



DIABETES:

An Optometrist's Guide to a Growing, Yet Treatable, Disease



W. Lloyd Clark, MD



Paul Karpecki, OD

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Both the prevalence and incidence of diabetes have increased considerably over the past decade and show no signs of slowing down. Make no mistake, diabetes is now considered to be an epidemic in the United States. It affects 9.3% of the US population (29.1 million people) and is the seventh leading cause of death.¹ An additional 86 million adults in the United States have prediabetes based on their fasting glucose or HbA1c levels and are at risk to develop diabetes.² It is projected that by 2050, as many as one in three to five adults will have diabetes.³

PREVALENCE OF DME IN THE US

- In the United States, approximately 21% of people with diabetes, or 8 million individuals, have diabetic retinopathy (DR).⁶ Only about 5.8 million of these are diagnosed.^{6,18,19}
- Of these 8 million people, about 2.3 million have diabetic macular edema (DME), 1.5 million are diagnosed and 750,000 have clinically significant macular edema (CSME)^{6,19}
- Of those with CSME, only about 400,000 are receiving treatment for DME.⁸

ABOUT THE AUTHORS

W. Lloyd Clark, MD, is an ophthalmologist and managing member at Palmetto Retina Center, LLC, in Columbia, SC. He is also clinical assistant professor of ophthalmology at University of South Carolina School of Medicine.



Dr. Clark specializes in vitreoretinal diseases and surgery. His clinical interests include pharmacologic management of retinal vascular disease, complex retinal detachment and retinopathy of prematurity. In addition to maintaining an active referral practice in medical and surgical retina, he operates a broad-based clinical research program. Dr. Clark participates in national and international multicenter trials sponsored by industry and the National Institutes of Health as well as investigator-sponsored trials. He has written investigator-initiated clinical trial protocols for Genentech-Roche and Regeneron Pharmaceuticals. He also sits on the Retinal Vein Occlusion Steering Committee for Regeneron, the Protocol B Steering committee for NIH-sponsored Diabetic Retinopathy Clinical Research (DRCR) Network and the Scientific Advisory Board for Santen Pharmaceuticals. Dr. Clark provides consulting services to all stakeholders in the field of retinal diseases and therapy.

Paul Karpecki, OD, received his doctor of optometry degree from Indiana University and completed a fellowship in medical cornea and refractive surgery in Kansas City in affiliation with the Pennsylvania College of Optometry. He currently practices at Kentucky Eye Institute.



Dr. Karpecki was one of two optometrists appointed to the Delphi International Society at Wilmer Eye Institute at Johns Hopkins, which included the top 25 dry eye experts in the world, and the National Eye Institute's Dry Eye Committee, to provide insights around the prevalence or incidence of dry eye in women.

A noted educator and author, he is the chief clinical editor of *Review of Optometry*. Dr. Karpecki is also past president of the Optometric Cornea, Cataract and Refractive Society and serves on the board for the charitable organization Optometry Giving Sight.

Americans are also getting diabetes at increasingly younger ages.^{1,2} One of the major drivers for this increase is obesity, which is a major risk factor for type 2 diabetes. Rates of obesity have increased from 20.1% in 2000 to 27.6% in 2012, and are a likely driver of the increase in diabetes rates.⁴

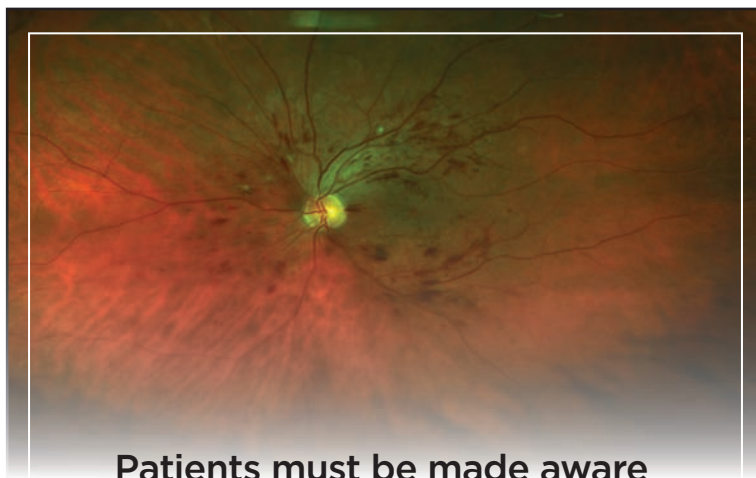
Whatever the cause, diabetes and its complications are an enormous burden on the healthcare system. Patients with diabetes visit a doctor about 24 times each year, on average, to address the many complications related to this disease.⁵ Specific to ocular complications, approximately 21% of patients with diabetes develop diabetic retinopathy (DR)⁶ and, among those who do, 70% will have diabetic macular edema (DME).⁷ Unfortu-

It is essential that diabetic patients receive screening for retinal disease so that appropriate interventions can be initiated before irreversible damage occurs.^{10,11}

nately, by 2020 approximately 9.6 million Americans will have diabetic retinopathy.⁸ For this reason, our responsibility as eye care providers to carefully monitor diabetic and prediabetic patients is crucial.

OCULAR COMPLICATIONS OF DIABETES

Up to 45% of people with diabetes experience vision loss.⁹ Diabetes impacts all



Patients must be made aware that diabetic macular edema can develop at any stage of diabetes and is often asymptomatic.

structures of the eye and many aspects of visual function.¹⁰

Diabetic retinal disease, the most common microvascular complication of diabetes, is a leading cause of vision loss among adults worldwide. It primarily manifests as diabetic retinopathy and/or diabetic macular edema.

Patients with diabetes are also at an increased risk of non-retinal ocular complications, including:¹⁰

- Changes in visual function, such as loss of visual acuity, refractive error changes, changes in color vision, accommodative dysfunction and visual field changes
- Eye movement anomalies secondary to diabetic neuropathy
- Sluggish pupillary reflexes
- Microaneurysms in the bulbar conjunctiva and an increased risk of conjunctival bacterial infections
- Tear film abnormalities leading to an increased incidence of dry eye

- Corneal abnormalities, such as slower wound healing, reduced corneal sensitivity, abrasions and contact lens–related microbial keratitis
- Iris abnormalities, such as depigmentation, neovascularization of the iris and neovascular glaucoma
- Cataracts, including reversible lenticular opacities
- Vitreous degeneration and posterior vitreous detachment (PVD), which may play a role in PDR
- Optic disc and nerve abnormalities, such as diabetic papillopathy and ischemic optic neuropathy



Color fundus photography can aid in documenting and evaluating more severe cases of DME while helping to track disease progression and treatment response.

- Primary open angle glaucoma
- Diabetic retinopathy disease severity varies greatly, ranging from no disease and no signs or symptoms, to nonproliferative diabetic retinopathy (which can be mild, moderate or severe), to proliferative diabetic retinopathy and possible severe vision loss due to neovascularization.¹¹ Macular edema may occur at any stage of DR.¹² As diabetic retinopathy progresses, patients

may present with microaneurysms, intraretinal hemorrhage, vitreous hemorrhage, exudates, macular ischemia, neovascularization and tractional retinal detachment. Seventy percent of patients with the most severe form of diabetic retinopathy will experience progression to diabetic macular edema.⁷

UNDERSTANDING BARRIERS TO CARE

It is essential that diabetic patients receive screening for retinal disease so that appropriate interventions can be initiated before irreversible damage occurs.^{10,11}

However, nearly one in four patients with diabetes age 40 years and older is not complying with the recommended yearly eye exam.¹³

There are several reasons why patients don't receive annual eye exams. According to a 2014 study on barriers to eye care in diabetes patients, the most commonly cited reasons for not getting exams are "no need" (39.7%) and cost or lack of insurance (32.3%).¹³ Other reasons are: not having an eye doctor, not being able to make an appointment with a

doctor and not having transportation to an appointment.

People ≥ 65 years of age were more likely to report "no need" as their main reason for being noncompliant, whereas those 40 to 64 years of age and women overall were more likely to report "cost or lack of insurance" as their main reason.

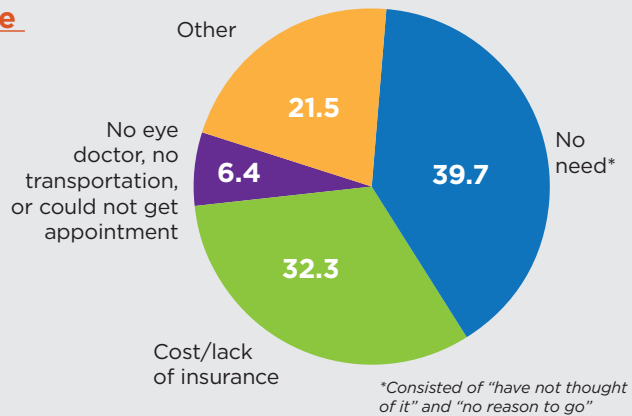
Given that "no need" was the most commonly cited reason for not seeking eye

Why Patients Don't Receive Annual Eye Exams

As reported by patients diagnosed with diabetes who are not receiving annual eye exams.

- Patients with visual impairments are more likely to cite "cost or lack of insurance" as a reason for not receiving an eye exam and less likely to report "no need"

Chou CF, et al. Diabetes Care. 2014;37:180-8.



care, diabetes eye health education programs or interventions that increase the awareness of the need for eye care among people with diabetes may be effective strategies toward helping to protect against vision loss.

HOW TO GET PATIENTS INTO THE OFFICE

Education is vital in the effort to connect with the 23.5% of patients who are noncompliant with their eye exams and get them into the office.¹³ To begin, we need to increase awareness between healthcare professionals and adults with diabetes 65 years and older of the importance of annual eye exams. Patients must be made aware that diabetic macular edema can develop at any stage of diabetes and is often asymptomatic. Older adults might not be aware of their vision impairment because symptoms progress slowly or they may consider vision loss to be a normal part of aging.

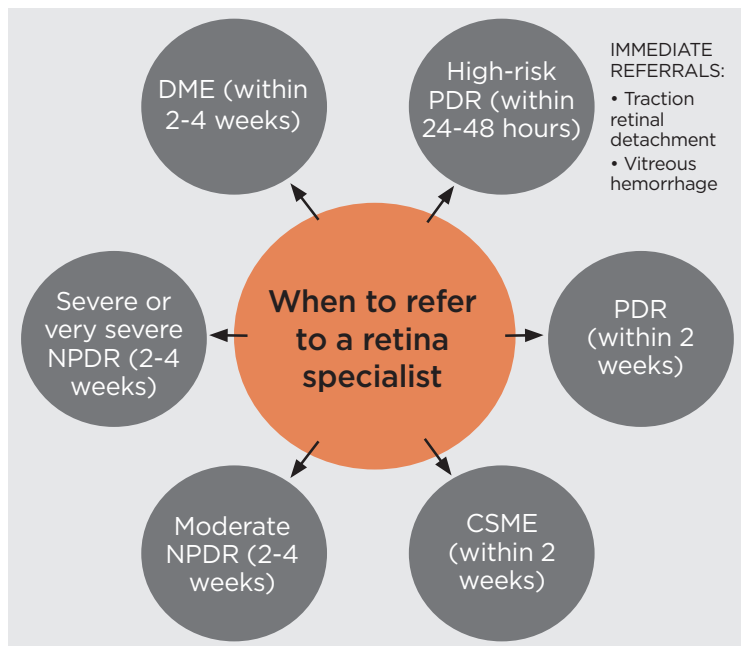
Increased education regarding the effect

diabetes has on vision can help reduce the numbers who believe there is no need for an exam.

Furthermore, targeting simple interventions (such as reminders) to patients with a lower income, those 40 to 64 years old, patients without health insurance and those who have been diagnosed with diabetes for a longer amount of time can encourage patients to seek annual dilated eye exams.

WHEN TO REFER^{1,2}

An annual dilated eye examination and



fundus photographs, if indicated, are generally sufficient for the patient with mild nonproliferative diabetic retinopathy (NPDR), as long as there is neither macular edema nor a coincident medical condition, such as hypertension, renal disease or pregnancy.¹⁴

Any patient with DME or with suspected DME should be referred to a retina specialist within two to four weeks for evaluation. The patient with high-risk proliferative diabetic retinopathy (PDR) should be referred to a retina specialist more quickly, usually within 24 to 48 hours. If a patient with high-risk proliferative diabetic retinopathy has a traction retinal detachment or vitreous hemorrhage, they should be referred immediately.

Those with clinically significant macular edema should be referred quickly as well, within two weeks. Patients whose proliferative diabetic retinopathy is less than high risk or who have signs of moderate, severe or very severe nonproliferative diabetic retinopathy should also be referred for consultation.^{14,15}

IDENTIFYING PROGRESSION

Recognizing the progression of DME involves several tests in addition to the eye exam. For example, optical coherence tomography (OCT) creates high-resolution, cross-sectional images of body structures by illuminating them with infrared light and measuring the reflected light.¹⁶ It is used in DME patients to detect and assess thickening of the retina due to edema.¹¹ However, it is important to note that OCT alone can miss areas of macular edema. If an OCT is taken only through the central macula, some increase in central retinal thickness may be missed. For this reason, it is important to conduct imaging in addition to the OCT.

Color fundus photography may help in documenting and evaluating more severe

cases of DME while helping to track disease progression and treatment response.¹¹ Fluorescein angiography also may be used to evaluate unexplained decreases in visual acuity.¹⁷ This test is considered most helpful in determining site of leakage in those with DME, as well as characterizing the severity of DR, assessing the extent of capillary nonperfusion and confirming neovascularization.^{16,17}

DIABETIC MACULAR EDEMA TREATMENT

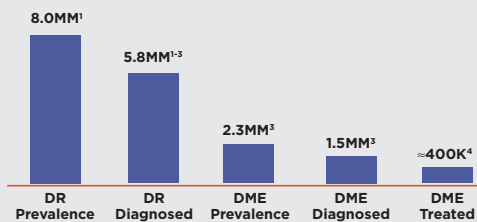
Of the 2.3 million patients with diabetic macular edema, only about half a million are treated for it.^{6,18,19} However, this is not due to lack of therapeutic options. Although there is no cure for diabetic macular edema, treatment options are available.

A variety of therapies have been studied over the years, and the treatment landscape for diabetic macular edema has evolved. Current therapies include laser treatments, steroids and vascular endothelial growth factor (VEGF) inhibitors. Anti-VEGF therapies are now widely used as frontline therapy for many patients with diabetic

Prevalence of DME in the US

Approximately 8 million (21%) of people with diabetes have DR¹

- 5.8 million are diagnosed¹⁻³
- 2.3 million have DME³



1. NHANES 2005-2008, projected to 2012 US population.
2. Centers for Disease Control and Prevention. www.cdc.gov. Accessed June 9, 2014. Saaddine JB, et al. Arch Ophthalmol. 2008;126(12):1740-7.
3. BioTrends Research Group. TreatmentTrendsSM: Diabetic Retinopathy/Diabetic Macular Edema (US) 2013.
4. Proprietary Quantitative Market Research (n=103 retina specialists, n=23,994 DME eyes with central involvement); fielded November 2013.

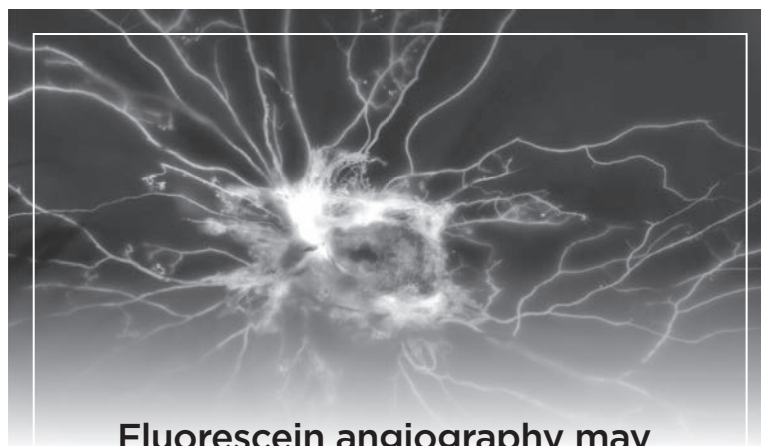
macular edema.²⁰⁻²²

Vascular endothelial growth factor-A (VEGF-A) plays an important role in the pathophysiology of DME.²³ Diabetic retinopathy causes microvascular damage in the retina, which reduces perfusion to the damaged areas and results in retinal hypoxia.²³ This hypoxia causes increased expression of VEGF-A, which in turn increases permeability and vascular leakage thereby producing DME.²³

CONCLUSION

The diabetes epidemic is taking a significant toll on the health of our nation's citizens and resources. Effective screening, education and frequent exams are essential to prevent the likelihood of vision loss. The optometrist plays a central role in this regard. ODs must be meticulous in their exams, thorough in their explanations clear with respect to explaining the ramifications of missed visits and vigilant in their study on the literature with regard to available treatment options. ■

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Fluorescein angiography may be used to evaluate unexplained decreases in a patient's visual acuity.

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