The new SPARK threshold strategy available for all OCULUS perimeters

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OCULUS SPARK: A New Standard In Visual Field Examination

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Visual field testing in clinical practice faces many challenges. To the most important of these belong the necessity to train adequately the patients before the definitive examination, the neurological fatigue of the retina during prolonged testing, and the variability of the results. These difficulties constitute important limitations not only for the diagnosis, but also for monitoring the disease progression. Especially fluctuation hinders differentiation between real and transient changes.

The SPARK strategy addresses each of these limitations: it facilitates a fast and easily manageable patient training, performs the examination in record time to limit fatigue, and provides very stable results.

Fast Patient Training

Firstly, SPARK performs an ultra-rapid initial assessment of the visual field in about 40 seconds. In untrained patients this phase may be repeated several times to ensure that the patient understands and successfully completes the examination, giving rise to reproducible results. This first phase examines only six points, whose information is highly representative of the entire visual field.

The test continues with a second phase that examines a greater number of points and provides more accurate results. In approximately one and a half minutes this phase produces results that are comparable to those of conventional strategies having much greater duration.

If even more accurate and stable results are required, the test may be continued with two additional phases. All four phases together last only about three minutes. Finally, a point by point analysis of the results obtained in each of the four phases is performed. For each point the most discrepant result is eliminated, and the final result is produced by averaging the values of the remaining three phases.

Figure 1 shows the results of examining a glaucomatous patient using all four phases. Clearly, the first phase provides a wealth of information, despite its short duration. The results of the following phases are very similar and each differs from the others to a degree similar to that induced by fluctuation in successive examinations of the same patient when using other strategies.

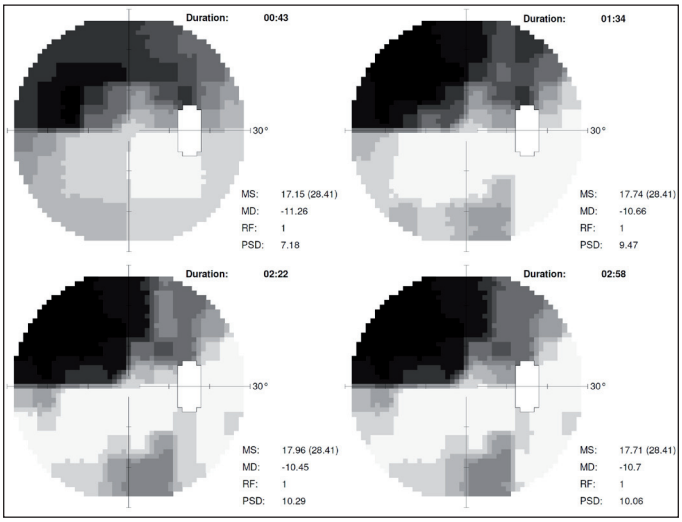

Figure1. - Results after each of the four phases of a SPARK examination in a patient with glaucoma. Note the great similarity of the results with that of the first phase which lasts about 43 seconds.

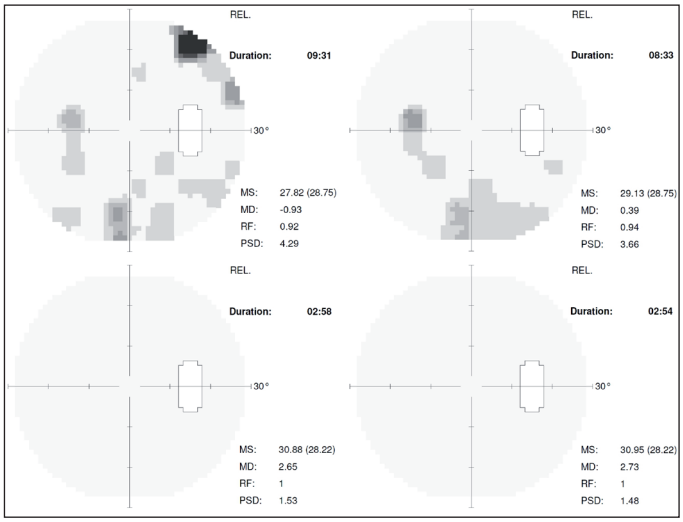

Figure 2. - Test-retest reproducibility: The top images correspond to two examinations of a normal patient performed on the same day with Full Threshold strategy. The lower images correspond to two examinations of the same patient conducted with the SPARK strategy.

Averaging these four visual field results produces a much more reproducible final result. Quantitatively, fluctuation is reduced by approximately 40% compared to other strategies. Figure 2 shows the result of examining a normal person twice with the conventional Full Threshold strategy and twice with SPARK perimetry. The latter clearly provides more stable results.

Strategy Suited For Various Defect Types

Although the strategy is optimized for the study of glaucoma, it can also detect other types of defects. If the patient has a neurological disease (or the test results suggest this situation), one can use a variant of the SPARK strategy that has been optimized for examining such cases. It is even shorter than in the case of glaucoma, which facilitates the examination of certain patients, whose degree of collaboration is limited. It employs three consecutive phases, and in some cases already the first phase may be sufficient for an orientative diagnosis, especially useful in patients in whom the examination cannot be prolonged.

Figure 3 shows the numerical results obtained when examining a patient with traumatic lesion of the optic nerve. Clearly, the full threshold strategy leads to some inconsistent results, since supposedly blind spots occur adjacent to other points with fairly high sensitivity. These are most certainly errors that are not observed in the SPARK strategy results, where defect delimitation appears quite reasonable.

The theoretical design of this new strategy is based on a sample of more than 90,000 visual fields, and was published in the Journal of Glaucoma [1]. A second study, which very favorably compares SPARK results with those of various morphological procedures of glaucoma diagnostics, appeared in the European Journal of Ophthalmology [2], other studies have verified the stability of SPARK results compared with some of the strategies used to date [3], and in the context of a new method of measuring the concentration of hemoglobin in the optic nerve [4].

The SPARK strategy is accompanied by the Threshold Noiseless Trend (TNT) program which allows progression analysis of visual field defects with high sensitivity and specificity [5, 6, 7, 8].

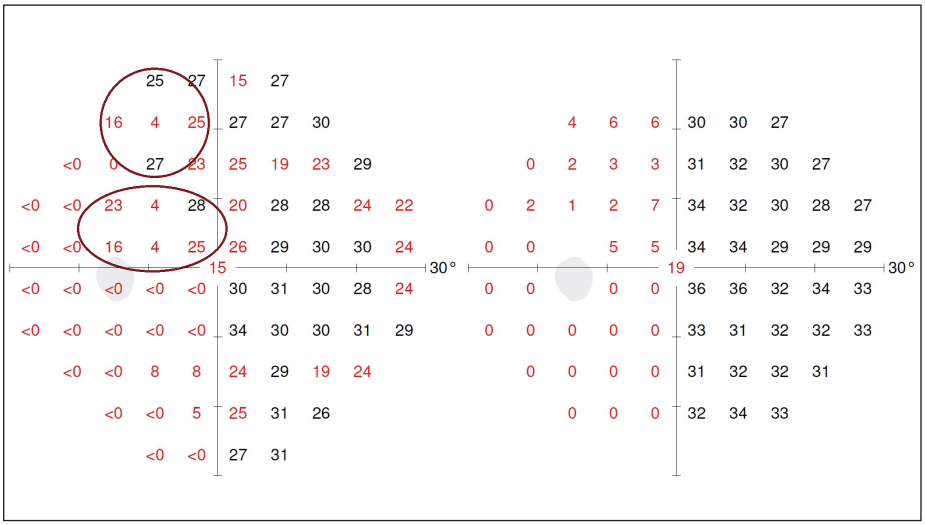

Figure 3. - Numerical results of a patient with traumatic lesion of the optic nerve. Full Threshold examination (left) presents less consistent results than the SPARK strategy (right).

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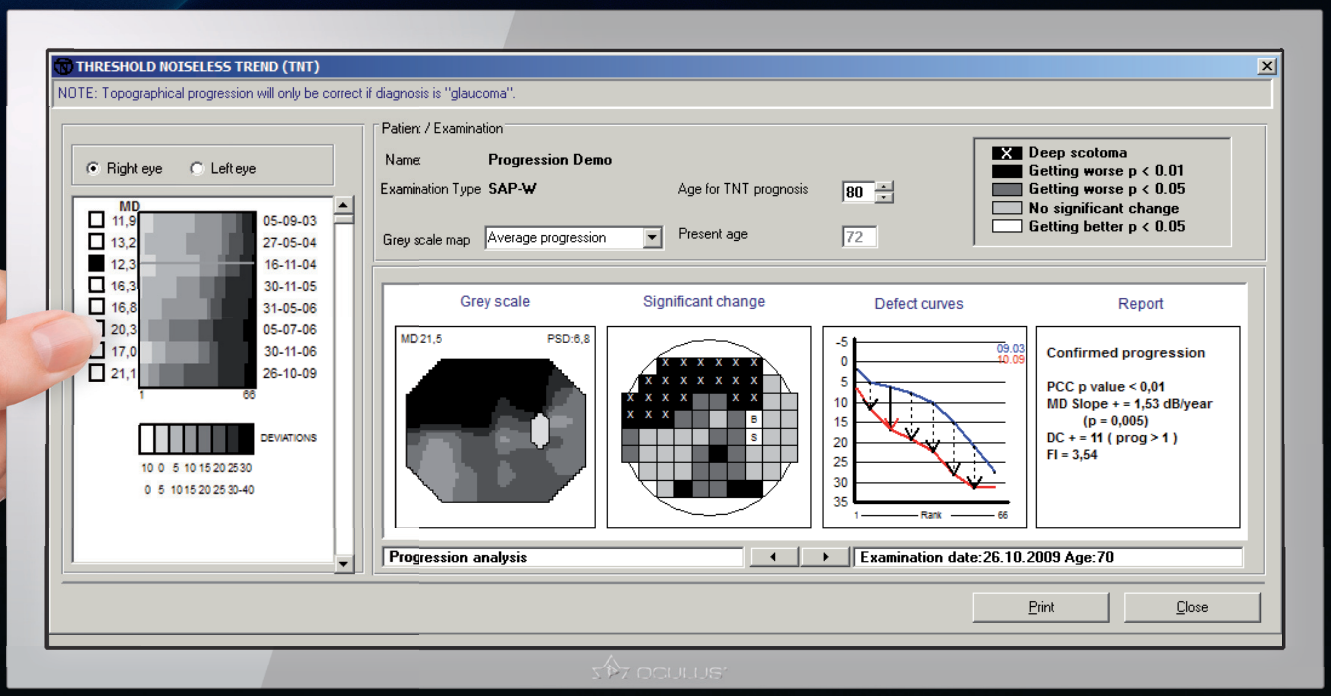

Using Threshold Noiseless Trend (TNT) for efficient progression analysiss

- Full-fledged perimetry in compact design
- SPARK strategy for fast and reliable examinations
- Automated glaucoma staging systems
- Threshold Noiseless Trend (TNT) for high sensitivity progression analysis

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