Vascular Pigmented Layer

- The uveal tract composed of the second (the vascular) coat of the globe which consists, from back to front, of the choroids, the ciliary body, and the iris.

Iris

- The iris is a thin, contractile, pigmented diaphragm with a central aperture (the pupil), between the cornea and the lens, dividing this space to an anterior chamber (A.C) and posterior chamber (P.C.)
- The periphery of the iris is attached to the anterior surface of the ciliary body (called the root of the iris).
- The pupil is surrounded by the pupillary margin. The iris is thickest about 2mm from the pupillary margin and thinnest at the ciliary margin.
- The anterior surface of the lens is convex and presses lightly against the iris, causing it to bulge anteriorly.
- The pupil varies in diameter from 1 to 8mm, and in about 25% of normal subjects the pupils differ slightly in size on the 2 sides.
- The aqueous humor, formed by the ciliary processes in PC, circulate through the pupil into AC and finally exits into the sinus venosus sclerae at the iridocorneal angle.
- The blue iris has less pigment in the melanocytes compared with the brown iris. The color results from the absorption of light, with long wavelengths and the reflection of the shorter blue waves that are seen by the observer
- Structure of the iris
  - Microscopically, the iris consists of two layers:
    - The stroma, situated anteriorly and derived from mesenchyme
    - Two epithelial layers located posteriorly and derived from the neural ectoderm.
  - The sphincter pupillae muscle is located in the pupillary zone of the iris. It forms a ring of smooth muscle fibers around the pupil, measuring about 1mm wide.
  - When the sphincter pupillae contracts, the pupil constricts.
  - Dilater pupille muscle: sympathetic suplying smooth

Ciliary body

- The ciliary body is continuous posteriorly with the choroid and anteriorly with the peripheral margin of the iris. Considered as a whole, the ciliary body is a complete ring that runs around the inside of the anterior sclera. It measures about 6 mm wide (6.5 mm on the temporal side and 5.5 mm on the nasal side) and extends forward to the scleral spur and backward to the ora serrata of the retina.

Choroid

- Is a thin, soft, brown coat lining the inner surface of the sclera. It is extremely vascular. The choroid extends from the optic nerve posteriorly to the ciliary body anteriorly. It is thickest at the posterior pole (about 0.22 mm) and gradually thins anteriorly (about 0.1mm).
- Its inner surface is smooth and firmly attached to the pigmented layer of the retina; its outer surface is roughened. It is firmly attached to the sclera in the region of the optic nerve and where the posterior ciliary arteries and ciliary nerves enter the eye. It is also tethered to sclera where vortex veins leave the eyeball.
- Structure of the choroid may be divided into three layers:
  - The vessel layer, The capillary layer, Bruch’s membrane

Function of the choroids

- Its principal function is to nourish with its blood vessels the outer layers of the retina. It also serves to conduct many blood vessels forward to the anterior regions of the eye.
Uveitis

Is inflammation of iris, ciliary body and choroid. Anterior uveitis is iridocyclitis, posterior uveitis is choroiditis. The known causes of uveitis may be classified as follows:

A. Exogenous Infections.
B. Endogenous Infections. These include:
   • Bacterial infections, e.g. tuberculosis, streptococcal infection, gonorrhea or syphilis.
   • Viral infections, e.g. mumps, smallpox, influenza or herpes.
   • Parasitic Infestations, e.g. toxoplasmosis and toxocara.
C. Uveitis 2ndary to an Ocular Pathology
   • **Uveitis of an Infective Nature:** This caused by direct spread of infection from an ocular inflammation, (suppurative keratitis or from a peri-ocular inflammation, e.g. orbital cellulitis.
   • **Uveitis of a Toxic Nature:** This is due to the presence of unusual ocular products in the eye as in: Intra-ocular neoplasm, Intra-ocular hemorrhage, Long-standing retinal detachment, Dislocated or subluxated lens.
   • **Uveitis of an Allergic Nature:** The uveal tract is often target for immunologic reactions, e.g.: Sympathetic ophthalmitis, Endophthalmitis, phaco-anaphylactic uveitis.
D. Uveitis Due to Bacterial Allergy. The two most classic examples are:
   • Minute tuberculous focus of infection in the lung or a lymph node.
   • Streptococcal focal infection commonly lodged in the teeth sinuses, tonsils or prostate.
E. Uveitis Complicating General Diseases. The following are common examples:
   • Ankylosing spondylitis.
   • Sarcoidosis.
   • Behcet's disease
   • Vogt-Koyanagi syndrome.

A. ACUTE IRIDOCYCLITIS

**Symptoms**

- Pain: The pain is due to toxic irritation of the sensory nerve ending in the iris and to spasm of the sphincter pupillae muscle.
- Photophobia
- Lacrimation: Reflex lacrimation occurs as a result of irritation of the sensory nerve endings in the iris.
- Blepharospasm: This is the result of photophobia and lacrimation.
- Mistness of Vision: This is due to the presence of inflammatory exudates in the anterior chamber. The plasmoid aqueous which is high in its protein content contribute to the impairment of vision.

**Signs**

The clinical signs of anterior uveitis vary considerable and depend on the type and acuteness of the inflammatory process and the uveal region preferentially affected. Signs of Iritis. The essential features of acute iritis include:

1. Hyperaemia and Circumcorneal Ciliary Injection.
2. Flare due to Exudation in the Anterior Chamber.
3. Blurring and Indistinctness of the Iris Pattern, leading to the appearance of a muddy iris
4. Constricted, Irregular and Sluggishly Reacting Pupil. (a) Mechanical contraction caused by hyperaemia of the radially disposed iris vessels and oedema of the iris. (b) Irritation of the iris by toxic products causing contraction of its plain muscle fibres.
Cyclitis

- Keratic Precipitates: The leucocytes circulating in the exudate which comes from the inflamed ciliary body pass through the pupil and adhere to the sticky corneal endothelium.
- Copious Thick Exudate into the Anterior Chamber: This is due to the abundant accumulation of cells in the aqueous and the vitreous.
- Exudation into the Vitreous: Exudates from the inflamed ciliary body pass into the anterior vitreous which becomes hazy due to diffuse dust-like opacities.
- Intra-Ocular Pressure: The tension is usually within normal, but a lowering of the ocular tension may be taken as an indication of long-standing involvement of the ciliary body.

B. CHRONIC IRIDO-CYCLITIS

- Chronic irido-cyclitis is an extremely chronic disease characterized by considerable diminution of vision without obvious cause. It is liable to exacerbations with gradual and insidious formation of posterior synechiae.
- Clinical Features
  - Mild ciliary injection involving the deeper vessels.
  - Tenderness on pressure over the ciliary body region.
  - The presence of exudates and inflammatory cells in the anterior chamber, which become evident as keratic precipitates on the corneal endothelium, and vitreous cavity.
  - Dust-like opacities in the vitreous whose consistency has undergone some liquefaction due to defective nutrition.

Complications of Iridocyclitis

- Formation of Posterior Synechia.
- Peripheral Anterior Synecchiae.
- Rubiosis iridis.
- Paches of Iris Atrophy.
- Secondary Glaucoma.
- Cataract
- Cyclitic Membrane.
- Vitreous Opacities: Dust-like opacities may form in the anterior part of the vitreous.

Diagnosis and Investigation of Uveitis

It is most difficult to make an aetiologic diagnosis of uveitis on clinical grounds because the morphologic features are not characteristic. Important clues regarding the probable diagnosis of uveitis are to be taken from the following clinical and laboratory investigations:

1. The onset and course of the disease.
2. The present and the past ophthalmological and medical histories.
3. The clinical picture of the lesions.
4. General medical examination, particularly the chest and the joints
5. Certain general laboratory investigations

Treatment of Iridocyclitis

1. Treatment of the Cause.
2. Symptomatic Treatment.
   a. Atropine.
   b. Local Steroid Therapy.
c. Local Hot Applications.
d. Subconjunctival Gentamycin: This may be necessary in severe pyogenic cases.
e. An Eye Pad and a Bandage: They keep the lids firmly closed over the eyes and thus provide rest and prevent photophobia.

3. General Treatment.
a. Systemic Steroid Therapy, e.g. prednisolone and adrenocorticotrophic hormone (ACTH).—If the local steroid drops alone are not effective, the treatment is supplemented by a course of systemic steroids to suppress the inflammatory process.
b. Systemic Antibiotics and Chemotherapy: When given alone, they have been found unsuccessful in arresting the process of uveitis, because the disease is an inflammation rather than an infection.
c. Analgesics: Aspirin may be required in some cases.
d. Specific Treatment: This should be directed towards any underlying cause.
e. Bed Rest. — This is valuable in some cases of uveitis but unfortunately this form of therapy is time-consuming and, on economic grounds, it causes anxiety to many patients.

4. Treatment of Complications.
a. Secondary Glaucoma. This is treated as follow:
   i. Carbonic anhydrase inhibitors
   ii. Hydrocortisone & atropine are instilled locally, in order to allay the inflammatory reaction.
   iii. Paracentesis should be performed if the above medical treatment fails to lower the ocular tension. It produces flushing of the eye with fresh aqueous containing a high antibody titre. It may be repeated every 2-3 days.
b. Annular Posterior Synechiae.—A complete iridectomy or laser iridotomy
c. Total Posterior Synechiae with Complicated
d. Cataract.—Removal of the lens is indicated after rupturing the posterior synechiae with an iris repositor.
e. Phthisis Bulbi.—A blind painful eye should be enucleated.

POSTERIOR UVEITIS INFLAMMATIONS OF THE CHOROID

Inflammations of the choroid (Choroiditis) occur in two forms:

- Suppurative Choroiditis. Two types are generally recognized:
  - Endophthalmitis, i.e. inflammation of the internal structures of the eye.
  - Panophthalmitis, i.e. inflammation of all the tissues of the eye.
- Non-Suppurative Choroiditis. This has been classified into:
  - Granulomatous Choroiditis.
  - Non-Granulomatous Choroiditis (Exudative Uveitis).

SUPPURATIVE CHOROIDITIS

- Suppurative choroiditis usually follows the introduction of infecting micro-organisms from outside or via the blood stream leading to endophthalmitis or panophthalmitis.
- Exogenous Causes.—Suppuration may follow:
  1. Perforating wounds of the eye.
  2. Perforating corneal ulcer.
  3. Postoperative infection.
- Endogenous Causes.—Suppuration may follow:
  1. Metastatic infection in pyemia.
  2. Purpural septicaemia.
  3. Cerebrospinal meningitis.
ENDOPHTHALMITIS

- Endophthalmitis is a purulent inflammation of the entire uveal tract, although the adjacent tissues may be secondarily affected.
- Symptoms: The patient usually complains of severe irritation in the eye, though pain is not very marked. Excessive lacrimation, photophobia and marked diminution of vision are very common.
- Signs
  - The eye is severely injected and red.
  - The conjunctiva becomes chemotic.
  - Keratic precipitates on the back of the cornea.
  - The aqueous becomes turbid with many cells circulating through it
- Treatment
  - Intensive local and systemic antibiotic therapy must be given. Local atropine, steroid and application of heat are very useful. It may be necessary to give systemic steroid in an attempt to suppress the inflammatory reaction.
  - Vitrectomy and intraocular injection of antibiotics, e.g. gentamycin may become sight saving therapeutic regimen.
  - When perception of light is lost, enucleation of the eyeball should be considered

PANOPHTHALMITIS

- Panophthalmitis is an intense purulent inflammation of the three coats of the eye. The eyeball is filled with pus, and the entire uveal tract is infiltrated with inflammatory cells, mainly polymorphonuclear leucocytes.
- Symptoms. The symptoms are usually severe and include:
  1. Fever and general febrile symptoms.
  2. Headache and vomiting.
  3. Severe pain in the eye.
- Signs: The main characteristic features of panophthalmitis are:
  - Swelling of the eyelids with intense congestion of the eyeball.
  - A small degree of proptosis.
  - Chemosis of the conjunctiva.
  - Haziness of the cornea.
  - Anterior chamber and vitreous filled with pus.
  - Loss of accurate projection of light, due to retinal detachment.
  - The eyeball may finally perforate or the pus may escape through the anterior ciliary region and eventually the eyeball shrinks.
- Treatment
  - Early use of intensive systemic and local antibiotic therapy may prevent the panophthalmitis. The treatment may be supplemented with systemic steroids to reduce inflammatory reactions.
  - The administration of analgesics to control pain, and the application of local heat to improve the blood flow are usually recommended in severe cases.
  - Loss of light perception is an indication for evisceration of the eyeball.