Advances in imaging have profoundly changed the practice of retina. These changes are most easily seen with the advances in optical coherence tomography (OCT). At this point, not only are the vast majority of retinal specialists using OCT in their clinics, but more comprehensive ophthalmologists are also routinely using OCT for their patients with retinal conditions. Spectral-domain OCT (SD-OCT) technologies, such as the RTVue (Optovue, Inc, Fremont, CA), continue to attract new users; they offer significant advantages over time-domain OCT technology such as Stratus OCT (Carl Zeiss Meditec, Jena, Germany).

Time-domain OCT has proven its utility both through its use in clinical trials and its rapid acceptance in most retinal practices. While time-domain OCT is adequate in most clinical scenarios when evaluating patients, there are many times in my practice I find that the additional details provided by RTVue can be very helpful. RTVue provides 26,000 axial scans per second—a 65-fold advance over the Stratus. This increased speed allows the accumulation of more data, and also eliminates some artifacts caused by patients’ motions. In addition, the device has twice the axial resolution down to 5 µm of axial resolution compared with the Stratus’ 10 µm. Several recent articles have

Figure 1. At follow-up, the Stratus (A, C) images show that the patient had significant motion artifact in both eyes, whereas the RTVue (B, D) avoids the motion artifact and dramatically highlights the continued subretinal fluid on the right as well. Recurrent CME from exudative AMD as imaged with the Stratus (E) and the RTVue (F).
demonstrated that SD-OCT and Stratus both make consistent measurements of the retinal layers.1-5 In addition, many authors have demonstrated that SD-OCT can reveal pathology overlooked by time-domain OCT.6-9

In this article I share a few of the clinical scenarios that convinced me to use the SD-OCT in the majority of my clinics. I find Optovue's SD-OCT especially helpful in cases in which subtle details can make a difference in diagnosis, prognosis, or management. I also find SD-OCT helpful in vitreous macular traction and often in cases of unexplained vision loss. In many situations time-domain OCT may reveal pathology, but sometimes it can be unclear, especially when looking for trace cystic macular edema or outer segment/inner segment disruption.

**EXUDATIVE AMD**

The most common situation in which I find the RTVue helpful is with age-related exudative macular degeneration (AMD). For example, I treated a patient who had exudative AMD in her right eye with advanced vision loss and 20/50 vision in her left eye. We decided to treat her right eye until it was dry and then consider observation, as her vision was compromised. Figures 1A-D show that at this follow-up, the Stratus showed significant motion artifact in both eyes, whereas the RTVue avoids the motion artifact and dramatically highlights the continued subretinal fluid on the right as well. The SD-OCT scans allowed me to decide to continue anti-vascular endothelial growth factor (VEGF) therapy on her right eye. Her fellow eye more clearly shows the difference in sensitivity to motion artifacts between the two systems.

Figure 1E and F show another patient with recurrent cystoid macular edema (CME) from exudative AMD. These images illustrate that the Stratus clearly demonstrates cystic fluid, but the RTVue images more clearly delineates the extent of the fluid. SD-OCT is more likely to detect trace
If the practitioner’s paradigm is to continue treatment whether the lesion is dry or not, then SD-OCT is not necessary, and OCT imaging may not be needed. For many, however, the detection of trace CME or subretinal fluid will likely change their management.

**POST-CATARACT VISION LOSS**

In another case, a patient had cataract surgery with postoperative vision worse than expected (best corrected vision of 20/60). Figures 2A and 2B show Stratus OCT images before and after surgery that look essentially the same with a stable subfoveal deposit (small vitelliform lesion). However, the RTVue image (Figure 2C) more clearly shows the trace subretinal fluid in the fovea and mild thickening. This allowed us to help the patient understand his vision loss and adjust the treatment. The subretinal fluid resolved with therapy and time, and the patient’s vision returned to 20/25.

**EPIRETINAL MEMBRANE**

I also find SD-OCT can be helpful in patients with mild epiretinal membranes. Figures 3A-D are of a 76 year-old-man with distortion and vision loss in both eyes—the left more so than the right—that developed over the past 2 years. Vision was 20/25 in his right eye and 20/70 in his left eye with distortion noted in both eyes. A dilated fundus exam revealed bilateral epiretinal membranes (ERM). In this case, the Stratus showed the ERM in the left eye and the lamellar hole in the right eye (Figures 3A and 3C); however, the RTVue images (Figures 3B and D) of both eyes were much more clear, especially to the patient. He could not “see” the ERM in his right eye on the Stratus image, but he did see it on the RTVue image. Figure 3E shows another example in which the clarity of the RTVue image helped the patient understand his condition. This patient noticed something in his vision, although he could read the 20/20 line. This “something” was always in his way when reading. After seeing the RTVue image, the patient had a better understanding of his condition and his course of treatment.

**VITREOMACULAR TRACTION**

As with ERMs, I find the high-resolution images great-
ly help patients with vitreomacular traction (VMT) understand their condition. Figures 4A and 4B show a case in which the Optovue SD-OCT clearly demonstrates the VMT, which is much less clear on Stratus OCT. This patient had underlying AMD and a pigment epithelial detachment, so the presence of VMT could dramatically change the treatment choice (if one did not note the traction), as the CME and vision loss is likely from mechanical traction rather than exudative AMD. In my experience, SD-OCT is much more sensitive to VMT than time-domain OCT. This can be helpful in diagnosis, of course, but also in educating the patient.

Figure 5C shows a patient in whom the IS/OS junction is clearly lost in two areas: one of geographic atrophy and one of subretinal fibrosis, both limiting her potential vision. Many AMD patients treated with anti-VEGF therapies now know that a significant percentage of people improve with treatment. Knowing that they may be less likely than most to improve can help them accept recurrent therapies that may only stabilize their vision rather than improve it. Likewise, patients with an ERM and IS/OS disruption in the fovea are likely to have a poorer prognosis than those with a normal photoreceptor layer.

CONCLUSION
In summary, SD-OCT has revolutionized retinal care. The Optovue RTVue has many other features I did not discuss, including 3-D imaging and volumetric calculations. We are using those features more and more in our clinic and will likely find that they affect our clinical management of patients as well. Hopefully, in the future, new imaging modalities will provide functional information in addition to the ravishing structural/anatomic images.

David G. Telander, MD, is an Assistant Professor of Ophthalmology at University of California, Davis Eye Center in Sacramento, CA. He reports no financial relationships: Dr. Telander can be reached at +1 916 724 6074; or via e-mail at dgtelander@ucdavis.edu.