



Clear and Present Dangers of Diabetes

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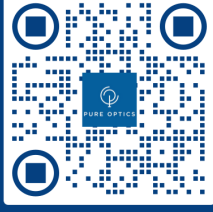
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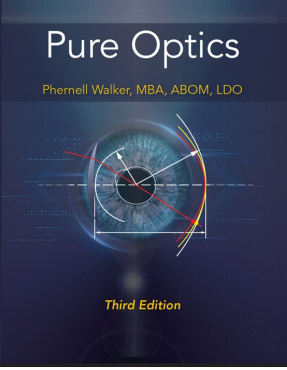
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Reference Resource

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Objectives

- Define diabetes
- Risk factors and causes
- Systemic treatment options
- Ophthalmic manifestations
- Ophthalmic treatment options

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What is Diabetes?

Diabetes - chronic systemic metabolic disease that affects the body's regulation of blood sugar or glucose.

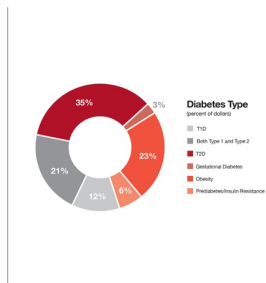
Diabetes is categorized into two groups:

- Type I
- Type II

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Prevalence of Diabetes in United States

- 37.3 million people
- 11% of U.S. population
- 90 to 95% Type II
- 5 to 10% Type I



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Diabetes Type I

- Inability to produce insulin
- Onset typically occurs in childhood
- Symptoms manifest faster than Type II
- Insulin replacement regimen required
 - a. Injections - stomach, arm, buttocks
 - b. Insulin pump - continuous insulin regulation

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Diabetes Type II

- Insulin resistant and unable to process the insulin produced
- Pancreas compensates by producing excessive insulin
- Glucose accumulates in the bloodstream
- Adult onset is progressive and slower than Type I
- Asymptomatic for years

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Diabetes Risk Factors

- Family History
- Race
- Lifestyle and Activity Level
- Age
- Medical history
 - a. cholesterol
 - b. triglycerides
 - c. hypertension
 - d. stroke
 - e. weight
 - f. gestational

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Diabetic Symptoms

- Polydipsia and polyuria
- Fatigue
- Refractive changes & blurred central vision ("make glasses don't work!")
- Neuropathy of extremities
- Poor healing of sores
- Unexplained weight loss



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Diabetes Mellitus Treatment Options

- Exercise regimen
- Dietary restrictions
- Medication (non-ophthalmic)
 - a. Most common is some of Metform
 - b. Jardiance
 - c. Glyxambi
 - d. Thiazolidinediones
 - e. SGLT2 Inhibitors

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Balanced Treatment Options Approach



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Avoid Certain Foods

- Dried fruit
- Sugary cereals
- Carbohydrates - rice, pasta and white bread
- Fructose laced foods and beverage
- Salty foods
- Limit alcohol (moderation is key)
- Candy, soda, etc...

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Diabetic Threats



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Vegetarian and Pescatarian Diet



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Blood Measurements



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Measuring Diabetes

- **A1C (aka: HbA1C)** - measures amount of hemoglobin blood sugar over a time period of 2 to 3 months.
- **Blood Sugar** - monitoring blood sugar is essential.
 1. blood sugar numbers show how well your diabetes is managed
 2. Target range:
 - a. Before meals: 80 to 130
 - b. Two hours after the start of a meal: < 180

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A1C

Indication	Range
Normal	5.7%
Pre-diabetes	5.7 to 6.4%
Diabetes	6.5%

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Target Blood Sugar (~20 yr. old)

Fasting	100
Before Meal	70 to 130
After Meal	180
Before Exercise	100
Before Bed	100 to 140

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Ophthalmic Manifestations

Uncontrolled diabetes can result in ophthalmic manifestations to include:

- floaters
- dark spots
- difficulty seeing at night
- blurred vision
- vision loss
- difficulty distinguishing colors
- diabetic retinopathy

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Crystalline Lens Changes

Diabetes mellitus can affect:

- Lens clarity
- Refractive index
- Accommodative amplitude of the lens

As the blood glucose level increases, so also does the glucose content in the aqueous humor.

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Blood Sugar and the Final Rx

Does your optometric physician require a stable blood sugar before prescribing a new final spectacle lens prescription?

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Retina Exam

- Dilated eye exam (standard of care)
- Ophthalmoscopy (direct & indirect)
- Fundus Photography
- Optical Coherence Tomography (OCT) or (OCT-A)
- Spectral Domain OCT (SD-OCT)
- Fluorescein Angiography

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Binocular Indirect Ophthalmoscopy



Photo Source: Keeler



Photo Source: VSP

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A Thousand Words



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Ophthalmoscopy and Fundus Photography

- Color
- Red-free
- Choroidal
- Autofluorescence
- Fluorescein angiography



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Fundus Photography Montage

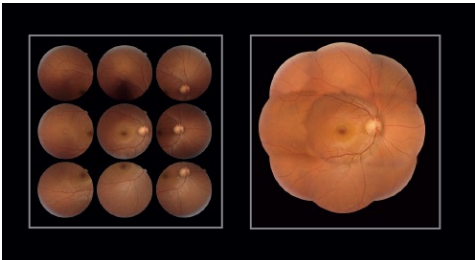


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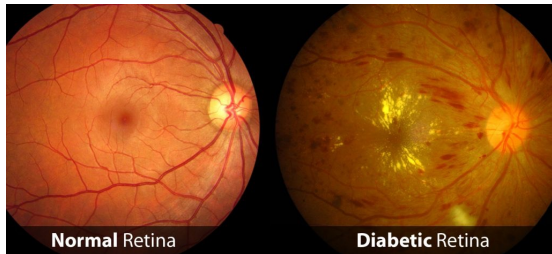
Diabetic Retinopathy (DR) E11.9

- Blood vessel damage
- Leaky blood vessels
- Blood vessel closure
- Hard exudates
- 80% of patient w/DM more than 10 yrs. will get DR



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Comparison



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Diabetic Retinopathy (DR) Stages E11.319

Diabetic Retinopathy (DR) - 2 stages:

- No-Proliferative Diabetic Retinopathy (NPDR) E11.329
- Proliferative Diabetic Retinopathy (PDR) E11.3559

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Non-proliferative Diabetic Retinopathy (NPDR) E11.329

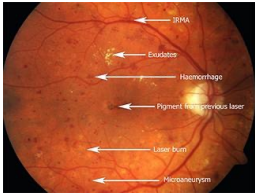
- Early stage of DR
- Leaky blood vessels
- Macular edema
- Macular ischemia (DMI)



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Proliferative Diabetic Retinopathy (PDR) E11.3599

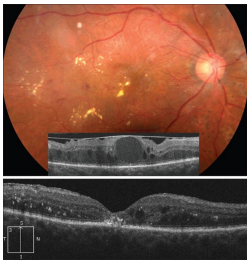
- Advanced stage of DR
- Neovascularization - scar tissue can result, potential PVD
- Intraretinal Microvascular Abnormalities (IRMA)
- Vitreous bleeding
- Central vision loss
- Peripheral vision loss



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Diabetic Macular Edema (DME)

- Result of diabetic retinopathy
- Blood leaks into macula
- Blurry/ wavy central vision
- Blind spot
- Colors appear dull



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Ophthalmic Treatment Options

- Anti-VEGF (vascular endothelial growth factor) drugs are designed to reduce swelling and improve vision loss (route ocular injections):
 - a. Avastin
 - b. Eylea
 - c. Lucentis
- Steroids (route ocular injections)
- Laser surgery - photocoagulation
- Vitrectomy - used for advanced PDR

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Diabetes Spectacle Prescription

- Acute myopic shifts to spectacle lens prescriptions
- Spectacle Prescription can change as the patient blood sugar changes. Consequently, their VA's will fluctuate

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Optician's Role in Diabetic Care

- Know the symptoms of diabetes
- Educate patients of the potential affects on their vision
- Open and honest dialogue from a position of eyewear expectations, NOT diagnosis as this is outside our scope of care

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Take Aways

- **Opportunities** - what opportunities can you implement at your practice to support diabetic eye care? Invest in the the latest diagnostic equipment to assess and monitor the progression. Promote your capabilities in the community.
- **Patient Education** - provide patient education for diabetic and pre-diabetic patients (i.e. verbal, written, video links, diabetic eye care workshops and more)
- **Correspondence** - communicate with the PCP of every diabetic patient and include the patient

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