Where does leukemia rank among childhood malignancies in terms of incidence?
Pediatric Leukemia and the Eye

Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.
Where does leukemia rank among childhood malignancies in terms of incidence?

It is #1 by a mile

Leukemia accounts for what proportion of childhood malignancies?
Pediatric Leukemia and the Eye

Where does leukemia rank among childhood malignancies in terms of incidence?

It is #1 by a mile

Leukemia accounts for what proportion of childhood malignancies?
About 1/3
Where does leukemia rank among childhood malignancies in terms of incidence?

*It is #1 by a mile*

Leukemia accounts for what proportion of childhood malignancies?
About 1/3

How many new cases of childhood leukemia occur every year in the US?
Where does leukemia rank among childhood malignancies in terms of incidence?

It is #1 by a mile

Leukemia accounts for what proportion of childhood malignancies?
About 1/3

How many new cases of childhood leukemia occur every year in the US?
About 4000
Where does leukemia rank among childhood malignancies in terms of incidence?
It is #1 by a mile

Leukemia accounts for what proportion of childhood malignancies?
About 1/3

How many new cases of childhood leukemia occur every year in the US?
About 4000

To put this in perspective: How many new cases of retinoblastoma are there every year in the US?
Pediatric Leukemia and the Eye

Where does leukemia rank among childhood malignancies in terms of incidence?

It is #1 by a mile

Leukemia accounts for what proportion of childhood malignancies?

About 1/3

How many new cases of childhood leukemia occur every year in the US?

About 4000

To put this in perspective: How many new cases of retinoblastoma are there every year in the US?

Only 200-300 or so
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous?
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic

Does it tend to be acute, or chronic?
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile

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Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic

Does it tend to be acute, or chronic? Acute

Putting it all together, what sort of leukemia occurs in most pediatric cases?
Pediatric Leukemia and the Eye

Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous?

Lymphocytic

Does it tend to be acute, or chronic?

Acute

Putting it all together, what sort of leukemia occurs in most pediatric cases?

Acute lymphocytic (ALL)
Pediatric Leukemia and the Eye

Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

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Lymphocytic

Does it tend to be acute, or chronic?

Acute

Putting it all together, what sort of leukemia occurs in most pediatric cases?

Acute lymphocytic (ALL)

My way to remember that ALL is the pediatric leukemia:
I think of ALL as standing for ‘Adults Least Likely’
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? 

**Lymphocytic**

Does it tend to be acute, or chronic? **Acute**

**Putting it all together, what sort of leukemia occurs in most pediatric cases?**

**Acute lymphocytic (ALL)**

My way to remember that ALL is the pediatric leukemia: *I think of ALL as standing for ‘Adults Least Likely’*

In contrast, the common form in adults is acute *myelogenous* leukemia, AML = ‘Adults Most Likely’
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic

Does it tend to be acute, or chronic? Acute

Is ophthalmic involvement common in leukemia?
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic

Does it tend to be acute, or chronic? Acute

Is ophthalmic involvement common in leukemia? Indeed it is.
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Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

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Is ophthalmic involvement common in leukemia? Indeed it is.

Clinical involvement of which ophthalmic structures is common?
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

Does it tend to be acute, or chronic? Acute.

Is ophthalmic involvement common in leukemia? Indeed it is.

Clinical involvement of which ophthalmic structures is common? --The orbit --The anterior chamber --The iris --The retina --The optic nerve.
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

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Clinical involvement of which ophthalmic structures is common? --The orbit --The anterior chamber --The iris --The retina --The optic nerve.

Which structure is most commonly affected by leukemia?
**Pediatric Leukemia and the Eye**

Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

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Clinical involvement of which ophthalmic structures is common?--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve

Which structure is most commonly affected by leukemia? The choroid.
Where does leukemia rank among childhood malignancies in terms of incidence?
It is #1 by a mile

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous?
Lymphocytic

Does it tend to be acute, or chronic?
Acute

Is ophthalmic involvement common in leukemia?
Indeed it is

Clinical involvement of which ophthalmic structures is common?
--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve

Say what? The choroid isn’t even on the list. What the deal?

Which structure is most commonly affected by leukemia?
The choroid
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

Does it tend to be acute, or chronic? Acute.

Is ophthalmic involvement common in leukemia? Indeed it is.

Clinical involvement of which ophthalmic structures is common?
--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve

Say what? The choroid isn’t even on the list. What the deal?
The deal is this: Being the most vascular structure in the eye, it should come as no surprise that the choroid is the structure most likely to be involved with a hematologic malignancy. That said…

The choroid
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic

Does it tend to be acute, or chronic? Acute

Is ophthalmic involvement common in leukemia? Indeed it is

Clinical involvement of which ophthalmic structures is common?
--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve

Say what? The choroid isn’t even on the list. What the deal? The deal is this: Being the most vascular structure in the eye, it should come as no surprise that the choroid is the structure most likely to be involved with a hematologic malignancy. That said…leukemic choroidal lesions are very subtle, and thus easily missed on exam. For this reason, the choroid doesn’t make the list of ophthalmic structures likely to manifest clinical involvement in leukemia.
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic

Does it tend to be acute, or chronic? Acute

Is ophthalmic involvement common in leukemia? Indeed it is

**Clinical involvement** of which ophthalmic structures is common?
--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve

If choroidal involvement isn’t clinically apparent, how on earth are you supposed to know it’s present?

---

The choroid

Say what? The choroid isn’t even on the list. What the deal? The deal is this: Being the most vascular structure in the eye, it should come as no surprise that the choroid is the most likely to be involved with a hematologic malignancy. Lesions are very subtle, and thus easily missed on exam. For this reason, choroidal involvement doesn’t make the list of ophthalmic structures likely to manifest clinical involvement in leukemia.
Pediatric Leukemia and the Eye

**Q/A**

Where does leukemia rank among childhood malignancies in terms of incidence?
It is #1 by a mile

*Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous?*
Lymphocytic

*Does it tend to be acute, or chronic?*
Acute

*Is ophthalmic involvement common in leukemia?*
Indeed it is

**Clinical involvement** of which ophthalmic structures is common?
--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve

---

Say what? The choroid isn’t even on the list. What the deal?

The deal is this: Being the most vascular structure in the eye, it should come as no surprise that the choroid is the most likely to be involved with a hematologic malignancy. That said, leukemic choroidal lesions are very subtle, and thus easily missed on exam.

For this reason, the choroid doesn’t make the list of ophthalmic structures likely to manifest clinical involvement in leukemia.

---

**If choroidal involvement isn’t clinically apparent, how on earth are you supposed to know it’s present?**
It will manifest on **ultrasonography**.
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic

Does it tend to be acute, or chronic? Acute

Is ophthalmic involvement common in leukemia? Indeed it is.

**Clinical involvement** of which ophthalmic structures is common?
--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve

If choroidal involvement isn’t clinically apparent, how on earth are you supposed to know it’s present? It will manifest on ultrasonography*

*OCT is likely correct as well, but my Academy source only mentions ultrasound.

Say what? The choroid isn’t even on the list. What the deal? The deal is this: Being the most vascular structure in the eye, it should come as no surprise that the choroid is involved. But… it’s likely to be involved with a hematologic malignancy due to the choroid’s high likelihood of involvement by leukemic choroidal lesions are very subtle, and thus easily missed on exam. For this reason, the choroid doesn’t make the list of ophthalmic structures likely to manifest clinical involvement in leukemia.
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

Does it tend to be acute, or chronic? Acute.

Is ophthalmic involvement common in leukemia? Indeed it is.

**Clinical involvement** of which ophthalmic structures is common?

--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve

Say what? The choroid isn’t even on the list. What the deal? The deal is this: Being the most vascular structure in the eye, it should come as no surprise that the choroid is the most likely to be involved with a hematologic malignancy. Leukemic choroidal lesions are very subtle, and thus easily missed on exam. For this reason, the choroid doesn’t make the list of ophthalmic structures likely to manifest clinical involvement in leukemia.

If choroidal involvement isn’t clinically apparent, how on earth are you supposed to know it’s present? It will manifest on ultrasonography as two words.
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

Does it tend to be acute, or chronic? Acute.

Is ophthalmic involvement common in leukemia? Indeed it is.

**Clinical involvement** of which ophthalmic structures is common?

--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve

If choroidal involvement isn’t clinically apparent, how on earth are you supposed to know it’s present?

It will manifest on ultrasonography as diffuse thickening.

**The choroid**
Leukemia: Choroidal thickening on $b$-scan
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

Does it tend to be acute, or chronic? Acute.

Is ophthalmic involvement common in leukemia? Indeed it is.

Clinical involvement of which ophthalmic structures is common?
--The orbit?
--The anterior chamber?
--The iris?
--The retina?
--The optic nerve?

OK, smart guy, which structure is clinically involved most frequently? The choroid.

Which structure is most commonly affected by leukemia? The choroid.
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

Does it tend to be acute, or chronic? Acute.

Is ophthalmic involvement common in leukemia? Indeed it is.

Clinical involvement of which ophthalmic structures is common?
--The orbit
--The anterior chamber
--The iris
--The retina!
--The optic nerve

OK, smart guy, which structure is clinically involved most frequently? The retina.

Which structure is most commonly affected by leukemia? The retina.

The choroid.
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

Does it tend to be acute, or chronic? Acute.

Is ophthalmic involvement common in leukemia? Indeed it is.

Clinical involvement of which ophthalmic structures is common?
--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve
--The vitreous?

Which structure is most commonly affected by leukemia? The choroid.
Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

Does it tend to be acute, or chronic? Acute.

Is ophthalmic involvement common in leukemia? Indeed it is.

Clinical involvement of which ophthalmic structures is common?
--The orbit
--The anterior chamber
--The iris
--The retina
--The optic nerve
--The vitreous? No!

Which structure is most commonly affected by leukemia? The choroid.

The vitreous isn’t on the list. Is it like the choroid, ie, commonly involved but clinically inapparent? No, just the opposite—vitreous involvement is very rare in leukemia.
Pediatric Leukemia and the Eye

Where does leukemia rank among childhood malignancies in terms of incidence? It is #1 by a mile.

Re its histology: Does pediatric leukemia tend to be lymphocytic, or myelogenous? Lymphocytic.

Does it tend to be acute, or chronic? Acute.

Is ophthalmic involvement common in leukemia? Indeed it is.

Clinical involvement of which ophthalmic structures is common?
--The orbit
--The anterior chamber
--The iris
--The retina! Next, we will drill down on retinal involvement in leukemia.
--The optic nerve

Clinically, which structure is most commonly affected by leukemia? The retina.

The choroid.
Pediatric leukemia and the eye

- Retinopathy more common than in adult leukemias
**Pediatric leukemia and the eye**

- Retinopathy less common than in adult leukemias
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages (abbrev.) + one word
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages

What is the mechanism by which retinal hemorrhages come to pass?
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemias
- Most common eye finding: RNFL hemorrhages

What is the mechanism by which retinal hemorrhages come to pass?
The interplay of three derangements produced by the leukemia:
--?
--?
--?
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages

What is the mechanism by which retinal hemorrhages come to pass?
The interplay of three derangements produced by the leukemia:
--Anemia
--Vascular occlusion
--Thrombocytopenia
Pediatric leukemia and the eye
- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be specific appearance
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemias
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka eponym)
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemias
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
Retinal hemorrhages in leukemia
(Full disclosure: I don’t know if these are kids)
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
- Can be white centered (aka Roth spots)

What is the DDx for Roth spots?
--Leukemia (duh)
--?
--?
--?
--(There are many others)
Pediatric Leukemia and the Eye

Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka **Roth spots**)

*What is the DDx for Roth spots?*
- Leukemia (duh)
- Subacute bacterial endocarditis
- Anemia
- Endophthalmitis
- (There are many others)
**What is the DDx for Roth spots?**

--- Leukemia
--- Subacute bacterial endocarditis!
--- Anemia
--- Endophthalmitis
--- (There are many others)

Of these, which is the most commonly cause of Roth spots?

--- Leukemia?
--- Subacute bacterial endocarditis?
--- Anemia?
--- Endophthalmitis?
--- (There are many others)
Pediatric leukemia and the eye

- Retinopathy **less** common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be **white centered** (aka *Roth spots* )

Of these, which is the most commonly cause of Roth spots?
SABE

What is the DDx for Roth spots?
- Leukemia
- **Subacute bacterial endocarditis**!
- Anemia
- Endophthalmitis
- (There are many others)
**Pediatric leukemia and the eye**

- Retinopathy less common than in adult leukemias
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)

Note: There is inconsistency across Academy sources with regard to the term Roth spots. Early in the BCSC Path book, Roth spot and white-centered hemorrhage are used interchangeably and are said to occur “in a number of conditions;” later, the term pseudo-Roth spot is used to refer to white-centered hemorrhages secondary to leukemia. (Per the master index, pseudo-Roth spot appears nowhere else in the BCSC.)

-- The Uveitis book uses ‘Roth spots’ when referring to white-centered hemorrhages secondary to bacterial endophthalmitis, but not when referring to those secondary to leukemia (these are simply termed ‘white-centered hemorrhages’).

-- The Peds book just says retinal hemorrhages in leukemia “may have white centers.”

-- The Academy source EyeWiki uses Roth spot to refer to white-centered hemorrhages of any cause.

-- Puzzlingly, neither Roth spot nor white-centered hemorrhage appear in the index of the Retina book.

What’s the correct usage? I dunno. Caveat emptor.
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemias
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)

Is the RNFL the only location at which intraocular leukemic hemorrhages can occur?
Pediatric leukemia and the eye
- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)

Is the RNFL the only location at which intraocular leukemic hemorrhages can occur? Not by a long shot. Intraretinal hemorrhages can occur at any level (ie, not just the NFL).
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemias
- Most common eye finding: RNFL hemorrhages
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- Most common eye finding: **RNFL hemorrhages**
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Is the RNFL the only location at which intraocular leukemic hemorrhages can occur? Not by a long shot. Intraretinal hemorrhages can occur at any level (ie, not just the NFL). Preretinal as well as vitreous hemorrhages can also occur.
Pediatric leukemia and the eye

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- Most common eye finding: RNFL hemorrhages
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Is the RNFL the only location at which intraocular leukemic hemorrhages can occur? Not by a long shot. Intraretinal hemorrhages can occur at any level (ie, not just the NFL). Preretinal as well as vitreous hemorrhages can also occur. Finally, both subretinal and choroidal hemorrhages may occur as well.
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemias
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
Pediatric leukemia and the eye
- Retinopathy **less** common than in adult leukemics
- Most common eye finding: **RNFL hemorrhages**
  - Can be **white centered** (aka *Roth spots*)
- ONH can be infiltrated: **Papilledema-like** appearance
Leukemia: ONH infiltration
(20 y.o. with recurrent ALL)
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent treatment
Pediatric leukemia and the eye
- Retinopathy **less** common than in adult leukemics
- Most common eye finding: **RNFL hemorrhages**
  - Can be **white centered** (aka **Roth spots**)
- ONH can be infiltrated: **Papilledema-like** appearance
  - Early ONH involvement→permanent loss of central vision:
    Medical emergency—need emergent **radiation therapy***

*Intrathecal chemotherapy is also indicated
Pediatric leukemia and the eye

- Retinopathy **less** common than in adult leukemics
- Most common eye finding: **RNFL hemorrhages**
  - Can be **white centered** (aka *Roth spots*)
- ONH can be infiltrated: **Papilledema-like** appearance
  - Early ONH involvement → permanent loss of central vision:
    Medical emergency—need emergent **radiation therapy**

* Intrathecal chemotherapy is also indicated
Pediatric leukemia and the eye

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- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding complication can occur!
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision:
    Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!
**Pediatric leukemia and the eye**

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!

- Leukemic infiltration of *anterior segment* can produce:
  - The three H’s of anterior segment leukemic infiltration
    - H
    - H
    - H
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!

- Leukemic infiltration of anterior segment can produce:
  - Heterochromia iridis
  - Hypopyon
  - Hyphema
Pediatric Leukemia and the Eye

Normal right iris

Left iris: Diffuse thickening, yellowish infiltrate

Leukemia: Heterochromia iridis
Leukemia: Heterochromia iridis

Pediatric Leukemia and the Eye

Normal right iris

Left iris: Diffuse thickening, yellowish infiltrate

Recall what was said earlier about leukemic involvement of the choroid resulting in its diffuse thickening...

Leukemia: Heterochromia iridis
Leukemia: Hyphema (with a little hypopyon as well)
**Pediatric leukemia and the eye**

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!
- Leukemic infiltration of anterior segment can produce:
  - Heterochromia
  - Pseudo-Hypopyon
  - Hypopyon
  - Hyphema

*Is it a hypopyon, or pseudo-hypopyon?*
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!

- Leukemic infiltration of anterior segment can produce:
  - Heterochromia
  - Hypopyon?
  - Hyphema

- Is it a hypopyon, or pseudo-hypopyon?
  - As with Roth spots vs Pseudo-Roth spots vs white-centered hemorrhages, the BCSC is unclear in this regard. Caveat emptor.
Leukemia: (Pseudo)hypopyon

With a little hyphema as well
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement \(\rightarrow\) permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!
- Leukemic infiltration of anterior segment can produce:
  - Heterochromia iridis
  - Hypopyon
  - Hyphema

Eyes with leukemic manifestations in the anterior chamber are at risk for the development of glaucoma by two separate mechanisms. What are they? --?

--?
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement \(\rightarrow\) permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blind ONH atrophy can occur!
- Leukemic infiltration of anterior segment can produce:
  - Heterochromia iridis
  - Hypopyon
  - Hyphema

Eyes with leukemic manifestations in the anterior chamber are at risk for the development of glaucoma by two separate mechanisms.
What are they?
--Tumor cells and/or RBCs can block the TM, thereby impeding aqueous egress
--?
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!

Eyes with leukemic manifestations in the anterior chamber are at risk for the development of glaucoma by two separate mechanisms. What are they?

--Tumor cells and/or RBCs can clog the TM, thereby impeding aqueous egress
--?

- Heterochromia iridis
- Hypopyon
- Hyphema
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement -> permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!
- Leukemic infiltration of anterior segment can produce:
  - Heterochromia iridis
  - Hypopyon
  - Hyphema

Eyes with leukemic manifestations in the anterior chamber are at risk for the development of glaucoma by two separate mechanisms. What are they?
- Tumor cells and/or RBCs can clog the TM, thereby impeding aqueous egress
- Posterior synechiae can develop
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
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Early ONH involvement $\rightarrow$ permanent loss of central vision: Medical emergency—need emergent radiation therapy

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Eyes with leukemic manifestations in the anterior chamber are at risk for the development of glaucoma by two separate mechanisms. *What are they?*

- Tumor cells and/or RBCs can clog the TM, thereby impeding aqueous egress
- Posterior synechiae can develop, leading to pupillary and subsequent pupillary-block glaucoma
Pediatric leukemia and the eye

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Eyes with leukemic manifestations in the anterior chamber are at risk for the development of glaucoma by two separate mechanisms. What are they?
- Tumor cells and/or RBCs can clog the TM, thereby impeding aqueous egress
- Posterior synechiae can develop, leading to pupillary seclusion and subsequent pupillary-block glaucoma

- **Heterochromia iridis**
- **Hypopyon**
- **Hyphema**
Pediatric leukemia and the eye

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  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!
- Leukemic infiltration of anterior segment (sclera, cornea, iris, lens, vitreous, uveal tract, RPE, choroid)
  - Heterochromia iridis
  - Hypopyon
  - Hyphema

If a child (or adult, for that matter) presents with hypopyon, what general sort of condition is likely to top the initial DDx?
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!

Leukemic infiltration of anterior segment (rare examples)

- Heterochromia iridis
- Hypopyon
- Hyphema

If a child (or adult, for that matter) presents with hypopyon, what general sort of condition is likely to top the initial DDx? Uveitis
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent radiation therapy
    - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!

Leukemic infiltration of anterior segment (especially eye)

- Heterochromia iridis
- Hypopyon
- Hyphema

If a child (or adult, for that matter) presents with hypopyon, what general sort of condition is likely to top the initial DDx? Uveitis

What is the general term for the set of conditions that can present like uveitis, but are not infectious/inflammatory (ie, not uveitides)?
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
  - Early ONH involvement → permanent loss of central vision: Medical emergency—need emergent radiation therapy
  - Note: Chemo patients are abnormally sensitive to radiation therapy—blinding ONH atrophy can occur!

Leukemic infiltration of anterior segment (anterior uveitis)

- Heterochromia iridis
- Hypopyon
- Hyphema

If a child (or adult, for that matter) presents with hypopyon, what general sort of condition is likely to top the initial DDx? Uveitis

What is the general term for the set of conditions that can present like uveitis, but are not infectious/inflammatory (ie, not uveitides)? Masquerade syndromes
Pediatric leukemia and the eye

- Retinopathy less common than in adult leukemics
- Most common eye finding: RNFL hemorrhages
  - Can be white centered (aka Roth spots)
- ONH can be infiltrated: Papilledema-like appearance
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Leukemic infiltration of anterior segment can produce:
- Heterochromia iridis
- Hypopyon
- Hyphema

If a child (or adult, for that matter) presents with hypopyon, what general sort of condition is likely to top the initial DDx? Uveitis

What about those conditions that can present like uveitis, but are not infectious/inflammatory (ie, not uveitides)? Let’s do a brief overview of masquerade syndromes then call it a day...
Masquerade Syndrome

A very basic distinction
Masquerade Syndrome

A very basic distinction

Neoplastic

Nonneoplastic
Masquerade Syndrome

Neoplastic

A very basic distinction?

Nonneoplastic
Masquerade Syndrome

Nonneoplastic

Neoplastic

Solid

Hematologic

ditto

Leukemic

Lymphoid
Masquerade Syndrome

- Nonneoplastic
  - Neoplastic
    - Solid
      - Hematologic
        - Leukemic
          - Lymphoid
            - Primary CNS lymphoma
            - Secondary to systemic lymphoma
            - Lymphoproliferative dz
Masquerade Syndrome

Nonneoplastic

Neoplastic

Solid

Hematologic

Leukemic

Lymphoid

Primary CNS lymphoma

Secondary to systemic lymphoma

Lymphoproliferative dz
Masquerade Syndrome

Neoplastic

Nonneoplastic

Solid

Hematologic

Leukemic

Leukemia

Lymphoid

Primary CNS lymphoma

Secondary to systemic lymphoma

Lymphoproliferative dz

There it is…
Masquerade Syndrome

Neoplastic

Solid

Hematologic

Leukemic

Lymphoid

Leukemia

Primary CNS lymphoma

Secondary to systemic lymphoma

Lymphoproliferative dz

Nonneoplastic

ditto

??
Masquerade Syndrome

Nonneoplastic

Neoplastic

Solid

Hematologic

Leukemic

Lymphoid

Leukemia

Primary CNS lymphoma

Secondary to systemic lymphoma

Lymphoproliferative dz

Mets

Primary
Masquerade Syndrome

- Neoplastic
  - Solid
    - Primary
      - Primary CNS lymphoma
      - Secondary to systemic lymphoma
      - Lymphoproliferative dz
  - Mets
- Nonneoplastic
- Lymphoid
  - Leukemic
    - Leukemia
- Hematologic
Masquerade Syndrome

Nonneoplastic

Neoplastic

Solid

Mets

Hematologic

Leukemic

Leukemia

Primary CNS lymphoma

Secondary to systemic lymphoma

Lymphoproliferative dz

Primary

Uveal melanoma

Rb
Masquerade Syndrome

Nonneoplastic

Neoplastic

Solid

Mets

Primary

Lymphoid

Lymphoid

Primary CNS lymphoma

Secondary to systemic lymphoma

Lymphoproliferative dz

Hematologic

Leukemic

Leukemia

Primary

Uveal melanoma

Rb

Secondary to systemic lymphoma

Lymphoproliferative dz
Masquerade Syndrome

Nonneoplastic

Neoplastic

Hematologic

Leukemic

Leukemia

Primary

Lymphoid

Primary CNS lymphoma

Secondary to systemic lymphoma

Lymphoproliferative dz

Solid

Mets

Lung

Breast

Uveal melanoma

Rb

Leukemia

Primary
Masquerade Syndrome

Neoplastic

Hematologic

Leukemic

Lymphoid

Leukemia

Primary

Uveal melanoma

Rb

Lymphoproliferative dz

Secondary to systemic lymphoma

Primary CNS lymphoma

Mets

Lung

Breast

Nonneoplastic

?