

Pupil apodization, contrast elevation and spot-size ratio as potential biomarkers

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Abstract: When the entry of a light beam through a pupil is gradually shifted from the centre toward its periphery Stiles Crawford reduction in visibility is observed. In addition to this the retinal visibility can also be governed by generating an interference pattern on the retina. Thus, dependence of visibility on both pupil entry point, and the contrast of the interference pattern can be considered suitable for use as potential biomarkers in early detection of diseases affecting the photoreceptor cones. Likewise, the relation of spot-size of the incident beam to the diameter of the photoreceptor indicating a strong directional coupling of the individual cone photoreceptors to the focused incident beam makes the ratio of the incident spot-size to that of the coupled waveguide mode also a suitable candidate for a biomarker. Finally, modelling Stiles-Crawford effect of the first kind as a pupil apodization, different modulation transfer functions would be obtained for healthy normal eye and an eye with photoreceptor disease. Here in this brief review the theoretical background is illustrated for each case of contrast elevation, spot-size ratio departure and pupil apodization to bring into home the suitability of each of them to be developed into biomarkers for early detection of diseases affecting the photoreceptors.

Keywords: Retinal response, Coherence, Contrast, Stiles Crawford Effect, Waveguiding, Spot-size ratio, Photoreceptor Cone

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