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(Retinoblastoma)
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How many new cases are there every year in North America?

14K - 20K

Higher
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How many new cases are there every year in North America?
About 250-300
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- How many new cases are there every year in North America? About 250-300
- In the US, what two factors influence the age at which Rb is typically diagnosed?
  - Laterality; ie, whether the child has unilateral vs bilateral disease.
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- Pt with a family hx of Rb: 4 months
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Is the rate in developing nations higher or lower?
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**Which two areas of the world have the highest Rb rates?**
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Which two areas of the world have the highest Rb rates?
Africa and India
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- About 60% represent nonheritable mutations
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- The incidence is roughly 1/100,000 live births  \( F \)
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- The incidence is roughly 1/100,000 live births. **False**
- About 60% represent nonheritable mutations. **True**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative). **False**

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All Rb cases

Basic hereditary division of cases

?  ?

Genetic basics of Rb: tl;dr
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Nonheritable dz (60%)  Heritable dz (40%)

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New germline mutation

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New germline mutation (30-35%)  
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Which form(s) is/are sporadic?

Genetic basics of Rb: tl;dr
All Rb cases

Nonheritable dz (60%)

Heritable dz (40%)

New germline mutation (30-35%)

Inherited (5-10%)

Which form(s) is/are sporadic? Both of these.
Because sporadic cases occur in the absence of a family history, it is often assumed (incorrectly) that all sporadic cases are nonheritable. To the contrary, fully 30-35% of Rb cases are both sporadic and heritable.

Genetic basics of Rb: tl;dr
Concerning Rb, which of the following are true?

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- The exophytic type looks like Coats disease
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present)
- Periodic MRI brain is warranted to detect early 'trilateral' disease
- Patients with Rb are more likely to die of a second malignancy than of Rb itself

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OK, so some Rb pts have heritable disease, and others don’t. Other than implications for genetic counseling regarding having children, does it really matter?

Yes, very much. Pts with heritable Rb have bilateral disease. Further, they are strongly predisposed to develop a host of different primary cancers throughout life. (98% of the time. We’ll talk about the other 2% later)
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In addition to bilaterality, what other sort of presentation is associated with the heritable form of Rb?

Multifocal disease; ie, multiple tumors within the same eye

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**What percent of heritable Rb pts develop bilateral disease?**
About 85!

*Note that this means 15% of heritable Rb pts have *unilateral* disease. Thus, unilateral disease is not pathognomonic for nonheritable Rb.*

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What finding would strongly suggest that a child with unilateral Rb harbors a germline mutation?

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What finding would strongly suggest that a child with unilateral Rb harbors a germline mutation?
If s/he had multifocal dz within the affected eye

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What percent of heritable Rb pts develop bilateral disease?
About 85!

**What other forms of cancer are they predisposed to, and at what stage in life do these arise?**

---Early childhood:
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What midline structure is commonly involved?

The pineal gland (ie, a pinealoma)

Histologically speaking, what does this tumor closely resemble?

A retinoblastoma

A pt with bilateral retinoblastoma + a histologically similar pinealoma is often said to be suffering from what disease?

'Trilateral' retinoblastoma
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---Early childhood: Midline intracranial tumors
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What proportion of pts with heritable Rb will develop a pinealoma?

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**What is the rule-of-thumb for the rate at which germline Rb pts will get another (ie, non-Rb) cancer?**

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Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births
- About 60% represent nonheritable mutations
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1o relative)
- The exophytic type looks like Coats disease
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present)
- Periodic MRI brain is warranted to detect early 'trilateral' disease
- Patients with Rb are more likely to die of a second malignancy than of Rb itself

What percent of Rb pts have a positive family hx for the disease? About 10%

But 60% of Rb pts have nonheritable disease. Shouldn't that mean 40% have inherited disease?

No, it means 40% have heritable disease.

How can a disease be heritable if it's not inherited?

A heritable disease is one that is coded for in germline cells. A heritable disease enters the germline in one of two ways--either it is inherited (i.e., present at conception), or occurs as a new, post-conception germline mutation. In Rb, the 40% of pts with heritable (i.e., germline) disease can be divided into 5-10% who inherited the disease, and the 30-35% who possess a new germline mutation.

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In these case, mutagenesis occurred later, in non-germline (i.e., somatic) cells.

OK, so some Rb pts have heritable disease, and others don't. Other than implications for genetic counseling regarding having children, does it really matter?

Yes, very much. Pts with nonheritable Rb have unilateral disease, and once cured, have a lifetime cancer risk essentially identical to that of their non-Rb schoolmates. The thing to know:

*What is the rule-of-thumb for the rate at which germline Rb pts will get another (ie, non-Rb) cancer?*

1% per year. So ~10% will have developed a second cancer by age 10, 20% by age 20, 30% by age 30, etc.

--Early childhood: Midline intracranial tumors
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- Pinealoma? 2.7 years
- Sarcoma? 13 years
- Melanoma? 27 years
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1% per year. So ~10% will have developed a second cancer by age 10, 20% by age 20, 30% by age 30, etc.

What is the average age of diagnosis for…

Pinealoma?

- Early childhood: Midline intracranial tumors
- Late childhood - teen years: Sarcomas
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**What is the rule-of-thumb for the rate at which germline Rb pts will get another (ie, non-Rb) cancer?**
1% per year. So ~10% will have developed a second cancer by age 10, 20% by age 20, 30% by age 30, etc.

**What is the average age of diagnosis for…**
*Pinealoma?* 3 years

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**Early childhood: Midline intracranial tumors**
---Late childhood - teen years: Sarcomas
---Early adulthood: Melanoma; brain tumors
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OK, so some Rb pts have heritable disease, and others don't. Other than implications for genetic counseling regarding having children, does it really matter?

Yes, very much. Pts with nonheritable Rb have unilateral disease, and once cured, have a lifetime cancer risk essentially identical to that of their non-Rb siblings. In contrast, the strong majority of pts with heritable Rb have bilateral disease. Further, they are strongly predisposed to develop a host of different primary cancers throughout life.

What is the rule-of-thumb for the rate at which germline Rb pts will get another (ie, non-Rb) cancer?

1% per year. So ~10% will have developed a second cancer by age 10, 20% by age 20, 30% by age 30, etc.

What is the average age of diagnosis for…

Pinealoma? 3 years
Sarcoma? 13 years

--Early childhood: Midline intracranial tumors
--Late childhood - teen years: Sarcomas
--Early adulthood: Melanoma; brain tumors
--Later adulthood: Lung cancer; bladder cancer

How can a disease be heritable if it's not inherited?

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- Patients with Rb are more likely to die of a second malignancy than of Rb itself

What percent of Rb pts have a positive family hx for the disease?

About 10% of Rb pts have a positive family history for the disease. However, it is important to note that 60% of Rb pts have nonheritable disease, which means 40% have heritable disease. This can be confusing because 40% might seem like a large percentage, but it is actually the complement of the 60% with nonheritable disease. A disease is heritable in the sense that it is coded for in germline cells, which may or may not be inherited at conception. It can also arise as a new, post-conception germline mutation. In Rb, the 40% of pts with heritable disease can be divided into 5-10% who inherited the disease and the 30-35% who possess a new germline mutation.

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Pedigree analysis reveals what sort of inheritance pattern in families with inherited Rb?
The inheritance pattern is consistent with autosomal dominant inheritance

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So Rb is an AD disease, then?
No, it is unquestionably an autosomal recessive disease. Both copies of the responsible gene (RB1) must be faulty within a given cell before abnormal replication can begin.

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What is the chromosomal location of the RB1 gene?

13q14
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The fact that it is the absence of a functioning copy of RB1 that leads to the development of Rb indicates what about its nature?

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*The fact that it is the absence of a functioning copy of RB1 that leads to the development of RB indicates what about its nature?*
*That it is a tumor-suppressor gene*

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**If Rb is AR, why does inherited disease present with an AD-like inheritance pattern?**

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Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births
- About 60% represent nonheritable mutations
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1o relative)
- The exophytic type looks like Coats disease
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present)
- Periodic MRI brain is warranted to detect early 'trilateral' disease
- Patients with Rb are more likely to die of a second malignancy than of Rb itself

Pedigree analysis reveals what sort of inheritance pattern in families with inherited Rb?
The inheritance pattern is consistent with autosomal dominant inheritance.

So Rb is an AD disease, then?
No, it is unquestionably an autosomal recessive disease. Both copies of the responsible gene (RB1) must be faulty within a given cell before abnormal replication can begin.

If Rb is AR, why does inherited disease present with an AD-like inheritance pattern?
In inherited disease, all cells contain one defective copy of RB1. In order for clinical Rb to develop, the other copy must be inactivated. Unfortunately, there are two factors that conspire to make this almost certain to occur in at least one retinoblast:
1)  
2)  

What percent of Rb pts have a positive family hx for the disease?
About 10

But 60% of Rb pts have nonheritable disease. Shouldn’t that mean 40% have inherited disease?
No, it means 40% have heritable disease

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An astonishing 90-95%!

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This also explains the relatively high rate of nonheritable (somatic) Rb. In a nonheritable disease pt, every retinoblast starts off with two intact copies of RB1. In order for such a person to develop Rb, at least one retinoblast must undergo mutations to both copies of RB1. For most AR diseases, the chances of this happening are very low. However, as mentioned above, the combination of a high number of potential mutations, plus the large population of retinoblasts, greatly increases the odds of this unfortunate occurrence.

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So Rb is an AD disease, then?

No, it is unquestionably an autosomal recessive disease. Both copies of the responsible gene (RB1) need not be defective in order for Rb to present. The responsible gene is RB1.

Given the plethora of potential mutations and the large number of retinoblasts in which they have the opportunity to occur, what percent of pts with germline loss of one RB1 gene will lose the other one in at least one cell (and therefore will develop at least one tumor)?

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To occur in at least one retinoblast:

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This also explains the relatively high rate of nonheritable (somatic) Rb. In a nonheritable disease pt, every retinoblast starts off with two intact copies of RB1. In order for such a person to develop Rb, at least one retinoblast must undergo mutations to both copies of RB1. For most AR diseases, the chances of this happening are very low. However, as mentioned above, the combination of a high number of potential mutations, plus the large population of retinoblasts, greatly increases the odds of this unfortunate occurrence.

Could this happen in both eyes of the same child? That is, can nonheritable Rb present bilaterally?

Yes—about 2% of bilateral Rb is somatic/nonheritable in origin.

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### Pedigree analysis

Pedigree analysis reveals what sort of inheritance pattern in families with inherited Rb? The inheritance pattern is consistent with autosomal dominant inheritance.

So Rb is an AD disease, then?

OK, so some Rb pts have heritable disease, and others don't. Other than implications for genetic counseling regarding having children, does it really matter? Yes, very much.

Pts with nonheritable Rb have unilateral disease (98% of the time. We'll talk about the other 2% later)

Recall this statement from an earlier slide—we're now talking about “the other 2%”

However, as mentioned above, the combination of a high number of potential mutations, and the sheer number of retinoblasts provides many opportunities for such a mutation to take place (remember, all that need happen for a tumor to develop is that ONE retinoblast lose its sole functioning copy of RB1).

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Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  **F**
- About 60% represent nonheritable mutations  **T**
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- The *exophytic* type looks like Coats disease
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*In a nutshell, what is Coats disease?*

A congenital (usually) retinal vascular condition characterized by exudation that can be severe enough to result in retinal detachment.
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In a nutshell, what is Coats disease?
A congenital (usually) retinal vascular condition characterized by [two words] that can be severe enough to result in retinal detachment.

Coats disease
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In a nutshell, what is Coats disease?
A congenital (usually) retinal vascular condition characterized by exudation that can be severe enough to result in retinal detachment.

What is the inheritance pattern in Coats?
It is sporadic.

What are its systemic associations?
It has none.

Is there a gender predilection?
Yes, it is vastly more common in males.
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*The three presentation types are…*
- Exophytic
- Endophytic
- Diffuse infiltrating
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births.  
  *False*

- About 60% represent nonheritable mutations.  
  *True*

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\( F \)

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\( T \)

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\( \begin{array}{|c|c|}
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\text{The three presentation types are...and their respective growth patterns are...}

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\text{What does an exophytic tumor look like on DFE?}
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The three presentation types are...and their respective growth patterns are...
- Exophytic: Subretinal growth
- Endophytic
- Diffuse infiltrating

What does an exophytic tumor look like on DFE?
A white mass with retinal vessels coursing over it
Rb: Exophytic growth pattern
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  

*In a nutshell, what is Coats disease?*  
A congenital (usually) retinal vascular condition that can be severe enough to result in retinal detachment  
(but not necessarily a 1° relative).

- The exophytic type looks like Coats disease.

The three presentation types are...and their respective growth patterns are...

--Exophytic: Subretinal growth
--Endophytic
--Diffuse infiltrating

What does an exophytic tumor look like on DFE? A white mass with retinal vessels coursing over it  

But Coats disease is an exudative process—no mass involved. Given this, how could an exophytic Rb be mistaken for Coats?
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births \(14K - 20K\) live births. \(F\)
- About 60% represent nonheritable mutations. \(T\)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1º relative). \(F\)
- The exophytic type looks like Coats disease. \(T\)

In a nutshell, what is Coats disease? A congenital (usually) retinal vascular condition characterized by exudation that can be severe enough to result in retinal detachment (but not necessarily a 1º relative). \(F\)

The three presentation types are... and their respective growth patterns are...

- Exophytic: Subretinal growth
- Endophytic
- Diffuse infiltrating

What does an exophytic tumor look like on DFE? A white mass with retinal vessels coursing over it.

But Coats disease is an exudative process—no mass involved. Given this, how could an exophytic Rb be mistaken for Coats? Because exophytic Rb is itself frequently associated with exuberant subretinal fluid, the effect of which can be to obscure the tumor mass.
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \text{F} \)
- About 60% represent nonheritable mutations  \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative). \( \text{F} \)
- The exophytic type looks like Coats disease  \( \text{T} \)

So, Coats disease is an exudative vascular condition…

(No question yet—proceed when ready)
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
- About 60% represent nonheritable mutations **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative). **F**
- The **exophytic type** looks like **Coats disease** **T**

So, **Coats disease is an exudative vascular condition… and Rb is a malignant neoplasm of retinal progenitor cells.**

(No question yet—proceed when ready)
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births. **F**
- About 60% represent nonheritable mutations. **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1º relative). **F**
- The _exophytic_ type looks like _Coats disease_. **T**

So, _Coats disease is an exudative vascular condition... and Rb is a malignant neoplasm of retinal progenitor cells._ These two things don’t sound anything alike, so why are we devoting so much space to Coats dz in a slide-set about Rb?
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \text{F} \)
- About 60% represent nonheritable mutations  \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1º relative)  \( \text{F} \)
- The exophytic type looks like Coats disease  \( \text{T} \)

So, Coats disease is an exudative vascular condition… and Rb is a malignant neoplasm of retinal progenitor cells. These two things don't sound anything alike, so why are we devoting so much space to Coats dz in a slide-set about Rb? Because both are very high on the DDx for leukocoria in the pediatric age group
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births
- About 60% represent nonheritable mutations
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1st relative).

- The exophytic type looks like Coats disease

So, Coats disease is an exudative vascular condition…and Rb is a malignant neoplasm of retinal progenitor cells. These two things don’t sound anything alike, so why are we devoting so much space to Coats dz in a slide-set about Rb? Because both are very high on the DDx for leukocoria in the pediatric age group.
OK, quiz time. Is it Coats, or exophytic Rb?
To figure it out, look at the vasculature
In Coats, the retinal vessels are dilated, with microaneurysms and telangiectasias. (Further, the appearance often has a yellow hue.)
In Coats, the retinal vessels are dilated, with microaneurysms and telangiectasias. (Further, the appearance often has a yellow hue.)

Contrast with Rb, in which the retinal vessels are normal in appearance. (And the hue tends to be white.)
In Coats, the retinal vessels are dilated, with microaneurysms and telangiectasias. (Further, the appearance often has a yellow hue.)

Contrast with Rb, in which the retinal vessels are normal in appearance. (And the hue tends to be white.)

For more on Coats vs Rb, see slide-set R1
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  
- About 60% represent noninheritable mutations  
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative)  
- The *exophytic type* looks like Coats disease  

The three presentation types are... and their respective growth patterns are...

--- Exophytic: Subretinal growth

--- Endophytic: Diffuse infiltrating

Next Q: Growth pattern of endophytic Rb type
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
- About 60% represent nonheritable mutations **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1º relative) **F**
- The exophytic type looks like Coats disease **T**

The three presentation types are…and their respective growth patterns are…

- Exophytic: Subretinal growth
- **Endophytic:** Vertical, into-the-vitreous growth
- Diffuse infiltrating
Rb: Endophytic growth pattern
Rb: Exophtic *and* endophytic growth pattern
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births. **False**
- About 60% represent nonheritable mutations. **True**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1º relative). **False**
- The **exophytic type** looks like Coats disease. **True**

The three presentation types are... and their respective growth patterns are...

--- Exophytic: Subretinal growth

--- Endophytic: Vertical, into-the-vitreous growth

--- Diffuse infiltrating

What does 'into the vitreous' indicate about the relationship between the tumor and the retina?

It indicates that the tumor has broken through the internal limiting membrane.
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births \( \text{F} \)
- About 60% represent nonheritable mutations \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative) \( \text{F} \)
- The \textit{exophytic type} looks like Coats disease \( \text{T} \)

\[ \text{14K - 20K} \]

The three presentation types are...and their respective growth patterns are...

- Exophytic: Subretinal growth
- \textbf{Endophytic:} Vertical, into-the-vitreous growth
- Diffuse infiltrating

What does 'into the vitreous' indicate about the relationship between the tumor and the retina?

It indicates that the tumor has broken through the internal limiting membrane
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \[14K \text{ - } 20K\] live births \(F\)
- About 60% represent nonheritable mutations \(T\)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\(^{st}\) relative) \(F\)
- The \textbf{exophytic type} looks like Coats disease \(T\)

\[The\ three\ presentation\ types\ are...\ and\ their\ respective\ growth\ patterns\ are...\]
--Exophytic: Subretinal growth
--Endophytic: Vertical, into-the-vitreous growth
--Diffuse infiltrating:
Concerning Rb, which of the following are true?

- The incidence is roughly $1/100,000$ live births \( \text{\textcolor{red}{F}} \)
- About 60% represent nonheritable mutations \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\textsuperscript{o} relative) \( \text{\textcolor{red}{F}} \)
- The \textit{exophytic type} looks like Coats disease \( \text{T} \)

\textit{The three presentation types are...and their respective growth patterns are...}
--Exophytic: Subretinal growth
--Endophytic: Vertical, into-the-vitreous growth
--\textbf{Diffuse infiltrating:} Lateral diffuse growth within the retina
Concerning Rb, which of the following are true?

- The incidence is roughly \(1/100,000\) live births \(\textbf{F}\)
- About 60% represent nonheritable mutations \(\textbf{T}\) need not
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a \(1^o\) relative) \(\textbf{F}\)
- The \textit{exophytic type} looks like Coats disease \(\textbf{T}\)

The three presentation types are...and their respective growth patterns are...
-- Exophytic: Subretinal growth
-- Endophytic: Vertical, into-the-vitreous growth
**Diffuse infiltrating**: Lateral diffuse growth within the retina

\textit{Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?}

-- It is much \(\text{less} \) common (\% of all Rb) than the other two forms
Concerning Rb, which of the following are true?

- The incidence is roughly $1/100,000$ live births \( \textcolor{red}{F} \)
- About 60\% represent nonheritable mutations \( \textcolor{green}{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\(^{\circ}\) relative) \( \textcolor{red}{F} \)
- The \textit{exophytic type} looks like Coats disease \( \textcolor{green}{T} \)

---

\textit{The three presentation types are...and their respective growth patterns are...}

- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth

\textbf{Diffuse infiltrating}: Lateral diffuse growth within the retina

---

\textit{Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?}

- It is much \textbf{less} common (\(<2\%\) of all Rb) than the other two forms
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births \( \times \) 1/100,000,000,000 live births \( F \)
- About 60% represent nonheritable mutations \( T \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\( ^{st} \) relative) \( F \)
- The **exophytic type** looks like Coats disease \( T \)

The three presentation types are... and their respective growth patterns are...

- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- **Diffuse infiltrating**: Lateral diffuse growth within the retina

**Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects.** What are they?

- It is much **less** common (<2% of all Rb) than the other two forms
- It strikes **older v younger** children
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \text{F} \)
- About 60% represent nonheritable mutations  \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1º relative)  \( \text{F} \)
- The exophytic type looks like Coats disease  \( \text{T} \)

The three presentation types are…and their respective growth patterns are…
- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- **Diffuse infiltrating**: Lateral diffuse growth within the retina

Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?
- It is much less common (\(<2\%\) of all Rb) than the other two forms
- It strikes older children (\(>5\))
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \(14K - 20K\)  **F**
- About 60% represent nonheritable mutations  **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\(^{st}\) relative)  **F**
- The \textit{exophytic type} looks like Coats disease  **T**

The three presentation types are...and their respective growth patterns are...
- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- \textbf{Diffuse infiltrating}: Lateral diffuse growth within the retina

\textit{Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?}
- It is much **less** common ( \(<2\%\) of all Rb) than the other two forms
- It strikes **older** children ( \(>5\) )
- It is virtually always \textbf{uni- v bilateral}
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
- About 60% represent nonheritable mutations **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative) **F**
- The **exophytic type** looks like Coats disease **T**

**The three presentation types are...and their respective growth patterns are...**

- **Exophytic:** Subretinal growth
- **Endophytic:** Vertical, into-the-vitreous growth
- **Diffuse infiltrating:** Lateral diffuse growth within the retina

**Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?**

- It is much **less** common (<2% of all Rb) than the other two forms
- It strikes **older** children (>5)
- It is virtually always **unilateral**
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
- About 60% represent nonheritable mutations **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1st-degree relative) **F**
- The **exophytic type** looks like Coats disease **T**

The three presentation types are...and their respective growth patterns are...

- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- **Diffuse infiltrating**: Lateral diffuse growth within the retina

Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?

-- It is much **less** common (<2% of all Rb) than the other two forms
-- It strikes **older** children (>5)
-- It is virtually always **unilateral**
-- It is virtually always non-heritable
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( F \)
- About 60% represent nonheritable mutations  \( T \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\(^\circ\) relative)  \( F \)
- The \textit{exophytic type} looks like Coats disease  \( T \)

\textit{The three presentation types are...and their respective growth patterns are...}

- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- \textbf{Diffuse infiltrating}: Lateral diffuse growth within the retina

\textit{Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?}

- It is much \textbf{less} common (\(<2\%\) of all Rb) than the other two forms
- It strikes \textbf{older} children (\(>5\))
- It is virtually always \textbf{unilateral}
- It is virtually always \textbf{nonheritable}
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \text{F} \)
- About 60% represent nonheritable mutations  \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\textsuperscript{st} relative)  \( \text{F} \)
- The **exophytic type** looks like Coats disease  \( \text{T} \)

*The three presentation types are...and their respective growth patterns are...*

- **Exophytic**: Subretinal growth
- **Endophytic**: Vertical, into-the-vitreous growth
- **Diffuse infiltrating**: Lateral diffuse growth within the retina

*Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?*

- It is much **less** common (\(<2\%\) of all Rb) than the other two forms
- It strikes **older** children (\(>5\))
- It is virtually always **unilateral**
- It is virtually always **nonheritable**
- It grows at a much **slower** rate than the other two forms
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
- About 60% represent nonheritable mutations **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative) **F**
- The **exophytic type** looks like Coats disease **T**

---

Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?

- It is much **less** common ( <2% of all Rb) than the other two forms
- It strikes **older** children ( >5 )
- It is virtually always **unilateral**
- It grows at a much **slower** rate than the other two forms
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births \( \text{F} \)
- About 60% represent nonheritable mutations \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\text{st} relative) \( \text{F} \)
- The \textit{exophytic type} looks like Coats disease \( \text{T} \)

\begin{itemize}
  \item \textit{Diffuse infiltrating} \textit{Rb} differs from its exo- and endophytic counterparts in many respects. What are they?
  \item It is much \textbf{less} common \((<2\% \text{ of all Rb})\) than the other two forms
  \item It strikes \textbf{older} children \((>5)\)
  \item It is virtually always \textbf{unilateral}
  \item It is virtually always \textbf{nonheritable}
  \item It grows at a much \textbf{slower} rate than the other two forms
  \item No distinct \textbf{tumor mass} is present (hence its name)
\end{itemize}
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \boxed{F} \)
- About 60% represent nonheritable mutations  \( \boxed{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\(^{\circ}\) relative)  \( \boxed{F} \)
- The exophytic type looks like Coats disease  \( \boxed{T} \)

The three presentation types are...and their respective growth patterns are...

- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- **Diffuse infiltrating**: Lateral diffuse growth within the retina

*Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?*

- It is much **less** common ( \(<2\%\) of all Rb) than the other two forms
- It strikes **older** children ( \(>5\) )
- It is virtually always **unilateral**
- It is virtually always **nonheritable**
- It grows at a much **slower** rate than the other two forms
- No distinct **tumor mass** is present (hence its name)
Rb: Diffuse infiltrating growth pattern
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \text{F} \)
- About 60% represent nonheritable mutations  \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\( ^{\circ} \) relative)  \( \text{F} \)
- The **exophytic type** looks like Coats disease  \( \text{T} \)

---

The three presentation types are...and their respective growth patterns are...

- **Exophytic**: Subretinal growth
- **Endophytic**: Vertical, into-the-vitreous growth
- **Diffuse infiltrating**: Lateral diffuse growth within the retina

---

Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?

- It is much **less** common (\(<2\%\) of all Rb) than the other two forms
- It strikes **older** children (\(>5\))
- It is virtually always **unilateral**
- It is virtually always **nonheritable**
- It grows at a much **slower** rate than the other two forms
- No distinct **tumor mass** is present (hence its name)

**Important Rb finding**

- **Calcification** is usually absent
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( F \)
- About 60% represent nonheritable mutations  \( T \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative)  \( F \)
- The **exophytic type** looks like Coats disease  \( T \)

The three presentation types are...and their respective growth patterns are...

- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- Diffuse infiltrating: Lateral diffuse growth within the retina

**Diffuse infiltrating** Rb differs from its exo- and endophytic counterparts in many respects. What are they?

- It is much **less** common ( <2% of all Rb) than the other two forms
- It strikes **older** children ( >5 )
- It is virtually always **unilateral**
- It is virtually always **nonheritable**
- It grows at a much **slower** rate than the other two forms
- No distinct **tumor mass** is present (hence its name)
- **Calcification** is usually absent
Q

Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \text{F} \)
- About 60% represent nonheritable mutations  \( \text{T} \)  \( \text{need not} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a \( 1^o \) relative)  \( \text{F} \)
- The **exophytic type** looks like Coats disease  \( \text{T} \)

\[ \text{14K - 20K} \]

Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?

- It is much **less** common ( <2% of all Rb) than the other two forms
- It strikes **older** children ( >5 )
- It is virtually always **unilateral**
- It is virtually always **nonheritable**
- It grows at a much **slower** rate than the other two forms
- No distinct **tumor mass** is present (hence its name)
- **Calcification** is usually absent
- It presents with an AC **finding** and V chamber finding

*The three presentation types are...and their respective growth patterns are...*
- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- **Diffuse infiltrating**: Lateral diffuse growth within the retina
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \[\text{F}\]
- About 60% represent nonheritable mutations  \[\text{T}\]
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\text{st} relative)  \[\text{F}\]
- The \textit{exophytic type} looks like Coats disease  \[\text{T}\]

\textit{The three presentation types are... and their respective growth patterns are...}
- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- **Diffuse infiltrating**: Lateral diffuse growth within the retina

\textit{Diffuse infiltrating Rb differs from its exo- and endophytic counterparts in many respects. What are they?}
- It is much \textbf{less} common (\textless{} 2\% of all Rb) than the other two forms
- It strikes \textbf{older} children (\textgreater{} 5)
- It is virtually always \textit{unilateral}
- It is virtually always \textit{nonheritable}
- It grows at a much \textbf{slower} rate than the other two forms
- No distinct \textit{tumor mass} is present (hence its name)
- \textbf{Calcification} is usually absent
- It presents with an \textit{AC cell/pseudohypopyon} and \textit{clumped vitreous cells}
Pseudohypopyon in diffuse infiltrating Rb
Diffuse infiltrating Rb is the form that can present as a uveitis ‘masquerade syndrome’ with vitritis and a pseudohypopyon
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births \( \text{F} \)
- About 60% represent nonheritable mutations \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\(^{\circ}\) relative) \( \text{F} \)
- The exophytic type looks like Coats disease \( \text{T} \)

The three presentation types are...and their respective growth patterns are...

- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- Diffuse infiltrating: Lateral diffuse growth within the retina

How does the pseudohypopyon of diffuse infiltrating Rb differ from a true inflammatory hypopyon?

- Unlike a hypopyon, the pseudohypopyon will shift easily with changes in head position
- The pseudohypopyon is snow-white, as opposed to the yellowish tinge of a true hypopyon

Diffuse infiltrating Rb is the form that can present as a uveitis ‘masquerade syndrome’ with vitritis and a pseudohypopyon

- It is not heritable
- It strikes older children
- It is virtually always unilateral
- It virtually always grows at a much slower rate than the other two forms
- No distinct tumor mass is present (hence its name)
- Calcification is usually absent
- It presents with an AC cell pseudohypopyon and clumped vitreous cells
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \text{F} \)
- About 60% represent nonheritable mutations  \( \text{T} \) need not
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\(^{\text{st}}\) relative)  \( \text{F} \)
- The **exophytic type** looks like Coats disease  \( \text{T} \)

**The three presentation types are...and their respective growth patterns are...**
- **Exophytic**: Subretinal growth
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**How does the pseudohypopyon of diffuse infiltrating Rb differ from a true inflammatory hypopyon?**
- Unlike a hypopyon, the pseudohypopyon will shift easily with changes in head position

**Diffuse infiltrating Rb** is the form that can present as a uveitis ‘masquerade syndrome’ with vitritis and a pseudohypopyon
- It is not restricted to children
- It primarily affects older children (>5)
- It is virtually always unilateral
- It grows at a much slower rate than the other two forms

- No distinct tumor mass is present (hence its name)
- Calcification is usually absent
- It presents with an AC cell/pseudohypopyon and clumped vitreous cells
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births \( \text{F} \)
- About 60% represent nonheritable mutations \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1<sup>o</sup> relative) \( \text{F} \)
- The **exophytic type** looks like Coats disease \( \text{T} \)

The three presentation types are...and their respective growth patterns are...
- Exophytic: Subretinal growth
- Endophytic: Vertical, into-the-vitreous growth
- Diffuse infiltrating: Lateral diffuse growth within the retina

**Diffuse infiltrating Rb** is the form that can present as a uveitis ‘masquerade syndrome’ with vitritis and a pseudohypopyon

- Unlike a hypopyon, the pseudohypopyon will shift easily with changes in head position
- The pseudohypopyon is **snow-white**, as opposed to the yellowish tinge of a true hypopyon

Diffuse infiltrating Rb is the form that can present as a uveitis ‘masquerade syndrome’ with vitritis and a pseudohypopyon

- No distinct tumor mass
- Calcification is usually absent
- It presents with an AC cell/pseudohypopyon and clumped vitreous cells
Pseudohypopyon in diffuse infiltrating Rb

Hypopyon in uveitis
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \text{False} \)
- About 60\% represent nonheritable mutations  \( \text{True} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\(^{\circ}\) relative)  \( \text{False} \)
- The *exophytic* type looks like Coats disease  \( \text{True} \)
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated  \( \text{True} \)
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  **F**
- About 60% represent nonheritable mutations  **T**
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Q

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**Biopsy and/or FNA should be undertaken under only the most extraordinary of circumstances, when all other diagnostic maneuvers have proven futile. Why?**
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\textit{Biopsy and/or FNA should be undertaken under only the most extraordinary of circumstances, when all other diagnostic maneuvers have proven futile. Why? Because it incurs a significant risk of disseminating tumor cells}
Concerning Rb, which of the following are true?

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In what way is CT superior to MRI in confirming the diagnosis of Rb?

In what way is MRI superior to CT?

Heritable Rb pts are at increased risk for developing cancers, and exposing them to even low-dose radiation (as occurs during CT scanning) poses an at least theoretical increase in that risk; MRI does not.

What three specific findings are you looking for on imaging?

---

Extraocular extension

Optic nerve invasion

A pinealoma (ie, 'trilateral disease')
Concerning Rb, which of the following are true?

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CT is better able to detect intralesional calcifications.

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What three specific findings are you looking for on imaging?
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What three specific findings are you looking for on imaging?

- Extraocular extension
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Rb: Calcifications on CT
Concerning Rb, which of the following are true?

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In what way is CT superior to MRI in confirming the diagnosis of Rb?

CT is better able to detect **intralesional calcifications**

What commonly-available alternative imaging technique is also effective for demonstrating intralesional calcifications?

- B-scan ultrasonography

In what way is MRI superior to CT?

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What commonly-available alternative imaging technique is also effective for demonstrating intrallesional calcifications? B-scan ultrasonography.
B-scan ultrasound of retinoblastoma. Note the intralesional calcifications
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In what way is MRI superior to CT?

Heritable Rb pts are at increased risk for developing cancers, and exposing them to even low-dose radiation (as occurs during CT scanning) poses an at least theoretical increase in that risk; MRI does not.

For this reason, MRI is now preferred over CT in the workup of Rb!
In what way is CT superior to MRI in confirming the diagnosis of Rb? CT is better able to detect intrallesional calcifications.

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What three specific findings are you looking for on imaging? -- -- --

Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap should not be obtained if enucleation is being contemplated. F

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What three specific findings should not be missed on imaging?

- Extraocular extension
- Optic nerve invasion
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Tissue diagnosis via fine-needle aspiration or vitreous tap must be obtained if enucleation is being contemplated.

What needs to be undertaken if imaging reveals extraocular extension and/or optic nerve invasion?

A metastatic workup

- Bone scan
- Lumbar puncture to check for tumor cells in the CSF
- Bone marrow biopsy to check for tumor cells
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What three specific findings should not be obtained if enucleation is being contemplated?
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What is the most common mechanism by which Rb escapes the eye?
Direct extension via the optic nerve, which allows access to the subarachnoid space.
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Rb: Optic nerve extension
Concerning Rb, which of the following are true?

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Why isn’t periodic MRI surveillance for midline intracranial tumors warranted?
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  
  - False
- About 60% represent nonheritable mutations  
  - True
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative)  
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Why isn’t periodic MRI surveillance for midline intracranial tumors warranted? Because early detection has not been shown to prolong survival
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What is the average life expectancy after diagnosis of such a tumor?
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Why isn’t periodic MRI surveillance for midline intracranial tumors warranted?
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The Reese-Ellsworth classification system was the standard for many years. Why has it fallen out of favor?

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The Reese-Ellsworth classification system was the standard for many years. Why has it fallen out of favor?

The Reese-Ellsworth system was based on the assumption that the primary treatment modality was external-beam radiation therapy (XBRT). Now that XBRT is no longer the first-line treatment for most cases of Rb, the Reese-Ellsworth system is not as useful.

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The International Classification for Intraocular Retinoblastoma (ICIR) was introduced to replace the outmoded Reese-Ellsworth system, which was built around XBRT. The ICIR is based on the probability that the eye can be saved with systemic chemotherapy.

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- **Group A**: Tumor(s) confined to retina, small, and far from the foveola and ONH.
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<td>Tumor(s) confined to retina; otherwise fail to qualify for Group A</td>
<td>?</td>
</tr>
<tr>
<td>D</td>
<td>Extensive extraretinal spread</td>
<td>?</td>
</tr>
<tr>
<td>E</td>
<td>Profoundly compromised eye (eg, NVG, tumor-lens touch, vitreous hemorrhage, aseptic orbital cellulitis secondary to tumor necrosis, etc)</td>
<td>?</td>
</tr>
</tbody>
</table>

As for treatment decisions in **bilateral** Rb… these are considerably more complex, and are beyond the scope of this review.
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( F \)
- About 60% represent nonheritable mutations  \( T \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative)  \( F \)
- The *exophytic* type looks like Coats disease  \( T \)
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated  \( F \)
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present)  \( F \)
- Periodic MRI brain is warranted to detect early ‘trilateral’ disease  \( F \)
- The Reese-Ellsworth classification system is the current preferred method for staging Rb  \( F \)
- Patients with Rb are more likely to die of a second malignancy than of Rb itself  \( F \)
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  
  **F**
- About 60% represent nonheritable mutations  
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- The *exophytic* type looks like Coats disease  
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- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated  
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- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present)  
  **F**
- Periodic MRI brain is warranted to detect early ‘trilateral’ disease  
  **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb  
  **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself  
  **T**
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  **F**
- About 60% represent nonheritable mutations  **T**
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- Periodic MRI brain is warranted to detect early ‘trilateral’ disease  **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb  **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself  **T**
- The histologic hallmark is the Homer Wright rosette
 Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births: **False**
- About 60% represent nonheritable mutations: **True**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative): **False**
- The exophytic type looks like Coats disease: **True**
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated: **False**
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present): **False**
- Periodic MRI brain is warranted to detect early ‘trilateral’ disease: **False**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb: **False**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself: **True**
- The histologic hallmark is the Homer Wright rosette: **False**

The Flexner-Wintersteiner rosette is no longer the hallmark of Rb.
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
- About 60% represent nonheritable mutations **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative) **F**
- The *exophytic* type looks like Coats disease **T**
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap *must* be obtained if enucleation is being contemplated **F**
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present) **F**
- Periodic MRI brain is warranted to detect early 'trilateral' disease **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself **T**
- The histologic hallmark is the Homer-Wright rosette **F**

With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer-Wright rosettes
- Two-words prefix rosettes
- Two different words of rosettes

The histologic hallmark is the Homer-Wright rosette **F**
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births [F]
- About 60% represent nonheritable mutations [T]
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1º relative) [F]
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- The histologic hallmark is the Homer Wright rosette [F]

**With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?**

- Flexner-Wintersteiner rosettes
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Concerning Rb, which of the following are true?

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- The histologic hallmark is the Homer-Wright rosette [F]

With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

- Flexner-Wintersteiner
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births F
- About 60% represent nonheritable mutations T
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative) F
- The exophytic type looks like Coats disease T
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap 
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- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital 
  extension is present) F
- Periodic MRI brain is warranted to detect early 'trilateral' disease F
- The Reese-Ellsworth classification system is the current preferred 
  method for staging Rb F
- Patients with Rb are more likely to die of a second malignancy than 
  of Rb itself T
- The histologic hallmark is the Homer Wright rosette F

With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

‘Fleurette’
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births. **T**
- About 60% represent nonheritable mutations. **F**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1o relative). **T**
- The exophytic type looks like Coats disease. **T**
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- Patients with Rb are more likely to die of a second malignancy than of Rb itself. **T**
- The histologic hallmark is the Homer Wright rosette. **F**

What is the characteristic appearance of a Flexner-Wintersteiner rosette?

A number of retinoblasts organized in a circle around a lumen. Is the lumen empty? Yes, but it is lined by a structure often described as 'refractile.' Is the Flexner-Wintersteiner rosette pathognomonic for Rb? No, but it is commonly present in Rb, and quite rare in other tumors. In a nutshell, the formation of Flexner-Wintersteiner rosettes can be described as an attempt by tumor cells to do something. Do what? They represent an attempt at differentiation into retinal structures.

With respect to Rb histology, the term 'rosette' is used in three contexts. What are they?

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

Again with respect to Rb histology, another '-ette' term is key. What is it? 'Fleurette'
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births. **T**
- About 60% represent nonheritable mutations. **T**
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- Periodic MRI brain is warranted to detect early 'trilateral' disease. **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb. **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself. **T**
- The histologic hallmark is the Homer Wright rosette. **F**

**What is the characteristic appearance of a Flexner-Wintersteiner rosette?**
A number of retinoblasts organized in a circle around a lumen.

**With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?**
- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

**Again with respect to Rb histology, another ‘-ette’ term is key. What is it?**
‘Fleurette’
Rb: Flexner-Wintersteiner rosettes
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births.
- About 60% represent nonheritable mutations.
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1st relative).
- The exophytic type looks like Coats disease.
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated.
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present).
- Periodic MRI brain is warranted to detect early 'trilateral' disease.
- The Reese-Ellsworth classification system is the current preferred method for staging Rb.
- Patients with Rb are more likely to die of a second malignancy than of Rb itself.
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What is the characteristic appearance of a Flexner-Wintersteiner rosette?

- A number of retinoblasts organized in a circle around a lumen.

Is the lumen empty?

- Yes, but it is lined by a structure often described as 'refractile.'

With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

Again with respect to Rb histology, another '-ette' term is key. What is it?

- Fleurette

Flexner-Wintersteiner rosettes

Homer Wright rosettes
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births.  
- About 60% represent nonheritable mutations.  
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---

**What is the characteristic appearance of a Flexner-Wintersteiner rosette?**

A number of retinoblasts organized in a circle around a lumen.

**Is the lumen empty?**

Yes, but it is lined by a structure often described as **refractile**.

**Is the Flexner-Wintersteiner rosette pathognomonic for Rb?**

No, but it is commonly present in Rb, and quite rare in other tumors.

In a nutshell, the formation of Flexner-Wintersteiner rosettes can be described as an attempt by tumor cells to do something. Do what?

They represent an attempt at differentiation into retinal structures.

---

With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?  
- **Flexner-Wintersteiner rosettes**  
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Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

‘Fleurette'
Concerning Rb, which of the following are true?

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What is the characteristic appearance of a Flexner-Wintersteiner rosette?
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Yes, but it is lined by a structure often described as ‘refractile’

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Again with respect to Rb histology, another ‘-ette’ term is key. What is it?
‘Fleurette’
Flexner-Wintersteiner rosette. Note the empty, lined lumen
Concerning Rb, which of the following are true?

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What is the characteristic appearance of a Flexner-Wintersteiner rosette?
A number of retinoblasts organized in a circle around a lumen.

Is the lumen empty?
Yes, but it is lined by a structure often described as ‘refractile’.

What normal retinal structure correlates with this refractile lining?

With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?

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What is the characteristic appearance of a Flexner-Wintersteiner rosette?
A number of retinoblasts organized in a circle around a lumen.

Is the lumen empty?
Yes, but it is lined by a structure often described as ‘refractile’.

What normal retinal structure correlates with this refractile lining?
The retinal outer membrane.

With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?
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No, but it is commonly present in Rb, and quite rare in other tumors.

With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?

--- Flexner-Wintersteiner rosettes
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The histologic hallmark is the Homer-Wright rosette.
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- Fleurette

**Flexner-Wintersteiner rosette**

Is the characteristic appearance of a Flexner-Wintersteiner rosette? A number of retinoblasts organized in a circle around a lumen

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No, but it is commonly present in Rb, and quite rare in other tumors.

In a nutshell, the formation of Flexner-Wintersteiner rosettes can be described as an attempt by tumor cells to do something. Do what?

With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?

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What is the characteristic appearance of a Flexner-Wintersteiner rosette? A number of retinoblasts organized in a circle around a lumen.

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With respect to Rb histology, the term ‘rosette’ is used in three contexts. What are they?
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Again with respect to Rb histology, another ‘-ette’ term is key. What is it? ‘Fleurette’

Flexner-Wintersteiner rosettes

Homer-Wright rosettes
Concerning Rb, which of the following are true?

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- The Reese-Ellsworth classification system is the current preferred method for staging Rb **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself **T**
- The histologic hallmark is the Homer Wright rosette **F**

What are pseudorosettes?

---

Pseudorosettes

---

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

- ‘Fleurette’

---

Homer-Wright rosettes

---

Flexner-Wintersteiner rosettes
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births \( \text{F} \)
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- To diagnose a case as 'heritable,' family history must be positive but not necessarily a 1o relative \( \text{F} \)
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- Periodic MRI brain is warranted to detect early 'trilateral' disease \( \text{F} \)
- The Reese-Ellsworth classification system is the current preferred method for staging Rb \( \text{F} \)
- Patients with Rb are more likely to die of a second malignancy than of Rb itself \( \text{T} \)
- The histologic hallmark is the Homer-Wright rosette \( \text{F} \)

What are pseudorosettes?
A description of the histologic appearance of the tumor with respect to how it organizes around blood vessels

---

Flexner-Wintersteiner rosettes

Pseudorosettes

Homer-Wright rosettes

Fleurette

---

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

‘Fleurette’
Concerning Rb, which of the following are true?

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- Periodic MRI brain is warranted to detect early 'trilateral' disease **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself **T**
- The histologic hallmark is the Homer-Wright rosette **F**

**What are pseudorosettes?**

A description of the histologic appearance of the tumor with respect to how it organizes around blood vessels.

**How does the tumor tend to organize with respect to blood vessels?**

- Flexner-Wintersteiner rosettes
- Pseudorosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

- Fleurette

The histologic hallmark is the Homer-Wright rosette **F**
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \(\text{F}\)
- About 60% represent nonheritable mutations  \(\text{T}\)
- To diagnose a case as 'heritable,' family history must be positive \(\text{but not necessarily a 1o relative}\) \(\text{F}\)
- The exophytic type looks like Coats disease \(\text{T}\)
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated \(\text{F}\)
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present) \(\text{F}\)
- Periodic MRI brain is warranted to detect early 'trilateral' disease \(\text{F}\)
- The Reese-Ellsworth classification system is the current preferred method for staging Rb \(\text{F}\)
- Patients with Rb are more likely to die of a second malignancy than of Rb itself \(\text{T}\)
- The histologic hallmark is the Homer-Wright rosette \(\text{F}\)

What are pseudorosettes?
A description of the histologic appearance of the tumor with respect to how it organizes around blood vessels

How does the tumor tend to organize with respect to blood vessels?
Like other fast-growing tumors, Rb has a tendency to 'outgrow' its blood supply. That is, tumor cells frequently end up so far from a blood vessel that they are unable to have their metabolic needs met. Cells in these areas die, and subsequently necrose.

Again with respect to Rb histology, another 'ette' term is key. What is it?
-Fleurette-

Pseudorosettes

- Flexner-Wintersteiner rosettes
- Homer-Wright rosettes

With respect to Rb histology, the term 'rosette' is used in three contexts. What are they?
---Flexner-Wintersteiner rosettes
---Pseudorosettes
---Homer-Wright rosettes

Flexner-Wintersteiner rosettes
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births. **F**
- About 60% represent nonheritable mutations. **T**
- To diagnose a case as ‘heritable,’ family history must be positive (but not necessarily a 1o relative). **F**
- The exophytic type looks like Coats disease. **T**
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated. **F**
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present). **F**
- Periodic MRI brain is warranted to detect early ‘trilateral’ disease. **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb. **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself. **T**
- The histologic hallmark is the Homer-Wright rosette. **F**

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**What are pseudorosettes?**
A description of the histologic appearance of the tumor with respect to how it organizes around blood vessels.

**How does the tumor tend to organize with respect to blood vessels?**
Like other fast-growing tumors, Rb has a tendency to ‘outgrow’ its blood supply. That is, tumor cells frequently end up so far from a blood vessel that they are unable to have their metabolic needs met. Cells in these areas die, and subsequently necrose. Thus, at low mag, an Rb tumor will be characterized by cuffs of living cells surrounding blood vessels, with the cuffs in turn being surrounded by areas of necrosis.

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**Pseudorosettes**

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**Fleurette**

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Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

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Flexner-Wintersteiner rosettes
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- The histologic hallmark is the Homer-Wright rosette **F**

*What are pseudorosettes?*
A description of the histologic appearance of the tumor with respect to how it organizes around blood vessels.

*How does the tumor tend to organize with respect to blood vessels?*
Like other fast-growing tumors, Rb has a tendency to ‘outgrow’ its blood supply. That is, tumor cells frequently end up so far from a blood vessel that they are unable to have their metabolic needs met. Cells in these areas die, and subsequently necrose. Thus, at low mag, an Rb tumor will be characterized by cuffs of living cells surrounding blood vessels, with the cuffs in turn being surrounded by areas of necrosis. A pseudorosette is the blood vessel along with its cuff of viable cells.

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- Flexner-Wintersteiner rosettes
- **Pseudorosettes**
- Homer-Wright rosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

‘Fleurette’
Rb: Pseudorosettes
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
- About 60% represent nonheritable mutations **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1o relative)
- The exophytic type looks like Coats disease **T**
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- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present) **F**
- Periodic MRI brain is warranted to detect early 'trilateral' disease **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself **T**
- The histologic hallmark is the Homer Wright rosette **F**

The areas of necrosis are characterized by the presence of a substance of some import. What is it?

Areas of necrosis are characterized by the presence of a substance of some import. What is it?

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer-Wright rosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

- ‘Fleurette’

With respect to Rb histology, the term 'rosette' is used in three contexts. What are they?

- Flexner-Wintersteiner rosettes
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- Homer-Wright rosettes
Concerning Rb, which of the following are true?

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- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present) \( F \)
- Periodic MRI brain is warranted to detect early 'trilateral' disease \( F \)
- The Reese-Ellsworth classification system is the current preferred method for staging Rb \( F \)
- Patients with Rb are more likely to die of a second malignancy than of Rb itself \( T \)
- The histologic hallmark is the Homer-Wright rosette \( F \)

- The areas of necrosis are characterized by the presence of a substance of some import. What is it?
  - Calcium
Q

Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births \( \times \) 1/100,000 live births
- About 60% represent nonheritable mutations
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1o relative)
- The exophytic type looks like Coats disease
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present)
- Periodic MRI brain is warranted to detect early 'trilateral' disease
- The Reese-Ellsworth classification system is the current preferred method for staging Rb
- Patients with Rb are more likely to die of a second malignancy than of Rb itself

The areas of necrosis are characterized by the presence of a substance of some import. What is it? Calcium

Why is the presence of calcium within areas of necrosis important?

Pseudorosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

Fleurette

The histologic hallmark is the Homer-Wright rosette
Concerning Rb, which of the following are true?

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- Patients with Rb are more likely to die of a second malignancy than of Rb itself **T**
- The histologic hallmark is the Homer-Wright rosette **F**

The areas of necrosis are characterized by the presence of a substance of some import. **What is it?**
Calcium

*Why is the presence of calcium within areas of necrosis important?*
It is this calcium that shows up on imaging, thus providing an important diagnostic clue that one is dealing with Rb.

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**Pseudorosettes**

Again with respect to Rb histology, another 'ette' term is key. **What is it?**

- 'Fleurette'

The histologic hallmark is the Homer-Wright rosette. **F**
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \text{F} \)
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- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\text{o} relative)  \( \text{F} \)
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- Patients with Rb are more likely to die of a second malignancy than of Rb itself  \( \text{T} \)
- The histologic hallmark is the Homer Wright rosette  \( \text{F} \)

What is the characteristic appearance of a Homer Wright rosette?

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

Again with respect to Rb histology, another 'ette' term is key. What is it?

- Fleurette

Is the Homer Wright rosette pathognomonic for Rb?

- No. It is not always encountered in Rb, and is commonly present in other tumors.
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
- About 60% represent nonheritable mutations **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1o relative) **F**
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- Periodic MRI brain is warranted to detect early 'trilateral' disease **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb **T**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself **T**
- The histologic hallmark is the Homer Wright rosette **F**

*What is the characteristic appearance of a Homer Wright rosette?*
Like a Flexner-Wintersteiner rosette, it is composed of a number of retinoblasts organized in a circle around a lumen.

*With respect to Rb histology, the term 'rosette' is used in three contexts. What are they?*
- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

*Again with respect to Rb histology, another 'ette' term is key. What is it?*
- Fleurette
Rb: Homer Wright rosettes
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births \(F\)
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- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative) \(F\)
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- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated \(F\)
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- Periodic MRI brain is warranted to detect early 'trilateral' disease \(F\)
- The Reese-Ellsworth classification system is the current preferred method for staging Rb \(F\)
- Patients with Rb are more likely to die of a second malignancy than of Rb itself \(T\)
- The histologic hallmark is the Homer Wright rosette \(F\)

What is the characteristic appearance of a Homer Wright rosette?
Like a Flexner-Wintersteiner rosette, it is composed of a number of retinoblasts organized in a circle around a lumen.

Is the lumen empty?
No, it contains an eosinophilic structure called a 'neurofibrillary tangle'.

Again with respect to Rb histology, another '-ette' term is key. What is it?
'Fleurette'

Flexner-Wintersteiner rosettes
Pseudorosettes
Homer Wright rosettes
Q/A

Concerning Rb, which of the following are true?

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- About 60% represent nonheritable mutations  **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1st relative)  **F**
- The exophytic type looks like Coats disease  **T**
- **FNA or vitreous tap** must be obtained if enucleation is being contemplated  **F**
- **CT orbits** has a role in purely intraocular Rb (i.e., even if no orbital extension is present)  **F**
- **Periodic MRI brain** is warranted to detect early 'trilateral' disease  **F**
- The **Reese-Ellsworth classification system** is the current preferred method for staging Rb  **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself  **T**
- The histologic hallmark is the Homer Wright rosette  **F**

---

**What is the characteristic appearance of a Homer Wright rosette?**

Like a Flexner-Wintersteiner rosette, it is composed of a number of retinoblasts organized in a circle around a lumen.

**Is the lumen empty?**

No, it contains an eosinophilic structure called a 'neurofibrillary tangle.'

---

**Fleurette**

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**Again with respect to Rb histology, another ‘-ette’ term is key. What is it?**

‘Fleurette’
Concerning Rb, which of the following are true?

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What is the characteristic appearance of a Homer Wright rosette?
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Is the lumen empty?
No, it contains an eosinophilic structure called a ‘neurofibrillary tangle’

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?
‘Fleurette’

The characteristic appearance of a Homer Wright rosette is:

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

With respect to Rb histology, another ‘-ette’ term is key. What is it?
‘Fleurette’

The characteristic appearance of a Homer Wright rosette is:

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?
‘Fleurette’
Rb: Homer Wright rosettes. Note the neurofibrillary tangle in the lumen of the rosette
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
- About 60% represent nonheritable mutations **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1o relative) **F**
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- Periodic MRI brain is warranted to detect early 'trilateral' disease **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself **T**
- The histologic hallmark is the Homer Wright rosette **F**

What is the characteristic appearance of a Homer Wright rosette?
Like a Flexner-Wintersteiner rosette, it is composed of a number of retinoblasts organized in a circle around a lumen.

Is the lumen empty?
No, it contains an eosinophilic structure called a ‘neurofibrillary tangle’

Is the Homer Wright rosette pathognomonic for Rb?

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?
‘Fleurette’

Flexner-Wintersteiner
Concerning Rb, which of the following are true?

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Is the lumen empty?
No, it contains an eosinophilic structure called a ‘neurofibrillary tangle’

Is the Homer Wright rosette pathognomonic for Rb?
No. It is not always encountered in Rb, and is commonly present in other tumors.

With respect to Rb histology, the term 'rosette' is used in three contexts. What are they?
- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer Wright rosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?
‘Fleurette’

Flexner-Wintersteiner Homer Wright
Concerning Rb, which of the following are true?

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- The Reese-Ellsworth classification system is the current preferred method for staging Rb  \( \text{F} \)
- Patients with Rb are more likely to die of a second malignancy than of Rb itself  \( \text{T} \)
- The histologic hallmark is the Homer-Wright rosette  \( \text{F} \)

What is a fleurette?

- A small cluster of Rb cells that have differentiated into photoreceptor-like structures
- It is a curvilinear structure, with extensions described as 'bulbous'
- As fleurettes represent a more advanced form of tumor-cell differentiation, it should come as no surprise that they are less commonly encountered than Flexner-Wintersteiner rosettes

Again with respect to Rb histology, another 'ette' term is key. What is it?

- 'Fleurette'

Flexner-Wintersteiner rosette

With respect to Rb, in which context is the term 'Homer-Wright rosette' used?

- In the context of retinal detachment
- In the context of intraocular tumor spread
- In the context of extraretinal tumor spread
- In the context of choroidal tumor spread
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births \( \text{F} \)
- About 60% represent nonheritable mutations \( \text{T} \)
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\(^{\circ}\) relative) \( \text{F} \)
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- Periodic MRI brain is warranted to detect early 'trilateral' disease \( \text{F} \)
- The Reese-Ellsworth classification system is the current preferred method for staging Rb \( \text{F} \)
- Patients with Rb are more likely to die of a second malignancy than of Rb itself \( \text{T} \)
- The histologic hallmark is the Homer Wright rosette \( \text{F} \)

**What is a fleurette?**
A small cluster of Rb cells that have differentiated into photoreceptor-like structures

**What are they?**
- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer-Wright rosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

- Fleurette

As fleurettes represent a more advanced form of tumor-cell differentiation, it should come as no surprise that they are less commonly encountered than Flexner-Wintersteiner rosettes.
Concerning Rb, which of the following are true?

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What is a fleurette?
A small cluster of Rb cells that have differentiated into photoreceptor-like structures

What does it look like?
It is a curvilinear structure, with extensions described as 'bulbous'

Are fleurettes more, or less common than Flexner-Wintersteiner rosettes?
As fleurettes represent a more advanced form of tumor-cell differentiation, it should come as no surprise that they are less commonly encountered than are Flexner-Wintersteiner rosettes
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
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- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative) **F**
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- Periodic MRI brain is warranted to detect early 'trilateral' disease **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself **T**
- The histologic hallmark is the Homer-Wright rosette **F**

What is a fleurette?
A small cluster of Rb cells that have differentiated into photoreceptor-like structures

What does it look like?
It is a curvilinear structure, with extensions described as **one word**

Again with respect to Rb histology, another 'ette' term is key. What is it?

- 'Fleurette'
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  \( \text{F} \)
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---

**What is a fleurette?**

A small cluster of Rb cells that have differentiated into photoreceptor-like structures

**What does it look like?**

It is a curvilinear structure, with extensions described as ‘bulbous’

**What are they?**

- Flexner-Wintersteiner rosettes
- Pseudorosettes
- Homer-Wright rosettes
- ‘Fleurette’

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

- Flexner-Wintersteiner
- Homer-Wright
- Fleurette
Rb: Fleurette. Note the bulbous extensions (arrow)
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  
  
- About 60% represent nonheritable mutations

To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1° relative).

- The exophytic type looks like Coats disease

- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated

- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present)

- Periodic MRI brain is warranted to detect early 'trilateral' disease

- The Reese-Ellsworth classification system is the current preferred method for staging Rb

- Patients with Rb are more likely to die of a second malignancy than of Rb itself

- The histologic hallmark is the Homer Wright rosette


What is a fleurette?
A small cluster of Rb cells that have differentiated into photoreceptor-like structures

What does it look like?
It is a curvilinear structure, with extensions described as ‘bulbous’

Are fleurettes more, or less common than Flexner-Wintersteiner rosettes?

- Fleurettes

- Flexner-Wintersteiner rosettes

Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

- ‘Flexner-Wintersteiner’
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births  **F**
- About 60% represent nonheritable mutations  **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1\(^{st}\) relative)  **F**
- The exophytic type looks like Coats disease  **T**
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated  **F**
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present)  **F**
- Periodic MRI brain is warranted to detect early 'trilateral' disease  **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb  **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself  **T**
- The histologic hallmark is the Homer-Wright rosette  **F**

**What is a fleurette?**
A small cluster of Rb cells that have differentiated into photoreceptor-like structures

**What does it look like?**
It is a curvilinear structure, with extensions described as ‘bulbous’

**Are fleurettes more, or less common that Flexner-Wintersteiner rosettes?**
As fleurettes represent a more advanced form of tumor-cell differentiation, it should come as no surprise that they are less commonly encountered than are Flexner-Wintersteiner rosettes

**‘Fleurette’**
A small cluster of Rb cells that have differentiated into photoreceptor-like structures

Flexner-Wintersteiner rosette
Concerning Rb, which of the following are true?

- The incidence is roughly 1/100,000 live births **F**
- About 60% represent nonheritable mutations **T**
- To diagnose a case as 'heritable,' family history must be positive (but not necessarily a 1º relative) **F**
- The exophytic type looks like Coats disease **T**
- Tissue diagnosis via fine-needle aspiration (FNA) or vitreous tap must be obtained if enucleation is being contemplated **F**
- CT orbits has a role in purely intraocular Rb (i.e., even if no orbital extension is present) **F**
- Periodic MRI brain is warranted to detect early 'trilateral' disease **F**
- The Reese-Ellsworth classification system is the current preferred method for staging Rb **F**
- Patients with Rb are more likely to die of a second malignancy than of Rb itself **T**

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Again with respect to Rb histology, another ‘-ette’ term is key. What is it?

‘Fleurette’

Flexner-Wintersteiner rosette
Not a great pic, but the best I could find for comparing and contrasting *F-W rosettes*, *Homer Wright rosettes*, and *fleurettes*.