Endpoint Management (EpM)

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The Pascal system (Pattern scanning laser; Topcon Medical Laser Systems Inc., California, USA) allows controlled and safe application of arrays with predetermined parameters.[1]

EpM allows for the control of the laser energy relative to titration level. It is particularly beneficial for treatment at low energies with considerable advantage when treating in the macular area, especially when treating close to the fovea. When using EpM the clinician begins by titrating the laser power to a barely visible or subthreshold burn, which will be at 100% of the selected power for the landmark burns. Next, the percentage of the energy to be delivered needs to be selected by the user, usually between 40 to 70%, for the rest of the burns within the array (Figure 1). EpM can be used for both the 532-nm and 577-nm laser wavelengths. It can be especially helpful when performing single-session PRP or single-session combined PRP with macular treatment, as it may reduce the risk of complications. EpM allows the physician to consistently operate within therapeutic range when performing sub-visible treatments.

The clinical benefit of using landmarks at 100% of the laser power to achieve a barely visible burn is that we can easily recognize the treated area. These landmarks are the edge of the arrays of burns and are key to avoid targeting previously treated areas (Figure 2).

Immediately following the application of barely visible or subthreshold laser, the complete array of spots can be mapped using fundus autofluorescence (FAF) imaging.[2] FAF is a non-invasive imaging technique that demonstrates the spatial distribution of the burns and guides re-treatment, to help avoid lasering previously treated areas.

EpM makes it easier to obtain highly localized burns with minimal axial and lateral spread. Therefore, minimizing outer retinal damage and reducing pain and most importantly with consequent less retinal–retinal pigment epithelium (RPE) atrophy and less visual field impairment while maintaining the adequate clinical effectiveness.

Healing Response

We have shown through imaging studies in humans a 50% reduction in the diameter of the Pascal burn at one year.[3]

Animal histopathology studies have shown a reduction in the width of the zone of retinal damage after laser treatment using barely visible or subthreshold burns secondary to the migration of photoreceptors and RPE cells from the immediate unaffected areas to fill in the gap in the photoreceptor layer.[4]

Conclusion

EpM facilitates laser treatment when aiming for a barely visible or subthreshold endpoint.

A barely visible or subthreshold laser treatment endpoint may allow for a healing response to take place at the level of the RPE and photoreceptor layer.

Barely visible or subthreshold endpoint laser induces less tissue damage followed by a healing response while achieving an adequate therapeutic outcome.

Figure 1: (a) OCT scan showing the laser applications immediately after treatment (purple arrows). (b) Purple line on fundus autofluorescence image corresponding to scanned area. (c) OCT retina map showing area of thickening and exudation. (d) Fundus autofluorescence image highlighting treated area (purple circle).

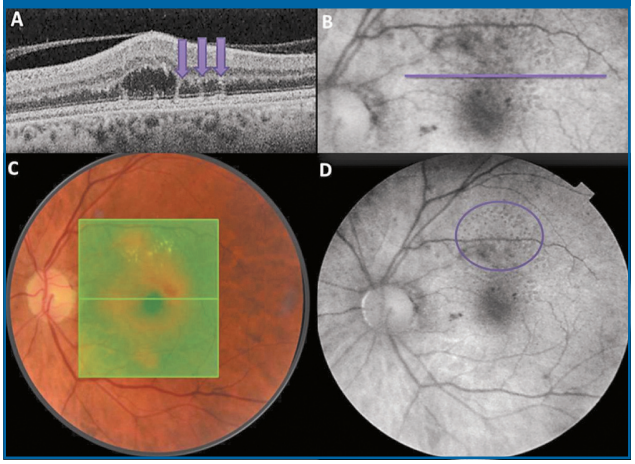
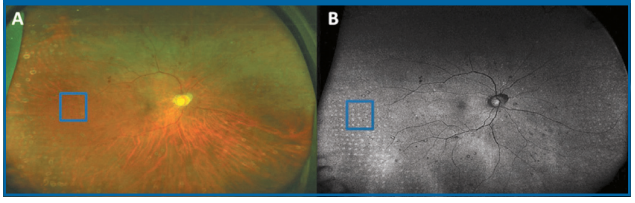


Figure 2: (a) Widefield colour fundus image showing PRP with barely visible burns, 5X5 Pascal array (blue square). (b) Widefield fundus autofluorescence showing the clinically barely visible corresponding burns in the same patient (blue square).



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Endpoint Management; advances in laser technology

Pascal method

Initially developed at Stanford University, the PASCAL Method of Photocoagulation is used to treat a variety of retinal conditions including diabetic retinopathy, age-related macular degeneration and retinal vascular occlusive disease. PASCAL photocoagulators provide significantly improved performance for the physician and an enhanced therapeutic experience for the patient through a family of lasers offered.

PASCAL legacy

PASCAL is the first Pattern Scanning Laser in the world. Since its introduction in 2006, over 750 000 patients have been treated. Over 25 million patterns have been delivered. PASCAL has a strong body of clinical evidence, resulting in more than 20 peer reviewed clinical articles. There are 60 abstract presentations at scientific meetings, highlighting the safety, efficacy and other benefits of PASCAL.

Photo-thermal stimulation Endpoint Management

Endpoint Management (EpM) uses photo-thermal stimulation, which selectively stimulates the RPE without the destruction associated with conventional laser photocoagulation. Using EpM, you can precisely reduce the power and specifically affect RPE cells.

EpM begins with titrating laser power to a hardly visible burn, then the clinician selects the percentage of that energy to be delivered to the treatment locations. Landmark Pattern provide visible indicators of the threated region.

EpM can be used for PASCAL lasers with 532-nm or 577-nm laser wavelengths for macular treatment and for PRP.

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