Initially, I was quite skeptical about OCT angiography (OCTA). Even after sitting through multiple meetings and presentations to learn about the technology, I just wasn’t seeing what difference it could make in how I practice. But, about 3 months ago, my associate arranged for our group to trial the AngioVue OCTA (Optovue), and my mind changed. I’ve been using OCTA on 40 to 50 patients every week and I’m enthused by what I see.

OCTA provides excellent visualization of the inner and middle retinal circulation, but I’ve been most impressed with what it reveals about what is occurring in eyes with age-related macular degeneration (AMD), a disease that “lives” at the RPE and below. I venture to say that OCTA will create a paradigm shift in how AMD patients are managed.

As of now, most of us are utilizing a VEGF inhibitor (VEGF) drug in a treat-and-extend treatment protocol, re-injecting when OCT B-scans show subretinal fluid or fluorescein angiography (FA) shows leakage. We don’t pay attention to the choroidal neovascular blood vessels themselves, but with OCTA we can. As I follow my AMD patients with serial scans, what I’m seeing is that choroidal neovascular membranes (CNVMs) don’t go away. Rather, they mature and stop leaking. Even when a membrane is no longer detectable by FA, OCTA can verify that it’s still present. It can also verify when new blood vessels begin budding off the mature vessel, and I find that it is these new vessels, visible as tiny buds at first, that leak. I find, too, that these immature vessels tend to re-perfuse and sometimes grow far sooner than I would have previously expected after an anti-VEGF injection. With OCTA, I’ve actually been able to distinguish mature neovascular membranes, which are not affected by anti-VEGF drugs (VEGF-resistant), much like insulin resistance, from VEGF-sensitive neovascular membranes (Figure 1). In one of my patients, for example, who has agreed to be scanned every week, I’ve watched as 1 week after an injection, there is no effect on the mature membrane, but the newer vessel “buds” are completely non-perfused. Beyond that point, my aim is to determine the time between an injection to the re-perfusion and sometimes growth of the same new vessel, which occurs prior to the detection of fluid by standard OCT B-scan. The goal is to give another injection once newer vessels re-appear, before fluid develops and damages the photoreceptors.

Basing AMD treatment decisions on the actual presence of new vessels as detected by OCTA — as opposed to noting the presence of a CNVM that might be mature and VEGF-resistant — or relying on leakage on FA or fluid on OCT B-scans could give us the ability to treat patients earlier, farther upstream in the disease process, and, so presumably, more effectively. It also would allow us to avoid unnecessary injections. Since I began using OCTA, I’ve been able to tell many patients that they don’t need an injection at the moment because there’s been no change, i.e., the mature neovascular membrane has remained the same and no new vessels have appeared. In addition, we could use this approach to determine which anti-VEGF agent keeps new vessels from developing for the longest time in each patient.

I believe the new information provided by OCTA will prompt us to think differently in other ways as well. For instance, in my experience so far, what we’ve been classifying as occult disease in our AMD patients appears to be not occult at all but, in fact, very well defined based on OCTA. Furthermore, I suspect OCTA will show us that subretinal fluid detected by OCT B-scan, or what appears to be leakage on FA, is not necessarily coming from a neovascular membrane that would benefit from anti-VEGF treatment. Instead, in cases where OCTA shows only mature vessels and no vessels that are VEGF-sensitive, i.e., newly developing vessels that are apt to leak, the actual culprit may be an inability of the RPE to adequately pump fluid (RPE pump failure) from the eye.

I believe that every retina specialist is going to need OCTA, and that it will decrease the number of FAs we perform by 80% to 90%. (The emergence of new vessels appears to be a far more useful parameter than fluorescein leakage in most cases.) The extent to which it improves how we manage our patients will expand as the technology is fine-tuned in areas such as field of view, minimization of artifact, and compensation for poor patient fixation. While it’s a shame that at this time we’re not reimbursed fairly for using this important new technology which, in my mind, is like considering an X-ray to be the same as a CAT scan I maintain that what’s best for the patient is best for the doctor in the long run. For me, the question is now that I have the ability to cost-effectively obtain angiographic information in seconds per eye without the use of dye that is potentially harmful to my patients, why would I not?