

## MODULE 7.3

## Standard Optical Coherence Tomography

**O**ptical coherence tomography (OCT) is a noninvasive imaging technique that provides in situ, real-time cross-sectional images analogous to histologic slices through retinal tissue.<sup>1</sup> The introduction of OCT to ophthalmology revolutionized the management of diabetic macular edema (DME), providing objective documentation of retinal thickening and cystic structures that are invisible on clinical examination. Spectral-domain OCT (SD-OCT) improved on the original technology of time-domain OCT, introducing faster scanning times and higher resolution and allowing the creation of 3D images of retinal tissue.<sup>2</sup>

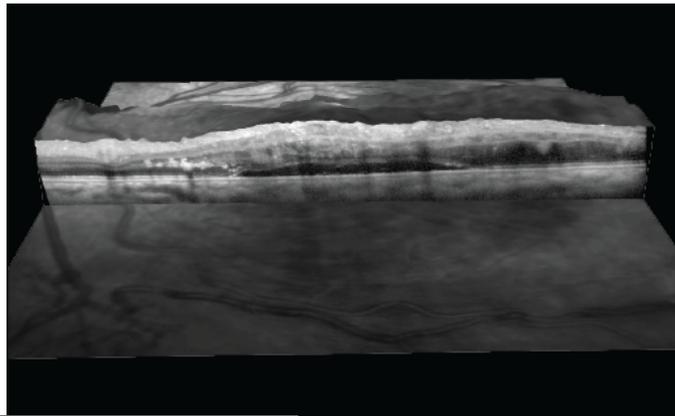
In DME, OCT shows retinal thickening as areas of low intraretinal reflectivity in the outer retinal layers and the loss of the foveal depression. SD-OCT can demonstrate small cysts, sometimes in the inner retinal layers, even when retinal thickening is moderate. OCT imaging can document accumulation of fluid in and under the retina, and serial

images allow comparative evaluation of the disease course.<sup>3</sup> OCT imaging can help the clinician to distinguish morphologic features of DME in a given patient, such as diffuse retinal thickening, cystoid macular edema, serous DME, DME with vitreomacular traction or adhesion, thickening of the posterior hyaloid, presence of an epiretinal membrane, or a mixture of these features.<sup>4</sup>

OCT may allow identification of DME at an early stage that would be difficult to detect by other imaging methods. Its use considerably enhances the ability to diagnose and follow macular edema. OCT can be particularly important in identifying retinal traction, which can produce cystic changes unrelated to leaking vessels.<sup>3</sup> You will learn more about other OCT technologies in the next module.

## Ocular Coherence Tomography

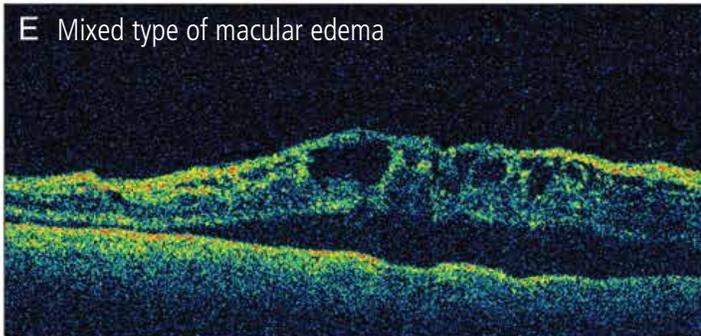
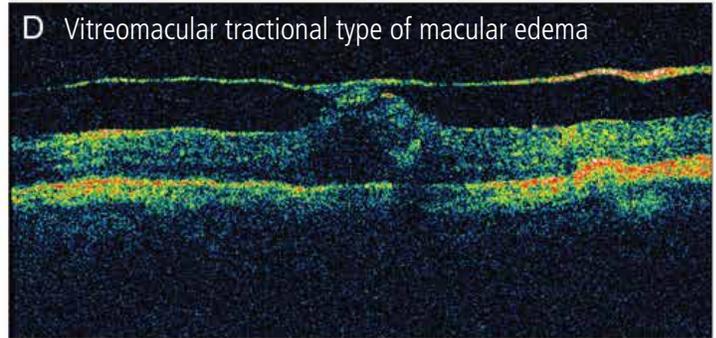
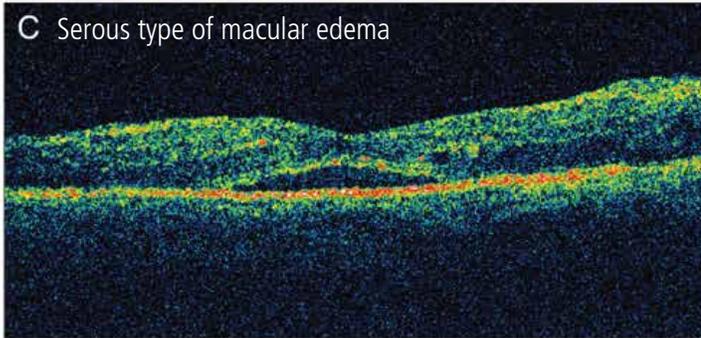
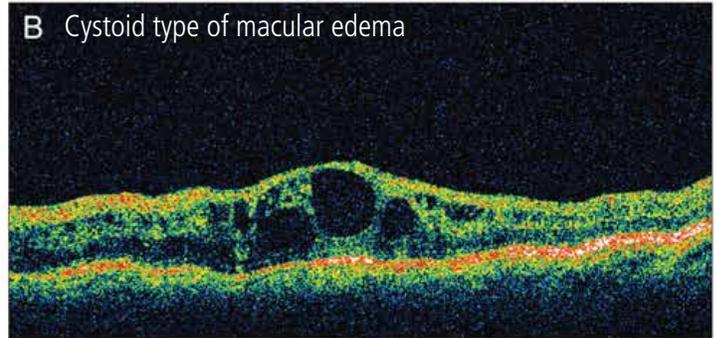
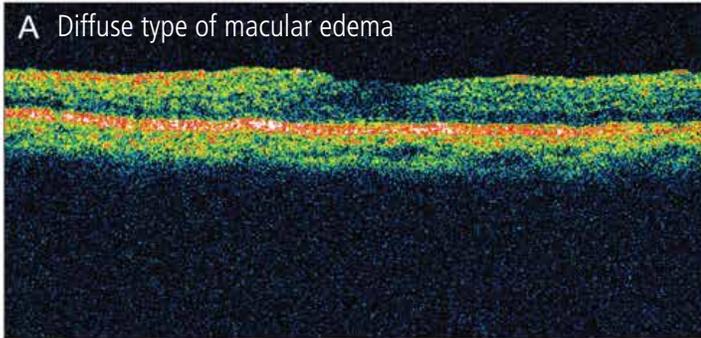
OCT is an imaging modality that uses the principle of low-coherence interferometry to create high-resolution cross-sectional images of the retina. OCT provides real-time in situ images of retinal layers in a manner analogous to ultrasound imaging, but using light instead of sound. It can be used to objectively, noninvasively document the thickness of the retina and the presence of subretinal or intraretinal fluid.



In the case of DME, OCT demonstrates increased retinal thickness with areas of low intraretinal reflectivity prevailing in the outer retinal layers and the loss of foveal depression. Spectral domain OCT (SD-OCT) can show small cysts, sometimes in the inner retina, even when retinal thickening is moderate.

## Ocular Coherence Tomography

Five different patterns of diabetic macular edema on optical coherence tomography



Relationship between the morphology of diabetic macular edema and renal dysfunction in diabetes. (Koo NK, Jin HC, Kim KS, Kim YC.) *Korean J Ophthalmol.* 2013; 27(2): 98–102.

### References

1. Huang D, Swanson EA, Lin CP, et al. Optical coherence tomography. *Science.* 1991;254:1178-1181.
2. Schuman JS. Spectral domain optical coherence tomography for glaucoma (An AOS Thesis). *Trans Am Ophthalmol Soc.* 2008;106:426-458.
3. Schlottman PG. Diabetic macular edema (DME): overview of etiology, diagnosis, and treatment options. Paper presented at: International DME Expert Summit; June 22, 2014; Paris, France.
4. Koo NK, Jin HC, Kim KS, Kim YC. Relationship between the morphology of diabetic macular edema and renal dysfunction in diabetes. *Korean J Ophthalmol.* 2013;27:98-102.