Q

- **Childhood Glaucoma: *Medical* Treatment**
  - **Miotics?**
    - yes or no
    - in congenital (why/why not)
Childhood Glaucoma: *Medical* Treatment

- Miotics?
  - **No** in congenital (ineffective)
Childhood Glaucoma: *Medical* Treatment

- Miotics?
  - No in congenital (ineffective)
  - Yes or no in JOAG

(Juvenile open-angle glaucoma)
Childhood Glaucoma: *Medical* Treatment

- **Miotics?**
  - *No* in congenital *(ineffective)*
  - *Yes* in JOAG
Childhood Glaucoma: *Medical* Treatment

- **Miotics?**
  - No in congenital *(ineffective)*
  - Yes in JOAG

- **β blockers?** Yes, *but*...
  - Use % solution (not the usual % formulation)
Childhood Glaucoma: *Medical* Treatment

- **Miotics?**
  - *No* in congenital (ineffective)
  - *Yes* in JOAG

- **β blockers? Yes, *but*…**
  - Use **.25%** solution (not the usual **.5%** formulation)
Childhood Glaucoma: Medical Treatment

- **Miotics?**
  - **No** in congenital (ineffective)
  - **Yes** in JOAG

- **β blockers? Yes, but...**
  - Use .25% solution (not the usual .5% formulation)
  - Avoid if history of systemic issue or if the infant is small.
Childhood Glaucoma: Medical Treatment

- Miotics?
  - **No** in congenital (ineffective)
  - **Yes** in JOAG

- **β blockers? Yes, but…**
  - Use **.25%** solution (not the usual **.5%** formulation)
  - Avoid if history of bronchospasm or if the infant is very small
Childhood Glaucoma: *Medical* Treatment

- Miotics?
  - No in congenital (ineffective)
  - Yes in JOAG

- β blockers? Yes, *but*...
  - Use .25% solution (not the usual .5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

On a (very) related note: β blockers should be avoided in breastfeeding mothers, because their metabolites get concentrated in breast milk.
Childhood Glaucoma: *Medical* Treatment

- Miotics?
  - **No** in congenital (ineffective)
  - **Yes** in JOAG

- **β blockers?** Yes, *but*…
  - Use .25% solution (not the usual .5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

On a (very) related note: β blockers should be avoided in nursing mothers, because their metabolites get concentrated in breast milk.
Childhood Glaucoma: Medical Treatment

- **Miotics?**
  - **No** in congenital (ineffective)
  - **Yes** in JOAG

- **β blockers? Yes, but...**
  - Use **.25%** solution (not the usual **.5%** formulation)
  - Avoid if history of **bronchospasm** or if the infant is **very small**

- **CAI... (Carbonic anhydrase inhibitors)**
  - **PO? Yes**, but monitor for:
    - side effect 1
    - side effect 2
    - side effect 3
Childhood Glaucoma: *Medical* Treatment

- **Miotics?**
  - *No* in congenital (ineffective)
  - *Yes* in JOAG

- **β blockers? Yes, but…**
  - Use 25% solution (not the usual 5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- **CAI…**
  - *PO? Yes*, but monitor for weight loss, lethargy, and acidosis
Childhood Glaucoma: *Medical* Treatment

- **Miotics?**
  - **No** in congenital (ineffective)
  - **Yes** in JOAG

- **β blockers? Yes, but…**
  - Use **0.25%** solution (not the usual **0.5%** formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- **CAI…**
  - **PO? Yes**, but monitor for weight loss, lethargy, and acidosis
  - **Topical?** yes or no
Childhood Glaucoma: *Medical* Treatment

- **Miotics?**
  - **No** in congenital (ineffective)
  - **Yes** in JOAG

- **β blockers? Yes, but...**
  - Use 0.25% solution (not the usual 0.5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- **CAI...**
  - **PO? Yes**, but monitor for weight loss, lethargy, and acidosis
  - **Topical? Yes**
Childhood Glaucoma: *Medical* Treatment

- **Miotics?**
  - No in congenital *(ineffective)*
  - Yes in JOAG

- **β blockers? Yes, but…**
  - Use **25%** solution (not the usual **.5%** formulation)
  - Avoid if history of **bronchospasm** or if the infant is very small

- **CAI…**
  - *PO? Yes,* but monitor for **weight loss, lethargy,** and **acidosis**
  - *Topical? Yes*

- **α/β agonists (epinephrine/dipivefrin)?** Yes or no (Why/why not)
Childhood Glaucoma: Medical Treatment

- Miotics?
  - No in congenital (ineffective)
  - Yes in JOAG

- β blockers? Yes, but...
  - Use .25% solution (not the usual .5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- CAI...
  - PO? Yes, but monitor for weight loss, lethargy, and acidosis
  - Topical? Yes
  - α/β agonists (epinephrine/dipivefrin)? No (ineffective)
Childhood Glaucoma: *Medical* Treatment

- **Miotics?**
  - **No** in congenital (ineffective)
  - **Yes** in JOAG

- **β blockers?** *Yes, but*...
  - Use 25% solution (not the usual 5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- **CAI...**
  - *PO? Yes*, but monitor for weight loss, lethargy, and acidosis
  - *Topical? Yes*

- **α/β agonists (epinephrine/dipivefrin)?** *No* (ineffective)

- **α₂ agonists?** *No*--effective but has severe side effects including hypotonia and significant...
Childhood Glaucoma: Medical Treatment

- Miotics?
  - No in congenital (ineffective)
  - Yes in JOAG

- β blockers? Yes, but...
  - Use 25% solution (not the usual .5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- CAI...
  - PO? Yes, but monitor for weight loss, lethargy, and acidosis
  - Topical? Yes

- α/β agonists (epinephrine/dipivefrin)? No (ineffective)

- α2 agonists? No--effective but has severe side effects including hypotonia and significant CNS depression
Childhood Glaucoma: Medical Treatment

- Miotics?
  - **No** in congenital (ineffective)
  - **Yes** in JOAG

- **β** blockers? **Yes, but**...
  - Use .25% solution (not the usual .5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- CAI...
  - **PO**? **Yes**, but monitor for weight loss, lethargy, and acidosis
  - **Topical**? **Yes**

- **α/β** agonists (epinephrine/dipivefrin)? **No** (ineffective)

- **α₂** agonists? **No**—effective but has severe side effects including hypotonia and significant CNS depression

**At what age is it safe to use α₂ agonists in the management of childhood glaucoma?**
Childhood Glaucoma: *Medical* Treatment

- Miotics?
  - No in congenital (ineffective)
  - Yes in JOAG
- **β** blockers? Yes, *but*…
  - Use .25% solution (not the usual .5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small
- CAI…
  - *PO? Yes*, but monitor for weight loss, lethargy, and acidosis
  - *Topical? Yes*
- **α/β** agonists (epinephrine/dipivefrin)? No (ineffective)
- **α₂** agonists? No--effective but has severe side effects including hypotonia and significant CNS depression

At what age is it safe to use α₂ agonists in the management of childhood glaucoma? There is no hard-and-fast rule, but probably not before age 8 years or so
Childhood Glaucoma: Medical Treatment

- Miotics?
  - No in congenital (ineffective)
  - Yes in JOAG

- β blockers? Yes, but...
  - Use .25% solution (not the usual .5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- CAI...
  - PO? Yes, but monitor for weight loss, lethargy, and acidosis
  - Topical? Yes

- α/β agonists (epinephrine/dipivefrin)? No (ineffective)
- α2 agonists? No--effective but has severe side effects including hypotonia and significant CNS depression

What specific and dreaded manifestation of CNS depression are we worried about here?
Childhood Glaucoma: Medical Treatment

- Miotics?
  - No in congenital (ineffective)
  - Yes in JOAG

- β blockers? Yes, but...
  - Use .25% solution (not the usual .5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- CAI...
  - PO? Yes, but monitor for weight loss, lethargy, and acidosis
  - Topical? Yes

- α/β agonists (epinephrine/dipivefrin)? No (ineffective)
- α₂ agonists? No--effective but has severe side effects including hypotonia and significant CNS depression

*What specific and dreaded manifestation of CNS depression are we worried about here?* 
Apnea
**Childhood Glaucoma: Medical Treatment**

- **Miotics?**
  - No in congenital (ineffective)
  - Yes in JOAG

- **β blockers? Yes, but…**
  - Use 25% solution (not the usual 5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- **CAI…**
  - PO? Yes, but monitor for weight loss, lethargy, and acidosis
  - Topical? Yes

- **α/β agonists (epinephrine/dipivefrin)? No (ineffective)**

- **α₂ agonists? No--effective but has severe side effects including hypotonia and significant CNS depression**

- **Prostaglandin analogue?** Yes or no (but... three words)
Childhood Glaucoma: Medical Treatment

- Miotics?
  - **No** in congenital (ineffective)
  - **Yes** in JOAG

- **β blockers? Yes, but…**
  - Use **0.25%** solution (not the usual **0.5%** formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- **CAI…**
  - **PO? Yes**, but monitor for weight loss, lethargy, and acidosis
  - **Topical? Yes**

- α/β agonists (epinephrine/dipivefrin)? **No** (ineffective)

- α₂ agonists? **No**--effective but has severe side effects including hypotonia and significant CNS depression

- Prostaglandin analogue? **Yes** (but effect is inconsistent)
Childhood Glaucoma: *Medical* Treatment

- **Miotics?**
  - No in congenital (ineffective)
  - Yes in JOAG

- **β blockers?**
  - Yes, but…
  - Use .25% solution (not the usual .5% formulation)
  - Avoid if history of bronchospasm or if the infant is very small

- **CAI?**

- **α/β agonists?**
  - No--ineffective
  - α₂ agonists?--effective but has severe side effects including hypotonia and significant CNS depression

- **Prostaglandin analogue?**

*Cutting to the chase--which med should be first-line selection in an infant or child?*
Childhood Glaucoma: *Medical* Treatment

- **Miotics**
  - β blockers 0.25
  - CAI
  - α/β agonists
  - α₂ agonists
  - Prostaglandin analogue

Cutting to the chase--which med should be first-line selection in an infant or child? As a general rule, timolol 0.25 would probably be the best choice
Childhood Glaucoma: *Medical Treatment*

- Miotics

  - β blockers 0.25
    - *Cutting to the chase--which med should be first-line selection in an infant or child? As a general rule, timolol 0.25 would probably be the best choice*

  - CAI

  - α/β agonists
  - α₂ agonists

  - Prostaglandin analogue

*For what other special population does this general rule apply?*
Childhood Glaucoma: *Medical* Treatment

- **Miotics**
  - **β blockers 0.25**

  Cutting to the chase--which med should be first-line selection in an infant or child? As a general rule, timolol 0.25 would probably be the best choice

- **CAI**

  For what other special population does this general rule apply?

- **α/β agonists**

- **α₂ agonists**

- Prostaglandin analogue
Childhood Glaucoma: Treatment

- Medical treatment is a stop-gap measure

- Surgical intervention is treatment of choice for congenital glaucoma and most 1o developmental glaucoma

- Angle surgery preferred
  - If cornea clear: Goniotomy
  - If cornea cloudy: Trabeculotomy
    - Note: this is not the same as trabecul
    - ectomy

- If angle surgery fails, trab or shunt is indicated

- Try angle surgery x 2 before changing tactics
Childhood Glaucoma: Treatment

- Medical treatment is a stop-gap measure

- Surgical intervention is treatment of choice for congenital glaucoma and most 1o developmental glaucoma
  - Angle surgery preferred
  - If cornea clear: Goniotomy
  - If cornea cloudy: Trabeculotomy
    - Note: this is not the same as trabeculotomy
  - If angle surgery fails, trab or shunt is indicated
  - Try angle surgery x 2 before changing tactics
Childhood Glaucoma: Treatment

- *Medical* treatment is a **stop-gap** measure
- *Surgical* intervention is treatment of choice for congenital glaucoma and most developmental glaucoma

- If cornea clear: Goniotomy
- If cornea cloudy: Trabeculotomy

Note: this is **not** the same as trabeculotomy

If angle surgery fails, trab or shunt is indicated

Try angle surgery x 2 before changing tactics
Childhood Glaucoma: Treatment

- *Medical* treatment is a stop-gap measure
- *Surgical* intervention is treatment of choice for congenital glaucoma and most 1\textsuperscript{o} developmental glaucoma
Childhood Glaucoma: Treatment

- *Medical* treatment is a **stop-gap** measure
- *Surgical* intervention is treatment of choice for **congenital** glaucoma and most **1° developmental** glaucoma
- Angle surgery preferred
Childhood Glaucoma: Treatment

- Medical treatment is a stop-gap measure
- Surgical intervention is treatment of choice for congenital glaucoma and most first 
  developmental 
  glaucoma
- Angle surgery preferred
Childhood Glaucoma: Treatment

- *Medical* treatment is a stop-gap measure
- *Surgical* intervention is treatment of choice for [congenital](#) glaucoma and most [1° developmental](#) glaucoma
- *Angle* surgery preferred
  - If cornea clear:
Childhood Glaucoma: Treatment

- *Medical* treatment is a stop-gap measure
- *Surgical* intervention is treatment of choice for congenital glaucoma and most 1º developmental glaucoma
- Angle surgery preferred
  - If cornea clear: *Goniotomy*
Childhood Glaucoma: Treatment

- Medical treatment is a stop-gap measure
- Surgical intervention is treatment of choice for congenital glaucoma and most 1° developmental glaucoma
- Angle surgery preferred
  - If cornea clear: Goniotomy
  - If cornea cloudy: Another surgical technique
**Childhood Glaucoma: Treatment**

- *Medical* treatment is a **stop-gap** measure
- *Surgical* intervention is treatment of choice for **congenital** glaucoma and most **1st** **developmental** glaucoma
- **Angle** surgery preferred
  - If cornea clear: *Goniotomy*
  - If cornea cloudy: *Trabeculotomy*
Childhood Glaucoma: Treatment

- *Medical* treatment is a **stop-gap** measure.
- *Surgical* intervention is treatment of choice for congenital glaucoma and most 1<sup>o</sup> developmental glaucoma.
- **Angle** surgery preferred
  - If cornea clear: *Goniotomy*
  - If cornea cloudy: *Trabeculotomy*
    - Note: this is *not* the same as trabeculotony.
Childhood Glaucoma: Treatment

- Medical treatment is a stop-gap measure
- Surgical intervention is treatment of choice for congenital glaucoma and most primary developmental glaucoma
- Angle surgery preferred
  - If cornea clear: Goniotomy
  - If cornea cloudy: Trabeculotomy
    - Note: this is not the same as trabeculectomy
Childhood Glaucoma: Treatment

- Medical treatment is a stop-gap measure
- Surgical intervention is treatment of choice for congenital glaucoma and most 1o developmental glaucoma
- Angle surgery preferred
  - If cornea clear: **Goniotomy**
  - If cornea cloudy: **Trabeculotomy**
    - Note: this is *not* the same as trabeculectomy

The goal of surgical intervention in congenital glaucoma is to form a direct pathway from the anterior chamber through the angle structures into Schlemm’s canal. **Goniotomy** is a procedure in which the TM is incised with a scalpel. Goniotomy is performed under direct visualization via a surgical goniolens, which is why the cornea must be clear to perform this procedure. In contrast, **trabeculotomy** involves accessing Schlemm’s canal via an external, trans-scleral approach, cannulating it, and then tearing through it to form a conduit between the anterior chamber and Schlemm’s canal. Because the surgical approach is external, trabeculotomy does not require a clear cornea.
Childhood Glaucoma: Treatment

- Medical treatment is a **stop-gap** measure
- Surgical intervention is treatment of choice for **congenital** glaucoma and most **1° developmental** glaucoma
- Angle surgery preferred
  - If cornea clear: Goniotomy
  - If cornea cloudy: Trabeculotomy
    - Note: this is *not* the same as trabeculectomy
- If angle surgery fails, **2 other surgeries** is indicated
Childhood Glaucoma: Treatment

- Medical treatment is a stop-gap measure
- Surgical intervention is treatment of choice for congenital glaucoma and most 1\textsuperscript{st} developmental glaucoma
- Angle surgery preferred
  - If cornea clear: Goniotomy
  - If cornea cloudy: Trabeculotomy
    - Note: this is not the same as trabeculectomy
- If angle surgery fails, trab or shunt is indicated
Childhood Glaucoma: Treatment

- *Medical* treatment is a stop-gap measure
- *Surgical* intervention is treatment of choice for congenital glaucoma and most 1° developmental glaucoma
- **Angle** surgery preferred
  - If cornea clear: *Goniotomy*
  - If cornea cloudy: *Trabeculotomy*
    - Note: this is *not* the same as trabeculectomy
- If angle surgery fails, *trab or shunt* is indicated
  - Try angle surgery 4 times before changing tactics
Childhood Glaucoma: Treatment

- *Medical* treatment is a **stop-gap** measure
- *Surgical* intervention is treatment of choice for **congenital** glaucoma and most **1° developmental** glaucoma
- **Angle** surgery preferred
  - If cornea clear: **Goniotomy**
  - If cornea cloudy: **Trabeculotomy**
    - Note: this is *not* the same as **trabeculectomy**
- If angle surgery fails, **trab or shunt** is indicated
  - Try angle surgery *x 2* before changing tactics