

Hormones and the Eye

1 hour

Pamela Theriot, OD, FAAO

Description

Hormonal changes influence ocular health throughout every stage of life. They affect the tear film, ocular surface, lens, retina, and optic nerve. This course explores the role of sex hormones in maintaining ocular surface homeostasis and examines how endocrine disorders such as diabetes and thyroid disease contribute to ocular complications. Participants will also review emerging evidence on circadian biology, GLP-1 therapies, and the hormonal influences involved in ocular surface disease, cataracts, glaucoma, and macular degeneration.

Learning Objectives

- Explain how estrogen, progesterone, and androgens influence the lacrimal functional unit, meibomian glands, tear film stability, and ocular surface inflammation.
- Describe the ocular manifestations of endocrine disorders such as thyroid disease and diabetes, including the impact of systemic treatments such as GLP-1 receptor agonists on ocular health.
- Discuss the relationship between hormones, circadian biology, and age-related ocular diseases including cataracts, glaucoma, and age-related macular degeneration.

Outline

I. Introduction: Why Hormones Matter in Eye Care

A. Epidemiology of Hormone-Related Ocular Disease

- Increased prevalence of dry eye disease in women
- Age-related changes in ocular surface health
- Hormone receptors throughout ocular tissues

B. Clinical Relevance

- Importance of endocrine history in optometric practice
- Interactions between hormones, inflammation, neural regulation, and glandular function

- Impact on diagnosis and treatment planning

II. Hormone Physiology and Ocular Surface Homeostasis

A. Sex Hormones and Ocular Tissues

- Estrogen receptors in ocular tissues
- Progesterone receptor activity
- Androgen regulation of meibomian and lacrimal glands

B. Additional Hormonal Influences

- Dehydroepiandrosterone (DHEA)
- Melatonin
- Serotonin

C. The Lacrimal Functional Unit

- Tear production
- Meibum secretion
- Goblet cell support
- Neural regulation of blink and tear homeostasis

D. Key Evidence Review

- Androgen deficiency and ocular surface disease
- Complex and sometimes conflicting estrogen effects

III. Ocular Surface Disease Across Female Life Stages

A. Hormonal Contraception

- Effects on tear film stability
- Contact lens intolerance
- Ocular surface symptom development

B. Pregnancy

- Physiologic hormonal changes
- Tear film alterations
- Meibomian gland effects
- Clinical management considerations

C. Postpartum Period

- Recovery of ocular physiology
- Sleep deprivation and ocular symptoms
- Refractive fluctuations
- Lactation-associated changes

D. Perimenopause

- Hormonal fluctuations and symptom progression
- Early recognition of ocular surface changes
- Quality-of-life implications

E. Menopause

- Changes in estrogen and androgen levels
- Increased prevalence of dry eye disease
- Meibomian gland dysfunction
- Ocular surface inflammation

F. Clinical Case Comparisons

- Similar symptoms across differing endocrine environments
- Tailoring management based on hormonal context

IV. Exogenous Hormones and Androgen Biology

A. Hormone Replacement Therapy

Estrogen Alone vs Estrogen Plus Progesterone

- Review of observational studies
- Meta-analysis findings
- Conflicting evidence regarding dry eye risk
- Clinical interpretation of current literature

Clinical Considerations

- Route of administration
- Timing of therapy
- Individualized patient counseling

B. Testosterone and Meibomian Gland Function

Mechanisms of Action

- Regulation of lipid secretion
- Maintenance of gland health
- Anti-inflammatory effects

Current Clinical Evidence

- Androgen deficiency and MGD
- Emerging therapeutic applications
- Topical testosterone studies
- Future directions in hormone-based dry eye treatment

V. Circadian Biology, Mood, and Ocular Surface Disease

A. Estrogen and Mood

- Anxiety and depression during hormonal transitions
- Relationship to symptom perception

B. Circadian Regulation

- Melatonin physiology
- Serotonin pathways
- Blue light exposure and circadian disruption

C. Clinical Impact

- Sleep quality and ocular discomfort
- Pain amplification
- Screen use and digital eye strain
- Practical patient counseling recommendations

VI. Diabetes and Ocular Surface Disease

A. Diabetic Ocular Surface Disease

- Hyperglycemia-induced changes
- Corneal neuropathy
- Tear film instability
- Delayed wound healing

B. Diabetic Keratopathy

- Epidemiology
- Clinical findings
- Corneal sensitivity changes
- Recurrent epithelial defects

C. Connecting Anterior and Posterior Segment Disease

- Diabetic retinopathy
- Shared mechanisms:
 - Microvascular damage
 - Chronic inflammation
 - Neuropathy

- o Metabolic dysfunction

VII. Thyroid Eye Disease and the Ocular Surface

A. Mechanisms of Ocular Surface Dysfunction

- Exposure-related disease
- Inflammatory changes
- Lacrimal gland involvement
- Meibomian gland dysfunction

B. Clinical Manifestations

- Dry eye symptoms
- Tear film instability
- Corneal staining
- Incomplete blink

C. Clinical Pearls

- Antibody-mediated inflammation
- Distinguishing thyroid dysfunction from thyroid eye disease

VIII. Hormones, AMD, and Glaucoma

A. Age-Related Macular Degeneration

- Proposed role of estrogen
- Evidence from epidemiologic studies
- Current limitations in the literature

B. Glaucoma

- Estrogen and intraocular pressure regulation
- Estrogen and neuroprotection
- Testosterone and glaucoma risk

- Clinical implications for risk assessment

IX. Summary and Question & Answer Session

Key Take-Home Messages

- Hormones influence ocular health throughout life.
- Ocular surface disease frequently reflects underlying endocrine changes.
- Diabetes, thyroid disease, sleep disruption, and sex hormone alterations significantly impact ocular function.
- Hormonal history should be incorporated into comprehensive ocular disease evaluations.
- Emerging evidence suggests hormonal influences extend beyond the ocular surface to glaucoma and retinal disease.