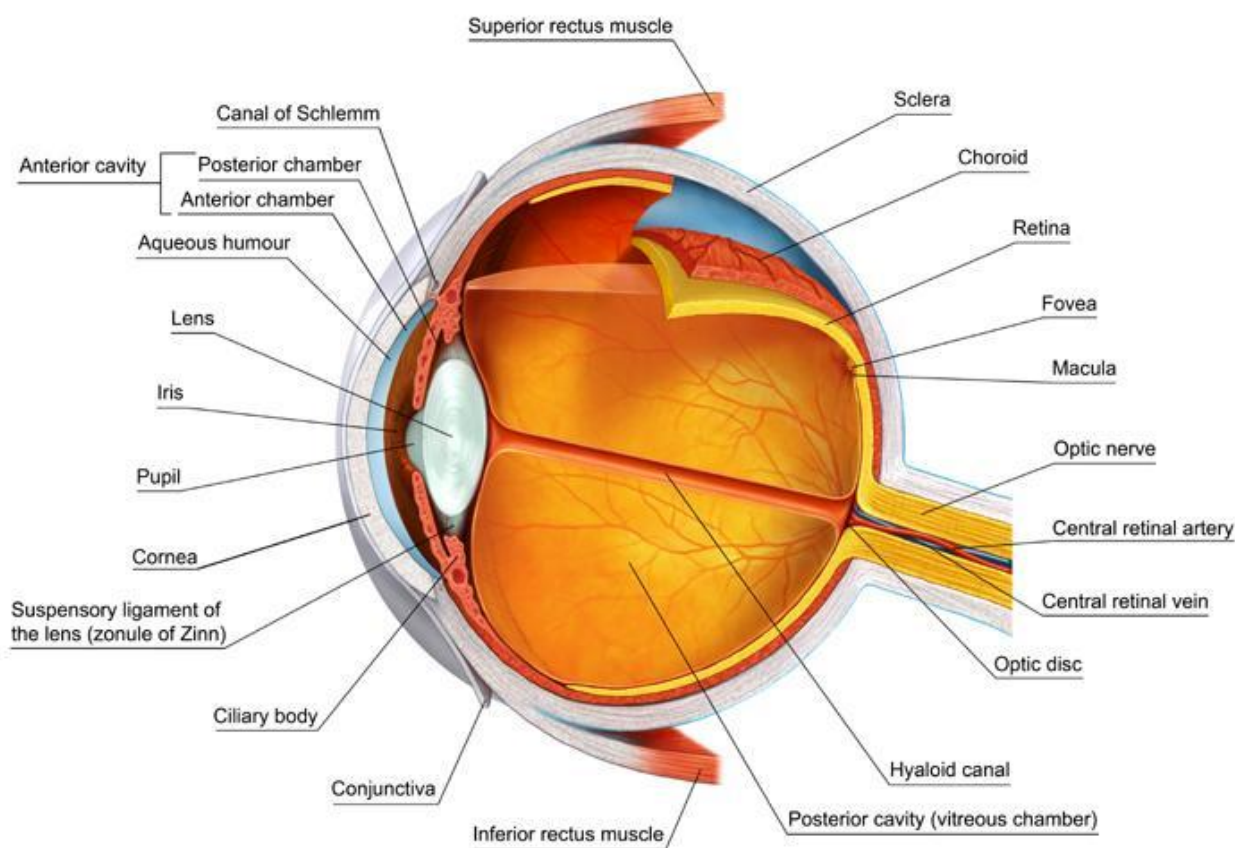


Reference of TCM Ophthalmology

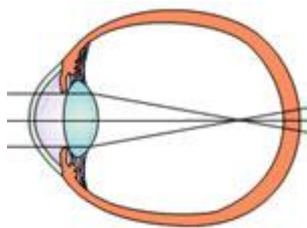
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1. Myopia



Myopia refers to the ability to see near objects clearly and perfectly, while at the same time there is **difficulty perceiving distant objects**.

Causes

Most nearsightedness is caused by a natural **change in the shape of the eyeball that makes the eyeball oval rather than round**. Less often, nearsightedness may be caused by a change in the cornea or the lens.

Symptoms

The main symptom of nearsightedness is **blurred vision when looking at distant objects**. Other symptoms of myopia are eye discomfort, squinting, and eye strain.

Treatment

People with myopia have three main options for treatment: eyeglasses, contact lenses, and for those who meet certain criteria, refractive eye surgery.

Eyeglasses are the most common method used to correct myopia. Concave glass or plastic lenses are placed in frames in front of the eyes. The lenses are ground to the thickness and curvature specified in the eyeglass prescription. The lenses cause the light rays to diverge so that they focus further back, directly on the retina, producing clear distance vision.

A wide variety of **contact lenses** are available, seeing eye doctor about their pros and cons is necessary.

Surgery can also be done to change the shape of the cornea or to implant artificial lenses in the eyes to reduce or fix nearsightedness.

2. Glaucoma 青光眼

Glaucoma is a **group of diseases of the optic nerve involving loss of retinal ganglion cells in a characteristic pattern of optic neuropathy**. Although raised intraocular pressure is a significant risk factor for developing glaucoma, there is no set threshold for intraocular pressure that causes glaucoma. One person may develop nerve damage at a relatively low pressure, while another person may have high eye pressures for years and yet never develop damage. Untreated glaucoma leads to permanent damage of the optic nerve and resultant visual field loss, which can progress to blindness.

Types

The most common type, **primary open angle glaucoma (POAG)** (H401), frequently has no symptoms and has been nicknamed "**the sneak thief of sight**". One factor may be a relative obstruction on the outflow of **aqueous humour** from the eye. Aqueous humour is produced by

the ciliary body of the eye, and then flows through the pupil and into the anterior chamber. The trabecular meshwork then drains the humour to Schlemm's canal, and ultimately to the venous system. All eyes have some intraocular pressure, which is caused by some resistance to the flow of aqueous through the trabeculum and Schlemm's canal. If the **intraocular pressure (IOP)** is too high (>21.5 mm Hg), the pressure exerted on the walls of the eye will result in compression of the ocular structures. However, other factors such as disturbances of blood flow in the optic nerve head may interact with IOP to affect the optic nerve. In one third of cases of POAG there is statistically normal IOP. This is called normal tension glaucoma (NTG). Because optic nerve examination and perimetry testing are not always done in addition to IOP measurement in those at risk, NTG is underdiagnosed and the condition presents late.

Another type, **acute angle-closure glaucoma** (H402), is characterized by an **acute rise in the intraocular pressure**. This occurs in susceptible eyes when the pupil dilates and blocks the flow of fluid through it, leading to the peripheral iris blocking the trabecular meshwork. Acute angle-closure glaucoma can cause pain and reduced visual acuity (blurred vision), and may lead to irreversible visual loss within a short time. This is an ocular emergency requiring immediate treatment. Many people with glaucoma experience halos around bright lights as well as the loss of sight characterized by the disease.

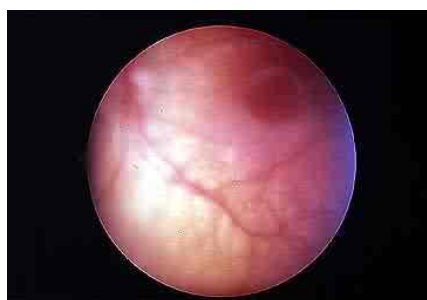
Primary congenital glaucoma (Q150) or *buphthalmos* is a rare genetic disease affecting infants. Newborns present with enlarged globes and clouded corneas. It is thought that reduced trabecular permeability is the cause of increased intraocular pressure. Surgery is the treatment.

Secondary glaucoma (H403-H406) occurs as a complication of various medical conditions such as eye surgery, advanced cataracts, eye injuries, some eye tumors, uveitis, diabetes or use of corticosteroid drugs.

Symptoms

While **glaucoma may or may not have distinct symptoms, an almost inevitable complication of glaucoma is vision loss**. Visual loss from glaucoma first affects peripheral vision. Early vision loss is subtle, and is not noticed by the patient. Moderate to severe vision loss may be noticed by the patient by checking his peripheral vision thoroughly. This can be done by closing one eye and examining all four corners of the visual field for clarity and sharpness, then repeating with the other eye closed. All too often, the patient does not notice the loss of vision until he experiences "tunnel vision". If the disease is not treated, the visual field will become more and more narrow, obscuring central vision, and finally progressing to blindness in the affected eye(s).

3. Retinal hemorrhage (Terson Syndrome) 视网膜出血



Normal retina:



Hemorrhages retina:

Signs and Symptoms

Retinal hemorrhage is defined as **intraocular hemorrhage associated with acute intracranial hemorrhage**. At that time, the association of vitreous hemorrhage with acute subarachnoid hemorrhage was also introduced. The syndrome has since evolved to include the presentation of any type of intraocular hemorrhage after spontaneous or trauma-induced intracranial bleeding. Key ocular diagnostic features include bilateral, multiple posterior segment hemorrhages occupying intraretinal, preretinal or intravitreal locations. The primary causative feature is spontaneous or trauma-induced intracranial bleeding (usually subarachnoid hemorrhage). Subarachnoid bleeding from a cerebral aneurysm, in particular an aneurysm of the anterior communicating artery, has been described as the most common underlying cause.

Intraocular hemorrhage is seen in approximately 20% of patients with acute intracranial bleeding. Significant vitreous hemorrhage occurs in a smaller percentage of these patients. Although the intraocular bleeding may consist of subretinal and deep intraretinal hemorrhage, they may also lie superficially, being just under the internal limiting membrane or **subhyaloid**. Significant vitreous hemorrhage will occur if the blood breaks through the internal limiting membrane or the posterior **hyaloid** face and moves into the **vitreous gel**.

Visual acuity is often diminished and in some cases is the first sign of trouble. The amount of acute vision loss is related to the extent of the bleeding. Late complications include epiretinal membrane formation and, rarely, tractional or rhegmatogenous retinal detachments. It is important to note that some patients suffering from ruptured intracranial aneurysms may exhibit vision loss secondary to the associated vitreous hemorrhage while not demonstrating any headache, neurological deficits or signs of meningeal irritation. Terson's syndrome seems to be an anomaly of adults, with at least one study documenting that the maximal incidence of intraretinal hemorrhage in children with non-abuse intracranial hemorrhage (intracranial hemorrhage not associated with shaken baby syndrome) is 8%.

4. Conjunctivitis 结膜炎

Conjunctivitis is swelling (inflammation) or infection of the membrane lining the eyelids (conjunctivaconjunctiva).

Causes

The conjunctiva is exposed to bacteria and other irritants. Tears help protect the conjunctiva by washing away bacteria. Tears also contain enzymes and antibodiesantibodies that kill bacteria.

There are many causes of conjunctivitis. Viruses are the most common cause. Other causes include:

- Allergies (allergic conjunctivitisallergic conjunctivitis)
- Bacteria
- Certain diseases
- Chemical exposure
- ChlamydiaChlamydia

- Fungi
 - Parasites (rarely)
 - Use of contact lenses (especially extended-wear lenses)
- "Pink eye" refers to a viral infection of the conjunctiva. These infections are especially contagious among children.

Newborns can be infected by bacteria in the birth canal. This condition is called ophthalmia neonatorum, and it must be treated immediately to preserve eyesight.

Symptoms

- Blurred visionBlurred vision
- Crusts that form on the eyelid overnight
- Eye painEye pain
- Gritty feeling in the eyesGritty feeling in the eyes
- Increased tearingIncreased tearing
- Itching of the eyeItching of the eye
- Redness in the eyesRedness in the eyes
- Sensitivity to lightSensitivity to light

Exams and Tests

- Examination of the eyes
- Swab of conjunctiva for analysis

5. Diabetic retinopathy (DR) 糖尿病视网膜病变

Diabetic retinopathy is retinopathy (damage to the retina) caused by complications of diabetes mellitus, which could eventually lead to blindness. It is an ocular manifestation of systemic disease which affects up to 80% of all diabetics who have had diabetes for 15 years or more.

Signs and symptoms

Diabetic retinopathy often has no early warning signs. Even macular edema, which may cause vision loss more rapidly, may not have any warning signs for some time. In general, however, a person with macular edema is likely to have blurred vision, making it hard to do things like read and drive. In some cases, the vision will get better or worse during the day.

As new blood vessels form at the back of the eye as a part of *proliferative diabetic retinopathy* (PDR), they can bleed (hemorrhage) and blur vision. The first time this happens, it may not be very severe. In most cases, it will leave just a few specks of blood, or spots, floating in a person's visual field, though the spots often go away after a few hours.

These spots are often followed within a few days or weeks by a much greater leakage of blood, which blurs vision. In extreme cases, a person will only be able to tell light from dark in that eye. It may take the blood anywhere from a few days to months or even years to clear from the inside of the eye, and in some cases the blood will not clear. These types of large hemorrhages tend to happen more than once, often during sleep.

Pathogenesis

Small blood vessels – such as those in the eye – are especially vulnerable to poor blood glucose control. An overaccumulation of glucose and/or fructose (Kawasaki *et al* 2004) damages the tiny blood vessels in the retina. During the initial stage, called nonproliferative diabetic retinopathy (NPDR), most people do not notice any changes in their vision.

Some people develop a condition called macular edema. It occurs when the damaged blood vessels leak fluid and lipids (fat) onto the macula, the part of the retina that lets us see detail. The fluid makes the macula swell, which blurs vision.

As the disease progresses, severe nonproliferative diabetic retinopathy enters an advanced, or proliferative, stage. The lack of oxygen (ischemia) in the retina causes fragile, new, blood vessels to grow along the retina and in the clear, gel-like vitreous that fills the inside of the eye. Without timely treatment, these new blood vessels can bleed, cloud vision, and destroy the retina. Usually, they look like cotton wool spots, or otherwise show up as microvascular abnormalities. Even so, the advanced proliferative diabetic retinopathy (PDR) can remain asymptomatic for a very long time, and so should be monitored closely with regular checkups.

Risk factors

All people with diabetes mellitus are at risk – those with Type I diabetes (*juvenile onset*) and those with Type II diabetes (*adult onset*). The longer a person has diabetes, the higher the risk of developing some ocular problem.

During pregnancy, diabetic retinopathy may also be a problem for women with diabetes. It is recommended that all pregnant women with diabetes have dilated eye examinations each trimester to protect their vision.

Diagnosis

Diabetic retinopathy is detected during an eye examination that includes:

- *Visual acuity test*: This test uses an eye chart to measure how well a person sees at various distances (*i.e.*, visual acuity).
- *Pupil dilation*: The eye care professional places drops into the eye to widen the pupil. This allows him or her to see more of the retina and look for signs of diabetic retinopathy. After the examination, close-up vision may remain blurred for several hours.
- *Ophthalmoscopy*: This is an examination of the retina in which the eye care professional: (1) looks through a device with a special magnifying lens that provides a narrow view of the retina, or (2) wearing a headset with a bright light, looks through a special magnifying glass and gains a wide view of the retina. Note that hand-held ophthalmoscopy is insufficient to rule out significant and treatable diabetic retinopathy.
- *Tonometry*: A standard test that determines the fluid pressure (intraocular pressure) inside the eye. Elevated pressure is a possible sign of glaucoma, another common eye problem in people with diabetes.
- *Digital Retinal Screening Programs*: Systematic programs for the early detection of eye disease including diabetic retinopathy are becoming more common. This involves digital image capture and transmission of the images to a digital reading center for evaluation and treatment referral. See Vanderbilt Ophthalmic Imaging Center .

The eye care professional will look at the retina for early signs of the disease, such as: (1) leaking blood vessels, (2) retinal swelling, such as macular edema, (3) pale, fatty deposits on the retina –

signs of leaking blood vessels, (4) damaged nerve tissue (neuropathy), and (5) any changes in the blood vessels.

Should the doctor suspect the need treatment for macular edema, he or she may perform a test called fluorescein angiography. In this test, a special dye is injected into the arm. Pictures are then taken as the dye passes through the blood vessels in the retina. This test allows the doctor to find the leaking blood vessels.

6. Optic atrophy 视神经萎缩

Optic atrophy can be defined as **damage to the optic nerve resulting in a degeneration or destruction of the optic nerve**. Optic atrophy may also be referred to as optic nerve head pallor because of the pale appearance of the optic nerve head as seen at the back of the eye. Possible causes of optic atrophy include: **optic neuritis**, Leber's hereditary optic atrophy, toxic or nutritional optic neuropathy, **glaucoma**, vascular disorders, trauma, and other systemic disorders.

The process of vision involves light entering the eye and triggering chemical changes in the retina, a pigmented layer lining the back of the eye. Nerve impulses created by this process travel to the brain via the optic nerve. Using a hand-held instrument called an ophthalmoscope, the doctor can see the optic nerve head (optic disc) which is the part of the optic nerve that enters at the back of the eyeball. In optic atrophy, the disc is pale and has fewer blood vessels than normal.

Causes and symptoms

Symptoms of optic atrophy are a change in the optic disc and a decrease in visual function. This change in visual function can be a decrease in sharpness and clarity of vision (visual acuity) or decreases in side (peripheral) vision. Color vision and contrast sensitivity can also be affected.

There are many possible causes of optic atrophy. The causes can range from trauma to systemic disorders. **Some possible causes of optic atrophy include:**

- **Optic neuritis.** Optic neuritis is an inflammation of the optic nerve. It may be associated with **eye pain** worsened by eye movement. It is more common in young to middle-aged women. Some patients with optic neuritis may develop **multiple sclerosis** later on in life.
- **Leber's hereditary optic neuropathy.** This is a disease of young men (late teens, early 20s), characterized by an onset over a few weeks of painless, severe, central visual loss in one eye, followed weeks or months later by the same process in the other eye. At first the optic disc may be slightly swollen, but eventually there is optic atrophy. The visual loss is generally permanent. This condition is hereditary. If a patient knows that Leber's runs in the family, **genetic counseling** should be considered.
- **Toxic optic neuropathy.** Nutritional deficiencies and poisons can be associated with gradual vision loss and optic atrophy, or with sudden vision loss and optic disc swelling. Toxic and nutritional optic neuropathies are uncommon in the United States, but took on epidemic proportions in Cuba in 1992-1993. The most common toxic optic neuropathy is known as tobacco-alcohol **amblyopia**, thought to be caused by exposure to cyanide from tobacco **smoking**, and by low levels of vitamin B₁₂ because of poor **nutrition** and poor

absorption associated with drinking alcohol. Other possible toxins included ethambutol, methyl alcohol (moonshine), ethylene glycol (antifreeze), cyanide, lead, and carbon monoxide. Certain medications have also been implicated. Nutritional optic neuropathy may be caused by deficiencies of protein, or of the **B vitamins** and folate, associated with **starvation**, malabsorption, or **alcoholism**.

- **Glaucoma.** Glaucoma may be caused by an increase of pressure inside the eye. This increased pressure may eventually affect the optic nerve if left untreated.
- **Compressive optic neuropathy.** This is the result of a tumor or other lesion putting pressure on the optic nerve. Another possible cause is enlargement of muscles involved in eye movement seen in **hyperthyroidism** (Graves' disease).
- **Retinitis pigmentosa.** This is a hereditary ocular disorder.
- **Syphilis.** Left untreated, this disease may result in optic atrophy.

Diagnosis

Diagnosis involves recognizing the characteristic changes in the optic disc with an **ophthalmoscope**, and measuring visual acuity, usually with an eye chart. Visual field testing can test peripheral vision. Color vision and contrast sensitivity can also be tested. Family history is important in the diagnosis of inherited conditions. Exposure to poisons, drugs, and even medications should be determined. Suspected **poisoning** can be confirmed through blood and urine analysis, as can vitamin deficiency.

Brain **magnetic resonance imaging** (MRI) may show a tumor or other structure putting pressure on the optic nerve, or may show plaques characteristic of multiple sclerosis, which is frequently associated with optic neuritis. However, similar MRI lesions may appear in Leber's hereditary optic neuropathy. Mitochondrial DNA testing can be done on a blood sample, and can identify the mutation responsible for Leber's.

Visual evoked potentials (VEP), which measure speed of conduction over the nerve pathways involved in sight, may detect abnormalities in the clinically unaffected eye in early cases of Leber's. Fluorescein **angiography** gives more detail about blood vessels in the retina.

7. Age-related macular degeneration(AMD)老年黄斑变性

Age-related macular degeneration (AMD) is a degenerative condition of the macula. It is the most common cause of vision loss in the United States in those 50 or older, and its prevalence increases with age. AMD is caused by hardening of the arteries that nourish the retina. This deprives the sensitive retinal tissue of oxygen and nutrients that it needs to function and thrive. As a result, the central vision deteriorates.



◀ This example demonstrates what a patient with advanced macular degeneration sees.

Macular degeneration varies widely in severity. In the worst cases, it causes a complete loss of central vision, making reading or driving impossible. For others, it may only cause slight distortion. Fortunately, macular degeneration does not cause total blindness since it does not affect the peripheral vision.

What is the difference between wet and dry macular degeneration?

AMD is classified as either wet (neovascular) or dry (non-neovascular). About 10% of patients who suffer from macular degeneration have wet AMD. This type occurs when new vessels form to improve the blood supply to oxygen-deprived retinal tissue. However, the new vessels are very delicate and break easily, causing bleeding and damage to surrounding tissue.

Patient with wet macular degeneration develop new blood vessels under the retina. This causes hemorrhage, swelling, and scar tissue but it can be treated with laser in some cases.

Dry macular degeneration, although more common, typically results in a less severe, more gradual loss of vision.

The dry type is much more common and is characterized by drusen and loss of pigment in the retina. Drusen are small, yellowish deposits that form within the layers of the retina.

What causes macular degeneration?

Macular degeneration may be caused by variety of factors. Genetics, age, nutrition, smoking, and sunlight exposure may all play a role.

Signs and Symptoms

- **Loss of central vision.** This may be gradual for those with the dry type. Patients with the wet type may experience a sudden decrease of the central vision.
- **Difficulty reading or performing tasks that require the ability to see detail**

- **Distorted vision** (Straight lines such as a doorway or the edge of a window may appear wavy or bent.)