66 patients, randomly assigned to receive either cryotherapy or laser photocoagulation for threshold ROP, was conducted to determine the refraction of each of these patients approximately 10 years after treatment, with specific attention to the role of the cornea, AC depth, and axial length of the eye. Twenty-five patients (44 eyes treated) were available for follow-up examination 10 years later.</p> <p>Eyes treated with cryotherapy were significantly more myopic than those treated with laser photocoagulation. When comparing patients with bilateral treatment, the mean spherical equivalent (SE) of eyes treated with laser was <math>-4.48</math> diopters (D) compared with a mean SE of <math>-7.65</math> D for eyes treated with cryotherapy (<math>n= 15</math> pairs of eyes, <math>P= 0.019</math>). Cryotherapy-treated eyes had a mean axial length of 21.7 mm versus 22.9 mm for laser-treated eyes (<math>P= 0.024</math>, <math>n = 12</math> pairs of eyes). The anterior chamber depth and lens thickness averaged 2.86 mm and 4.33 mm, respectively, in the cryotherapy-treated eyes compared with 3.42 mm and 3.95 mm in the laser-treated eyes (<math>P&lt;0.001</math>, <math>n= 12</math> pairs for both measurements). There were no statistical differences in anterior corneal curvature and central corneal thickness between the two treatment modalities. Crystalline lens power bore the strongest correlation to refractive outcomes in both laser-treated (<math>r=0.885</math>, <math>P&lt;0.001</math>) and cryotherapy-treated eyes (<math>R=0.591</math>, <math>P=0.026</math>). Although keratometric readings were higher than normal values in these eyes, there was no correlation to the degree of myopia. Conclusions: Laser-treated eyes were significantly less myopic than cryotherapy-treated eyes. Lens power seemed to be the predominant factor contributing to the excess myopia.</p>
<p><b>ROP-LI58 Diode Laser Photocoagulation to the Ridge and Avascular Retina in Threshold Retinopathy of Prematurity</b>                  Steinmetz RL, Brooks HL. Retina 22:48-52, 2002</p>	<p>A retrospective review of 82 consecutive eyes in 43 preterm infants with stage 3+ threshold disease who had both the peripheral avascular retina and the ridge treated with diode laser photocoagulation was conducted. All eyes were treated within 72 hours of the detection of threshold disease. An unfavorable outcome consisted of either 1) retinal fold involving the macula; 2) any retinal detachment involving zone I, or 3) a retrolental tissue or "mass" that obscured the posterior pole.</p> <p>Treatment parameters included a spot size of approximately 600 <math>\mu\text{m}</math>, 0.2 second duration, and power of 200 to 500 mW. Confluent laser burns were applied to the peripheral avascular</p>

	<p>retina, including the ridge and all associated extraretinal fibrovascular proliferation for 360°. On average, 1,245 burns of confluent laser photocoagulation were given per eye (range, 400 – 1,760 burns). Often, increased laser energy was required to obtain the gray-white burn intensity similar to those placed in the peripheral retina. In many eyes, localized hemorrhage occurred at the ridge during treatment, but in no instance did hemorrhage prevent the completion of the laser treatment. In all eyes, the hemorrhages cleared within 3 to 4 weeks and none were associated with an unfavorable outcome. All postoperative eyes received either an antibiotic or an antibiotic/steroid ointment twice daily for 3 days.</p> <p>Patients were followed-up for a mean of 18 months (range, 3 – 72 months), with a median follow-up of 12 months. At the 3-month follow-up, a favorable anatomic outcome occurred in 79 eyes (96%). The 3 eyes with unfavorable outcomes, all had received complete initial laser photocoagulation for zone I disease, but 2 of the eyes were in one infant who was unable to be examined and re-treated in the critical weeks that followed. It is therefore conceivable that additional laser treatment to both the ridge and peripheral avascular retina could have salvaged these eyes and improved the favorable outcome rate. There were no intraoperative complications. Postoperative intraocular hemorrhage occurred in 8 eyes (10%) and resolved without sequelae. Supplemental laser was required in only 2 eyes (2%). Conclusions: Diode laser photocoagulation to the ridge and peripheral avascular retina in threshold ROP is associated with a favorable anatomic outcome. The risk of postoperative intraocular hemorrhage and the need for supplemental laser photocoagulation is low.</p>
<p><b>ROP-LI59 Treatment of Threshold Retinopathy of Prematurity with Diode Laser</b>  Lee AC, Kim JE, Perkins SL, Connor TB, Han DP.  Ophthalmology, Medical College of Wisconsin, Milwaukee, WI.  2002 Annual Meeting Abstract and Program Planner accessed at <a href="http://www.arvo.org">www.arvo.org</a> Association for Research in Vision and Ophthalmology. Abstract 1240, 2002</p>	<p>To evaluate the outcome of indirect diode laser on the treatment of threshold ROP and to report demographic changes, a retrospective chart review of 111 eyes of 61 babies treated for threshold ROP between 1991 and 2001 was conducted. Fourteen eyes had zone 1 disease at the time of laser treatment, while 97 eyes had zone 2 disease. The median length of follow-up was 2 months (range, 0 to 94 months). Regression of neovascularization was achieved in 96/111 eyes (86%). Thirty-six percent of eyes with zone 1 disease progressed to stage 4 or 5 disease, while 10% of the initial zone 2 eyes progressed. The mean gestational age at birth (25 weeks) and at time of treatment (37 weeks) and the mean birth weight between eyes with zone 1 versus zone 2 were not statistically different (<math>p=0.3-0.9</math>). Five eyes (5%) developed stage 4a disease, 6 eyes (5%) developed 4b disease, and 4 (3.5%) eyes developed stage 5 disease. There was no statistical difference in mean gestational age at birth (25.0 versus 25.2 weeks, <math>p=0.74</math>) and mean birth weight (746 versus 724 grams, <math>p=0.78</math>) between individuals that progressed compared with those that stabilized. During 1991 to 2001, there was a statistically significant trend towards lower mean gestational age at time of birth (Pearson correlation = <math>-0.36</math>, <math>p = 0.005</math>) and mean birth weight (Pearson correlation = <math>-0.35</math>, <math>p = 0.0041</math>). Conclusion: Favorable outcome was noted in 86% of eyes after laser treatment, which is comparable to other published studies. A larger number of eyes with zone 1</p>

	<p>disease progressed to stage 4 or stage 5 disease as compared to zone 2 disease; however, there was no difference in mean birth weight or gestational age at time of birth.</p>
<p><b>ROP-LI60 Diode Laser Photocoagulation and Vitrectomy for the Management of Retinopathy of Prematurity in Chile</b>                  Kychenthal A,<sup>1</sup> Katz X,<sup>2</sup> Dorta P,<sup>3</sup> Stevenson R.<sup>3</sup>  <sup>1</sup>Clinica Alemana &amp; Hospital Salvador, Santiago, Chile; <sup>2</sup>Clinica Las Condes, Santiago, Chile; <sup>3</sup>Hospital Salvador, Santiago, Chile.                  2002 Annual Meeting Abstract and Program Planner accessed at <a href="http://www.arvo.org">www.arvo.org</a>. Association for Research in Vision and Ophthalmology. Abstract 1248, 2002</p>	<p>Forty consecutive eyes in 20 infants with zone I ROP and 93 eyes in 49 infants with zone II ROP were treated with indirect diode laser to study the clinical characteristics and treatment outcome after laser and surgical treatment in a series of infants with ROP. In the zone I group, two anatomical subgroups (anterior and posterior) were defined. Additionally, 28 eyes with retinal detachment secondary to ROP were surgically treated. Structural outcome was evaluated at 3 months. In the laser group, 20 out of 40 eyes (50%) with zone I ROP had unfavorable outcome compared with 6 out of 93 eyes (6.5%) with zone II ROP (<math>p &lt; 0.001</math>). Treatment age was significantly less (<math>p=0.001</math>) for zone I group than for zone II group (35.7 vs 37.2 weeks). Fourteen out of 34 eyes (41.2%) with anterior zone I ROP and 6 out of 6 (100%) eyes with posterior zone I ROP had unfavorable outcome (<math>p=0.007</math>). In the surgery group 13 out of 17 eyes (76.5%) with stage 4 and 5 out of 11 eyes (45.5%) with stage 5 ROP had a favorable outcome. Conclusion: Laser for Zone I ROP is not as effective as for Zone II. Zone I eyes need earlier treatment. Surgical intervention can effectively attach the retina in some cases of stage 4 and 5 ROP.</p>
<p><b>ROP-LI61 Re-Treatment with Diode Laser Photocoagulation for Severe Retinopathy of Prematurity: Indications and Results</b>                  Wallace DK,<sup>1</sup> Freedman SF,<sup>2</sup> Coats DL,<sup>3</sup> Sprunger DT,<sup>4</sup> Brooks SE.<sup>5</sup>  <sup>1</sup>University of North Carolina, Chapel Hill, NC; <sup>2</sup>Duke University, Durham, NC; <sup>3</sup>Baylor College of Medicine, Houston, TX; <sup>4</sup>Indiana University, Indianapolis, IN; <sup>5</sup>Augusta, GA.                  2002 Annual Meeting Abstract and Program Planner accessed at <a href="http://www.arvo.org">www.arvo.org</a>. Association for Research in Vision and Ophthalmology. Abstract 4014, 2002</p>	<p>Records were reviewed from 26 patients who received a second diode laser treatment for ROP on at least 1 eye at 1 of 5 centers over the past 4-7 years. Indications for re-treatment included skipped areas, persistent plus disease and/or stage 3, and progression of disease. An unfavorable anatomic outcome was defined, as in the CRYO-ROP study, as a retinal fold through the macula, a retinal detachment in zone I, or a retrolental mass. Of 36 eyes in 26 patients who received a second diode laser treatment, 31 (86%) had a favorable anatomic outcome and 5 (14%) had an unfavorable outcome. The mean interval between first and second treatment was 16 days (range 4-68). The mean number of laser spots at first treatment was 1675 (1319-2600) in zone I eyes and 1093 (300-1929) in zone II eyes. The mean number of spots at second treatment was 693 (157-1842) in zone I eyes and 364 (100-1274) in zone II eyes. Conclusion: When an eye with severe ROP fails to regress after laser treatment, prompt retreatment directed at untreated or lightly treated avascular retina results in a favorable anatomic outcome in most cases.</p>
<p> <b>ROP-LI62 Acquired Cataracts after Diode Laser Photocoagulation for Threshold Retinopathy of Prematurity</b>                  Paysse EA, Miller A, Brady McCreery KM, Coats DK.                  Ophthalmology 109:1662-1665, 2002</p>	<p>A retrospective, noncomparative, interventional case series to report the incidence of acquired cataract after diode laser photocoagulation for threshold ROP was conducted. One hundred fifty-three infants (293 eyes) with threshold ROP received transpupillary diode laser photocoagulation using the 810 nm OcuLight laser system. The entire avascular peripheral retina was treated, using either a 20-diopter (D) or a 28-D condensing lens to visualize the retina. One hundred fifty-four eyes were treated with a pulse mode, with a laser energy</p>

duration per spot averaging 300 milliseconds (pulse mode), and 132 eyes were treated with a continuous mode, with the laser energy duration set a 9000 milliseconds (continuous mode). Four eyes were treated with a combination of pulse and continuous mode laser. The treatment mode was not recorded in 3 eyes. The power setting varied between cases from 185 mW to 800 mW (mean, 307 mW) in the pulse group and from 130 to 600 mW (mean, 255 mW) in the continuous mode group. The laser power was titrated to achieve the desired end point of a gray-white retinal burn, and the laser spots were placed approximately one half of a burn width apart in a scatter pattern. When using the continuous mode, scatter treatment was achieved by moving the laser's aiming beam from one site to another as soon as a burn appeared. In this way, interrupted laser burns were spaced approximately one half burn width apart despite having the laser set on a continuous mode. Patients were evaluated after surgery at 1- to 2-week intervals for 4 weeks and then again between 6 and 12 weeks after surgery. Subsequent follow-up visits were spaced out according to the physician's discretion.

**Results:** One hundred four (203 eyes) of the 153 patients (68%) had follow-up for at least 6 months. One cataract (0.003%) in 293 eyes occurred after transpupillary diode laser photocoagulation. This cataract consisted of peripheral cortical punctate lenticular opacities, first detected 7 weeks after laser treatment. These peripheral cortical lenticular opacities were not visually significant and were non-progressive after 24 months of follow-up. Before surgery, the eye had zone 2, stage 3 ROP with severe plus disease and a prominent persistent anterior tunica vasculosa lentis at the time of treatment. Pulse mode laser was used in this eye. Limited uptake of laser energy was noted in this eye, requiring high power and multiple burns to treat the avascular retina fully. The following treatment parameters were used in this eye: power, 300 to 550 mW; duration of laser energy per burn, 400 milliseconds; and number of burns, 2889. A progressive stage 4A retinal detachment also developed in this eye requiring pars plana vitrectomy with silicone oil placement. The cataract did not progress before or after silicone oil placement.

**Conclusions:** The authors believe that post-laser cataracts are more likely the result of thermal damage from absorption of laser energy by lens proteins or hemoglobin in the blood circulating through a persistent anterior tunica vasculosa lentis and that they should, for the most part, occur in the first postoperative weeks after the laser treatment. If true, this phenomenon of laser energy absorption is likely to be less frequent with diode than with argon laser surgery because of the reduced absorption of diode laser energy by hemoglobin. The low incidence and the absence of visually significant cataracts suggest a potential advantage of transpupillary laser treatment with the diode over the argon laser. This advantage may be especially true in infants with significant persistent anterior tunica vasculosa lentis. A prospective, randomized clinical trial may be helpful in further clarifying these issues.






<p><b>ROP-LI63 Treatment of Threshold Retinopathy of Prematurity with Diode Laser</b>                  Kim JE, Lee AC, Perkins SL, Connor, Jr, TB, Han DP.                  Retina Congress. San Francisco, CA 2002</p>	<p>To evaluate the outcome of indirect diode laser on treatment of threshold ROP and to report demographic changes, the authors conducted a retrospective chart review of 111 eyes of 61 babies treated with indirect diode laser for threshold ROP between 1991 and 2001. The average gestational age at birth was 25 weeks (SD 2, range: 23-35 weeks), and the mean birth weight was 728 grams (SD 190, range: 435 to 1400 grams). The mean gestational age at the time of treatment was 37 weeks (SD 2, range:32-44 weeks). 96/111 eyes achieved regression of neovascularization. 14 eyes had zone 1 disease at the time of laser treatment, while 97 eyes had zone 2 disease. 36% of eyes with zone 1 disease and 10% of zone 2 disease progressed to stage 4 or 5 disease. The mean gestational age at birth and at time of treatment and the mean birth weight between eyes with zone 1 versus zone 2 were not statistically different (P=0.3 to 0.9). There was no statistical difference in mean gestational age at birth (25 versus 25.2 weeks, P=0.74) and mean birth weight (746 versus 724 grams, P=0.78) between individuals who progressed compared with those who stabilized. During 1991 to 2001, there was a statistically significant trend towards lower mean gestational age at time of birth (Pearson correlation=-0.36, P=0.005) and mean birth weight (Pearson correlation=-0.35, P=0.004). Conclusions: Favorable outcome was noted in 86% of eyes after indirect diode laser treatment. A larger number of eyes with zone 1 disease progressed to stage 4 or stage 5 disease as compared to zone 2 disease. However, there was no difference in mean birth weight or gestational age at time of birth between zone 1 and zone 2 groups. Premature infants needing treatment for threshold ROP appear to be presenting at an earlier gestational age and with lower birth weights over time.</p>
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<p><b>ROP-LI64 Clinical Outcome of Confluent Laser Photoablation for Retinopathy of Prematurity</b>                  Fallaha N, Lynn MJ, Aaberg, TM Jr, Lambert SR.                  Journal of AAPOS 6:81-85, 2002</p>	<p>The authors retrospectively studied 91 eyes (47 patients) treated with confluent diode laser photoablation using the 810 nm IRIS Medical OcuLight diode laser. Four main outcomes were evaluated: (1) rate of progression, (2) frequency of laser retreatment, (3) postoperative complications, and (4) postoperative refractive error. A mean of 1943 ± 912 (range 693 to 4535) laser burns were administered in a confluent pattern. Twenty-four eyes (29%) received more than 2000 laser burns. Zone I and posterior zone II ROP received significantly more burns than anterior zone II disease (mean ± SD, 2665 ± 1154 vs 1570 ± 509 burns; P = .0002). Laser treatment was applied to the avascular retina immediately anterior to the ridge extending to the ora serrata for 360°. The fibrovascular ridge was not treated. Laser settings ranging from 250 to 400 mW and 0.1 to 0.2 seconds were varied to achieve a moderately white laser burn. Follow-up examinations were performed 1 to 2 weeks after the treatment and then biweekly until the ROP regressed. Supplemental laser treatment was performed if skipped areas were identified and the disease persisted for 2 weeks after treatment. Progression to stage 4 or 5 disease occurred in 13 (44.8%) of 29 eyes with zone I and posterior zone II and in 2 (3.9%) of 51 eyes with anterior zone II (P=.01). Eyes with anterior zone II ROP that received more than or equal to 2000 burns progressed more than those that received fewer than 2000 burns. Only 1 (1%) eye needed retreatment. Postoperative complications included corneal edema (2.3%), anterior segment ischemia (2.3%), vitreous hemorrhage</p>
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	<p>(7.9%), posterior synechia (2.3%), cataract (4.9%), and macular ectopia (12%). The rate of complications was not shown to be related to the number of laser burns. The mean spherical equivalent at the last follow-up was <math>-4.52 \pm 5.63</math> D. Conclusion: While confluent treatment has almost completely eliminated supplemental treatment, it was associated with a similar rate of progression and complications as previous reports with other patterns (scatter, near-confluent) of laser treatment. The overall progression rate to stage 4 or 5 ROP appears to be comparable to scatter photocoagulation but higher than with a near-confluent technique. This finding is unexpected, because one would expect that confluent laser treatment would be associated with a lower rate of progression to stage 4 and 5 disease; however, it is unclear if the progression rate is related to the pattern of treatment or the severity of the disease being treated.</p>
<p> <b>ROP-LI65 Retinopathy of Prematurity in Practice. II: Longterm Results Following Treatment for Threshold Disease</b> Gnanaraj L, Brennan R, Cottrell DG. Eye (17);189–193, 2003</p>	<p>A total of 35 infants diagnosed with threshold ROP were treated between 1987 and 1998. Cryotherapy, 810 or 532 nm laser was used. To determine the long-term (5 years mean; range 2-12 years) outcome of treatment for threshold ROP, the patients were divided into two groups: Group 1 (21 patients/40 eyes), who attended a special review clinic and Group 2 (6 patients/12 eyes), who were unable to attend, but contained sufficient data to justify their inclusion in the study. Each group was subdivided into cryotherapy and laser subgroups for data analysis.</p> <p>A total of 12 infants (22 eyes) were treated with cryotherapy and 15 infants (30 eyes) were treated with either 810 nm (20 eyes) or 532 nm laser photocoagulation (10 eyes).</p> <p>Structural Outcome: When data from Groups 1 and 2 were combined, a favorable structural outcome was achieved in 72.7% (16/22) of the cryotherapy group and 90% (27/30) of the laser group. Two eyes in the cryotherapy group had a peripheral, temporal localized tractional retinal detachment with a flat posterior pole, and their corrected visual acuity was 6/18. Six eyes in the cryotherapy and 3 eyes in the laser group developed a total retinal detachment.</p> <p>Visual Acuity (VA) Outcome: A favorable outcome in VA was achieved in 59.1% (13/22) of the eyes in the cryotherapy group and 90% (27/30) in the laser group. A VA of 6/12 or better was achieved in 45.5% (10/22) in the cryotherapy group and in 56.7% (17/30) in the laser treatment group. Overall, 9 eyes were blind as a result of ROP.</p> <p>Refraction: Of the 21 patients in Group 1, seven eyes (16.7%) were myopic by more than 3.0 D. Of these, 5 eyes were from the cryotherapy group and 2 eyes were from the laser group. In the cryotherapy group, 5/20 eyes (25%) had myopia between 4.5 and 17.5 D. In the laser group, the refractive error was -7.5 D in both the eyes. Strabismus was observed in 8 children (36.4%): esotropia in 6 (27.3%) patients and exotropia in 2 patients.</p> <p>Conclusion: These results are consistent with previous studies, which show that treatment with laser photocoagulation seems to be as effective, if not better than, cryotherapy and can achieve a good structural and functional outcome.</p>



New

<p><b>ROP-LI66 Dense, Near Confluent, Laser Treatment for Near Threshold and Early Threshold Retinopathy of Prematurity</b>                  Albanis CV,<sup>1A</sup> Abdelsalam A,<sup>1A</sup> Wall SN,<sup>1B</sup> Schreiber MD,<sup>1B</sup> Jager RD,<sup>1A</sup> Rezai KA,<sup>2</sup> Elliott D.<sup>2</sup>  <sup>A</sup>Ophthalmology, <sup>B</sup>Pediatrics and Neonatology, <sup>1</sup>University of Chicago, Chicago, IL; <sup>2</sup>Ophthalmology, Kresge Eye Institute, Detroit, MI.                  Invest Ophthalmol Vis Sci. 44: ARVO E-Abstract 586, 2003</p>	<p>The authors conducted a retrospective chart review of 40 eyes from 20 patients who received dense, near confluent, laser treatment for near threshold and early threshold ROP to study anatomical outcomes. At a mean follow-up of 6 months, there was no progression of ROP, no eyes requiring retreatment, and no anatomical complications. Conclusions: Currently, treatment with laser photocoagulation is the standard of care for patients reaching threshold ROP. Treatment with dense, near confluent, laser treatment for near threshold and early threshold ROP is successful and beneficial. In this study, there was no evidence of further progression of disease, no need for re-treatment, and no anatomical complications.</p>
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New

<p><b>ROP-LI67 Continuous versus Non-Continuous Laser Photocoagulation for the Treatment of Threshold Retinopathy of Prematurity</b>                  Rosenberg KD, Murray TG, Berrocal A, Ysasaga E, Loo R, Aragon A, Douglas M, Feuer W, Gregori G.                  Ophthalmology, Bascom Palmer Eye Institute/University of Miami, FL, Miami, FL.                  Invest Ophthalmol Vis Sci. 44: ARVO E-Abstract 596, 2003</p>	<p>Records of Bascom Palmer Eye Institute and Jackson Memorial Hospital were reviewed to identify patients with threshold ROP who underwent laser treatment between 1996-2002. Post-operative complications, the need for retreatment and the rate of disease progression between continuous laser photocoagulation and standard non-continuous laser photocoagulation modalities were compared. Patients were evaluated at 1 week, 1 month and 6 months post-treatment and at last follow-up. Results: There were 42 patients (84 eyes), 28 patients (56 eyes) who underwent non-continuous photocoagulation and 14 patients (28 eyes) who underwent continuous photocoagulation. The mean overall birth weight was 689 grams (range 415-1200 grams) and the mean overall gestational age was 24.9 weeks (range 23-29 weeks). Post-operative complications occurred in 28 eyes (50%) of patients treated with non-continuous laser therapy and 8 eyes (29%) in patients treated with continuous laser therapy. Seven eyes (12.5%) treated with non-continuous laser photocoagulation required re-treatment versus none of the eyes treated with continuous laser photocoagulation (p=0.12). In the non-continuous group, 4 eyes (7%) progressed to more advanced disease (p=0.28), 3 eyes to stage 4a and 1 eye to stage 4b. No patients treated with continuous photocoagulation progressed to more advanced disease. No patients in either group progressed to stage 5 disease. Conclusions: Continuous laser photocoagulation is safe and effective and can be considered a treatment option for threshold ROP. In addition, the use of continuous pattern photocoagulation as a treatment modality reduced the need for supplemental treatment and was associated with a decreased rate of disease progression.</p>
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New

<p><b>ROP-LI68 Functional and Refractive Outcome of Laser Photocoagulation for Retinopathy of Prematurity</b>                  G.Kieselbach, A.Ramharter, I.Baldissera, M.T. Kralinger.                  Ophthalmology, Univ of Innsbruck, Innsbruck, Austria.                  Invest Ophthalmol Vis Sci. 45:ARVO E-Abstract 4039, 2004   <i>Also listed as ROP-TS9.</i></p>	<p>The authors examined 19 consecutive patients who had undergone photocoagulation for ROP between 1997 and 2002. A total of 37 eyes received either 810 nm transscleral or transpupillary laser treatment. Data consisted of grade of ROP pre-and postoperatively, birth-weight, perioperative and postoperative complications and refraction. Based on indirect ophthalmoscopy, independent observers graded the extent of ROP and determined the postoperative refraction by retinoscopy. Results: 97.3 % of all eyes responded to laser treatment with regression of ROP. Only 1/37 eyes progressed to stage 4B despite photocoagulation and therefore an encircling procedure was performed. After further progression the eye</p>
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	<p>had to have a vitrectomy. Perioperative complications included hemorrhages in 21.6% that resorbed spontaneously and cataract formation in 1 eye (2.7%). Postoperative refractive errors at a mean age of 25±16 months were evaluated. The mean spherical equivalent was +1.0±3.5D. Only 13.6% of the refracted eyes were myopic. Conclusions: Photocoagulation for ROP resulted in regression of threshold ROP. In addition, the analyses of the refractive outcomes demonstrated a predominance of hypermetropia. Whether laser therapy is beneficial in avoiding myopic shift in preterm infants, must be evaluated by a prospective study.</p>