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# Under Pressure:

## Understanding Glaucoma Treatment

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6/9/21

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# Financial Disclosures

No financial disclosures

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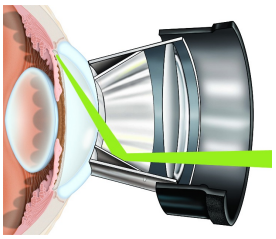
# Overview

- **Goal of glaucoma treatment**
- **Most common treatment modalities:**
  - Medications
  - Lasers
  - Surgery



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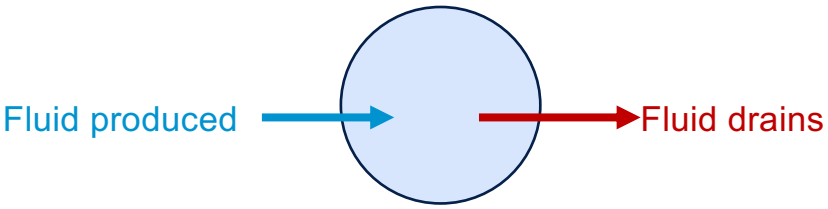
# Goal of Glaucoma Treatment

- Lower the eye pressure




| | | |
|---|---|---|
| Decrease | Eye pressure ↓ | Same |
| Same | Eye pressure ↓ | Increases |

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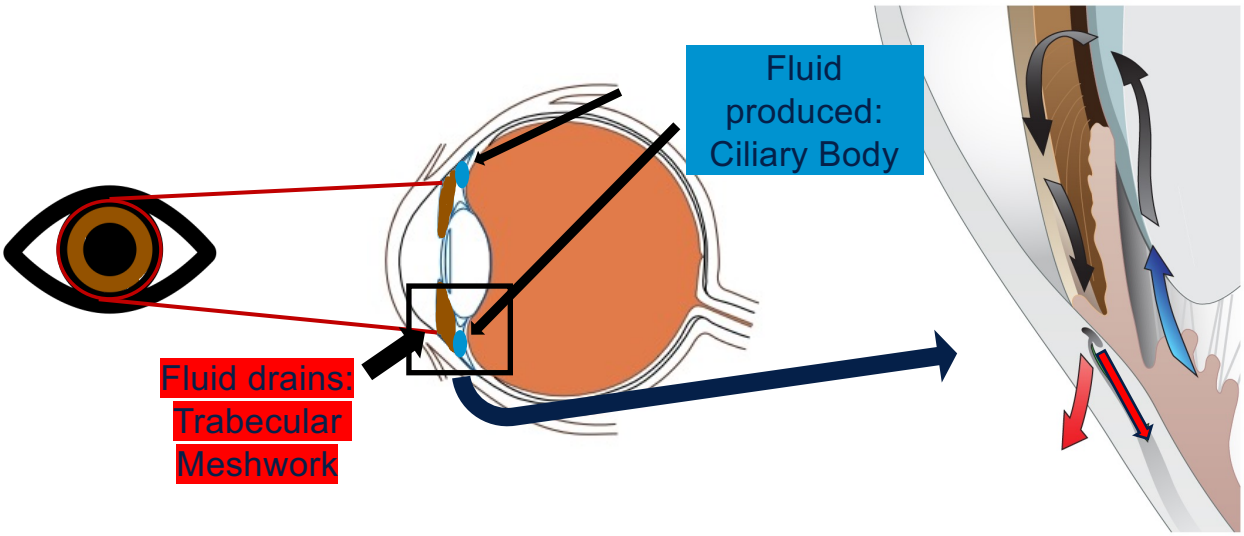
# How to lower the eye pressure?

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# Overview

- Medications
- Lasers
- Surgeries


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# Medications

- Most often referring to eye drops
- Often the first treatment for glaucoma
- How do they work?
  - Decreasing fluid production from the eye
  - Increasing fluid drainage from the eye
  - Goal: lower the eye pressure
- Each class of medication has a different mechanism of action
  - The caps of each class usually have the same color

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# Medications

- There are usually several medications within each class
- If you are unable to tolerate one medication in a class, your doctor may SWITCH you to an alternative in the same class
- If you need more eye pressure control, your doctor may ADD a new medication class

**Generic Name:** Latanoprost
(**Brand Name:** Xalatan)


Bimatoprost
(Lumigan)


Travoprost
(Travatan)


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# Combination drops

Some eye drops have 2 classes of medications combined in 1 bottle

**Brand: Cosopt**
(Generic: Dorzolamide + Timolol)


**Combigan**
(Brimonidine + Timolol)


**Simbrinza**
(Brinzolamide + Brimonidine)


**Rocklatan**
(Netarsudil + Latanoprost)


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# Allergies & Adverse Reaction

- Some people can get an allergic reaction to the medication
- Based on your symptoms and appearance, your doctor will determine if it's an allergic reaction to the main medication ingredient or the preservatives
- Preservatives:
  - Used in eye drops that come in a bottle to maintain an antimicrobial environment
  - Different types of preservatives can be used in different medications
  - There are preservative-free medications

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# Preservative-Free (PF) Eye Drops

- These are single-use containers that can be recapped but should be thrown away 24 hours after opening
- No preservatives so increased risk of contamination
- Benefits: Often better tolerated for those with very dry eyes
- Downsides:
  - Often expensive
  - May require approval from your insurance company to receive a reduction in cost
  - Small container can be difficult to handle


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# Practical Tips: How to use eye drops

1. Wash your hands
2. Examine the bottle (make sure it isn't expired)
   - Unopened bottles can usually be kept for 1 year (or expiration date)
   - Opened bottles should usually be kept for only 3 months
   - Opened preservative free drops should be thrown away after 24 hours
   - Some bottles might need to be shaken if the liquid is a suspension and looks milky (Brinzolamide or Azopt)


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# Practical Tips: How to use eye drops

3. Sit down. Tilt your head back and look up at the ceiling
4. Pull your lower eyelid away with your index finger to form a pocket and gently squeeze the bottle
   - Make sure the tip does not hit your eye
5. Close your eyes gently (no need to squeeze shut) for 2-3 minutes

https://www.aao.org/eye-health/treatments/how-to-put-in-eye-drops

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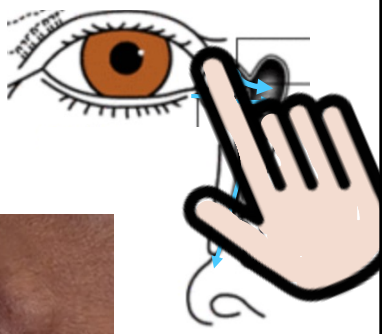
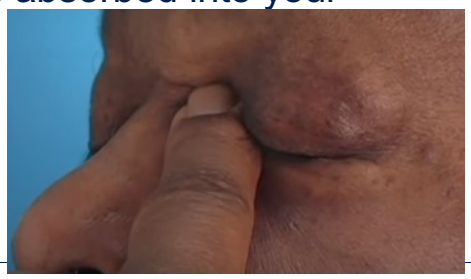
# Practical Tips: How to use eye drops

6. Apply gentle pressure to your tear ducts (where your eyelid meets the nose) for 2-3 minutes with your eyes closed
   - **Nasolacrimal occlusion** can help decrease the amount of medication that goes to the back of your throat and is absorbed into your blood stream





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# Practical Tips: How to use eye drops

7. Gently wipe away excess liquid from your skin with a soft tissue or cloth
8. Wait 3-5 minutes before putting in another medication in the same eye

- If you are having trouble, ask a friend or family member to help

https://www.aao.org/eye-health/treatments/how-to-put-in-eye-drops

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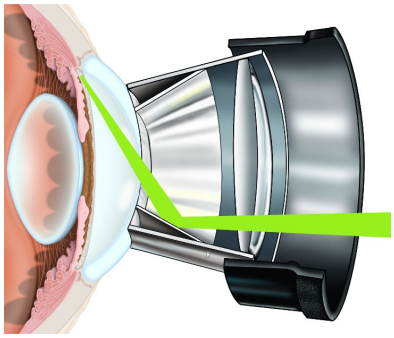
# Overview

- Medications
- Lasers
  - Angle-closure glaucoma
  - Open-angle glaucoma
- Surgery



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# Lasers: Angle-closure glaucoma

- **What is angle closure glaucoma?**
  - The angle is closed in many or all areas so no fluid can drain out
  - This leads to increased eye pressure -> optic nerve damage -> vision loss
  - This can occur acutely (called angle closure attack) or slowly
  - There are also precursor forms of the disease where the angle is narrow or closed but the eye pressure is not high yet
  - Laser is most helpful after an acute attack or for the precursor forms

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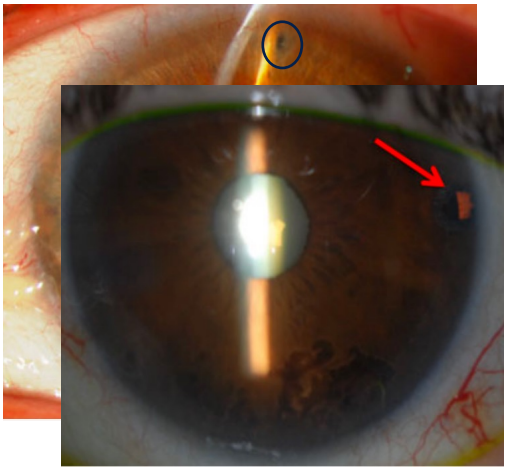
# Lasers: Angle-closure glaucoma

- **How does laser peripheral iridotomy (LPI) work?**
  - It creates a tiny hole in the outer edge of the iris which leads to an opening of the angle in most cases
  - After the angle is opened, fluid drainage is improved
  - Takes place in the clinic



https://www.glaucomapatients.org/treatment/laser-peripheral-iridotomy/

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# Lasers: Angle-closure glaucoma

- **What are the risks of LPI?**
  - Temporary elevation in eye pressure so your eye pressure is rechecked 30min-1hr afterwards
  - Inflammation which improves after 1 week with anti-inflammatory drops
  - Closure of the iridotomy (less common)
  - Extra visual symptoms (bright lights, halos, glare) rarely occurs

https://www.glaucomapatients.org/treatment/laser-peripheral-iridotomy/

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# Lasers: Open-angle glaucoma

- **What is open-angle glaucoma?**
  - Primary open-angle glaucoma is the most common form of glaucoma in the US
  - The angle (natural drainage paths) look open but there is likely some sort of blockage
  - This usually presents with high eye pressure -> optic nerve damage -> vision loss
- The first line treatments are usually medication or laser called selective laser trabeculoplasty (SLT)

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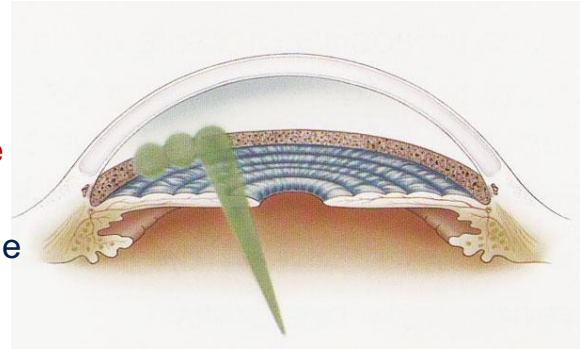
# Lasers: Open-angle glaucoma

- **How does selective laser trabeculoplasty (SLT) work?**
  - The laser targets the natural drainage tissue of the eye (trabecular meshwork) to improve drainage
  - Uses low energy to gently treat the trabecular meshwork to help it function more effectively again
  - No hole or incision is made
  - Takes place in the clinic



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# Lasers: Open-angle glaucoma

- **What are the risks of SLT?**
  - Very few risks
  - Some people can have a slight increase in eye pressure afterwards so you're monitored for 30min -1hr after the procedure
  - Mild inflammation which usually resolves on its own or with an anti-inflammatory drop in a few days
- **What are the benefits?**
  - Can work just as well as an eye drop in some cases
  - Works about 70-80% of the time for up to 3 years
  - Can be repeated if it worked the first time

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# Overview

- Medications
- Lasers
- Surgery

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# Types of Surgery

- Cataract surgery (angle-closure glaucoma, mild glaucoma)
- Minimally invasive glaucoma surgery (mild-moderate glaucoma)
- Major glaucoma surgery (advanced glaucoma):
  - Trabeculectomy
  - Glaucoma drainage implant (tube shunts)

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# Considerations of Surgery

- Your doctor will take into consideration a number of things:
  - How high your eye pressure is
  - Your target eye pressure
  - How advanced your glaucoma is
  - If you have other eye conditions or other medical conditions
  - Previous eye surgeries and lasers
  - How you will do in the post-operative healing period

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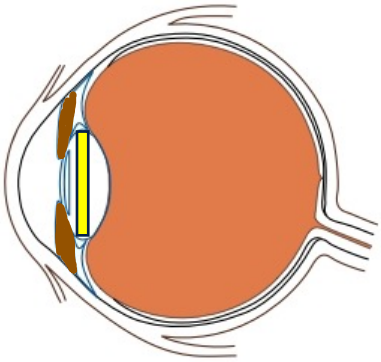
# Cataract surgery

- **Angle-closure glaucoma & precursors:**
  - The lens takes up a lot of room whereas the lens implant is flat
  - Removing the lens can help open the drainage pathway and cure this form of glaucoma
- **Open-angle glaucoma:**
  - Some patients with mild glaucoma can have eye pressure reduction afterwards



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# Minimally Invasive Glaucoma Surgery (MIGS)

- Refers to a group of surgeries that use microscopic-sized devices and smaller incisions to make glaucoma surgery safer
- In many cases, these surgeries are less effective at lowering eye pressure than the traditional glaucoma surgeries
- Can be combined with cataract surgery
- Usually for mild to moderate glaucoma

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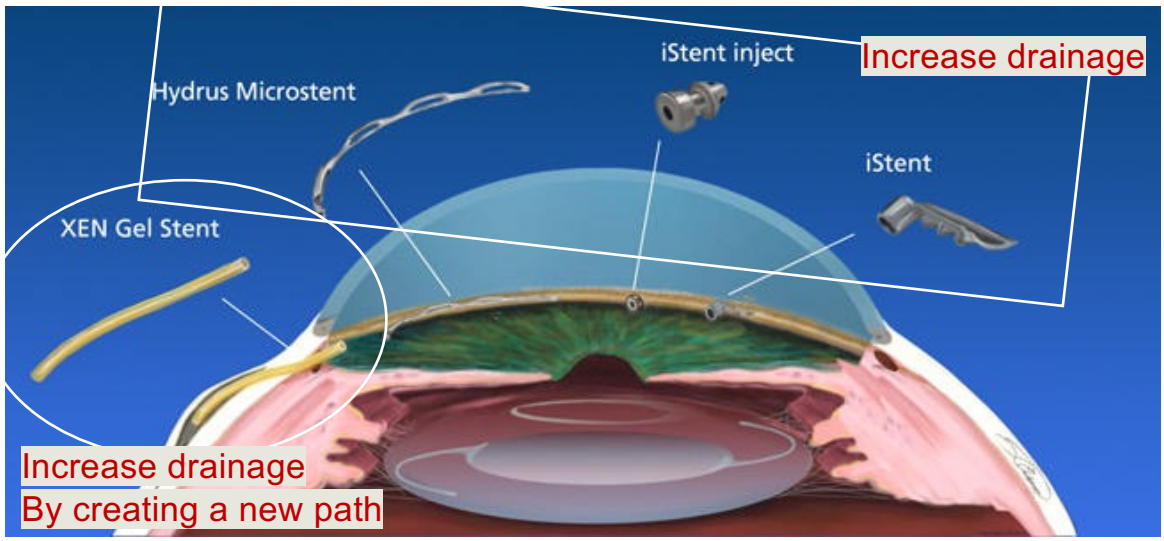
# Minimally Invasive Glaucoma Surgery (MIGS)




https://www.glaucoma.org/treatment/what-is-migs.php

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# Major (Traditional) Glaucoma Surgery

- **Goal:** Create a new drainage pathway
- Why? Natural drainage pathway is clogged and no longer working
- Advanced glaucoma when medications and lasers are not enough

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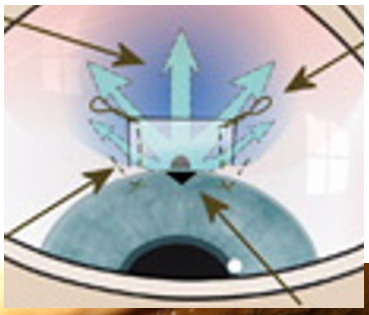
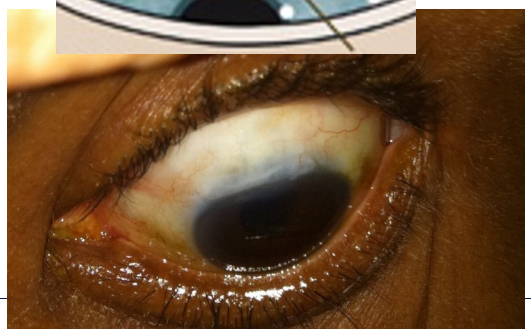
# Major (Traditional) Glaucoma Surgery

- **Trabeculectomy**
  - A tiny drainage hole is made in the sclera (white part of the eye)
  - Fluid flows into a small blister-like pocket called a bleb that sits underneath your upper eyelid





Photos courtesy of Yvonne Ou

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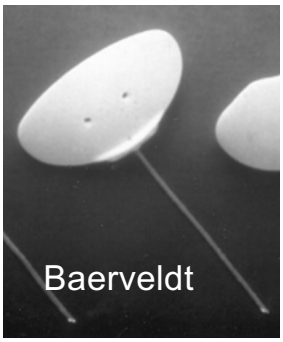
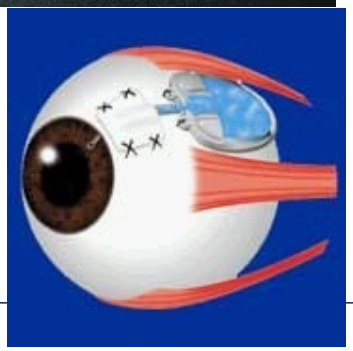
# Major (Traditional) Glaucoma Surgery

- **Glaucoma Drainage Implant (Tube shunt)**
  - A tiny drainage hole is made in the sclera (white part of the eye) and a tube is placed through it
  - Fluid flows into the area near the implant in the back of the eye.

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# Summary

- Goal of glaucoma treatment is to lower eye pressure
- Eye pressure can be lowered by:
  - Decreasing fluid production from the eye
  - Increasing fluid drainage from the eye
- Medications: Common types of eye drops and how to safely instill them
- Lasers: Most common lasers used in angle-closure and open-angle glaucoma
- Surgery: Types of surgeries that can be performed for glaucoma

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