

TOPIC: Beyond Retinopathy: Destructive Effects of Diabetes Mellitus.

DESCRIPTION : Be familiar with the current demographic on Diabetes Mellitus (DM). A brief update of what is all involved when providing eyecare for a patient with diabetes. This course will explore the other ocular side effects of diabetes other than Diabetic Retinopathy. What to look for, how to treat it or when to refer. Be better equipped to help your patients.

Hours : 2

COPE :

- Learning Objectives:
- 1) Understand the demographics of DM and what is involved when you see a patient with DM.
  - 2) Understand that Diabetes have other ocular side effects than diabetic Retinopathy.
  - 3) Be able to diagnose and manage these conditions.
  - 4) When to refer and when to monitor.
  - 5) Be familiar with lab tests and drugs use for treatment.
  - 6) Educate patients and emphasize the need for follow-up care.
  - 7) Be familiar with billing.

### **Demographics of Diabetes Mellitus**

Diabetes affects 30.3 million people of all ages, 9.3 percent of the U.S. population.

More than 100 million Americans are living with diabetes (30.3 million) or prediabetes (84.1 million).

Type 1 diabetes represent 5% and Type 2 represents 90% of patients with DM.

About 1.9 million people ages 20 years or older were newly diagnosed with diabetes in 2010 in the United States

Diabetes is the leading cause of kidney failure, non-traumatic lower-limb amputations, and new cases of blindness among adults in the United States.

Diabetes is a major cause of heart disease and stroke.

Diabetes is the seventh leading cause of death in the United States

### **Complication of Diabetes Mellitus:**

- 1) Heart Disease and Stroke
- 2) Hypertension
- 3) Kidney Disease
- 4) Nervous System Disease
- 5) Amputations
- 6) Dental Disease
- 7) Complications of Pregnancy
- 8) Blindness and Eye Problems**
- 9) Depression**
- 10) Erectile Dysfunction**

### **THE ABCs of diabetes**

- 1) A1C
- 2) Blood Pressure
- 3) Cholesterol
- 4) Smoking

### **Common Medications**

- 1) Metformin
- 2) Byetta
- 3) Actose
- 4) Januvia
- 5) Victoza
- 6) Glipizide
- 7) Glimepiride

- 8) Glyburide
- 9) Lantus
- 10) Levimer
- 11) Novolog
- 12) Humalog

### New Medications:

- **DPP-4 inhibitors** include the oral drugs Januvia, Nesina, Onglyza, and Tradjenta. These protect a natural compound in the body -- GLP-1 -- from breaking down. GLP-1 helps lower blood glucose.
- **Incretin mimetics or GLP analogs** include the injected drugs Byetta, Bydureon, Tanzeum, Trulicity, and Victoza. They use the body's own signaling system to boost insulin after meals.
- **Sodium-glucose co-transporter 2 (SGLT2) inhibitors** work by blocking glucose from being reabsorbed by the kidneys. That raises the amount of glucose urinated, and lowers the amount of glucose in the blood. Currently, Invokana (canaglifozin) is the only drug in this class that's approved by the FDA. More SGLT2 inhibitors are being developed.
- **Other drugs** include Symilin, an injectable synthetic hormone. It helps lower blood sugar after meals in people with diabetes who use insulin.
- **Combination drugs** have made a difference. They join different medications in one pill -- often metformin and a sulfonylurea, a meglitinide, a DPP4 inhibitor, a thiazolidinedione, or a thiazolidinedione in combination with a sulfonylurea. This cuts down the number of pills a person has to take. Combination drugs include Actoplus MET, Avandamet, Duetact, Glucovance, Metaglip, Kazano, Oseni, and PrandiMet. There can be drawbacks. They tend to cost more than generic drugs. They can also make it harder to fine-tune the treatment. "When you have a combination drug, you can't adjust the dose of one drug without adjusting the other too," says Rita Kalyani, MD, assistant professor of medicine at Johns Hopkins University. "There is less room for precision."

### Additional information

- 1) Be familiar with Lab tests
- 2) Insulin pump
- 3) Importance of foot care
- 4) Be familiar with glucometers

## Good Glycemic Control (Lower HbA<sub>1c</sub>) Reduces Incidence of Complications

HbA <sub>1c</sub>	DCCT <sup>1,2</sup> 9→7%	Kumamoto <sup>3</sup> 9→7%	UKPDS <sup>4</sup> 8→7%
<b>Retinopathy</b>	63%	69%	17–21%
<b>Nephropathy</b>	54%	70%	24–33%
<b>Neuropathy</b>	60%	—	—
<b>Macrovascular Disease</b>	41%*	—	16%*

\*Not statistically significant.

<sup>1</sup>DCCT Research Group. *N Engl J Med*. 1993;329:977–986.

<sup>2</sup>DCCT Research Group. *Diabetes*. 1995;44:968–983.

<sup>3</sup>Ohkubo Y, et al. *Diabetes Res Clin Pract*. 1995;28:103–117.

<sup>4</sup>UK Prospective Diabetes Study Group (UKPDS) 33. *Lancet*. 1998;352:837–853.

### OTHER EYE SIDE EFFECTS

#### (A) Cataracts:

Prevalence of posterior subcapsular vs cortical vs nuclear

What cause cataracts to form

Surgical options

Complications from surgery

#### (B) Anterior ischemic optic neuropathy:

25% of patients with AION have a history of diabetes

The contra-lateral eye of patients with AION is typically small in diameter with a small or absent cup, referred to as a “disc at risk”

Good recovery of vision was observed in 43% of patients in the Ischemic Optic Neuropathy Decompression Trial

There are no proven treatments for AION, and the Ischemic Optic Neuropathy Decompression Trial revealed no benefit of optic nerve decompression surgery.

(C) Diabetic papillopathy

Diabetic papillopathy is an uncommon optic nerve condition characterized by acute disc edema and mild vision loss

The significance of this condition is two-fold (1) it may be misdiagnosed as papilledema and (2) maybe be mistaken as neovascularization in the optic disc as part of proliferative diabetic retinopathy, leading to unnecessary laser photocoagulation.

(D) Ocular movement disorders

EOM disorder may occur in patients with diabetes, secondary to diabetic neuropathy, involving the third, fourth and sixth cranial nerve.

(E) Visual function

Reduced VA

Refractive changes

Accommodative changes

Visual field defects

(F) Conjunctiva

Conjunctival microaneurysm

Bitot’s spot

(G) Cornea

Tear film deficiency

Reduced corneal sensitivity

Basement membrane abnormality

Endothelial cell change leading to increase corneal thickness

(H) Orbit

Higher risk for fungal and bacterial infection

Clinical signs of mucormycosis include ophthalmoplegia, loss of vision, pain and proptosis.

(I) Iris

Depigmentation

Neovascular glaucoma

Rubiosis iridis

(J) Vitreous

Hemorrhage in proliferative retinopathy

(k) Tear Film

Dry eyes more prevalent in diabetics vs non-diabetics

Tear instability

Reduce TBUT

Reduce tear secretion

**OCULAR CONDITIONS FOR WHICH DIABETES IS A KNOWN RISK FACTOR**

(1) Glaucoma

Primary Open Angle

Neo-vascular glaucoma

## (2) Ocular ischemic syndrome (OIS)

(OIS) is an uncommon vascular problem that results from chronic hypoperfusion of the eye, most commonly caused by ipsilateral internal carotid or ophthalmic artery occlusion

Patient with OIS usually present with vision loss and a dull ocular pain

Diabetes is a major risk factor for carotid artery stenosis and plaque formation, the underlying cause of OIS

Although carotid endarterectomy lowers the risk of stroke in patients with symptomatic carotid stenosis, it is unclear whether this procedure alters vision prognosis in eyes with OIS.

## **OCULAR CONDITIONS WHERE DIABETES IS A POSSIBLE RISK FACTOR**

- (1) Retinal vein occlusion
- (2) Retinal artery occlusion
- (3) Retinal arteriole embolism

## **CONDITIONS MASQUERADING AS DIABETIC RETINOPATHY**

- (1) Age-related macular degeneration
- (2) Hypertensive retinopathy
- (3) Radiation retinopathy
- (4) Radiation retinopathy

**CONCLUSION:**

Diabetes is not only HbA1C and glucose levels

Be familiar with the condition, treatment options etc

Be a source of info for your patients

Keep up to date with the constant changes in Diabetes