A LOOK INSIDE
DIABETIC
EYE DISEASE

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FINANCIAL
DISCLOSURES

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“...I think diabetes is affecting my eyesight. I have trouble seeing the consequences of poor food choices.”
DIABETES MELLITUS

**TYPE 1**
- autoimmune disorder
- body attacks pancreas with antibodies
- pancreas doesn’t make insulin
- often begins in childhood
- may cause diabetic retinopathy and nephropathy

**TYPE 2**
- most common type
- pancreas produces some insulin
- either not enough insulin or body is resistant to it
- people who are obese are at high risk
- no cure, but can be managed with diet, exercise, and medications
- may cause diabetic retinopathy and nephropathy

DIABETIC EYE EXAM

1. Why is it important?
   - diagnose problems at an early stage
   - refer for treatment before vision loss
2. Who should do it?
   - optometrist or ophthalmologist can do dilated exam
   - may need referral to retinal specialist
3. How often should it be done?
   - yearly if no sign of effects of diabetes on eyes
   - more often (1-6 months) if retinopathy
4. What happens after exam?
   - referral made if necessary
   - report sent to PCP
WHAT IS “DIABETIC EYE DISEASE”?  
Group of conditions affecting people with diabetes:

1) Diabetic Retinopathy – affects blood vessels in the retina; most common cause of vision loss among diabetics
2) Diabetic Macular Edema (DME) – swelling in center of retina (macula); consequence of diabetic retinopathy
3) Cataract – clouding of lens of the eye; diabetics develop cataracts at a younger age
4) Glaucoma – affects the optic nerve leading to the brain; diabetics are at almost a double risk

SYMPTOMS OF DIABETIC EYE DISEASE

1. Vision fluctuations, especially with blood sugar changes
2. Decreased vision
3. Cloudy vision
4. Double vision
5. Dark spots (floaters)
WHY DOES DIABETES CAUSE VISION FLUCTUATIONS?

It’s all about the lens!

DIABETIC RETINOPATHY

- over time, diabetes damages blood vessels in the retina
- occurs when tiny blood vessels leak blood and other fluids
- retinal tissue swells
- usually affects both eyes
- symptoms include seeing spots, blurred vision, dark or empty spot in vision, night difficulties
- many people have no symptoms early on
- lens of eye can also take up fluid causing fluctuations in vision and prescription

NORMAL RETINA VS. DIABETIC RETINOPATHY
NON-PROLIFERATIVE DIABETIC RETINOPATHY

- **Mild**: presence of at least one microaneurysm
- **Moderate**: dot-blot hemorrhages, microaneurysms, and hard exudates
- **Severe**: dot-blot hemorrhages and microaneurysms in 4 quadrants of the retina, venous beading in at least 2 quadrants and intraretinal microvascular abnormalities in at least 1 quadrant

NON-PROLIFERATIVE DIABETIC RETINOPATHY

- Neovascularization – HALLMARK SIGN!
- Pre-retinal hemorrhages – between the retina and the posterior hyaloid space, may appear boat shaped
- Vitreous hemorrhage
- Fibrovascular tissue proliferation
- Traction retinal detachments
- Macular edema
FIBROVASCULAR TISSUE PROLIFERATION

TRACTION RETINAL DETACHMENTS

DIABETIC MACULAR EDEMA
DIAGNOSING DIABETIC RETINOPATHY

- Dilated Fundus Exam
- Fluorescein Angiography – fluorescent dye injected into the bloodstream to highlight blood vessels so they can be photographed
- Optical Coherence Tomography (OCT) – determines thickness of retina for presence of swelling and vitreomacular traction
- B-scan ultrasonography – helpful in vitreous hemorrhage
- Lab testing – including fasting glucose and hemoglobin A1c

FLUORESCEIN ANGIOGRAPHY

FLUORESCEIN ANGIOGRAPHY
B-SCAN SHOWING RETINAL DETACHMENT

CATARACT

- Clouding of the eye's natural lens, which lies behind the iris and the pupil
- Most common cause of vision loss in people over the age of 40 and principal cause of blindness in the world
- Often happen at a younger age in diabetics than in non-diabetics
- Easily surgically repaired

TYPES OF CATARACTS

1. Posterior subcapsular cataract:
   - occur at the back of the lens
   - diabetics and those on steroid medications have a higher risk of this type
2. Nuclear cataract:
   - forms deep in the center(nucleus) of the lens
   - mostly associated with aging
3. Cortical cataract:
   - white, wedge-like opacities start in the periphery of the lens and work to the center in a spoke fashion
   - occur in the cortex of the lens, surrounding the nucleus
POSTERIOR SUBCAPSULAR CATARACT

NUCLEAR CATARACT

CORTICAL CATARACT
SYMPTOMS OF CATARACTS

- Blurred vision
- Sensitivity to light
- Glare from headlights or street lights at night
- Haloes around lights at night
- Occasionally patients will have "second sight": improvement in vision due to shift in prescription
- Dulling of colors (may not be noticeable until after surgery)
- Decreased ability to read fine print
- Decreased driving vision

GLAUCOMA

- Fluid builds up in the front part of your eye, causing pressure to increase and damage to the optic nerve in the back of the eye
- Most common type is primary open angle glaucoma
- Progressive, painless disease that causes no vision loss at first
- Eventually, if glaucoma is left untreated, peripheral vision will be lost (visual field loss)
- Blindness can be prevented with early intervention and treatment
OPTIC NERVE CHANGES IN GLAUCOMA

VISUAL FIELD CHANGES IN GLAUCOMA

MANAGEMENT OF DIABETIC EYE DISEASE

Glucose Control

- Lowering of glucose decreases the incidence and progression of diabetic retinopathy
- Important to track glucose control with fasting glucose levels, along with hemoglobin A1C (average blood glucose level over the past 3 months)
- Communication of lab and exam results between the primary care provider and the eye care provider is very important to the overall diabetic care of the patient
MANAGEMENT OF DIABETIC EYE DISEASE: DIABETIC RETINOPATHY/MACULAR EDEMA

Pharmacologic Therapy
1. Kenalog (triamcinolone) injection
   - for macular edema
2. Avastin (bevacizumab) injection
   - cancer medication used off-label
3. Lucentis (ranibizumab) injection
4. Eyelea (aflibercept) injection

**Avastin, Lucentis, and Eyelea all are anti-VEGF (vascular endothelial growth factor) therapies which prohibit new vessel growth**

MANAGEMENT OF DIABETIC EYE DISEASE: DIABETIC RETINOPATHY

Laser photocoagulation
- Focal/Grid Laser
  - used to treat macular edema in non-proliferative diabetic retinopathy
  - leaves behind a visible scar and can cause visual field loss
- Panretinal Photocoagulation (PRP)
  - used in the treatment of proliferative diabetic retinopathy
  - laser burns over entire retina, sparing macula
- Newer, more selective, lasers show promise of treatment without side effects of current treatments

PANRETINAL PHOTOCOAGULATION (PRP)
MANAGEMENT OF DIABETIC EYE DISEASE: DIABETIC RETINOPATHY

**Vitrectomy**

- removing vitreous humor of the eye
- temporarily replace vitreous with a mixture of gas/air, which will slowly reabsorb and be replaced by clear aqueous fluid
- often used in cases of vitreous hemorrhage or retinal detachment

MANAGEMENT OF DIABETIC EYE DISEASE: CATARACT SURGERY

- done on outpatient basis in ambulatory surgery center
- one eye done at a time
- hollow tip is inserted in small incision in the eye (phacoemulsification)
- ultrasonic energy flows through the tip to break up the lens, which is then suctioned up through same tip
- folded intraocular lens is inserted through the same incision and opened up in the cavity where your original lens was located
- wound heals itself, stitches rarely needed
- eyedrops needed for about a month after
- prescription can be altered as desired with lens choice
MANAGEMENT OF DIABETIC EYE DISEASE: GLAUCOMA

- Drops are most common way to control pressure and prevent vision loss
- A small number of patients may need laser procedures or filtering surgery to help control the eye pressure
- Glaucoma is a chronic disease, therefore treatment is ongoing
- Patients are generally seen every 3-6 months
- Intraocular pressure readings, dilated fundus exams, visual field testing and optical coherence tomography (imaging) are all used to determine if the disease is progressing

GLAUCOMA DROPS
CASE 1: R.S.

- 45 y.o. WM presents for routine eye exam 01/2007
- complains of blurred distance vision and headaches when he reads
- last physical exam was in July of 2006
- reports good overall health, with the exception of sleep apnea for which he uses a Cpap machine
- new glasses prescription improves vision to 20/20 in each eye
- all other external exam elements were fine
- dilated exam reveals:

![Image of dilated eye exam](image-url)
CASE 1: R.S. (CONTINUED)

“So…now what do we do?”

Refer to primary care doctor!

CASE 1: R.S. (CONTINUED)

- patient returned to me 2 months later
- saw primary care doc who said all lab results were normal
- majority of the microaneurysms had resolved
- six months later, retina was within normal limits
- no follow-up for 18 months – at that time patient tells me he has been told his blood sugar is now borderline
- two years later, in 2011, patient finally is on medication for diabetes and has his blood sugar under good control
- continues to be seen yearly for dilated exams with no signs of diabetic retinopathy
- highlights need for yearly exams and cooperative care between eye doctor and primary care doctor

CASE 2: J.B.

- 40 y.o. WM first presented in March of 2006
- diagnosed with Type 2 DM in January, diet-controlled
- stopped taking blood sugar readings in 2007
- finally put on oral medications in 2009
- continued to have uncontrolled blood sugar and was put on insulin in 2011
- no signs of diabetic retinopathy for many years
- finally in July of 2016 he reports “sugar crashes” and stopped insulin
- in September of 2017 he reports that he stopped ALL of his medications and stopped seeing both his primary care doctor and his endocrinologist one year prior
- dilated exam looks like this:
CASE 2: J.B.(CONTINUED)

This is a tougher one!

Re-establish with endocrinology and primary care doctor!

I will see patient back in three months
the most important thing in this case is to re-establish good blood sugar control
hopefully the diabetic retinopathy will resolve, however this is a patient on the edge
if the diabetic retinopathy increases or threatens vision, this patient will need a referral to retina
patient is at risk for earlier cataracts
**LEGAL BLINDNESS**

**Legal Blindness:**
- Best corrected central visual acuity in the better seeing eye is 20/200 and/or a visual field of 20 degree or less
- Patients may qualify for Social Security Disability Insurance (SSDI) and/or Supplemental Security Income (SSI)
- Federal taxpayers are allowed an additional deduction on top of the standard deduction
- State agencies exist to help with work training, independent living, and rehab services

**LOW VISION AIDS**

<table>
<thead>
<tr>
<th>OPTICAL</th>
<th>NON-OPTICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand held magnifiers</td>
<td>Lamps</td>
</tr>
<tr>
<td>Stand magnifiers</td>
<td>Talking devices, including glucose monitors</td>
</tr>
<tr>
<td>Magnifying reading glasses</td>
<td>Audio/large print books</td>
</tr>
<tr>
<td>Telescopes</td>
<td>Bump/Colored labels</td>
</tr>
<tr>
<td>Closed circuit televisions</td>
<td>Writing/check guides</td>
</tr>
<tr>
<td>Hand held electronic magnifying devices</td>
<td>Bold markers</td>
</tr>
<tr>
<td>Screen magnifiers</td>
<td>Tactile writing paper</td>
</tr>
<tr>
<td>Mobility canes/aids</td>
<td></td>
</tr>
</tbody>
</table>

**MAGNIFIERS AND TELESCOPES**
ELECTRONIC MAGNIFYING DEVICE

CLOSED CIRCUIT TELEVISION

TALKING GLUCOSE METER
WHITE MOBILITY CANE

STATE OF WISCONSIN AGENCIES FOR THE BLIND
Office for the Blind and Visually Impaired
- help individuals achieve goals of independent living
- home visits to teach orientation and mobility, home management, personal care, and communications
Division of Vocational Rehabilitation (DVR)
- Federal/State program designed to obtain, maintain, and improve employment for people with disabilities
Blind Rehabilitation Center of the Hines VA Hospital
- helps blinded veterans acquire skills necessary to develop personal independence and emotional stability
Wisconsin Center for the Blind and Visually Impaired
- provides statewide services for blind and visually impaired students as part of the DPI

GUIDE DOGS
The Occupaws Guide Dog Assn
www.occupaws.org
(Madison, WI)
Leader Dogs for the Blind
www.leaderdog.org
(Rochester Hills, MI)
REFERENCES

11. NIH, National Eye Institute: Facts About Diabetic Eye Disease