

Time-Domain vs. Spectral-Domain OCT in AMD

The new spectral-domain (SD) OCT devices include a spectrometer in the receiver that analyzes the spectrum of reflected light on the retina and transforms it into information about the depth of the structures according to the Fourier principle. This technology eliminates the need to mechanically move the reference arm with the consequent increase in the speed with which images are received and axial resolution in time-domain (TD) OCT.³⁰ In addition to greater speed in capturing images and higher definition, the algorithms used by SD-OCT differ from those of TD-OCT, and the retinal thickness measurements are not comparable between the two. While TD-OCT determines the total retinal thickness by measuring the distance from the internal limiting membrane to the highest hyperreflective band, i.e., that combining the inner and outer segments of the photoreceptors, SD-OCT set this threshold in the RPE hyperreflective band, so the retinal thickness values are higher than those obtained by TD-OCT ([Figure 13](#)).^{31,32}

These differences justify the results of studies that compared the two devices in patients with wet AMD. Thus, Mylonas and colleagues found that in a number of patients with wet AMD, the retinal thickness measurements obtained by three SD-OCT devices were higher than those obtained by TD-OCT instruments. The authors also emphasized the importance of segmentation analysis as the main source of errors with both devices.³³ The effect of this parameter had already been studied widely for Stratus OCT (Carl Zeiss Meditec Inc., Dublin, CA), and the proposed solution to avoid these errors was the manual correction of segmentation lines in each image, especially in clinical trials of neovascular AMD, in which the difficulty establishing the limits in cases with subretinal and intraretinal fluid was automatically higher.^{22,34,35} To assess the incidence of errors at this level in the SD-OCT apparatus, Krebs and colleagues assessed 104 patients with neovascular AMD with both TD-OCT and SD-OCT and analyzed the position of the lines drawn automatically by segmentation analysis in each case.³⁶ The results showed differences between the devices, with TD-OCT committing errors in 69.2% of cases and SD-OCT in 25%. These data suggested that SD-OCT makes fewer errors in automatic segmentation analysis, and these can be corrected manually identical to TD-OCT and therefore constitute a marked improvement in the main source of erroneous measurements. Finally, some studies have compared both devices in a series of patients treated with antiangiogenic agents. Sayanagi and colleagues compared tomographic findings with TD-OCT and SD-OCT in 58 patients with wet AMD treated with ranibizumab (Lucentis, Novartis) and concluded that SD-OCT is better than the TD linear mode B and mode 3D cube for detecting intraretinal cysts and intraretinal and subretinal fluid or fluid under the RPE, making it a more effective tool for managing these patients.³⁷

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