

A BETTER WAY TO MAKE YOUR FIRST MISTAKES P. 30 • UPDATE ON ANTI-VEGF ROP MONOTHERAPY P. 56
WILLS EYE RESIDENTS CASE SERIES P. 86 • EVALUATING GLAUCOMA: TREAT, TEST OR WAIT P. 66
A CORNEAL ROUTE TO TREATING PRESBYOPIA P. 72 • THE PROS AND CONS OF DRY-EYE TESTS P. 62

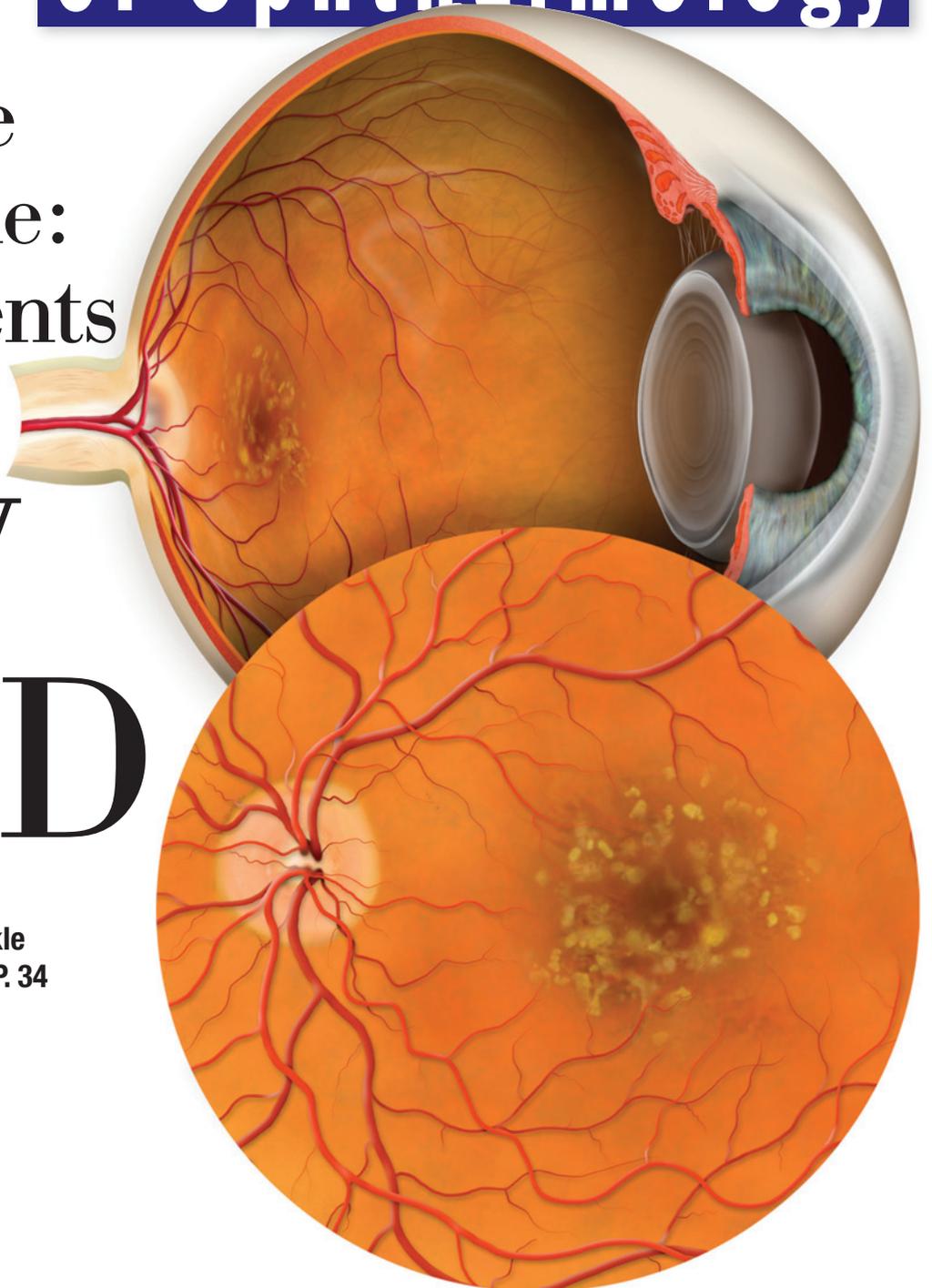
REVIEW[®] of Ophthalmology

August 2011 • revophth.com

In the Pipeline: Treatments for Dry AMD

Combining Forces to Tackle
Diabetic Macular Edema P. 34

Uveitis: Tailor Your
Treatment Plan P. 50



Stopping Dry AMD In Its Tracks

Christopher Kent, Senior Editor

A host of new treatment options are being tested—and showing promise.

One of the toughest parts of telling a patient that he or she is developing age-related macular degeneration is informing the patient that, currently, little can be done to help. Of course, recent studies of nutritional supplements have offered some hope, and those studies continue to proliferate—albeit with sometimes contradictory results. (Among the recent entries: Data from the Carotenoids in Age-Related Eye Disease study suggests that high concentrations of vitamin D may protect against early macular degeneration in women younger than 75 years of age, although it may increase the odds of developing the disease in women older than 75.¹ And a recent multi-year study of 38,022 women without any diagnosis of macular degeneration at the outset found evidence that regular consumption of docosahexaenoic acid, eicosapentaenoic acid and fish was associated with a significantly decreased risk of incident macular degeneration during the 10-year follow-up period.²) Unfortunately, these studies are largely focused on prevention. Furthermore, the best outcomes are not seen in every subject.

Now, however, the prognosis for dry AMD may be about to improve; numerous ideas for treatment are

showing promise in clinical and pre-clinical trials. They cover a wide range of approaches, including managing enzymes that influence RNA behavior; slowing the visual cycle to reduce damage; increasing blood flow in the eye to restore normal function; new laser treatments; stem cells; high-tech implants to deliver drugs long-term; an antioxidant-rich spice; neuroprotection; and various drugs that reduce inflammation.

Enzymes and RNA

One promising new approach to addressing dry AMD has come from the work of Jayakrishna Ambati, MD, professor of physiology and ophthalmology, and his team of researchers at the University of Kentucky. They've discovered a molecular process that appears to lead to geographic atrophy, and they're developing ways to interfere with that process.

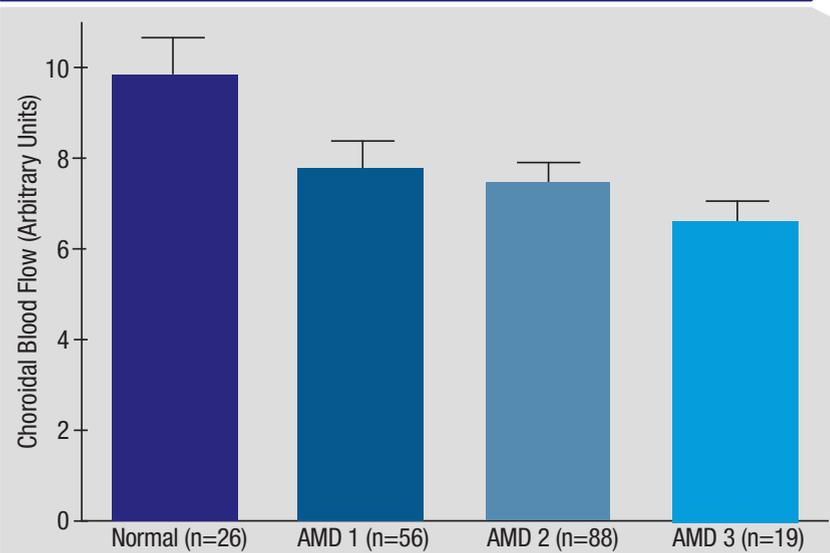
Dr. Ambati says his group's approach to research has been to examine diseased post-mortem eyes to discover how they compare to healthy eyes. "As described in our published paper on this topic,³ we found that in human donor eyes with geographic atrophy there's a dramatic reduction in the abundance of an enzyme called Dicer," he says. "Dicer regu-

lates many important processes, including the creation of micro-RNA, and we found that reducing Dicer in various cell cultures and mouse eyes caused the kind of changes that we see with geographic atrophy. [The published study showed that this result did not occur when other similar enzymes were reduced.] Through a series of experiments we found that a deficiency of Dicer leads to an accumulation of an RNA substance called Alu transcripts, and we were able to show that Alu transcripts are directly toxic to RPE cells. In fact, taking this toxic material from human eyes and putting it into mouse systems causes the disease to occur in those systems.”

Dr. Ambati explains that this suggested three possible approaches to blocking the process. “In our paper we discussed two approaches: increasing Dicer abundance and blocking Alu RNA,” he notes. “Since then, we’ve confirmed the changes in Dicer and Alu RNA in more human eyes, and also created a non-human primate model of the disease. In addition, we’ve developed a third approach to blocking the process: We’ve now identified how the Alu RNA is signaling and causing the death of RPE cells, and we’ve found small molecules that can block that downstream signaling.”

Dr. Ambati says each of the three possible approaches has advantages and disadvantages. “Increasing Dicer levels would probably have to be done using something like viral gene therapy,” he says. “Unfortunately, that process is long and arduous, and the regulatory guidelines are not entirely clear and delineated. Also, Dicer is a protein that has many important functions, and it might be risky trying to get it to levels that are exactly right. So we’re not very fond of that approach. Blocking Alu RNA using anti-sense molecules is interesting, but there are a lot of problems with anti-sense technology. The third approach—using small molecules to

Foveolar Choroidal Blood Flow and Increasing AMD Severity



Studies have found an association between reduced choroidal blood flow and more severe dry AMD (p -value for linear trend: 0.003). This has led to the treatment strategy of increasing blood flow to combat the disease (See p. 42). Data from Grunwald 2005.⁶

block the downstream effects of Alu RNA—is something we’re becoming more fond of, because it’s amenable to a small molecule delivery strategy and may be compatible with drug delivery systems that others are developing.”

Dr. Ambati says his group is in conversation with pharmaceutical companies about licensing this technology, and they’re preparing for a clinical trial. “We’ve established a database of patients, identified a reading center and have a variety of clinical trial centers both here and abroad,” he notes. “People are very eager to collaborate with us. We plan to start Phase I trials in the next few months; ultimately we’ll have to seek FDA approval to market the agent we use in the trials. If everything goes well, we should have the Phase I trial completed by the end of 2012.”

Nonthermal Nanolaser

Another promising new approach to treating early macular degeneration involves treating the retina with

a nanosecond laser with the power reduced to sub-thermal levels. Twelve-month data from a non-randomized, prospective clinical pilot study involving 50 high-risk patients suggests that the treatment reduces drusen and has a beneficial effect on visual function.

The treatment, called Retinal Rejuvenation Therapy, or 2RT, was developed by Ellex (Adelaide, Australia). The trial was partly funded by the Victorian government and conducted by the Centre for Eye research Australia, University of Melbourne, at the Royal Victorian Eye and Ear Hospital. Laser treatment in the highest-risk eye of each participant consisted of either 12 single pulses of 3-ns duration, placed in a “clock face” pattern around the mid-macula, or two linear patterns of six shots following the superior and inferior arcades. Follow-up is being performed at three, six and 12 months, with completion of the 12-month follow-up targeted for the end of December 2011.

Interim 12-month results for 24 patients presented at the 2011 meeting

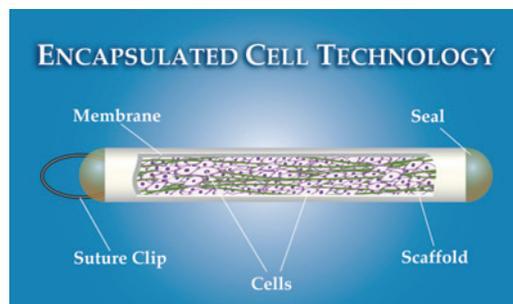
of the Association for Research in Vision and Ophthalmology demonstrated that approximately two-thirds of patients experienced an improvement in visual function and/or drusen reduction in the treated eye. Interestingly, the majority of patients also noted an improvement in the fellow, untreated eye, and the treated areas of the retina did not correlate with the location of visual function improvement. Instead, visual function improved predominately in the regions of greatest dysfunction. (There was no decrease in function in the treated areas, and no adverse effects were noted.)

“This treatment is aimed at trying to reduce or slow down early disease—where there are usually no symptoms but the retina shows signs of drusen and pigment change—or even reverse the progression to either dry or wet,” notes the study’s principal investigator, Professor Robyn Guymer, head of the Macular Research Unit at the Centre for Eye Research Australia. “The aim at Ellex was to develop a laser that could deliver beneficial effects to the RPE/Bruch’s membrane interface without any of the harmful effects potentially caused by thermal lasers. To accomplish that, the 2RT laser treatment uses 500 to 1,000 times less energy per laser spot than previous thermal lasers. So far, we’re not sure what the mechanism of action is, but it is clearly systemic, because a beneficial effect is also seen in the fellow eye.

“Next,” she adds, “we hope to do a masked, randomized study with large enough numbers over a long enough time period to show that this treatment really does result in less progression to late AMD.”

Stem Cells

As with many other physical ailments, researchers are hopeful that



To provide long-term treatment, a 6 mm long implant is filled with cells genetically engineered to produce ciliary neurotrophic factor for up to 24 months. CNTF has been shown to retard the loss of photoreceptor cells. (See p. 46)

stem cells may be able to help manage macular degeneration. Several universities and health-care organizations in the United States and England are investigating this possibility.

One company, Advanced Cell Technology, received FDA approval in January to begin trials using human embryonic cells for this purpose. The company coaxes the stem cells into becoming RPE cells; the idea is that the transplanted cells will replace damaged RPE cells before all RPE function is lost. The initial study will test the safety of the modified cells and how well the subjects tolerate them over a 12-month period. (Concurrent with the macular degeneration study, the company will be running a similar study with patients who have Stargardt’s disease.) ACT has been developing the technology for the past decade, and some animal studies have suggested that it is effective. ACT recently announced the enrollment of the first patient in the Phase I/II prospective, open-label trial, at the Jules Stein Eye Institute at UCLA. Eleven more patients will be enrolled by mid-summer. The subjects will be divided into groups to test different doses of the cells.

Earlier this year, researchers at Georgetown University Medical Center also published a study documenting their success at creating retinal cells from stem cells.⁴ They demon-

strated that RPE cells generated from human induced pluripotent stem cells can exhibit ion transport, membrane potential, polarized VEGF secretion and gene expression profile similar to those of a normal eye’s RPE cells. However, the lead author on the study, Nady Golestaneh, PhD, has noted that the group is not yet ready to attempt transplantation; the altered cells display some problems that appear to be related to the use of viruses to reprogram the cells.

Research is also under way at Columbia University Medical Center in New York, and the School of Science at Indiana University-Purdue University in Indianapolis.

Increasing Blood Flow

MacuCLEAR, a clinical-stage specialty pharmaceutical company started at Texas A&M several years ago by George Chiou, PhD (best known for leading the discovery of timolol, the pioneering treatment for glaucoma), is currently developing MC-1101, a proprietary eye drop intended to stop dry stage macular degeneration from progressing to the wet stage by enhancing blood flow in the back of the eye. The active ingredient of MC-1101 has been previously approved by the FDA as an oral antihypertensive drug, so its safety and toxicity profile is well-established.

Studies conducted by the company have demonstrated that despite being topically applied, MC-1101 reaches the retina, relaxes the epithelial lining of the vasculature, dilates choroidal blood vessels by stimulating nitric oxide production and increases blood flow. The argument for using this approach to treat dry macular degeneration centers around the idea that the fundamental difference between dry AMD and wet AMD is the integrity of Bruch’s membrane. Re-

storing unrestricted blood flow should normalize the removal of debris and toxins, thus controlling inflammation and oxidation of tissues of the retina and preventing neovascularization, in turn preventing the rupture of Bruch's membrane.

"MC-1101 is based on a vascular model developed by Dr. Chiou," explains Phil Ralston Jr., CEO of MacuCLEAR. "Dr. Chiou realized that the retina requires more oxygen than any other tissue in the body, and many ophthalmic luminaries have reported on the coincidence of low choroidal blood flow and macular degeneration.^{5,6} We know that with aging, you get an atherosclerotic reduction of blood flow in the choroid, leading to a dysfunction in the ability to remove the waste occurring in the back of the eye. We also know that when the body is deprived of oxygen, it builds collateral blood vessels.

"Many other approaches [to treating dry AMD] try to remove one factor from the disease process, but the process continues," he notes. "We're trying to restore the mechanism that effectively prevents disease in the two-thirds of us who don't develop it—the mechanism that manages all of those other factors."

"Today, with the FDA's guidance, we're preparing to start a series of Phase III studies designed to show the efficacy of our drug, measuring visual function with agreed-upon endpoints," Mr. Ralston adds. "If the first, smaller study produces good results, we'll do a second trial with more patients. We hope to start the first study early in the fourth quarter of this year." MC-1101 has been granted 505(b)(2) status with Fast Track designation from the FDA.

Slowing the Visual Cycle

Abnormal accumulation of lipofuscin and retinol-derived toxins, including A2E, have been implicated in the

development and progression of geographic atrophy. For that reason, reduction of circulating retinol is theorized to be a potential treatment for the development of GA, and fenretinide, a synthetic derivative of vitamin A, has been shown to reduce levels of serum retinol binding protein (RBP), which in turn reduces delivery of retinol to the eye.

A recently completed two-year, randomized, multicenter study measured the effect of fenretinide on 246 patients with geographic atrophy; 153 completed the full two years of treatment. Fifty-nine received placebo, 47 received 100 mg of the drug each day, and 47 received 300 mg per day.

- In subjects who experienced at least a 60-percent drop in serum RBP, the median lesion growth rate over the two years was 1.28 mm²/year; in the placebo group, the rate was 2.03 mm²/year, a significant difference.

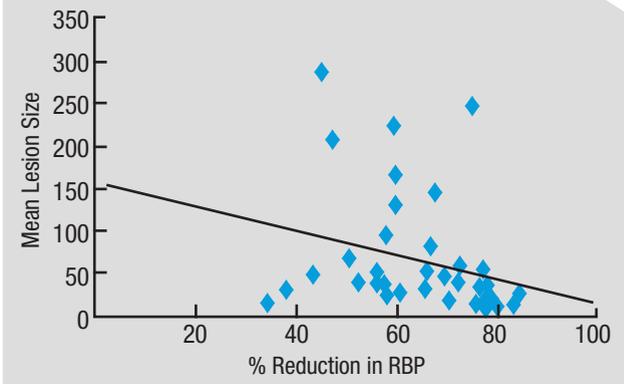
- In subjects who experienced at least a 60-percent drop in serum RBP, atrophic lesion size remained stable between months 12 and 24, resulting in a loss of six letters; those in the placebo group lost 11 letters during the same period.

- In the 300-mg group, median lesion growth was 30 percent from baseline; in the placebo group it was 50 percent.

- Patients in both fenretinide groups had half the risk of progressing to wet macular degeneration at two years, compared to placebo.

Jason Slakter, MD, a partner at Vitreous Retina Macula Consultants of New York and a clinical professor

Fenretinide: Mean Lesion Size vs. Percent Reduction in Retinol Binding Protein



A Phase IIb clinical trial conducted by ReVision Therapeutics found a sustained reduction in RBP correlated with reduced lesion size in geographic atrophy patients.

of ophthalmology at New York University School of Medicine, has been involved with the clinical trials of the drug. (He has no financial interest in fenretinide or its manufacturer.)

"One of the potential targets for treating dry macular degeneration is modification of the visual cycle," he explains. (Other drugs being tested using this approach include Acucela's ACU-4429, an oral drug currently starting a Phase III trial. It appears to reduce accumulation of toxic fluorophores and lipofuscin, preventing photoreceptor and RPE cell loss.) "There's a lot of evidence that the damage caused by geographic atrophy is damage to the RPE cells from a buildup of toxic byproducts from the visual cycle—i.e., the recycling of photopigments. These byproducts are supposed to be processed and carried out of the cells, but in many patients they build up and apparently poison the cells. Unfortunately, the only way we know of to slow the accumulation of these byproducts is to slow down the normal visual process."

Dr. Slakter notes that blood levels were also tested during the trial. "Animal studies had already indicated that a physiologic effect required achieving at least a 60-percent reduction

in RBP,” he says. “In this trial, all but one of the subjects on the original formulation—the group that did so well—had a greater than 60-percent reduction in RBP. Furthermore, there was a correlation between the amount of RBP suppression and the change in atrophy rate and vision preservation.

“One of the things this indicates is that you need to suppress RBP below a certain level to have an effect,” he notes. “Thus, it offers a biomarker; a blood test at one month might reveal whether or not a patient is going to respond to this treatment. It also might allow you to titrate the drug. As long as you achieve suppression of 60 percent, you’ll probably get the beneficial effect, and you might be able to reduce the dose.”

Dr. Slakter acknowledges that night vision is likely to be affected by the drug. “You’re trading off long-term preservation of central vision for some degree of night-vision difficulty,” he says. “However, less than 10 percent of patients in the trial had significant night-vision problems.”

In terms of preventing neovascularization, Dr. Slakter says he was surprised by that finding. “The rate was significantly lower in both fenretinide groups,” he says. “Apparently, fenretinide also acts through a different pathway to suppress VEGF. The threshold for that function may be lower, so you might see VEGF suppression with even less drug.”

Encapsulated Cell Therapy

Another novel approach to treating dry macular degeneration now being pursued at multiple centers, including the Shiley Eye Center at the University of California, involves long-term delivery of ciliary neurotrophic factor to the retina via encapsulated cell therapy. Animal studies have shown that CNTF has the potential to retard the loss of photoreceptor cells.

Encapsulated cell therapy refers to

implanting a capsule—a proprietary technology developed by Neurotech Pharmaceuticals in Lincoln, R.I., called NT-501—into the back of the eye. The capsule, roughly the size of a grain of rice, contains genetically engineered cells that continuously produce CNTF for up to 24 months, according to the company. The capsule allows the CNTF to diffuse into nearby tissues while allowing oxygen and nutrients into the capsule to nourish the drug-producing cells; at the same time, it protects the cells inside from antibodies and the immune system. Implanting the capsule is done as an outpatient procedure that takes 15 to 20 minutes, and the capsule can be removed later if necessary.

In a Phase II, multicenter, double-masked, sham-controlled trial, 27 geographic atrophy patients received the implant while another 24 patients underwent a sham surgery or were implanted with a lower dose. The primary endpoint was change in BCVA at 12 months. The high-dose eyes showed a significantly reduced amount of change in macular volume at 12 months compared to the sham group; all but one patient in the high-dose group (96.3 percent) lost fewer than three lines of vision, compared to 75 percent of the sham group. The high-dose group also showed increased retinal thickness that correlated with vision stabilization. Furthermore, an analysis of a subgroup of subjects who began the trial with vision of at least 20/63 or better found that 100 percent of the high-dose group (n=10) maintained stable visual acuity, whereas only 55.6 percent of the low-dose and sham-treated subjects in this category did (n=9). However, no increase in BCVA (the primary endpoint of the study) was observed.

In this study, as well as others using this technology to treat other conditions, no adverse events have been associated with the surgical procedure

or the implant.

Neurotech has received fast-track designation for NT-501 for the treatment of visual loss associated with dry macular degeneration.

Adding a Bit of Spice

A recent study conducted at multiple universities in Italy⁷ found that short-term supplementation with saffron, a spice containing the antioxidant carotenoids crocin and crocetin, improved some measures of vision in patients with early macular degeneration. Twenty-five patients received 20 mg/day of oral saffron or placebo for three months, followed by switching to the alternative for three more months. After saffron supplementation, focal electroretinograms increased in amplitude and showed decreased thresholds, compared to baseline or placebo ($p<0.01$). Clinical exams performed after 90 days of supplementation also found that saffron subjects’ visual acuity improved from 0.70 at baseline to 0.80; placebo subjects’ visual acuity only improved to 0.72. The difference was significant ($p<0.01$).

A follow-up study of 29 early AMD patients was conducted to see whether visual improvement resulting from saffron supplementation would last out to one year. (*Falsini B, et al. IOVS 2011;52:ARVO E-Abstract 127*) After three months of supplementation, mean visual acuity improved by two Snellen lines compared to baseline values (0.75 to 0.9, $p<0.01$); mean focal ERG sensitivity improved by 0.3 log units compared to baseline values ($p<0.01$). These changes remained stable over the follow-up period. A longer-term study is now being planned.

“We have preliminary evidence that as a consequence of saffron neuroprotection, the function of a pool of damaged but still viable cone photoreceptors in AMD eyes can be restored

by saffron dietary supplementation,” says Benedetto Falsini, MD, associate professor of ophthalmology at the Department of Ophthalmology, Università Cattolica, Policlinico A. Gemelli, in Rome. “The idea of using saffron supplementation to combat early macular degeneration was inspired by Prof. Silva Bisti’s experimental work on murine models of oxidative damage. That work showed a highly significant effect of saffron on both structure and function of

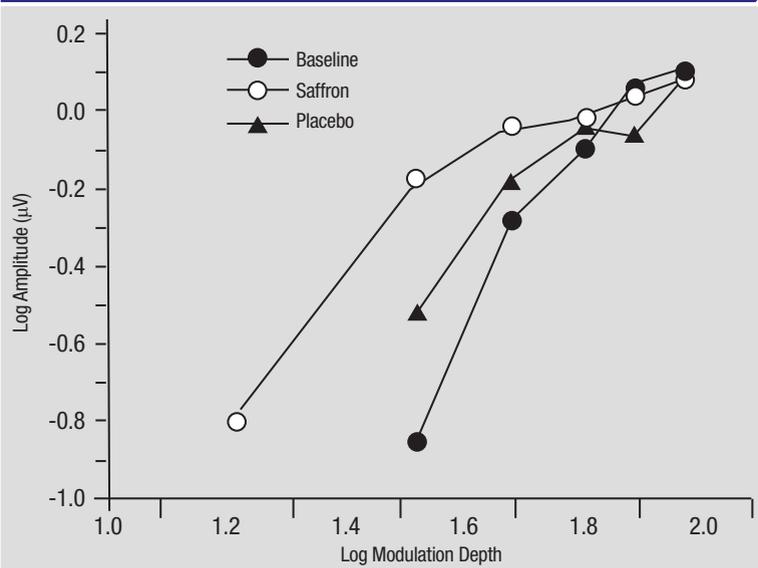
the retina exposed to oxidative damage. We believe this effect is due to the effects of crocin and crocetin, saffron constituents and powerful antioxidants.”

Regarding the safety of saffron supplementation, Dr. Falsini says the study indicates that the doses employed in the study are safe. “It’s definitely something doctors can offer patients,” he says. “However, doctors need to remember that saffron is delicate and easy to manipulate. We use selected saffron previously tested in animal models, and the pills are prepared for us by a specialized company.”

Amyloid Suppression

At least two drugs being tested are designed to reduce the presence of amyloids, a component of drusen. Copaxone, or glatiramer acetate, is a drug that’s been FDA-approved for treatment of multiple sclerosis; it suppresses T-cells and down-regulates inflammatory cytokines. A Phase II/III trial of the drug is currently underway at the New York Eye & Ear Infirmary. “Researchers in Israel dis-

Effect of Saffron on Focal ERG Function After 90 Days



Focal ERG functions in dry AMD patients at baseline and after 90 days of saffron or placebo supplementation. (Data from Falsini 2010.)

covered that copaxone has the ability to reduce drusen formation,” explains David Boyer, MD, in clinical practice with Retina-Vitreous Associates Medical Group in Los Angeles and a clinical professor of ophthalmology at the University of Southern California Keck School of Medicine.

“Pfizer also has a systemic anti-amyloid drug called RN6G that binds amyloid beta,” he adds. “It’s currently being used to treat Alzheimer’s disease, and they’re looking at the possibility of using it as a long-term treatment for reducing drusen.”

Neuroprotection

Several drugs being tested are taking this approach. Dr. Boyer is a participant in an ongoing trial of Tandoospirone, aka AL-83098 (Alcon), a serotonin 1A receptor agonist delivered as a topical eye drop. “Animal studies have shown this drug to be neuroprotective,” says Dr. Boyer. “It reduces the waste products that are found at the edge of geographic atrophy. The current trial is a large Phase II trial designed to see whether the

drug can reduce the growth of geographic atrophy. All patients have completed one year, and 18-month results—the pre-specified endpoint—should be available soon.”

Allergan’s brimonidine is also being tested as a resource against dry macular degeneration. “Brimonidine has been shown to be neuroprotective in a variety of different insults,” notes Dr. Boyer. “For this particular purpose the drug is inject-

ed intravitreally using the Ozurdex platform [currently used to deliver dexamethasone]. This releases the drug gradually over an extended time period.”

Other drugs under investigation as neuroprotective agents include trimetazidine, an anti-ischemic agent, the subject of a multicenter, randomized, double-blind, placebo-controlled, phase III study involving 1,100 patients in Belgium, France and Spain; and Alprostadil, a prostaglandin known to increase blood flow, currently in a Phase III trial in Europe.

Reducing Inflammation

Reducing inflammation is also seen as a promising avenue to pursue. Options being investigated include:

- **Fluocinolone acetate.** “Alimera Sciences is conducting a small study involving the Medidur implant,” says Dr. Boyer. “They’re investigating the possibility of using the steroid/device as a long-acting means of reducing the inflammatory component and hopefully triggering regression or a lack of progression of geographic atrophy.”

• **Rapamycin (sirolimus)**. Once seen as a potential treatment for wet macular degeneration, sirolimus is now under investigation in an NIH-funded trial to determine its efficacy as a treatment for patients with bilateral geographic atrophy. Sirolimus inhibits the production, signaling and activity of many inflammatory factors relevant to the development of GA. The drug is being given in the form of multiple subconjunctival injections.

In addition, several drugs reduce inflammation by interfering with the complement immune system, the “innate” immune system that helps antibodies and phagocytic cells clear pathogens from the body; it may be involved with the pathogenesis of macular degeneration. Drugs in this category include: eculizumab (Soliris, Alexion), a monoclonal antibody that inhibits complement factor 5, given intravenously and currently approved for treating paroxysmal nocturnal hemoglobinuria; FCFD4514S (Genentech/Roche), derived from an antibody that inhibits complement factor D; JPE1375 (Jerini Ophthalmic), a complement factor C5a receptor inhibitor; TA106 (TaliGen Therapeutics), an antigen-binding complement factor B inhibitor; and ARC 1905 (Ophthotech), a C5 inhibitor.

Dr. Boyer notes that there are many unanswered questions regarding the complement system approach. “We don’t know whether we need to use this type of drug systemically or locally, or how long we have to use it, and it’s not clear in many cases whether we should be using the drug for wet or dry disease,” he says. “Furthermore, these drugs inhibit different parts of the immune cascade. It’s not clear which is the best way to go with this.”

Help Is on the Way

None of the treatments on this list is currently ready for prime time. But with so many different promising options under investigation, the odds are good that you’ll soon have something to offer besides comforting words and nutritional supplements. And that’s good news for both you and your patients. [REVIEW](#)

1. Millen AE, Volland R, Sondel SA, Parekh N, Horst RL, Wallace RB, Hageman GS, Chappell R, Blodi BA, Klein ML, Gehrs KM, Sarto GE, Mares JA; CAREDS Study Group. Vitamin D status and early age-related macular degeneration in postmenopausal women. *Arch Ophthalmol* 2011;129:4:481-489.
2. Christen WG, Schaumberg DA, Glynn RJ, Buring JE. Dietary omega-3 fatty acid and fish intake and incident age-related macular degeneration in women. *Arch Ophthalmol*. 2011; March 14 [Epub ahead of print].
3. Kaneko H, Dridi S, et al. DICER1 deficit induces Alu RNA toxicity in age-related macular degeneration. *Nature* 2011;17:471:7338:325-30.
4. Kokkinaki M, Sahibzada N, Golestaneh N. Human Induced Pluripotent Stem-Derived Retinal Pigment Epithelium (RPE) Cells Exhibit Ion Transport, Membrane Potential, Polarized Vascular Endothelial Growth Factor Secretion, and Gene Expression Pattern Similar to Native RPE. *Stem Cells* 2011;29:825-835.
5. Ehrlich R, Harris A, et al. Age-related macular degeneration and the aging eye. *Clin Interv Aging* 2008;3:3:473-482.
6. Grunwald JE, Metelitsina TI, et al. Reduced Foveolar Choroidal Blood Flow in Eyes with Increasing AMD Severity. *IOVS* 2005;46:1033-1038.
7. Falsini B, Piccardi M, et al. Influence of Saffron Supplementation on Retinal Flicker Sensitivity in Early Age-Related Macular Degeneration. *IOVS* 2010;51:6:118-24.

AUGUST

4 - 7

SONOMA, CALIF.

The Women in Ophthalmology Summer Symposium will take place this year at The Lodge at Sonoma Resort and Spa in Sonoma. The program will feature an increased focus on education from a variety of professionals within the medical and ophthalmology worlds. CME hours are available. For information, visit wioonline.org

4 - 6

MACKINAC ISLAND, MICH.

The Michigan Society of Eye Physicians and Surgeons will be hosting their 43rd Annual Meeting at the Grand Hotel at Mackinac Island. CME hours will be available. For information, contact Theresa Wiley. Phone: (313) 823-1000; Website: misesps.org

26 - 27

FT. WORTH, TEXAS

The Continuing Professional Education (CPE) Ophthalmology program will be comprehensive in nature and focus on techniques of phacoemulsification and management of complications in cataract and refractive surgery. Other topics of discussion will cover ocular disease, glaucoma care and intraocular lenses. The format will consist of interactive lectures, presentations of illustrative or unusual surgical cases, panel discussions and a hands-on microsurgical laboratory session. Participants for this program should be in their third year of ophthalmology residency at the time of the program. For more information, visit revophth.com/cpeophth2011.

SEPTEMBER

10 - 11

SAN DIEGO

The Complimentary Ophthalmic Residents Education program focuses on state of the art cataract surgical techniques and technology. There will be a pre-course evaluation of the residents’ knowledge of the surgical procedure, phaco technology and specific surgical instruments. Interactive lectures will focus on surgical knowledge and technical skills necessary to perform safe and efficient surgery. The course will also include a hands-on microsurgical lab. During the lab residents will practice specific surgical skills and safely evaluate phacoemulsification machine parameters. Faculty members will demonstrate procedures and coach residents during the wet lab. For more information, visit revophth.com/corewest2011.

23 - 24

OMAHA, NEB.

The Nebraska Academy of Eye Physicians and Surgeons will hold its 2011 Scientific Meeting at the Magnolia Hotel in Omaha. The meeting will focus on the latest developments while also providing a review in the field of ophthalmic treatments and disorders. CME hours are available. For information, visit nebeve.org.

OCTOBER

21 - 22

ORLANDO, FLA.

The American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS) will hold its 42nd Annual Fall Scientific Symposium at The Hilton Bonnet Creek in Orlando. CME hours are available. For information, call (952) 646-2038; Website: asoprs.org/

22 - 25

ORLANDO, FLA.

The American Academy of Ophthalmology’s (AAO) Annual Meeting will take place in Orlando, at the Orange County Convention Center. The annual meeting will be preceded by Subspecialty Days. CME hours will be available. For information: Phone: (415) 447-0320; Website: aao.org.

NOVEMBER

3 - 6

FT. WORTH, TEXAS

The Continuing Professional Education (CPE) Fellows Program for Cornea Fellows is designed to provide a comprehensive update on the treatment and management of the ocular surface. Presentations will include dry eye, allergy, anti-infectives and surgical techniques. This program offers a unique educational opportunity for participants to meet and exchange ideas with some of the most respected thought leaders in the same subspecialty, and the opportunity to network with fellows from other programs. Interactive lectures, case studies and a hands-on workshop aimed at provoking high-level discussions between faculty and fellows will be the focus of this program. For more information, visit revophth.com/2011CPEcornea