

## **Quantitative Analysis of Fundus and Angiographic Images Variables by Photoshop Software**

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### **Advantages:**

To have a method for quantitative analysis of fundus or angiographic images variables using computer software. This technique has the following advantages : 1. Useful in research programs for precise data analysis; 2. Good accuracy; 3. Good sensitivity; 4. Compatible with new digital retinal photography; 5. Inexpensive; 6. No need for special training; 7. Relatively independent on individual opinion; 8. Relatively rapid.

### **Methods:**

Evaluation of each type of variables is performed by a distinct manner. 1) Measurement of hard exudates in fundus pictures: A circle is selected over the macula. Then through the color selection program of Photoshop software, areas with hard exudate within the circle are selected with the eyedropper tool. Then the histogram command of the software quantified the number of selected pixels, which correlated to the size of the yellow area confined within the circle. The same protocol can be performed to measure the amount of hard exudates in a red free picture by choosing white color. 2) Measurement of foveal avascular zone size: With the use of the magnetic lasso tool, the terminal ends of vessels surrounding the FAZ are connected to each other. The area confined by this line is selected and its size is calculated in pixels. 3) Measurement of leakage: After overlaying a circle on a specified area, the histogram graded the severity of luminosity within this area which reflected the amount of whitening (or leakage).

### **Effectiveness / Safety:**

The effectiveness of these quantitative measurements has been shown in a study evaluating the agreement of this software analysis with clinical evaluations. The coefficients of agreement (Kappa) between the two methods in the amount of HE, leakage severity, and FAZ size measurement were 85% (0.69), 72% (0.46), and 89% (0.77), respectively. Take home message: Graphic software is useful for quantitative analysis of different variables in retinal photographs.