Q

What is the classic DFE appearance of angioid streaks?
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.
What is the classic DFE appearance of angioid streaks?

Reddish-brown lines radiating out from the (atrophic) peripapillary region

Why are they called ‘angioid’ streaks?
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Why are they called ‘angioid’ streaks? Because the streaks resemble blood vessels.
Angioid streaks (arrowheads).

Note that only a few of the many present have been marked.

Angioid streaks (arrowheads).
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region **bilaterally? unilaterally?**

*Does angioid streaks present unilaterally, or bilaterally?*
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region bilaterally? unilaterally?

Does angioid streaks present unilaterally, or bilaterally?
Bilaterally
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region **bilaterally**? **unilaterally**?

*Does angioid streaks present unilaterally, or bilaterally?*

**Bilaterally**

*With what symptom(s) does/do angioid streaks present?*
Angiod Streaks

What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region bilaterally? unilaterally?

Does angioid streaks present unilaterally, or bilaterally?
Bilaterally

With what symptom(s) does/do angioid streaks present?
Nothing—it is asymptomatic (until/unless the fovea is involved)
What is the classic DFE appearance of angioid streaks?
Reddish-brown lines radiating out from the (atrophic) peripapillary region bilaterally? unilaterally?

Does angioid streaks present unilaterally, or bilaterally?
Bilaterally

With what symptom(s) does/do angioid streaks present?
Nothing—it is asymptomatic (until/unless the fovea is involved)

Can angioid streaks occur congenitally?
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region bilaterally? unilaterally?

Does angioid streaks present unilaterally, or bilaterally?
Bilaterally

With what symptom(s) does/doi angioid streaks present?
Nothing—it is asymptomatic (until/unless the fovea is involved)

Can angioid streaks occur congenitally?
Apparently not—there has never been a reported case of their presence in the fundus of an infant
What is the classic DFE appearance of angioid streaks?
Reddish-brown lines radiating out from the (atrophic) peripapillary region

Which layer of the retina is abnormal?
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region

Which layer of the retina is abnormal? Bruch’s membrane

*Let’s briefly review the anatomy of Bruch’s membrane…*
What are the five layers of Bruch’s membrane?

1) (Start here)
2)
3)
4)
5)

Bruch’s membrane

Innermost

Outermost

Angioid Streaks
What are the five layers of Bruch’s membrane?

1) Basement membrane of RPE
2) Innermost
3) 4) 5) Outermost

Q/A

Angioid Streaks
What are the five layers of Bruch’s membrane?

1) **Basement membrane** of RPE
2) Innermost
3) (Next)
4) 
5) Outermost
What are the five layers of Bruch’s membrane?

1) **Basement membrane** of RPE
2) Inner collagenous layer
3) 
4) 
5) 

**Innermost**

**Outermost**

Angioid Streaks
What are the five layers of Bruch’s membrane?

1) **Basement membrane** of RPE
2) Inner **collagenous** layer
3) (Next)
4)
5)
What are the five layers of Bruch’s membrane?

1) Basement membrane of RPE
2) Inner collagenous layer
3) [blank] layer
4)
5)
What are the five layers of Bruch’s membrane?

1) **Basement membrane** of RPE
2) **Inner collagenous** layer
3) **Elastic** layer
4) *(Next)*
5) *(Next)*
What are the five layers of Bruch’s membrane?

1) **Basement membrane** of RPE
2) Inner **collagenous** layer
3) **Elastic** layer
4) Outer **layer**
5) **one familiar word**

**Angioid Streaks**

**Q/A**

**Bruch’s membrane**

**Innermost**

**Outermost**
What are the five layers of Bruch’s membrane?

1) **Basement membrane** of RPE
2) Inner **collagenous** layer
3) **Elastic** layer
4) Outer **collagenous** layer
5) (Next)
What are the five layers of Bruch’s membrane?

1) **Basement membrane** of RPE
2) Inner **collagenous** layer
3) **Elastic** layer
4) Outer **collagenous** layer
5) two familiar words of choriocapillaris

**Angioid Streaks**
What are the five layers of Bruch’s membrane?

1) **Basement membrane** of RPE
2) Inner **collagenous** layer
3) **Elastic** layer
4) Outer **collagenous** layer
5) **Basement membrane** of choriocapillaris

**Angioid Streaks**
What are the five layers of Bruch’s membrane?

1) Basement membrane of RPE
2) Inner collagenous layer
3) Elastic layer
4) Outer collagenous layer
5) Basement membrane of choriocapillaris

What (non-Bruch’s) structure goes here?
What are the five layers of Bruch’s membrane?

1) Basement membrane of RPE
2) Inner collagenous layer
3) Elastic layer
4) Outer collagenous layer
5) Basement membrane of choriocapillaris

The RPE cells themselves

What (non-Bruch’s) structure goes here?
What are the five layers of Bruch's membrane?

- Basement membrane of RPE
- Inner collagenous layer
- Elastic layer
- Outer collagenous layer
- Basement membrane of choriocapillaris

What (non-RPE) structures go here?

Innermost:

Outermost:

Angiod Streaks
What are the five layers of Bruch's membrane?

- Baseline membrane of RPE
- Inner collagenous layer
- Elastic layer
- Outer collagenous layer
- Baseline membrane of choriocapillaris

What (non-RPE) structures go here?

The photoreceptor outer segments

Diagram:

1) Basement membrane of RPE
2) Inner collagenous layer
3) Elastic layer
4) Outer collagenous layer
5) Basement membrane of choriocapillaris
What are the five layers of Bruch’s membrane?

- 1) Basement membrane of RPE
- 2) Inner collagenous layer
- 3) Elastic layer
- 4) Outer collagenous layer
- 5) Basement membrane of choriocapillaris

What cell type is this?

- Bipolar cells

Angioid Streaks

Innermost

Outermost
What are the five layers of Bruch’s membrane?

- 1) Basement membrane of RPE
- 2) Inner collagenous layer
- 3) Elastic layer
- 4) Outer collagenous layer
- 5) Basement membrane of choriocapillaris

What cell type is this?

- Bipolar cells
- PR outer segs
- RPE cells

Angiod Streaks

Innermost

Outermost
What are the five layers of Bruch's membrane?

1) Basement membrane of RPE
2) Inner collagenous layer
3) Elastic layer
4) Outer collagenous layer
5) Basement membrane of choriocapillaris

- 6) What structure is this?
What are the five layers of Bruch's membrane?

- 1) Basement membrane of RPE
- 2) Inner collagenous layer
- 3) Elastic layer
- 4) Outer collagenous layer
- 5) Basement membrane of choriocapillaris

What structure is this? The choriocapillaris
What are the five layers of Bruch’s membrane?

1. Basement membrane of RPE
2. Inner collagenous layer
3. Elastic layer
4. Outer collagenous layer
5. Basement membrane of choriocapillaris

What structure is this?

- PR outer segs
- Bipolar cells

- RPE cells

- Innermost
- Outermost

Angioid Streaks

Choriocapillaris

What structure is this?
What are the five layers of Bruch’s membrane?

- 1) Basement membrane of RPE
- 2) Inner collagenous layer
- 3) Elastic layer
- 4) Outer collagenous layer
- 5) Basement membrane of choriocapillaris

What structure is this? The choroid
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? **Bruch’s membrane**

What's abnormal about Bruch’s in angioid streaks?
--
--
Q/A

- What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region
- Which layer of the retina is abnormal? Bruch’s membrane

**What's abnormal about Bruch’s in angioid streaks?**
--It is...[thickened vs thinned]
--It is...[common pathologic process]
A

**Angiod Streaks**

- What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region
- Which layer of the retina is abnormal? **Bruch’s membrane**

*What's abnormal about Bruch’s in angioid streaks?*
-- It is...thickened
-- It is...calcified (and thus brittle)
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane

What’s abnormal about Bruch’s in angioid streaks?
--It is…thickened
--It is…calcified (and thus brittle)

How are angioid streaks related to Bruch’s?
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane

What’s abnormal about Bruch’s in angioid streaks?
--It is…thickened
--It is…calcified (and thus brittle)

How are angioid streaks related to Bruch’s?
Angioid streaks represent breaks in the brittle Bruch’s
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? **Bruch’s membrane**

What’s abnormal about Bruch’s in angioid streaks?
-- It is...thickened
-- It is...calcified (and thus **brittle**)

How are angioid streaks related to Bruch’s?
Angioid streaks represent **breaks in the brittle Bruch’s**

What serious complications can result from the breaks in Bruch’s?
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? **Bruch’s membrane**

What's abnormal about Bruch’s in angioid streaks?
--It is...thickened
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How are angioid streaks related to Bruch’s?
Angioid streaks represent **breaks in the brittle Bruch’s**

What serious complications can result from the breaks in Bruch’s?
Choroidal neovascular membrane and subretinal hemorrhage
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? **Bruch’s membrane**

What’s abnormal about Bruch’s in angioid streaks?
--It is...thickened
--It is...calcified (and thus **brittle**)

How are angioid streaks related to Bruch’s?
Angioid streaks represent **breaks in the brittle Bruch’s**

What serious complications can result from the breaks in Bruch’s?
Choroidal neovascular membrane and **subretinal hemorrhage**

*To be clear: Does this refer to hemorrhage not related to a CNVM?*
**Angioid Streaks**

- What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

- Which layer of the retina is abnormal? **Bruch’s membrane**

---

**What’s abnormal about Bruch’s in angioid streaks?**

-- It is...thickened
-- It is...calcified (and thus **brittle**)  

**How are angioid streaks related to Bruch’s?**

Angioid streaks represent **breaks in the brittle Bruch’s**

**What serious complications can result from the breaks in Bruch’s?**

Choroidal neovascular membrane and **subretinal hemorrhage**

To be clear: Does this refer to hemorrhage **not** related to a CNVM? Yes
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

What’s abnormal about Bruch’s in angioid streaks?
--It is...thickened
--It is...calcified (and thus brittle)

How are angioid streaks related to Bruch’s?
Angioid streaks represent breaks in the brittle Bruch’s membrane.

What serious complications can result from the breaks in Bruch’s?
Choroidal neovascular membrane and subretinal hemorrhage.

Is CNVM a common occurrence in angioid streaks?
Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? **Bruch’s membrane**

What's abnormal about Bruch’s in angioid streaks?
-- It is...thickened
-- It is...calcified (and thus brittle)

How are angioid streaks related to Bruch’s? Angioid streaks represent **breaks in the brittle Bruch’s**

What serious complications can result from the breaks in Bruch’s? Choroidal neovascular membrane and subretinal hemorrhage.

Is CNVM a common occurrence in angioid streaks? Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as __80%__.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? **Bruch’s membrane**

What’s abnormal about Bruch’s in angioid streaks?
-- It is…thickened
-- It is…calcified (and thus **brittle**)

How are angioid streaks related to Bruch’s?
Angioid streaks represent *breaks in the brittle Bruch’s*

What serious complications can result from the breaks in Bruch’s?
Choroidal neovascular membrane and subretinal hemorrhage

*Is CNVM a common occurrence in angioid streaks? Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%*
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? **Bruch’s membrane**

What's abnormal about Bruch's in angioid streaks?
-- It is...thickened
-- It is...calcified (and thus **brittle**)

How are angioid streaks related to Bruch's?
Angioid streaks represent **breaks in the brittle Bruch’s**

What serious complications can result from the breaks in Bruch’s?
Choroidal neovascular membrane and subretinal hemorrhage

Is CNVM a common occurrence in angioid streaks? Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%.

Does CNVM in angioid streaks carry a good, or poor prognosis?

**Poor**
Angioid Streaks

- What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.
- Which layer of the retina is abnormal? **Bruch’s membrane**

**What's abnormal about Bruch’s in angioid streaks?**
- It is...thickened
- It is...calcified (and thus **brittle**)

**How are angioid streaks related to Bruch’s?**
Angioid streaks represent **breaks in the brittle Bruch’s**

**What serious complications can result from the breaks in Bruch’s?**
Choroidal neovascular membrane and subretinal hemorrhage

**Is CNVM a common occurrence in angioid streaks?**
Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%

**Does CNVM in angioid streaks carry a good, or poor prognosis?**
Poor
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? **Bruch’s membrane**

**Angioid Streaks**

Does the brittleness of Bruch’s...

What’s abnormal about Bruch’s in angioid streaks?
- It is... thickened
- It is... calcified (and thus **brittle**)

How are angioid streaks related to Bruch’s?
Angioid streaks represent **breaks in the brittle Bruch’s**

What serious complications can result from the breaks in Bruch’s?
- Choroidal neovascular membrane
- Subretinal hemorrhage

Is CNVM a common occurrence in angioid streaks?
Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%

Does CNVM in angioid streaks carry a good, or poor prognosis?
Poor
Angiod Streaks

- What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region
- Which layer of the retina is abnormal? **Bruch’s membrane**

**Does the brittleness of Bruch’s… predispose these eyes to traumatic choroidal rupture with subsequent CNVM development?**

**What’s abnormal about Bruch’s in angioid streaks?**
- It is…thickened
- --It is…calcified (and thus **brittle**)  

**How are angioid streaks related to Bruch’s?**
Angioid streaks represent **breaks in the brittle Bruch’s**

**What serious complications can result from the breaks in Bruch’s?**
Choroidal neovascular membrane and subretinal hemorrhage

**Is CNVM a common occurrence in angioid streaks?** Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%

**Does CNVM in angioid streaks carry a good, or poor prognosis?** Poor
Angiod Streaks

- What is the classic DFE appearance of angiod streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region

- Which layer of the retina is abnormal? Bruch’s membrane

**Does the brittleness of Bruch’s…**
- predispose these eyes to traumatic choroidal rupture with subsequent CNVM development?
  - Indeed it does

**What’s abnormal about Bruch’s in angiod streaks?**
- It is…thickened
- --It is... calcified (and thus brittle)

**How are angiod streaks related to Bruch’s?**
- Angioid streaks represent breaks in the brittle Bruch’s

**What serious complications can result from the breaks in Bruch’s?**
- Choroidal neovascular membrane
- and subretinal hemorrhage

**Is CNVM a common occurrence in angiod streaks?**
- Indeed it is—estimates of CNVM prevalence in angiod streaks run as high as 80%

**Does CNVM in angiod streaks carry a good, or poor prognosis?**
- Poor
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? **Bruch’s membrane**

- Does the brittleness of Bruch’s... predispose these eyes to traumatic choroidal rupture with subsequent CNVM development? Indeed it does.
- What’s abnormal about Bruch’s in angioid streaks? It is... thickened --It is... calcified (and thus brittle).
- How are angioid streaks related to Bruch’s? Angioid streaks represent breaks in the brittle Bruch’s.
- What serious complications can result from the breaks in Bruch’s? Choroidal neovascular membrane and subretinal hemorrhage.
- Is CNVM a common occurrence in angioid streaks? Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%.
- Does CNVM in angioid streaks carry a good, or poor prognosis? Poor.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

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Does CNVM in angioid streaks carry a good, or poor prognosis? Poor.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

What is the typical appearance of angioid streaks on FA? The streaks hyperfluoresce early due to a window defect, and late due to staining. Of course, if a CNVM develops, it will hyperfluoresce during the choroidal phase.

What serious complications can result from the breaks in Bruch’s? Choroidal neovascular membrane and subretinal hemorrhage.

Is CNVM a common occurrence in angioid streaks? Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%.

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What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

What is the typical appearance of angioid streaks on FA? The streaks hyperfluoresce early due to a window defect, and late due to staining mechanism.

Angioid streaks represent breaks in the brittle Bruch’s. Is CNVM a common occurrence in angioid streaks? Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%. Does CNVM in angioid streaks carry a good, or poor prognosis? Poor.

What serious complications can result from the breaks in Bruch’s? Choroidal neovascular membrane and subretinal hemorrhage.

Bruch’s membrane—It is thickened and calcified (and thus brittle).
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? **Bruch’s membrane**

What is the typical appearance of angioid streaks on FA? The streaks **hyperfluoresce** early due to a window defect, and late due to staining.

Angioid streaks represent **breaks in the brittle Bruch’s**.

What serious complications can result from the breaks in Bruch’s? Choroidal neovascular membrane and subretinal hemorrhage.

Is CNVM a common occurrence in angioid streaks? Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%.

Does CNVM in angioid streaks carry a good, or poor prognosis? Poor.
Angioid Streaks

Early

Late

FA
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane

What is the typical appearance of angioid streaks on FA? The streaks hyperfluoresce early due to a window defect, and late due to staining.

Of course, if a CNVM develops, it will hypo-fluoresce during the choroidal phase.

What serious complications can result from the breaks in Bruch’s? Choroidal neovascular membrane and subretinal hemorrhage.

Is CNVM a common occurrence in angioid streaks? Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%.

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Of course, if a CNVM develops, it will hyperfluoresce during the choroidal phase.

Angioid streaks represent breaks in the brittle Bruch’s membrane.

What serious complications can result from the breaks in Bruch’s membrane? Choroidal neovascular membrane and subretinal hemorrhage.

Is CNVM a common occurrence in angioid streaks? Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%.

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Angioid Streaks

What is the classic DFE appearance of angioid streaks?
Reddish-brown lines radiating out from the (atrophic) peripapillary region

Which layer of the retina is abnormal? Bruch’s membrane

What is the typical appearance of angioid streaks on FA?
The streaks hyperfluoresce early due to a window defect, and late due to staining.

Of course, if a CNVM develops, it will hyperfluoresce during the choroidal phase.

What serious complications can result from the breaks in Bruch’s?
Choroidal neovascular membrane and subretinal hemorrhage

Angioid streaks represent breaks in the brittle Bruch’s.

What is CNVM a common occurrence in angioid streaks?
Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%.

Does CNVM in angioid streaks carry a good, or poor prognosis?
Poor
What is the classic DFE appearance of angioid streaks?
- Reddish-brown lines radiating out from the (atrophic) peripapillary region

Which layer of the retina is abnormal? **Bruch’s membrane**

---

**Angioid Streaks**

There is another Bruch’s-based condition that, similar to angioid streaks, presents with a linear finding on DFE. What is that condition? **Lacquer cracks**

<table>
<thead>
<tr>
<th></th>
<th>Angioid streaks</th>
<th>Lacquer cracks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Color</strong></td>
<td>Reddish-brown</td>
<td>?</td>
</tr>
</tbody>
</table>

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What is the typical appearance of angioid streaks on FA?
The streaks **hyperfluoresce** early due to a window defect, and late due to staining.

Of course, if a CNVM develops, it will **hyperfluoresce** during the choroidal phase.

Angioid streaks represent breaks in the brittle Bruch’s.

---

What serious complications can result from the breaks in Bruch’s?
- Choroidal neovascular membrane
- Subretinal hemorrhage

---

Is CNVM a common occurrence in angioid streaks?
Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%.

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Poor
What is the classic DFE appearance of angioid streaks?
Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane

What’s abnormal about Bruch’s in angioid streaks?
-- It is thickened
-- It is calcified (and thus brittle)

How are angioid streaks related to Bruch’s?
Angioid streaks represent breaks in the brittle Bruch’s.

What serious complications can result from the breaks in Bruch’s?
Choroidal neovascular membrane and subretinal hemorrhage

Is CNVM a common occurrence in angioid streaks?
Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%

Does CNVM in angioid streaks carry a good, or poor prognosis?
Poor
**Angioid Streaks**

Angioid streaks: ‘Reddish-brown’

Lacquer cracks: ‘Yellowish’
What is the classic DFE appearance of angioid streaks?
Reddish-brown lines radiating out from the (atrophic) peripapillary region

Which layer of the retina is abnormal?
Bruch's membrane

What's abnormal about Bruch's in angioid streaks?
-- It is…thickened
-- It is…calcified (and thus brittle)

How are angioid streaks related to Bruch's?
Angioid streaks represent breaks in the brittle Bruch's

What serious complications can result from the breaks in Bruch's?
Choroidal neovascular membrane and subretinal hemorrhage

Is CNVM a common occurrence in angioid streaks?
Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%

Does CNVM in angioid streaks carry a good, or poor prognosis?
Poor

What is the typical appearance of angioid streaks on FA?
The streaks hyperfluoresce early due to a window defect, and late due to staining

Of course, if a CNVM develops, it will hyperfluoresce during the choroidal phase

There is another Bruch’s-based condition that, similar to angioid streaks, presents with a linear finding on DFE. What is that condition?

**Angioid Streaks**

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Angioid Streaks Lacquer cracks

There is another Bruch’s-based condition that, similar to angioid streaks, presents with a linear finding on DFE. What is that condition?
What is the classic DFE appearance of angioid streaks?
Reddish-brown lines radiating out from the (atrophic) peripapillary region

Which layer of the retina is abnormal?
Bruch's membrane

What's abnormal about Bruch's in angioid streaks?
-- It is thickened
-- It is calcified (and thus brittle)

How are angioid streaks related to Bruch's?
Angioid streaks represent breaks in the brittle Bruch’s

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Angioid streaks:
‘Reddish-brown’
‘Peripapillary’

Lacquer cracks:
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‘Macular’
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- **What is the classic DFE appearance of angioid streaks?**
  - Reddish-brown lines radiating out from the (atrophic) peripapillary region

- **Which layer of the retina is abnormal?**
  - Bruch’s membrane

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  - It is thickened
  - It is calcified (and thus brittle)

- **How are angioid streaks related to Bruch’s?**
  - Angioid streaks represent breaks in the brittle Bruch’s membrane

- **What serious complications can result from the breaks in Bruch’s?**
  - Choroidal neovascular membrane and subretinal hemorrhage

- **Is CNVM a common occurrence in angioid streaks?**
  - Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%

- **Does CNVM in angioid streaks carry a good, or poor prognosis?**
  - Poor
**What is the classic DFE appearance of angioid streaks?**
- Reddish-brown lines radiating out from the (atrophic) peripapillary region

**Which layer of the retina is abnormal?**
- Bruch’s membrane

---

### Angioid Streaks vs. Lacquer Cracks

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**How are angioid streaks related to Bruch’s?**
- Angioid streaks represent breaks in the brittle Bruch’s membrane

**What serious complications can result from the breaks in Bruch’s?**
- Choroidal neovascular membrane and subretinal hemorrhage

**Is CNVM a common occurrence in angioid streaks?**
- Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%

**Does CNVM in angioid streaks carry a good, or poor prognosis?**
- Poor

---

**There is another Bruch’s-based condition that, similar to angioid streaks, presents with a linear finding on DFE. What is that condition?**
- Lacquer cracks

---

**The streaks**
- Hyperfluoresce early due to a window defect
- Hyperfluoresce late due to staining

**Of course, if a CNVM develops, it will hyperfluoresce during the choroidal phase**

---

**What is the typical appearance of angioid streaks on FA?**
- The streaks hyperfluoresce early due to a window defect, and late due to staining

---

**Angioid Streaks Lacquer Cracks**
- The streaks are red and yellow, respectively
- The location is peripapillary for angioid streaks and macula for lacquer cracks
- Subretinal heme is present in both conditions
- The locus for CNV is yes for both conditions
- The associated condition is yet to be determined for angioid streaks, but known for lacquer cracks

---

**What is the typical appearance of angioid streaks on FA?**
- The streaks hyperfluoresce early due to a window defect, and late due to staining

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**Does CNVM in angioid streaks carry a good, or poor prognosis?**
- Poor
**Angioid Streaks**

There is another Bruch’s-based condition that, similar to angioid streaks, presents with a linear finding on DFE. What is that condition?

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- What is the classic DFE appearance of angioid streaks?
  - Reddish-brown lines radiating out from the (atrophic) peripapillary region

- Which layer of the retina is abnormal?
  - Bruch’s membrane

- What is abnormal about Bruch’s in angioid streaks?
  - It is…thickened
  - It is…calcified (and thus brittle)

- How are angioid streaks related to Bruch’s?
  - Angioid streaks represent breaks in the brittle Bruch’s

- What serious complications can result from the breaks in Bruch’s?
  - Choroidal neovascular membrane and subretinal hemorrhage

- Is CNVM a common occurrence in angioid streaks?
  - Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%

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Angioid Streaks

Angioid streaks:
‘Reddish-brown’
‘Peripapillary’

Lacquer cracks:
‘Yellowish’
‘Macular’
‘High myopia’ (note the optic disc)
**Angioid Streaks**

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**Review slide—no question**

Angioid streaks represent breaks in the brittle Bruch’s membrane.

What serious complications can result from the breaks in Bruch’s membrane? Choroidal neovascular membrane and subretinal hemorrhage.

Is CNVM a common occurrence in angioid streaks? Indeed it is—estimates of CNVM prevalence in angioid streaks run as high as 80%.

Does CNVM in angioid streaks carry a good, or poor prognosis? Poor.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

What proportion of angioid streaks are associated with systemic abnormalities?
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

What proportion of angioid streaks are associated with systemic abnormalities? About half.
Q

- What is the classic DFE appearance of angioid streaks? **Reddish-brown lines radiating out from the (atrophic) peripapillary region**
- Which layer of the retina is abnormal? **Bruch’s membrane**
- What proportion of angioid streaks are associated with systemic abnormalities? **About half**
- *What is the well-known mnemonic for angioid streaks’ associations?*
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

What proportion of angioid streaks are associated with systemic abnormalities? About half.

What is the well-known mnemonic for angioid streaks’ associations?

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E
P
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What is the well-known mnemonic for angioid streaks’ associations? What are the associations?

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Which layer of the retina is abnormal? Bruch’s membrane.

What proportion of angioid streaks are associated with systemic abnormalities? About half.

What is the well-known mnemonic for angioid streaks’ associations? What are the associations?

- Pseudoxanthoma elasticum (PXE)
- Ehlers-Danlos syndrome
- Paget’s disease of bone
- Sickle-cell disease
- Idiopathic (I know, it’s not really an association)
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

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Mnemonic caveat #1: A number of hemoglobinopathies (eg, β-thal) besides sickle-cell dz are associated with angioid streaks.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region

Which layer of the retina is abnormal? Bruch’s membrane

What proportion of angioid streaks are associated with systemic abnormalities? About half

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- Idiopathic

*Mnemonic caveat #2:* The list of conditions that have been associated with angioid streaks is much longer than the PEPSI mnemonic suggests. Caveat emptor.
Angioid Streaks

- What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.
- Which layer of the retina is abnormal? Bruch’s membrane.
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  - Pseudoxanthoma elasticum (PXE)?
  - Ehlers-Danlos syndrome?
  - Paget’s disease of bone?
  - Sickle-cell disease?
  - Idiopathic?

Of these, which has the strongest association with angioid streaks?
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

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Of these, which has the strongest association with angioid streaks? Idiopathic.
Angioid Streaks

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**What is the well-known mnemonic for angioid streaks’ associations? What are the associations?**

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- Ehlers-Danlos syndrome
- Paget’s disease of bone
- Sickle-cell disease
- **Idiopathic!**

Of these, **which has the strongest association with angioid streaks?**
Idiopathic

**What proportion of cases are idiopathic?**

About half
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

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Of these, which has the strongest association with angioid streaks? Idiopathic.

What proportion of cases are idiopathic? About half (as implied above).
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

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Of these, which has the strongest association with angioid streaks? Idiopathic.

What should you do if you see an angioid-streak pt who does not carry the dx of a known associated systemic condition?
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

What proportion of angioid streaks are associated with systemic abnormalities? About half.

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- Idiopathic!

Of these, which has the strongest association with angioid streaks? Idiopathic.

What should you do if you see an angioid-streak pt who does not carry the dx of a known associated systemic condition? Refer her for a workup, just to make certain.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

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- Pseudoxanthoma elasticum (PXE)?
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Of the cases associated with a condition, which condition is most likely? PXE.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

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Of the cases associated with a condition, which condition is most likely? PXE, by a mile.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

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- Paget’s disease of bone
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- Idiopathic

Of the cases associated with a condition, which condition is most likely? Paget’s and sickle-cell are a distant second and third.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

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Of those angioid-streaks pts with a systemic association, what proportion have PXE?

Of pts with PXE, what proportion have angioid streaks? Essentially all of them, eventually.

PXE, by a mile
Angioid Streaks

- What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.
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Of those angioid-streaks pts with a systemic association, what proportion have PXE? Well over half.

Of those angioid-streaks pts, which condition is most likely? PXE, by a mile.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

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Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch’s membrane.

What proportion of angioid streaks are associated with systemic abnormalities? About half.

What is the well-known mnemonic for angioid streaks’ associations? Pseudoxanthoma elasticum (PXE), Ehlers-Danlos syndrome, Paget’s disease of bone, Sickle-cell disease, Idiopathic.

Of the cases associated with a condition, which condition is most likely? PXE, by a mile.

Briefly, what sort of disorder is PXE?
An elastorrhexis, ie, a condition characterized by progressive calcification and fragmentation of elastic tissues. Rare, with a gender predilection; females are twice as likely to be affected. Affects skin, vascular system, GI tract, and eye.

Pseudoxanthoma elasticum (PXE)!
What is the classic DFE appearance of angioid streaks?
Reddish-brown lines radiating out from the (atrophic) peripapillary region

Which layer of the retina is abnormal? Bruch’s membrane

What proportion of angioid streaks are associated with systemic abnormalities? About half

What is the well-known mnemonic for angioid streaks’ associations?

Pseudoxanthoma elasticum (PXE)!

- Ehlers-Danlos syndrome
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Reddish-brown lines radiating out from the (atrophic) peripapillary region.

Which layer of the retina is abnormal? Bruch's membrane

What proportion of angioid streaks are associated with systemic abnormalities? About half

What is the well-known mnemonic for angioid streaks’ associations?

- Pseudoxanthoma elasticum (PXE)
- Ehlers-Danlos syndrome
- Paget’s disease of bone
- Sickle-cell disease
- Idiopathic

Briefly, what sort of disorder is PXE?
An elastorrhexis, i.e., a condition characterized by progressive calcification and fragmentation of elastic tissues.

Is it common, or rare?
Rare

Is there a gender predilection?
Yes, ♀ are twice as likely to be affected.

Other than the eye, what organ-systems are affected?
- Skin
- Vascular system
- GI tract
- Eye

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What is the appearance of affected skin?
An area of waxy-yellow, papule-like lesions

What is the classic informal descriptor for this appearance?
'Chicken skin'

In what two locations is 'chicken skin' most often found?
--The neck
--The axillae

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What are the associations? Skin / Vascular system / GI tract / Eye.

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In a number of ways; the two mentioned in the Retina book are calcific coronary artery dz, and an increased risk of CVA

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Hemorrhage, which is common, and life-threatening in severity
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PXE: Peau d’orange fundus
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In two, hyphenated words, what sort of disorder is Ehlers-Danlos?
It is a two-words disorder.
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In two, hyphenated words, what sort of disorder is Ehlers-Danlos? It is a connective-tissue disorder.
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Angioid Streaks
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Briefly, what are its main nonocular findings?
- Fragile
- Joints
- Easy

Two related words...
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What colorful eye finding is associated with Ehlers-Danlos?
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It is a connective-tissue disorder.

**Briefly, what are its main nonocular findings?**
- Fragile skin
- Hyperextensible joints
- Easy bruising/bleeding

**What colorful eye finding is associated with Ehlers-Danlos?**
Blue
Angioid Streaks

- What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region
- Which layer of the retina is abnormal? Bruch’s membrane
- What proportion of angioid streaks are associated with systemic abnormalities? About half
- What is the well-known mnemonic for angioid streaks’ associations? What are the associations?
  - Pseudoxanthoma elasticum (PXE)
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Blue sclera in Ehlers-Danlos
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Is Paget’s a common, or uncommon condition?

Quite common; it is the most common bone disease after osteoporosis.

Briefly, what is the pathophysiology? Increased osteoclastic and osteoblastic activity lead to focal abnormal bone structure.

How does it present clinically? It is usually asymptomatic, but can present with skeletal deformities.

As noted previously, essentially all PXE pts develop angioid streaks. Is the same true of Paget’s pts?

No—only 10% will develop angioid streaks.
What is the classic DFE appearance of angioid streaks? Reddish-brown lines radiating out from the (atrophic) peripapillary region.

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What is the key difference between SS, SC and S-Thal vs SA disease? The first three manifest as clinically apparent dz, whereas SA is an asymptomatic (usually) carrier state—aka ‘sickle trait’

What percent of African-Americans test positive for sickle trait? 8% (1 in 12)
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Sickle-cell retinopathy comes in two basic forms—what are they?

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- Like DBR, does sickle retinopathy tend to occur in the posterior pole?
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<th>Location</th>
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<th>SR</th>
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<tr>
<td>Posterior to the</td>
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<td><strong>Anterior</strong> to the equator (ie, peripherally)</td>
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</tr>
<tr>
<td>Prone to developing retinal tears when lasered?</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

- **Review slide—no questions**