

# Can cone and rod mediation be estimated in the full-field stimulus test (FST) by comparing responses at different wavelengths, as is currently done with dark-adapted chromatic perimetry (DACP)?

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## **Purpose**

In DACP, responses mediation by cones and rods is usually evaluated by comparing thresholds at wavelengths of 500 and 650 nm.

This study evaluates whether the same approach can be applied to FST measurements. FST is also a psychophysical technique, but differs from DACP in stimulus size and, eventually, in stimulus duration.

## **Methods**

Thresholds were measured as a function of stimulus duration with FST and spot stimulations (Goldmann size V, 6 degrees below fixation) at 500 and 650 nm. 3 normal subjects were tested after 30 minutes of dark adaptation on the MonCvONE perimeter (Metrovision). Stimulus duration varied between 10 and 1000 ms.

Dark adaptation (DA) was performed on the same instrument to obtain an estimate of cone threshold from the cone plateau. After bleaching with white ganzfeld illumination at 1600 cd/m<sup>2</sup> during 2 minutes, thresholds were measured with ganzfeld and spot stimulations at 500 and 650 nm and stimulus duration of 10 and 300 ms.

## **Results**

Figure 1 shows that FST and spot thresholds at 500 and 650nm follow Bloch's law up to a critical time of 100ms. The effect of temporal summation is identical in all 4 cases.

Thresholds for FST are lower than for spot, in agreement with Ricco's law. However, this reduction is much higher at 650nm (2.35 log) than at 500nm (1.55 log).

The difference between thresholds at 500 and 650nm is significantly lower for FST (1.55 log) than for spot (2.35 log).

Figure 2 shows that the cone plateau (650nm curve) is 1.0 log unit lower for 300ms stimulus duration than for 10ms.

The DA curve for FST at 650nm shows an important reduction of threshold after the cone

plateau, much greater than with spot stimulations and probably due to spatial summation of rods. It does explain the lower difference between thresholds at 500 and 650nm found with FST.

### **Conclusions**

Results of FST and DACP tests are strongly affected by the temporal and spatial summation properties of the retina.

Estimations of cone and rod mediation by measuring threshold differences between 500 and 650 nm cannot reliably be applied to FST tests.

**Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.**

