

A SUPPLEMENT TO REVIEW OF OPTOMETRY

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4TH EDITION

Wellness Essentials

FOR CLINICAL PRACTICE

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living among your patients.*



A Proactive Approach to Managing Prediabetes and Type 2 Diabetes

We can prevent or delay diabetic retinopathy by engaging with patients early on in the course of the disease.

BY ANSEL T. JOHNSON, OD

Optometrists are well trained in grading the severity of retinal conditions secondary to diabetes and referring patients to the proper surgical specialist. However, we often examine patients living with prediabetes and diabetes possibly years prior to the need for ocular surgical intervention. There are newer diagnostic tools and information that can be shared at these stages—long before retinopathy develops—to help patients avoid or reduce risks of sight-threatening conditions. By doing so, optometrists have an opportunity to make a substantial positive impact on reducing the burden of vision impairment as well as morbidity and even mortality from diabetes.

DEFINITIONS

Diabetes mellitus is a group of metabolic conditions characterized by chronic elevated blood sugar levels or hyperglycemia. This can lead to long-term damage to the body's organs and to the cardiovascular system.¹

Type 1 diabetes is an autoimmune condition where the insulin-producing beta cell tissues in the pancreas are attacked by the body's own immune system. Only about 10% of diabetes cases in the US are type 1.¹

Type 2 diabetes is characterized by insulin resistance and relative insulin deficiency. The most common form of diabetes, type 2 usually develops in adults, though it is increasingly diagnosed in younger populations due to rising obesity rates and other factors.¹ This article will focus on optometric care of those with prediabetes and type 2 diabetes.

Prediabetes is a condition where blood glucose levels are higher than normal but not yet high enough to be diagnosed

as diabetes. Prediabetes is diagnosed through tests such as fasting plasma glucose, oral glucose tolerance test and HbA1c.¹

It was estimated that, in 2020, 11.6% of the US population overall and 14.7% of adults had diabetes. Furthermore, based on A1c levels, 38.0% of all US adults had prediabetes and only 19.0% of these adults were told about it by a health professional.²

IMPORTANCE OF EARLY DETECTION

Early detection and management of prediabetes and type 2 diabetes are crucial in preventing or delaying the onset of complications. Effective management strategies, including lifestyle modifications and pharmacological interventions, can significantly reduce the risk of progression from prediabetes to type 2 diabetes and then to diabetic retinopathy (DR).

The substantial economic impact also underscores the need for effective prevention and management strategies to reduce the prevalence of diabetes and its associated costs.^{2,3}

When retinal changes are detected prior to sight-threatening retinal vascular change, we have the opportunity to establish a baseline and then monitor closely for any change, be it positive or negative. Though other ocular manifestations exist, close monitoring of subclinical retinal neuropathy and vasculopathy with modern ancillary testing provides opportunities to help patients better take control of their condition.

Advances in ocular imaging technologies have revolutionized the early detection and management of diabetic eye conditions.

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OCT provides high-resolution cross-sectional images of the retina, aiding in the detection of macular edema and other structural abnormalities. OCT angiography (OCT-A) allows for noninvasive imaging of retinal blood vessels. It can detect microvascular changes associated with DR, providing valuable information for early diagnosis and monitoring of disease progression. Analytics for the OCT-A and OCT findings provide a great tool in monitoring retinal vessel and ganglion cell changes.^{4,5}

Full-field electroretinography (ERG) assesses the electrical responses of various cell types in the retina, including the photoreceptors, inner retinal cells and the ganglion cells. This technology is crucial for detecting retinal dysfunction that may not yet be visible on imaging or during a clinical exam. The diabetes risk score provided by this instrument is a game changer and a major piece in monitoring subclinical retinal changes.⁶

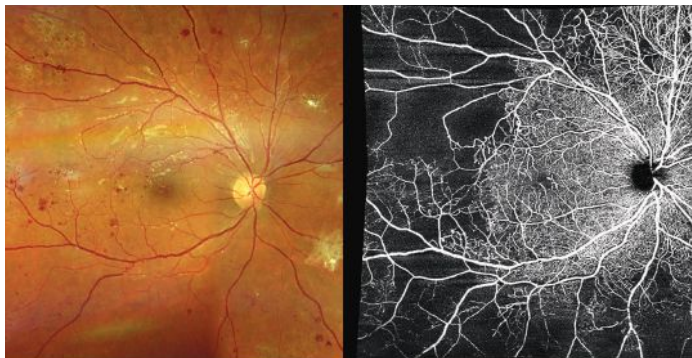
Color vision testing—whether digital (Waggoner, Konan) or traditional (D-15)—can show subtle changes in color perception that may be indicative of early retinal damage. Diabetes can affect color vision by damaging the retina's blood vessels and reducing oxygen supply to retinal cells. Identifying these changes early through comprehensive color vision testing can prompt more timely interventions.^{7,8}

All these newer technologies offer an opportunity to track ocular and subclinical changes early. They provide a reference for case management and sharing information with the patient and primary care provider (PCP). An optometrist can then provide a critical touch point in patient management.

IMPACT OF DIABETES EDUCATION ON A1c

Diabetes education has been shown to be highly effective in improving glycemic control, as measured by hemoglobin A1c (HbA1c) levels. HbA1c reflects average blood glucose levels over the past two to three months and is a key indicator of diabetes management. Some studies show comprehensive diabetes education programs can lead to significant reductions in HbA1c levels. For instance, a meta-analysis from 2016 found that diabetes self-management education and support interventions led to an average reduction in HbA1c of 0.57 points. Another study showed A1c reduction ranging from 0.2 to 0.8.⁹ Weight loss is the mainstay of reducing the risk of progression to diabetes mellitus in patients with prediabetes.¹⁰

Getting patients to reach and maintain lower HbA1c levels is associated with a reduced risk of diabetes-related complications and mortality. The landmark Diabetes Control and Complications Trial established that intensive glycemic control significantly reduces the risk of microvascular and macrovascular complications in individuals with diabetes.¹¹ By lowering HbA1c levels, diabetes education programs can lower the incidence of complications such as retinopathy, nephropa-



OCT-A allows for noninvasive imaging of retinal blood vessels. It can detect microvascular changes associated with DR.

Photo: Jessica Tarka, OD, and Carolyn Majcher, OD

thy, neuropathy and cardiovascular events, thus improving patient outcomes and quality of life.

Optometrists play a critical role in the early detection and management of diabetic eye conditions. Given the frequent and direct contact they have with patients, the profession is well-positioned to provide diabetes education and support well before severe exacerbations of the disease. Educating patients about the importance of glycemic control, regular eye examinations and lifestyle modifications can empower them to take the initiative in managing their condition and reduce the risk of ocular and systemic complications. Basic education starts with asking patients questions to see how engaged they are in their own diabetes care.

Education and coaching should start when they are known to be prediabetic. This presents the best opportunity for patients to reduce or reverse their trajectory towards Type 2 diabetes and the complications that come with this chronic disease.¹² Research has shown that lifestyle changes can reduce risk of developing type 2 diabetes by 58% and 71% for those over 60.

COACHING STRATEGIES DURING EYE EXAMS

During ocular examinations, optometrists can employ various counseling strategies to educate patients about diabetes management. We often see these patients throughout the year for other ocular reasons and then have opportunities to advise them on changes, which can empower a patient for more positive outcomes in living with diabetes and prediabetes. While tracking retinal changes like neuropathy and vascular changes is easier with newer technologies, here are some coaching strategies that any optometrist can always use.

For prediabetes:

- Ask if they have previously been told they were borderline diabetic. A1c in the range of 5.7 to 6.4 defines borderline diabetes.^{1,13} Note that most people with prediabetes do not know it. Ask patients on all follow-up visits.

A PROACTIVE APPROACH TO MANAGING PREDIABETES AND TYPE 2 DIABETES

GLP-1 Agonists: Usage, Side Effects and Emerging Concerns

By Lara Zakaria, PharmD, MS, CDN, CNS, IFMCP

Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) are a class of medications primarily used to manage type 2 diabetes and obesity. They work by mimicking the action of the GLP-1 hormone, which increases insulin secretion, decreases glucagon secretion, slows gastric emptying and promotes satiety. This results in improved blood glucose control and weight loss, making them highly effective for patients struggling with these conditions.¹

Agents such as liraglutide (Victoza, Novo Nordisk) and semaglutide (Ozempic, Wegovy; both Novo Nordisk) have gained popularity not only for their efficacy in controlling blood sugar levels but also for their significant weight loss benefits. Recent trends indicate an increasing use of these medications for obesity management, reflecting a shift towards addressing weight as a critical component of metabolic health.²

SIGNIFICANT SIDE EFFECTS AND CLINICAL CONSIDERATIONS

Despite their benefits, GLP-1 RAs come with notable side effects. Gastrointestinal issues are the most common, which include nausea, vomiting, diarrhea and constipation. These are typically more pronounced at the beginning of the treatment or during dose escalation. More severe, albeit rarer, adverse effects include pancreatitis and gallbladder disease, necessitating careful patient selection and monitoring.^{1,2}

These gastrointestinal effects can substantially impact nutrient intake—particularly protein, fiber and various micronutrients—due to reduced overall energy intake or feeling full more quickly. As a result, patients might experience deficiencies in

essential nutrients, exacerbating existing health issues or creating new ones. Eyecare professionals should be aware of these potential side effects because nutrient deficiencies can directly affect ocular health, particularly in patients with diabetes, who are already at an increased risk of developing DR and other ocular complications. Monitoring dietary intake and recommending nutrient-rich foods or supplements can help mitigate these risks.

Additionally, there is growing concern about GLP-1 agonists contributing to sarcopenia, or the loss of muscle mass, which can further complicate a patient's overall health. For patients experiencing significant muscle loss, the inclusion of protein and creatine supplements might be necessary to preserve muscle health. ODs, while not directly managing muscle health, play a crucial role in the holistic care of their patients by collaborating with other healthcare providers. Ensuring that patients receive comprehensive care, including nutritional counseling and appropriate supplementation, can help manage the side effects of GLP-1 agonists and support overall health, thereby reducing the risk of complications that could impact vision and ocular health.

Additionally, GLP-1 RAs are contraindicated in patients with a history of medullary thyroid cancer or multiple endocrine neoplasia syndrome type 2 due to an observed increased risk of thyroid tumors in animal studies.

EMERGING CONCERNS: DIABETIC RETINOPATHY

Recent studies have raised concerns about the potential link between GLP-1 RAs and diabetic retinopathy. While some studies suggest an increased risk of DR with GLP-1 RA use, particularly with semaglutide, the evidence remains mixed and somewhat controversial.³⁻⁵

Considering that GLP-1 receptor agonists are increasingly being prescribed to patients, eyecare professionals should be

- Inform patients that if they lose 5% to 7% of their body weight over 12 months, they have a good chance of avoiding converting to type 2 diabetes.¹⁴
- If a patient has not seen a nutritionist, encourage them to ask their physician for a referral, especially if they are struggling with their diet.
- Ask about their level of physical activity. Encourage them to find a physical activity they may enjoy, like walking, dancing, bike riding, etc.

For type 2 diabetes:

- Educate patients to know their A1c, BP and cholesterol numbers to start empowering them in their own care. Upon follow-up, reinforce positive behavioral changes.
- Inquire if patients check their own blood sugar and how often.
- Encourage being more physically active.
- Let the patient know that you will send their PCP or endocrinologist a report about their ocular status.
- Encourage a visit with a diabetes educator by getting a referral from their PCP. Medicare and most medical insur-

ances will cover these services every year, for up to two hours after the initial training.¹⁵

- Always celebrate progress since the last visit, be it weight loss and/or improvement in blood sugar control.
- Recommend evidence-based nutritional supplements that support a healthy retina. These provide opportunities to support without conflicting with conventional therapy for DR.¹⁶ The following is a partial list, and some can be found in combination with supplements marketed to optometrists to prescribe to their patients:
 - o Vitamin A.
 - o Lutein and zeaxanthin.
 - o Vitamins B1, B2, B3, B5, B6, Folate, B12.
 - o Vitamin C (ascorbic acid), vitamin D, vitamin E, zinc.
 - o Lipoic acid (as alpha-lipoic acid).
 - o N-acetyl cysteine.
 - o Homocysteine.
 - o Betaine.
 - o AREDS/AREDS2 supplements (effects on DR shown in animal studies).

familiar with the medication class potential impact on eye health. Complications such as increased incidence of DR, even though the evidence is mixed at this time, suggests we should closely monitor diabetic patients starting on GLP-1 agonists, especially for those at most risk, to manage any emerging complications.

CONCLUSION

GLP-1 receptor agonists represent an intriguing therapeutic option in the management of type 2 diabetes and in supporting weight loss. However, healthcare providers must be aware of the potential side effects, impacts on nutritional status and emerging concerns such as diabetic retinopathy. Careful patient selection, monitoring and a holistic approach to treatment can help optimize the benefits of these medications while minimizing risks.

Understanding these complexities ensures that healthcare professionals can better support their patients, leading to improved health outcomes and quality of life.

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OTC CONTINUOUS GLUCOSE MONITORS

At the time of this publication, Stelo (Dexcom), Lingo (Abbott) and Libre Rio (Abbott) will be available as wearable devices. Optometrists can recommend a biosensor to their patients with prediabetes and type 2 diabetes. These are the first FDA-cleared glucose biosensors available without a prescription.¹⁷

This option can be a game changer in patients who have prediabetes and diabetes to promote better self-management. Optometrists will be able to help track how well patients are controlling their blood glucose levels to reduce the risk of ocular complications.

CONCLUSION

In summary, optometric wellness coaching integrated with newer technologies in testing and imaging plays a pivotal role in the early detection and management of diabetes and its ocular complications. These technologies and skills give optometrists a greater opportunity to help empower patients to better health. □



The Stelo blood glucose monitor is one of a new class that will be available over the counter, helping to encourage more routine use.

Photo: Dexcom

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