

Oculosystemic Diseases and the Drugs that Treat Them

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Course Goal

To provide clinically relevant information about systemic conditions and the drugs used to treat them.

Course Objectives

At the conclusion of this course, the attendee should be able to:

1. Describe relevant functional anatomy as pertains to common systemic conditions.
2. Explain methods to detect and treat/manage obesity, hypertension, and diabetes.
3. Detail the pharmacokinetics, pharmacodynamics, and ocular and systemic side effects of various oral medications for oculosystemic diseases.
4. Identify and manage ocular complications of sarcoidosis and be familiar with its pharmacotherapies.
5. Detect ophthalmic features of GCA, carotid occlusive disease, SLE, and rheumatoid arthritis.
6. Be familiar with management and treatment for all of these conditions.

Course Description

The eye is an extension of the brain. We perform dilated funduscopy to not only assess the integrity of the eye's posterior segment, but also to detect telltale signs of systemic disease. In this course, scenarios are presented that illustrate ocular complications of a variety of systemic diseases, as well as profile the drug therapies used in their treatment.

Course Outline

Public Health Challenges and Epidemics

Smoking

Obesity

Types 1 and 2 Diabetes

- Children and adolescents
- Adults
- Diabetes in diverse populations

Medications

- Metformin (Fortamet, Glumetza, others)

Action

- Limit the liver's ability to release sugar
- Improve cells' sensitivity to insulin

Advantages

- Very effective
- May lead to minor weight loss
- Low cost

Possible side effects

- Nausea
- Stomach pain
- Diarrhea
- Very rarely, the harmful buildup of lactic acid — a condition called lactic acidosis —in people with kidney failure or liver failure

Incretin mimetic (GLP-1 receptor agonists)

Medications

- Dulaglutide (Trulicity)
- Exenatide (Byetta, Bydureon Bcise)
- Liraglutide (Saxenda, Victoza)
- Lixisenatide (Adlyxin)
- Semaglutide (Ozempic, Rybelsus, Wegovy)

Action

- Cause the release of insulin as blood sugar levels are rising
- May be used with metformin, basal insulin or a sulfonylurea

Advantages

- May decrease hunger
- May lead to weight loss

Possible side effects

- Nausea
- Vomiting
- Diarrhea
- Abdominal pain
- Increased risk of inflamed pancreas — a condition called pancreatitis

Connective Tissue and Dermatologic Disorders

- Ankylosing Spondylitis
- Sjogren Syndrome
- Pseudoxanthoma elasticum
- Ehlers Danlos syndrome
- Paget's Disease
- Rosacea
- HLA B-27 associated conditions

Endocrine Disorders

- Graves' Disease
- Diabetes Mellitus and the Metabolic Syndrome
 - Some important systemic effects of diabetes that affect **retinopathy** and increase the risk of Heart Attack
 - **Proteinuria**
 - First sign of renal disease
 - As nephropathy increases...the glomerular filtration rate falls
 - American Diabetes Association (ADA) recommends
 - yearly urinalysis
 - Random Spot Urine or 24-hour collection
 - **Normal <30**
 - **Microalbuminuria 30 mg – 299 mg, Albuminuria > 300 mg**
 - **Anemia**
 - Gets more severe as renal disease worsens

- Kidney production of “**Erythropoietin**” decrease, which means that less reaches the bone marrow and less red blood cells are made
 - Measured by Hematocrit (HCT) and hemoglobin levels in a CBC
 - If hemoglobin levels are less than 11g/dl = **anemia**
 - **Anemia** may actually be making the retinopathy worse!!!
 - Treat the patient with **Procrit** if patient is not on dialysis
 - Iron supplementation
 - Kidney Erythropoietin Bone Marrow RBC’s
- **Hyperlipidemia**
 - Cholesterol and triglyceride healthy levels should be < 200 mg/dl
 - PCP should consider Lipitor if cholesterol high
- **Hypertension**
 - Target blood pressure for diabetics with nephropathy is 130 /80
 - ACE inhibitors should be given if blood pressure is high
 - ACE inhibitors are both renal-protective and anti-proteinuric
- **Hyperglycemia**
 - Induces vasoconstriction = kidney (glomerular) damage
 - The Hemoglobin A1C should be as close to 7 % as possible

Hematologic and Cardiovascular Disorders

- Giant Cell Arteritis
 - Acute painless vision loss (VA loss is usually permanent)
 - Pale swelling of the optic nerve head with flame shaped hemes
 - Central retinal artery occlusion may occur
 - Cranial nerve palsy (CN 3,4,6) may also be present, CWS
 - Possible association with “**Polymyalgia Rheumatica**” (PMR)
 - Stiffness in the neck, shoulder, and hip
 - 50 % of Giant Cell patients have PMR
 - Is there a link between GCA and PMR?
- Hypertension
 - Malignant HTH: Blood Pressure > **200/120**
 - Disc edema with or without exudate
 - Arterio-venous crossing changes
 - Nerve fiber layer infarcts (cotton wool spots)
 - Macular edema
 - Hard exudates / flame shaped hemes
 - Choroidal ischemia
- Leukemias
- Carotid Occlusive Disease
 - Ocular Ischemic Syndrome
 - **Hypoperfusion Retinopathy / Ocular Ischemic Syndrome:**
 - Usually unilateral but may be bilateral in 20% of cases
 - Males > Females by a 2 to 1 ratio
 - Dot and blot hemes / microaneurysms found only in the mid-peripheral retina = Hypoperfusion Retinopathy

- When the above is associated with neovascularization of the Disc,
 - Retina, Iris or Angle = Ocular Ischemic Syndrome
 - **Pathogenesis: Ocular Ischemic Syndrome:**
 - Atheromatous ulceration and stenosis at the bifurcation of the
 - common carotid artery (90% occlusion has to be present)
 - **Symptoms: Ocular Ischemic Syndrome:**
 - Ocular and periorbital pain in **40%** of cases = “**Ocular Angina**”
 - Prolonged recovery of vision following exposure to bright light-
 - known as “**Light Induced Amaurosis**”
 - Amaurosis Fugax (Transient Monocular Blindness) in 5% of cases
 - Transient Ischemic Attacks (TIA)
 - Vision Loss (90%) – Short Posterior Ciliary Arterial hypoperfusion
 - **Ocular Signs: Ocular Ischemic Syndrome:**
 - Dilated but not tortuous retinal veins
 - Retinal Hemorrhages in mid-peripheral retina (80%) of patients
 - Cotton Wool Spots (5%)
 - Neovascularization of the Disc (35%)
 - Neovascularization of the Retina (8%)
 - Rubeosis iridis (65%)
 - Uveitis – mild anterior (20%)
 - Emboli (retinal)
 - Lower IOP - initially
 - **Work Up:**
 - Carotid artery evaluation (Carotid – Duplex Scanning)
 - Possible MRA (Magnetic Resonance Angiography)
 - Cardiology work up (Echocardiogram) – Transesophageal
 - Lipid Panel
 - **Treatment:**
 - Consider carotid surgery if warranted (Endarterectomy)
 - Therapeutic approach – Aspirin (325 mg QD or BID)
 - Panretinal photocoagulation (PRP) if neovascularization
 - Stop smoking
 - **Important Note:**
 - Leading cause of death = **Ischemic heart disease**
 - Second leading cause of death = **Stroke**
- Sickle Cell Disease
 - Types
 - SC Retinopathy

Inflammatory Conditions

- Rheumatoid Arthritis
 - Keratitis sicca
 - Scleritis/episcleritis
 - Uveitis
- Systemic Lupus
 - In SLE and other autoimmune diseases, the immune system's recognition apparatus breaks down—specifically, misguided T cells and autoantibodies contribute to the development of these conditions.
 - They begin to destroy healthy cells and tissues, leaving the body unable to perform vital functions and making it vulnerable to attack from actual pathogens.
 - The course of SLE may be unpredictable, with periods of exacerbation and remission.
- Sarcoidosis
 - Sarcoidosis (also called sarcoid) is a granulomatous disease that can affect virtually every body system, especially respiratory and lymphatic systems
 - A granulomatous condition is characterized by an organized collection of:
 - Macrophages.

Infectious Disease

- Syphilis
- Herpes (HSV / HZV)
- Bartonella (Cat scratch)

Other Misc Disorders

- Interferon Retinopathy
- Radiation Retinopathy
- IHH