



Glaucoma

Glaucomas are a group of eye disorders characterized by progressive optic nerve damage in which an important part is a relative increase in intraocular pressure (IOP). Glaucoma is the 2nd most common cause of blindness worldwide. About 14 million people worldwide have glaucoma, but only half are aware of it. Glaucoma can occur at any age but is 6 times more common among people > 60 yr.

There are four major types of glaucoma:

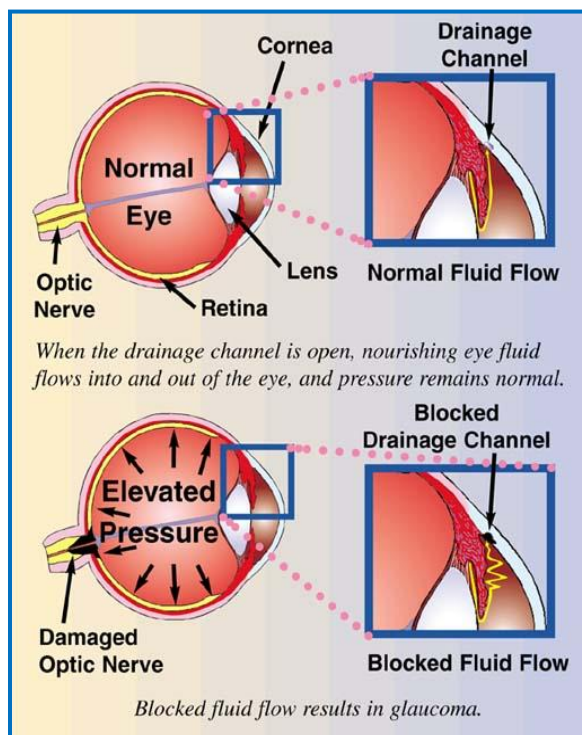
- Open-angle (chronic) glaucoma
- Angle-closure (acute) glaucoma
- Congenital glaucoma
- Secondary glaucoma

The “angle” refers to the angle formed by the junction of the iris and cornea at the periphery of the anterior chamber. The angle is where > 98% of the aqueous humor exits the eye via either the trabecular meshwork and the Schlemm canal (the major pathway, particularly in the elderly) or the ciliary body face and choroidal vasculature. These outflow pathways are not simply a mechanical filter and drain but instead involve active physiologic processes.

Glaucomas are further subdivided into primary (cause of outflow resistance or angle closure is unknown) and secondary (outflow resistance results from a known disorder), accounting for > 20 adult types.

Open-angle (chronic) glaucoma is the most common type of glaucoma. The cause is unknown. An increase in eye pressure occurs slowly over time. The pressure pushes on the optic nerve. Open-angle glaucoma tends to run in families. The risk is higher if the patient has a parent or grandparent with open-angle glaucoma. People of African descent are at particularly high risk for this disease.

Angle-closure (acute) glaucoma occurs when the exit of the aqueous humor fluid is suddenly blocked.



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This causes a quick, severe, and painful rise in the pressure inside the eye. Angle-closure glaucoma is an emergency. This is very different from open-angle glaucoma, which painlessly and slowly damages vision.

Dilating eye drops and certain medications may trigger an acute glaucoma attack.

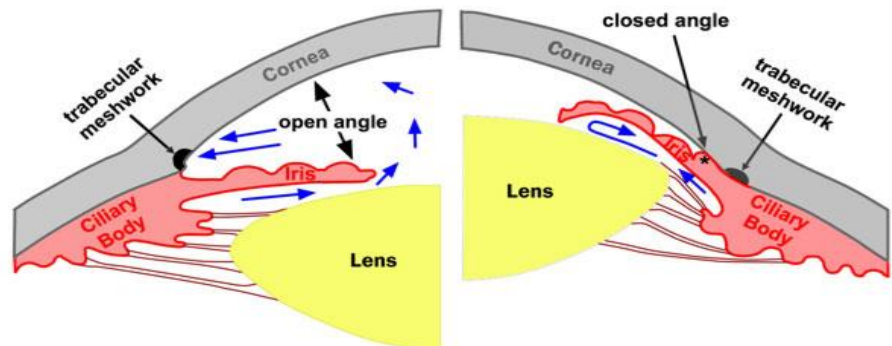
Congenital glaucoma is seen in babies. It's often inherited.

- It is present at birth and is caused by abnormal eye development.

Secondary glaucoma

Is caused by:

- Drugs such as corticosteroids
- Eye diseases such as uveitis, systemic diseases or trauma



Pathophysiology

Axons of retinal ganglion cells travel through the optic nerve carrying visual information from the eye to the brain. Damage to these axons causes ganglion cell death with resultant optic nerve atrophy and patchy vision loss. Elevated IOP (in unaffected eyes, the average range is 11 to 21 mm Hg) plays a role in axonal damage, either by direct nerve compression or diminution of blood flow. However, the relationship between externally measured pressure and nerve damage is complicated. Of people with IOP > 21 mm Hg (i.e., ocular hypertension), only about 1 to 2%/yr develop glaucoma. Additionally, about one third of patients with glaucoma do not have IOP > 21 mm Hg (known as low-tension glaucoma or normal-tension glaucoma). One factor may be that externally measured IOP does not always reflect true IOP; the cornea may be thinner than average, which leads to a higher IOP, or thicker than average, which leads to a lower IOP, inside the eye than externally measured IOP. Another factor may be that a vascular disorder compromises blood flow to the optic nerve. Also, it is likely that there are factors within the optic nerve that affect susceptibility to damage.

IOP is determined by the balance of aqueous secretion and drainage. Elevated IOP is caused by inhibited or obstructed outflow, not oversecretion; a combination of factors in the trabecular meshwork (is an area of tissue in the eye located around the base of the cornea, near the ciliary body, and is responsible for draining the aqueous humor from the eye via the anterior chamber) appear to be involved. In open-angle glaucoma, IOP is elevated because outflow is inadequate despite an angle that appears unobstructed. In angle-closure glaucoma, IOP is elevated when a physical distortion of the peripheral iris mechanically blocks outflow.

Symptoms

Open-Angle Glaucoma

Most people have no symptoms

- Once vision loss occurs, the damage is already severe.
- There is a slow loss of peripheral vision (also called tunnel vision).
- Advanced glaucoma can lead to blindness.

Angle-Closure Glaucoma

Symptoms may come and go at first, or steadily become worse

- Sudden, severe pain in one eye, redness and eye feels swollen.
- Decreased or cloudy vision, often called "steamy" vision
- Nausea and vomiting
- Rainbow-like halos around lights

Congenital Glaucoma

Symptoms are usually noticed when the child is a few months old

- Cloudiness of the front of the eye
- Enlargement of one eye or both eyes
- Red eye, sensitivity to light and tearing.

Diagnosis

- Characteristic optic nerve changes
- Characteristic visual field defects
- Exclusion of other causes
- IOP usually > 21 mm Hg (but not required for the diagnosis)

Glaucoma should be suspected in a patient with any of the following:

- Abnormal optic nerve on ophthalmoscopy
- Elevated IOP
- Family history of glaucoma
- Typical visual field defects

Such patients (and those with any risk factors) should be referred to an ophthalmologist for a comprehensive examination that includes a thorough history, family history, examination of the optic disks (preferably using a binocular examination technique), formal visual field examination, IOP measurement, measurement of central corneal thickness, and gonioscopy (visualization of the anterior chamber angle with a special mirrored contact lens prism). Glaucoma is diagnosed when characteristic findings of optic nerve damage are present and other causes (eg, multiple sclerosis) have been excluded. Elevated IOP makes the diagnosis more likely but is not essential.

Screening

Screening can be done by checking visual fields with frequency-doubling technology (FDT) perimetry and ophthalmoscopic evaluation of the optic nerve. FDT perimetry involves use of a desktop device that can screen visual field abnormalities suggestive of glaucoma in 2 to 3 min per eye. Although IOP should be measured, screening based only on IOP has low sensitivity, low specificity, and low positive predictive value. Patients > 40 yr and those who have risk factors for open-angle or angle-closure glaucoma should receive a comprehensive eye examination every 1 to 2 yr.

Treatment

Patients with characteristic optic nerve and corresponding visual field changes are treated regardless of IOP. Lowering the IOP is the only clinically proven treatment. For chronic adult and juvenile glaucomas, the initial target IOP is at least 20 to 40% below pretreatment readings. Three methods are available: drugs, laser surgery, and incisional surgery. The type of glaucoma determines the appropriate method or methods. Drugs and most laser surgeries modify the existing aqueous secretion and drainage system. Traditional incisional surgeries (eg, guarded filtration procedures [trabeculectomy], glaucoma drainage implant devices [tube shunts]) create a new drainage pathway between the anterior chamber and subconjunctival space. Newer incisional surgeries attempt to enhance trabecular or uveoscleral outflow without creating a full-thickness fistula.

Prophylactic IOP lowering in patients with ocular hypertension delays the onset of glaucoma. However, because the rate of conversion from ocular hypertension to glaucoma in untreated people is low, the decision to treat prophylactically should be individualized based on the presence of risk factors, magnitude of IOP elevation, and patient factors (ie, preference for drugs vs surgery, drug adverse effects). Generally, treatment is recommended for patients with IOP > 30 mm Hg even if the visual field is

full and the optic nerve disk appears healthy because the likelihood of damage is significant at that IOP level.

References: 1) www.merckmanuals.com/professional/eye_disorders/glaucoma/overview
2) www.nlm.nih.gov/medlineplus/ency/article/001620.htm

Terminology

Spasmodic Torticollis

A chronic condition in which the neck is rotated or deviated laterally, forwards, or back-wards, often with additional jerking or tremor. It is a form of focal DYSTONIA (Focal dystonia is a neurological condition that affects a muscle or group of muscles in a specific part of the body causing involuntary muscular contractions and abnormal postures.)



Reference: Marcovitch H. 2005. *Black's Medical Dictionary*. 41th ed. London: A&C Black Publishers Limited. p 657.

FDA News

FDA Approves New Treatment for Hepatitis C Virus

The U.S. Food and Drug Administration Nov. 22, 2013, approved **Olysio (simeprevir)**, a new therapy to treat chronic hepatitis C virus infection.

Most people infected with the hepatitis C virus have no symptoms of the disease until liver damage becomes apparent, which may take several years. Most of these people then go on to develop chronic hepatitis C. Some will also develop scarring and cirrhosis over many years, which can lead to complications such as bleeding, jaundice, ascitis, infections or liver cancer. **Olysio** is a protease inhibitor that blocks a specific protein needed by the hepatitis C virus to replicate. It is to be used as a component of a combination antiviral treatment regimen. In clinical studies, **Olysio** was evaluated in combination with peginterferon-alfa and ribavirin, two drugs also used to treat hepatitis C virus infection. **Olysio** is intended for adults with compensated liver disease, including cirrhosis, who have not received treatment for their infection (treatment naïve) or for whom previous treatment has not been effective (treatment experienced). **Olysio** is the third FDA-approved protease inhibitor to treat chronic hepatitis C virus infection, and provides health professionals and patients with a new, effective treatment for this serious disease.



The most common side effects reported in clinical study participants treated with **Olysio** in combination with peginterferon-alfa and ribavirin were rash (including photosensitivity), itching pruritis and nausea. Serious photosensitivity reactions resulting in hospitalization were reported. Patients will be advised to limit sun exposure and to use sun protective measures during treatment with **Olysio** in combination with peginterferon alfa and ribavirin. **Olysio** should not be used alone to treat chronic hepatitis C infection.

Source: <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm376449.htm>

Test Your Knowledge

1) In the treatment of acute hypertensive crisis, nitroprusside (Nitropress) is administered

- (A) sublingually
- (B) subcutaneously
- (C) as an IV bolus
- (D) transdermally
- (E) as an IV infusion

2) Gastric emptying is slowed by all of the following EXCEPT

- (A) vigorous exercise
- (B) fatty foods
- (C) hot meals
- (D) hunger
- (E) emotional stress

3) Which of the following complications associated with the administration of TPN solutions is most likely to occur after the infusions have been discontinued?

- (A) hypoglycemia
- (B) hyperchloremic metabolic acidosis
- (C) hyperosmotic nonketotic hyperglycemia
- (D) alkalosis
- (E) pulmonary edema

4) The parenteral system known as "ADD-Vantage" is best described as being a

- (A) disposable needle and syringe
- (B) premixed minibag of drug solution
- (C) two-compartment container
- (D) vial attached to a minibag of diluent
- (E) burette type of administration set



Real Enquiries

At the "Drug Information Center", we respond to enquiries from the professional health team as well as from others. Here's one of the enquiries received at the center!

Enquiry received from Mrs/ Ayat Abdel-moneim

Enquiry: How can I relieve painful engorgement and dry up breast milk after weaning?

Summary of Answer:

In the past, women who didn't want to breastfeed were routinely prescribed a medication called bromocriptine. There were many unpleasant side effects, ranging from dizziness and nausea to hair loss, heart attack, most doctors recommend using natural remedies for the safest possible end to lactation. For a slightly more natural solution, there are several vitamins and herbs that have been found to be helpful with engorgement

- Taking 200mg of vitamin B₆ for five days may relieve engorgement.
- Sage (المريمية) tea can be found at a natural foods store, or make it at home by steeping 1 tsp rubbed sage in 1 cup boiling water for 15 minutes. Drink a cup every 6 hours.

- Cold cabbage leaves applied directly to the breasts can help relieve engorgement as well. Break off the stems, and soften the leaves by pressing or pounding them just before applying. Avoid covering your nipples, and change the leaves after 30 minutes.

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Ask the expert

Q: How does diabetes mellitus affect muscles?

A: Diabetes mellitus can affect muscles in several ways.



Patients with diabetes mellitus can develop contracture of digits and limbs as a result of soft tissue thickening in these areas. This can lead to wasting of the muscle from disuse. This is referred to as atrophy. Diabetes mellitus promotes atherosclerosis which impairs the circulation to many tissues of the body. When the muscles of the limbs are affected, the decreased blood flow can lead to cramping and to painful walking (peripheral vascular disease resulting in claudication). In the worst case scenario - this can lead to death (infarction) of the localized areas of the muscle. This is characterized by local pain in the involved area. Blood testing can demonstrate elevated muscle enzymes (CPK, aldolase). When the heart muscle is affected by such atherosclerosis, it can lead to heart attack.

Diabetes mellitus can also damage the nerves that supply the hands and feet. This can lead to inadequate nerve supply and further muscle wasting. People with longstanding diabetes mellitus can develop pain, and muscle twitching, in addition to muscle wasting of the muscles around the shoulders and hips (limb girdle wasting). This condition is referred to as diabetic amyotrophy. In the majority of people with diabetes, muscle strength is preserved well enough to allow for modest physical activity under a doctor's supervision, this is not an excuse for someone with diabetes to refrain from physical activity.

Reference: medicinenet.com

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Nutritional Requirements

Good nutrition aims to achieve and maintain a desirable body composition and high potential for physical and mental work. Balancing energy intake with energy expenditure is necessary for a desirable body weight. Energy expenditure depends on age, sex, weight and metabolic and physical activity. If energy intake exceeds expenditure, weight is gained. Taking in about 100 calories/day more than needed results in a weight gain of about 4 to 5 kg in a year. If energy intake is less than expenditure, weight is lost. Routine use of nutritional supplements is not necessary or beneficial; some supplements can be harmful. For example, excess vitamin A can lead to hypervitaminosis A, with headaches, osteoporosis, and rash.

Generally, the recommended intake decreases with aging because physical activity tends to decrease, resulting in less energy expended. The new Food Guide Pyramid emphasizes the following:

- Increasing consumption of whole grains, vegetables and fruits.
- Substituting fat-free or low-fat milk products for whole-fat milk products.
- Reducing consumption of saturated fats and trans fatty acids
- Exercising regularly, and ensuring adequate fluid intake.

Source: merckmanuals.com/professional/nutritional_disorders/nutrition_general_considerations/nutrition_in_clinical_medicine.html

Symptoms and Signs of Nutritional Deficiency		
Area/System	Symptom or Sign	Deficiency
General appearance	Wasting	Energy
Skin	Rash	Many vitamins, zinc, essential fatty acids
	Rash in sun-exposed areas	Niacin (pellagra)
	Easy bruising	Vitamin C or K
Hair and nails	Thinning or loss of hair	Protein
	Premature whitening of hair	Selenium
	Spooning (upcurling) of nails	Iron
Eyes	Impaired night vision	Vitamin A
	Corneal keratomalacia (corneal drying and clouding)	Vitamin A
Mouth	Cheilosis and glossitis	Riboflavin, niacin, pyridoxine, iron
	Bleeding gums	Vitamin C, riboflavin
Extremities	Edema	Protein
Neurologic	Paresthesias or numbness in a stocking-glove distribution	Thiamin (beriberi)
	Tetany	Ca, Mg
	Cognitive and sensory deficits	Thiamin, niacin, pyridoxine, vitamin B ₁₂
	Dementia	Thiamin, niacin, vitamin B ₁₂
Musculoskeletal	Wasting of muscle	Protein
	Bone deformities (e.g., bowlegs, knocked knees, curved spine)	Vitamin D, Ca
	Bone tenderness	Vitamin D
	Joint pain or swelling	Vitamin C
GI	Diarrhea	Protein, niacin, folate, vitamin B ₁₂
	Diarrhea and dysgeusia	Zinc
	Dysphagia or odynophagia (due to Plummer-Vinson syndrome)	Iron
Endocrine	Thyromegaly	Iodine

Answers:

Q1: (E) Nitroprusside has marked antihypertensive activity when given by IV infusion. It lowers blood pressure by relaxing vascular smooth muscle, thereby dilating peripheral arteries and veins.

Q2: (D) Gastric emptying appears to be an exponential process with a normal half-life of between 20 and 60 minutes. However, many factors can influence the rate of this process. It is slowed by the A, B, C, and E choices and is speeded by hunger, mild exercise, cold meals, dilute solutions, and lying on the right side.

Q3: (A) Suddenly discontinuing dextrose solution may cause a rebound hypoglycemia in response to the sudden elimination of the sustained glucose load of the TPN solution. It is best to maintain the patient on a nominal amount of dextrose such as D5W or to wean the patient slowly from the TPN solution.

Q4: (D) The ADD-Vantage system consists of a vial usually containing a powder which is already attached to a minibag. The health professional simply has to engage the vial into the bag, thus allowing reconstitution of the powder and subsequent mixing with the main body of diluent.

What's In the Label?



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The elevated demand for medical herbal preparations has promoted a fast growth of their manufacture and trade. Nevertheless, currently, there are no standardized methods to identify the plant ingredients contained in these products. As a consequence, the authenticity and quality of herbal preparations is often at risk.

By using the genetic method **DNA barcoding** (a taxonomic method that uses a short genetic marker in an organism's DNA to identify it as belonging to a particular species), Steven Newmaster, University of Guelph, ON, Canada, and colleagues tested the authenticity of 44 herbal products from 12 different companies. The analysis revealed that 59 % of the products examined contained species of plants not listed on the labels. In some cases, the main herbal ingredients indicated on the labels were absent and substituted with other ingredients. In other cases, the herbal preparations were contaminated with substances known to be toxic and to provoke side effects. Furthermore, in some products, rice, soybean, and grasses were used as fillers, thus representing a potential health risk for people allergic to these plants.

The authentication of herbal products with DNA barcoding methods is thus necessary to provide customers with safe and high quality preparations.

Source / Publisher: BioMed Central Medicine/BioMed Central