Fill in the IOP equation below.

\[ IOP = \text{Aqueous Formation Rate (\( \mu \)L/min)} + \text{Outflow Facility (\( \mu \)L/min/mmHg)} + \text{Episcleral Venous Pressure (EVP)} \]
Fill in the IOP equation below.

\[
IOP = \frac{\text{Aqueous Formation Rate (\(\mu\text{L/min}\))}}{\text{Outflow Facility (\(\mu\text{L/min/mmHg}\))}} + \text{Episceral Venous Pressure (mmHg)}
\]
The Goldmann Equation

Fill in the IOP equation below. What is its eponymous name?

\[ IOP = \frac{\text{Aqueous Formation Rate (} \mu\text{L/min})}{\text{Outflow Facility (} \mu\text{L/min/mmHg})} + \text{Episceral Venous Pressure (mmHg)} \]
Fill in the IOP equation below. What is its eponymous name?
The Goldmann equation

\[ IOP = \frac{\text{Aqueous Formation Rate (\(\mu\text{L/min}\))}}{\text{Outflow Facility (\(\mu\text{L/min/mmHg}\))}} + \text{Episcleral Venous Pressure (mmHg)} \]
IOP = \frac{\text{Aqueous Formation Rate (\(\mu\text{L/min})}}{\text{Outflow Facility (\(\mu\text{L/min/mmHg})}} + \text{Episcleral Venous Pressure (mmHg)}

Note how the \(\mu\text{L/min}\) cancel, leaving IOP in mmHg

Fill in the IOP equation below. What is its eponymous name? The **Goldmann equation**
Fill in the IOP equation below. What is its eponymous name?
The Goldmann equation

\[ IOP = \frac{\text{Aqueous Formation Rate (\(\mu\text{L/min}\))}}{\text{Outflow Facility (\(\mu\text{L/min/mmHg}\))}} + \text{Episcleral Venous Pressure (mmHg)} \]

So to lower IOP, one must:

Three IOP-lowering maneuvers implied by the Goldmann equation

-- 

-- 

-- and/or and/or and/or
Fill in the IOP equation below. What is its eponymous name?
The **Goldmann equation**

\[ \text{IOP} = \frac{\text{Aqueous Formation Rate (}\mu\text{L/min})}{\text{Outflow Facility (}\mu\text{L/min/mmHg})} + \text{Episcleral Venous Pressure (mmHg)} \]

So to lower IOP, one must:

- decrease aqueous formation, *and/or*
- increase outflow facility, *and/or*
- decrease episcleral venous pressure
Fill in the IOP equation below. What is its eponymous name?

The Goldmann equation

\[ \text{IOP} = \frac{\text{Aqueous Formation Rate (} \mu\text{L/min})}{\text{Outflow Facility (} \mu\text{L/min/mmHg})} + \text{Episcleral Venous Pressure (mmHg)} \]

Let’s take a look at the process of aqueous formation…

So to lower IOP, one must:
--decrease aqueous formation, \textit{and/or}
--increase outflow facility, \textit{and/or}
--decrease episcleral venous pressure
Speaking of Aqueous Formation…
  - Where is it formed? What cells specifically?
Speaking of Aqueous Formation…

Where is it formed? What cells specifically?

pigmented vs nonpigmented epithelial cells of the portion of the

two words
two different words
Speaking of Aqueous Formation…

- Where is it formed? What cells specifically?
  Nonpigmented epithelial cells of the pars plicata portion of the ciliary body
Nonpigmented epithelium of the pars plicata of the ciliary body
(note also the presence of a pigmented epithelial layer)
Speaking of Aqueous Formation…

Where is it formed? What cells specifically?
Nonpigmented epithelial cells of the pars plicata portion of the ciliary body

The ciliary body has two parts. One is the pars plicata; what is the other?
Speaking of Aqueous Formation...

- Where is it formed? What cells specifically?
  - Nonpigmented epithelial cells of the pars plicata portion of the ciliary body

The ciliary body has two parts. One is the pars plicata; what is the other?
The pars plana
Ciliary body: One perspective, two questions
Ciliary body: One perspective, two questions

This part is the...Pars plicata

This part is the...Pars plana
Speaking of Aqueous Formation…

- Where is it formed? What cells specifically?
  Nonpigmented epithelial cells of the pars plicata portion of the ciliary body
- What is the normal rate of production? \(\#\#\, \mu\text{L/\text{min}}\)
Speaking of Aqueous Formation…

- Where is it formed? What cells specifically? Nonpigmented epithelial cells of the pars plicata portion of the ciliary body
- What is the normal rate of production? 2-3 μL/min
Speaking of Aqueous Formation…

- Where is it formed? What cells specifically? Nonpigmented epithelial cells of the pars plicata portion of the ciliary body
- What is the normal rate of production? 2-3 $\mu$L/min
- What is the average AC aqueous volume? $\text{#}\mu$L
Speaking of Aqueous Formation...

- Where is it formed? What cells specifically? Nonpigmented epithelial cells of the pars plicata portion of the ciliary body
- What is the normal rate of production? 2-3 μL/min
- What is the average AC aqueous volume? ~260 μL
Speaking of Aqueous Formation…

- Where is it formed? What cells specifically?
  Nonpigmented epithelial cells of the pars plicata portion of the ciliary body
- What is the normal rate of production? 2-3 μL/min
- What is the average AC aqueous volume? ~260 μL
- So, what percent of AC volume is formed per minute?
Speaking of Aqueous Formation...

Where is it formed? What cells specifically?
Nonpigmented epithelial cells of the pars plicata portion of the ciliary body

What is the normal rate of production? 2-3 μL/min

What is the average AC aqueous volume? ~260 μL

So, what percent of AC volume is formed per minute? ~1%
Speaking of Aqueous Formation...

- Where is it formed? What cells specifically?
  Nonpigmented epithelial cells of the pars plicata portion of the ciliary body

- What is the normal rate of production? 2-3 μL/min

- What is the average AC aqueous volume? ~260 μL

- So, what percent of AC volume is formed per minute? ~1%

- How long does it take to have a complete turnover of aqueous?
• Speaking of Aqueous Formation…
  • Where is it formed? What cells specifically?
    Nonpigmented epithelial cells of the pars plicata portion of the ciliary body
  • What is the normal rate of production? 2-3 μL/min
  • What is the average AC aqueous volume? ~260 μL
  • So, what percent of AC volume is formed per minute? ~1%
  • How long does it take to have a complete turnover of aqueous? About 100 minutes
Which three classes of meds decrease aqueous formation?
--
--
--

So to lower IOP, one must:
--decrease aqueous formation and/or
--increase outflow facility, and/or
--decrease episcleral venous pressure

Fill in the IOP equation below. What is its eponymous name?
The Goldmann equation
Which three classes of meds decrease aqueous formation?
- β blockers
- CAIs
- α agonists

So to lower IOP, one must:
- decrease aqueous formation
- increase outflow facility, and/or
- decrease episcleral venous pressure

The Goldmann equation

\[
IOP = \text{Aqueous Formation Rate (μL/min)} + \text{Episcleral Venous Pressure (mmHg)} - \text{Outflow Facility (μL/min/mmHg)}
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So to lower IOP, one must:
-- decrease aqueous formation
and/or
-- increase outflow facility, and/or
-- decrease episcleral venous pressure

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The Goldmann equation

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-- β blockers
-- CAIs
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Which two laser procedures decrease aqueous formation?
--
--
So to lower IOP, one must:

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\[ IOP = \frac{\text{Aqueous Formation Rate (} \mu \text{L/min)} \times \text{Outflow Facility (} \mu \text{L/min/mmHg)}}{\text{Episceral Venous Pressure (mmHg))}\]

Which three classes of meds decrease aqueous formation?
- \( \beta \) blockers
- CAIs
- \( \alpha \) agonists

Which two laser procedures decrease aqueous formation?
- Trans-scleral cyclophotocoagulation (TS-CPC)
- Endocyclophotocoagulation (ECP)
The Goldmann Equation

Cyclophotocoagulation (CPC)

Trans-scleral

Endoscopic
So to lower IOP, one must:

-- decrease aqueous formation, and/or
-- increase outflow facility, and/or
-- decrease episcleral venous pressure

**The Goldmann equation**

\[ IOP = \frac{\text{Aqueous Formation Rate (} \mu\text{L/min)} \times \text{Outflow Facility (} \mu\text{L/min/mmHg)} + \text{Episcleral Venous Pressure (mmHg)} \]

**What are the two types of outflow?**

--

--
So to lower IOP, one must:

--decrease aqueous formation, and/or
--increase outflow facility, and/or
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The Goldmann Equation

\[ \text{IOP} = \frac{\text{Aqueous Formation Rate (µL/min) \times Outflow }}{\text{Outflow Facility (µL/min/mmHg)}} + \text{Episcleral Venous Pressure (mmHg)} \]
So to lower IOP, one must:
--decrease aqueous formation, and/or
--increase outflow facility, and/or
--decrease episcleral venous pressure

What are the two types of outflow?
--Trabecular meshwork (TM)
--Uveoscleral (U/S)

One of these is referred to as ‘conventional outflow,’
the other, ‘unconventional.’ Which is which?
TM =
U/S =

The Goldmann Equation

Fill in the IOP equation below. What is its eponymous name?
The Goldmann equation
To lower IOP, one must:

--decrease aqueous formation, and/or
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TM = conventional
U/S = unconventional
So to lower IOP, one must:

- decrease aqueous formation,
- increase outflow facility,
- decrease episcleral venous pressure.

The Goldmann Equation

Fill in the IOP equation below. What is its eponymous name?

The Goldmann equation

\[ IOP = \frac{\text{Aqueous Formation Rate} \ (\mu L/min)}{\text{Outflow Facility} \ (\mu L/min/mmHg)} + \text{Episci\rlap{eral Venous Pressure} \ (mmHg)} \]

What are the two types of outflow?

- Trabecular meshwork (TM)
- Uveoscleral (U/S)

One of these is referred to as ‘pressure-dependent outflow,’ the other, ‘pressure-independent.’ Which is which?

- TM = conventional
- U/S = unconventional

One of these is referred to as ‘conventional outflow,’ the other, ‘unconventional.’ Which is which?

- TM = conventional
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Fill in the IOP equation below. What is its eponymous name?

The Goldmann equation

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\[ IOP = \text{Aqueous Formation Rate} (\mu L/min) + \frac{\text{Outflow Facility} (\mu L/min/mmHg)}{\text{Episceral Venous Pressure (mmHg)}} \]

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--Uveoscleral (U/S)

One of these is referred to as ‘pressure-dependent outflow,’ the other, ‘pressure-independent.’ Which is which?

TM = conventional = pressure-dependent
U/S = unconventional = pressure-independent

What does it mean to say outflow is ‘pressure-dependent’ or ‘pressure-independent’?
It refers to whether the rate of outflow is influenced by IOP. Take a closer look at the denominator of the Goldmann equation. Note that, in it, outflow is a function of IOP (hence the mmHg in the term). For pressure-dependent outflow (ie, outflow via the TM), increases in IOP result in increased outflow facility. On the other hand, changes in IOP do not affect U/S outflow—it is pressure-independent. From this, it can be inferred (correctly) that Dr. Goldmann was unaware of uveoscleral outflow at the time he developed his equation.
So to lower IOP, one must:

--decrease aqueous formation, and/or
--increase outflow facility, and/or
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U/S = unconventional
So to lower IOP, one must:
--decrease aqueous formation,
and/or
--increase outflow facility,
and/or
--decrease episcleral venous pressure.

Fill in the IOP equation below. What is its eponymous name?

The Goldmann Equation

IOP = Aqueous Formation Rate (μL/min) / Outflow Facility (μL/min/mmHg) + Episcleral Venous Pressure (mmHg)

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--Trabecular meshwork (TM)
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and/or

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So to lower IOP, one must:

--decrease aqueous formation,

and/or

--increase outflow facility,

and/or

--decrease episcleral venous pressure

Fill in the IOP equation below. What is its eponymous name?

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IOP = \frac{\text{Aqueous Formation Rate (}\mu\text{L/min})}{\text{Outflow Facility (}\mu\text{L/min/mmHg})} + \text{Episceral Venous Pressure (mmHg)}
\]

One of these is referred to as 'pressure-dependent outflow,' the other, 'pressure-independent.' Which is which?

- TM = conventional = pressure-dependent
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Let's take a look at the process of aqueous outflow…

One of these is referred to as 'conventional outflow,' the other, 'unconventional.' Which is which?

- TM = conventional
- U/S = unconventional
And Speaking of Aqueous Outflow…

What are the major structures aqueous encounters along the conventional outflow pathway?

- Start here—name the first structure crossed by aqueous on the way out via the conventional pathway

- The Goldmann Equation

- TM
- Schlemm's canal
- Episcleral veins
- Anterior ciliary and superior ophthalmic veins
- Cavernous sinus
And Speaking of Aqueous Outflow...
- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episcleral veins
  - Anterior ciliary and superior ophthalmic veins
  - Cavernous sinus

The Goldmann Equation
The Goldmann Equation

Canal of Schlemm (CS) and trabecular meshwork (TM) are located in anterior crotch of scleral spur (SS). Longitudinal ciliary muscle (CM) attaches to posterior aspect of spur.

The trabecular meshwork (TM)
The Goldmann Equation

And Speaking of Aqueous Outflow...

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM

The TM has three layers. From innermost (ie, nearest the anterior chamber) to outermost, what are they?

- 
- 
-
And Speaking of Aqueous Outflow…

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM

The TM has three layers. From innermost (i.e., nearest the anterior chamber) to outermost, what are they?
- Uveal layer
- Corneoscleral layer
- Juxtacanalicular layer
The Goldmann Equation

TM: Layers
And Speaking of Aqueous Outflow…

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM

The TM has three layers. From innermost (ie, nearest the anterior chamber) to outermost, what are they?
- Uveal layer?
- Corneoscleral layer?
- Juxtacanalicular layer?

Of the three, which is the major site of resistance to aqueous outflow?
And Speaking of Aqueous Outflow…

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM

The TM has three layers. From innermost (ie, nearest the anterior chamber) to outermost, what are they?
- Uveal layer
- Corneoscleral layer
- Juxtacanalicular layer

Of the three, which is the major site of resistance to aqueous outflow?
The juxtacanalicular layer

The Goldmann Equation
And Speaking of Aqueous Outflow...

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Next structure—a space, of sorts

Q/A

The Goldmann Equation
And Speaking of Aqueous Outflow...

What are the major structures aqueous encounters along the conventional outflow pathway?

- The TM
- Schlemm’s canal
The Goldmann Equation

Schlemm’s canal
And Speaking of Aqueous Outflow...

What are the major structures aqueous encounters along the conventional outflow pathway?

- The TM
- Schlemm’s canal
- Vascular structures

The Goldmann Equation
Q/A

And Speaking of Aqueous Outflow...

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episcleral veins

The Goldmann Equation
Episceral veins
And Speaking of Aqueous Outflow...
- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episcleral veins
  - Next, more and larger vascular structures
And Speaking of Aqueous Outflow...

What are the major structures aqueous encounters along the conventional outflow pathway?

- The TM
- Schlemm’s canal
- Episcleral veins
- Anterior ciliary vein...
The Goldmann Equation

Anterior ciliary vein
Q/A

And Speaking of Aqueous Outflow…

What are the major structures aqueous encounters along the conventional outflow pathway?

- The TM
- Schlemm’s canal
- Episcleral veins
- Anterior ciliary vein…and superior ophthalmic vein
The Goldmann Equation

Superior ophthalmic vein
And Speaking of Aqueous Outflow...

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episcleral veins
  - Anterior ciliary vein…and superior ophthalmic vein

Finally, a major vascular space
And Speaking of Aqueous Outflow...

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episcleral veins
  - Anterior ciliary vein...and superior ophthalmic vein
  - Cavernous sinus

The Goldmann Equation
The Goldmann Equation

Cavernous sinus
And Speaking of Aqueous Outflow...

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episcleral veins
  - Anterior ciliary vein...and superior ophthalmic vein
  - Cavernous sinus

- What are the major structures aqueous encounters along the unconventional outflow pathway?
  - Start here—name the first structure crossed by aqueous on the way out via the unconventional pathway
And Speaking of Aqueous Outflow...

What are the major structures aqueous encounters along the conventional outflow pathway?
- The TM
- Schlemm’s canal
- Episcleral veins
- Anterior ciliary vein...and superior ophthalmic vein
- Cavernous sinus

What are the major structures aqueous encounters along the unconventional outflow pathway?
- Ciliary body

And next, a space(s) associated with the CB
And Speaking of Aqueous Outflow...

What are the major structures aqueous encounters along the conventional outflow pathway?
- The TM
- Schlemm’s canal
- Episceral veins
- Anterior ciliary vein...and superior ophthalmic vein
- Cavernous sinus

What are the major structures aqueous encounters along the unconventional outflow pathway?
- Ciliary body
- Supraciliary/suprachoroidal spaces

And next, another major component of the eye
Q/A

And Speaking of Aqueous Outflow...

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episceral veins
  - Anterior ciliary vein…and superior ophthalmic vein
  - Cavernous sinus

- What are the major structures aqueous encounters along the unconventional outflow pathway?
  - Ciliary body
  - Supraciliary/suprachoroidal spaces
  - Sclera

  And finally…another major component of the eye

The Goldmann Equation
And Speaking of Aqueous Outflow...

What are the major structures aqueous encounters along the conventional outflow pathway?
- The TM
- Schlemm’s canal
- Episceral veins
- Anterior ciliary vein…and superior ophthalmic vein
- Cavernous sinus

What are the major structures aqueous encounters along the unconventional outflow pathway?
- Ciliary body
- Supraciliary/suprachoroidal spaces
- Sclera
- Conjunctiva

The Goldmann Equation
And Speaking of Aqueous Outflow…

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episceral veins
  - Anterior ciliary vein…and superior ophthalmic vein
  - Cavernous sinus

- What are the major structures aqueous encounters along the **unconventional outflow pathway**?

  - What proportion of egressed aqueous leaves via the unconventional pathway?

  - Decrease
And Speaking of Aqueous Outflow...

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episcleral veins
  - Anterior ciliary vein...and superior ophthalmic vein
  - Cavernous sinus

- What are the major structures aqueous encounters along the unconventional outflow pathway?
  

What proportion of egressed aqueous leaves via the unconventional pathway?
- The most recent version of the BCSC Glaucoma book in my possession puts it at 5-15%, but acknowledges that it may be higher than that
And Speaking of Aqueous Outflow…

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episceral veins
  - Anterior ciliary vein…and superior ophthalmic vein
  - Cavernous sinus

- What are the major structures aqueous encounters along the **unconventional outflow pathway**?
  
  - *What proportion of egressed aqueous leaves via the unconventional pathway?*
    - The most recent version of the BCSC *Glaucoma* book in my possession puts it at 5-15%, but acknowledges that it may be higher than that
  - *Does the proportion leaving via this pathway increase, or decrease with age?*
And Speaking of Aqueous Outflow...

- What are the major structures aqueous encounters along the conventional outflow pathway?
  - The TM
  - Schlemm’s canal
  - Episceral veins
  - Anterior ciliary vein…and superior ophthalmic vein
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  - What proportion of egressed aqueous leaves via the unconventional pathway?
    - The most recent version of the BCSC *Glaucoma* book in my possession puts it at 5-15%, but acknowledges that it may be higher than that
  - Does the proportion leaving via this pathway increase, or decrease with age?
    - Decrease
So to lower IOP, one must:

- decrease aqueous formation, and/or
- increase outflow facility, and/or
- decrease episcleral venous pressure

The Goldmann Equation

\[ IOP = \frac{\text{Aqueous Formation Rate} (\mu\text{L/min})}{\text{Outflow Facility} (\mu\text{L/min/mmHg}) + \text{Episcleral Venous Pressure} (\text{mmHg})} \]
So to lower IOP, one must:

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Fill in the IOP equation below. What is its eponymous name?

The Goldmann equation

\[ IOP = \frac{\text{Aqueous Formation Rate (μL/min)}}{\text{Outflow Facility (μL/min/mmHg)}} + \text{Episcleral Venous Pressure (mmHg)} \]

What are the two types of outflow?

--Trabecular meshwork (TM)
--Uveoscleral (U/S)

Which class of meds increases TM outflow?
Parasympathomimetics, ie, pilo
So to lower IOP, one must:

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--increase outflow facility, and/or
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Fill in the IOP equation below. What is its eponymous name?

The Goldmann Equation

IOP = \[ \text{Aqueous Formation Rate (μL/min)} \times \text{Outflow Facility (μL/min/mmHg)} + \text{Episcleral Venous Pressure (mmHg)} \]

What laser procedure enhances TM outflow?

Laser trabeculoplasty

Microinvasive glaucoma surgery (MIGS) to enhance TM outflow takes one of three general approaches. What are they?

--Disruption or removal of a portion of the TM
--Creation of an artificial conduit through it with an implanted bypass stent
--Enlargement of Schlemm's canal via cannulation and dilation

What are the two types of outflow?

--Trabecular meshwork (TM)
--Uveoscleral (U/S)

Which class of meds increases TM outflow?

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So to lower IOP, one must:

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and/or

--increase outflow facility,

and/or

--decrease episcleral venous pressure.

**The Goldmann Equation**

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What are the two types of outflow?

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Which class of meds increases TM outflow?

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Laser trabeculoplasty
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Fill in the IOP equation below. What is its eponymous name?

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The Goldmann Equation

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-- Uveoscleral (U/S)

Which class of meds increases TM outflow?
Parasympathomimetics, ie, pilo

Laser trabeculoplasty

Microinvasive glaucoma surgery (MIGS) to enhance TM outflow takes one of three general approaches. What are they?
-- Disruption or removal of a portion of the TM
-- Creation of an artificial conduit through it with an implanted bypass stent
-- Enlargement of Schlemm’s canal via cannulation and dilation
So to lower IOP, one must:
- decrease aqueous formation, and/or
- increase outflow facility, and/or
- decrease episcleral venous pressure

Fill in the IOP equation below. What is its eponymous name?
The Goldmann Equation

The Goldmann Equation

\[ \text{IOP} = \text{Aqueous Formation Rate (µL/min)} + \text{Outflow Facility (µL/min/mmHg)} + \text{Episcleral Venous Pressure (mmHg)} \]

What are the two types of outflow?
- Trabecular meshwork (TM)
- Uveoscleral (U/S)

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What laser procedure enhances TM outflow?
Laser trabeculoplasty

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$$IOP = \text{Aqueous Formation Rate (\mu L/min)} + \text{Outflow Facility (\mu L/min/mmHg)} + \text{Episcleral Venous Pressure (mmHg)}$$

**What are the two types of outflow?**
- Trabecular meshwork (TM)
- Uveoscleral (U/S)

**Which class of meds has as its main IOP-lowering effect an increase in U/S outflow?**
- Prostaglandin analogues

--decrease aqueous formation, and/or
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Prostaglandin analogues

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Prostaglandin analogues

Is there a MIGS procedure that enhances U/S outflow?

--- decrease aqueous formation, and/or
--- decrease episcleral venous pressure
--- increase outflow facility
So to lower IOP, one must:
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and/or
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Fill in the IOP equation below. What is its eponymous name? The **Goldmann equation**

\[
IOP = \text{Aqueous Formation Rate (} \mu\text{L/min)} \quad + \quad \text{Outflow Facility (} \mu\text{L/min/mmHg)} \quad + \quad \text{Episcleral Venous Pressure (mmHg)}
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--Trabecular meshwork (TM)
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Which class of meds has as its main IOP-lowering effect an increase in U/S outflow?
Prostaglandin analogues

Is there a MIGS procedure that enhances U/S outflow?
As of this writing, no. An implantable bypass device that shunted aqueous into the suprachoroidal space was available for a time, but has since been withdrawn owing to corneal complications associated with it.
IOP = \frac{\text{Aqueous Formation Rate (\mu L/min)}}{\text{Outflow Facility (\mu L/min/mmHg)}} + \text{Episceral Venous Pressure (mmHg)}

**The Goldmann equation**

*Fill in the IOP equation below. What is its eponymous name?*

The Goldmann equation

*Are there medical options for lowering EVP?*

*Note how the \mu L/min cancel, leaving IOP in mmHg*
Fill in the IOP equation below. What is its eponymous name?

The Goldmann equation

\[ \text{IOP} = \frac{\text{Aqueous Formation Rate (}\mu\text{L/min})}{\text{Outflow Facility (}\mu\text{L/min/mmHg})} + \text{Episcleral Venous Pressure (mmHg)} \]

Are there medical options for lowering EVP?
One selective \(\alpha\)-agonist—apracaclidine—lowers EVP to some extent.

Note how the \(\mu\text{L/min}\) cancel, leaving IOP in mmHg.
Fill in the IOP equation below. What is its eponymous name?

The **Goldmann equation**

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So to lower IOP, one must:

- decrease aqueous formation, *and/or*
- increase outflow facility, *and/or*
- decrease episcleral venous pressure

*Important IOP-lowering maneuver not implied by the Goldmann equation*

... *and/or* 
three words

*with a* 
one word

*agent*
Fill in the IOP equation below. What is its eponymous name?

The Goldmann equation

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So to lower IOP, one must:

- decrease aqueous formation, and/or
- increase outflow facility, and/or
- decrease episcleral venous pressure

…and/or dehydrate the vitreous with a hyperosmotic agent
Fill in the IOP equation below. What is its eponymous name?

The **Goldmann equation**

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IOP = \frac{\text{Aqueous Formation Rate (\(\mu\text{L/min}\))}}{\text{Outflow Facility (\(\mu\text{L/min/mmHg}\))}} + \text{Episcleral Venous Pressure (mmHg)}
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Important IOP-lowering maneuver not implied by the Goldmann equation

... and/or dehydrate the vitreous

Which hyperosmotic agent is used most often?

**Mannitol**
The Goldmann Equation

Fill in the IOP equation below. What is its eponymous name?

The Goldmann equation

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Three IOP-lowering maneuvers implied by the Goldmann equation

Important IOP-lowering maneuver not implied by the Goldmann equation

...and/or dehydrate the vitreous

Which hyperosmotic agent is used most often?

Mannitol