

## Journal Article Review

**Multimodal imaging of disease-associated pigmentary changes in retinitis pigmentosa**

Schuerch K, Marsiglia M, Lee W, Tsang SH, and Sparrow JR. *Retina*, 2016 Dec;36 Suppl 1:S147-S158

**Purpose**

This study sought to further define the anatomical landmarks of retinitis pigmentosa (RP) by evaluating morphological changes in the photoreceptor layer and the retinal pigment epithelium (RPE) with different imaging modalities. As RPE cells migrate, proliferate, and drop out, they influence the optical characteristics of the imaging wavelength being employed in different ways. By analyzing these differences, this study has classified different stages of degeneration. Previous studies have described an autofluorescent arc or ring corresponding to a transition zone of photoreceptor loss, and this study investigated the details of that autofluorescent area in an attempt to better define RPE anatomical changes across the retina.

**Methods**

60 patients (Mean: 36.6 years old, range: 7 to 70, various ethnicities) had short-wavelength autofluorescence (SW-AF) imaging, near-infrared autofluorescence (NIR-AF) imaging, near-infrared reflectance (NIR-R) imaging, spectral domain optical coherence tomography (SD-OCT) imaging, and color fundus photography. SW-AF, NIR-R, and SD-OCT were performed on the SPECTRALIS® HRA+OCT and NIR-AF was collected on a Heidelberg Retina Angiograph II. Color fundus photographs were taken with a FF 450 plus camera (Carl Zeiss Meditec). Images were registered and analyzed across modalities to compare pathology features, including bone spicule pigmentation autofluorescence, areas of hyper/hypo fluorescence, the extent of RPE pigmentation, and loss of retinal layers in SD-OCT.

**Discussion**

Multimodal imaging and registration with color fundus images revealed different regions of the degenerative RP process. Central regions of autofluorescence were visible in short- and near-infrared modalities and the appearance of bone spicule pigmentation varied across modalities. The “photoreceptor ellipsoid band” was absent in SD-OCT beyond the autofluorescent rings, corresponding to areas of visual function loss. Choroidal visibility, indicating loss of RPE, was also revealed in multiple modalities, and was more pronounced in areas adjacent to bone spicule pigmentation. Finally, based on these differences, the authors defined anatomical regions relative to the autofluorescent rings that indicate the various stages of disease progression.

**Conclusions**

A multimodal approach to imaging patients with retinitis pigmentosa allows for a clearer classification of degenerative stages. Having the option of multiple imaging modalities, such as those available with the SPECTRALIS, to assess a retina with progressive degeneration is a valuable tool for clinicians, as it offers the ability to better define areas of degeneration by understanding the underlying stages of RPE changes. Multimodal approaches in longitudinal studies may help clinicians better predict the rate of disease progression in their patients with certain genetic mutations.