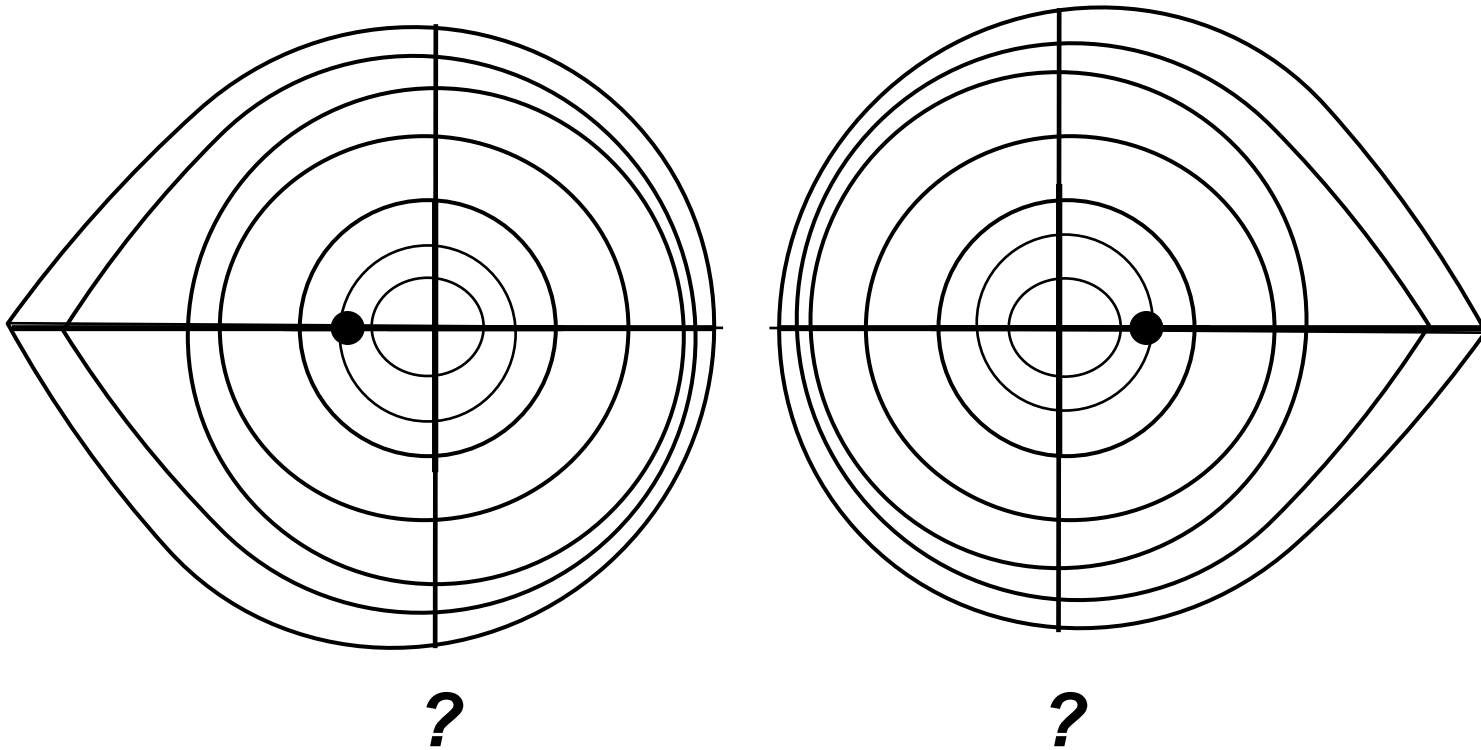
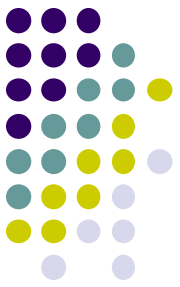
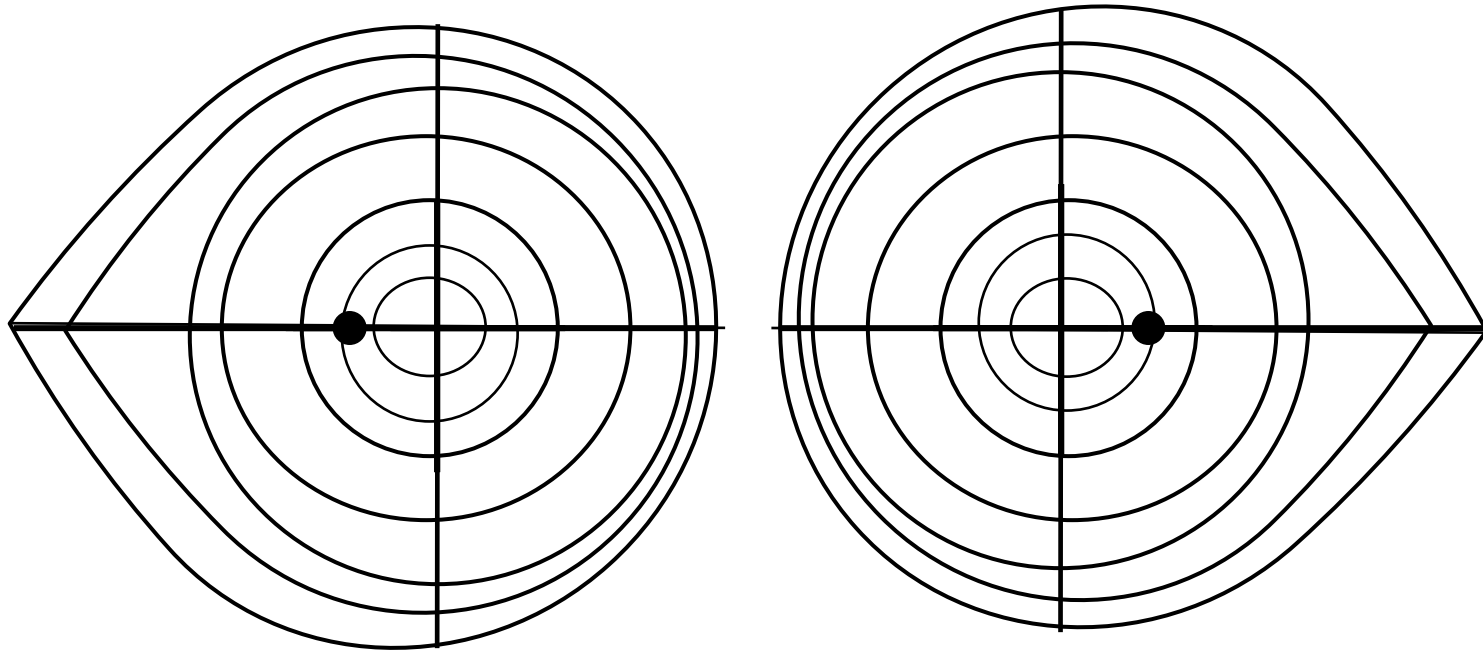
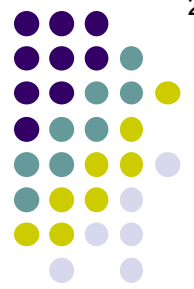


Visual Field Defects



Here is a representation of the VF for each eye. Which is OD, and which OS?

Visual Field Defects

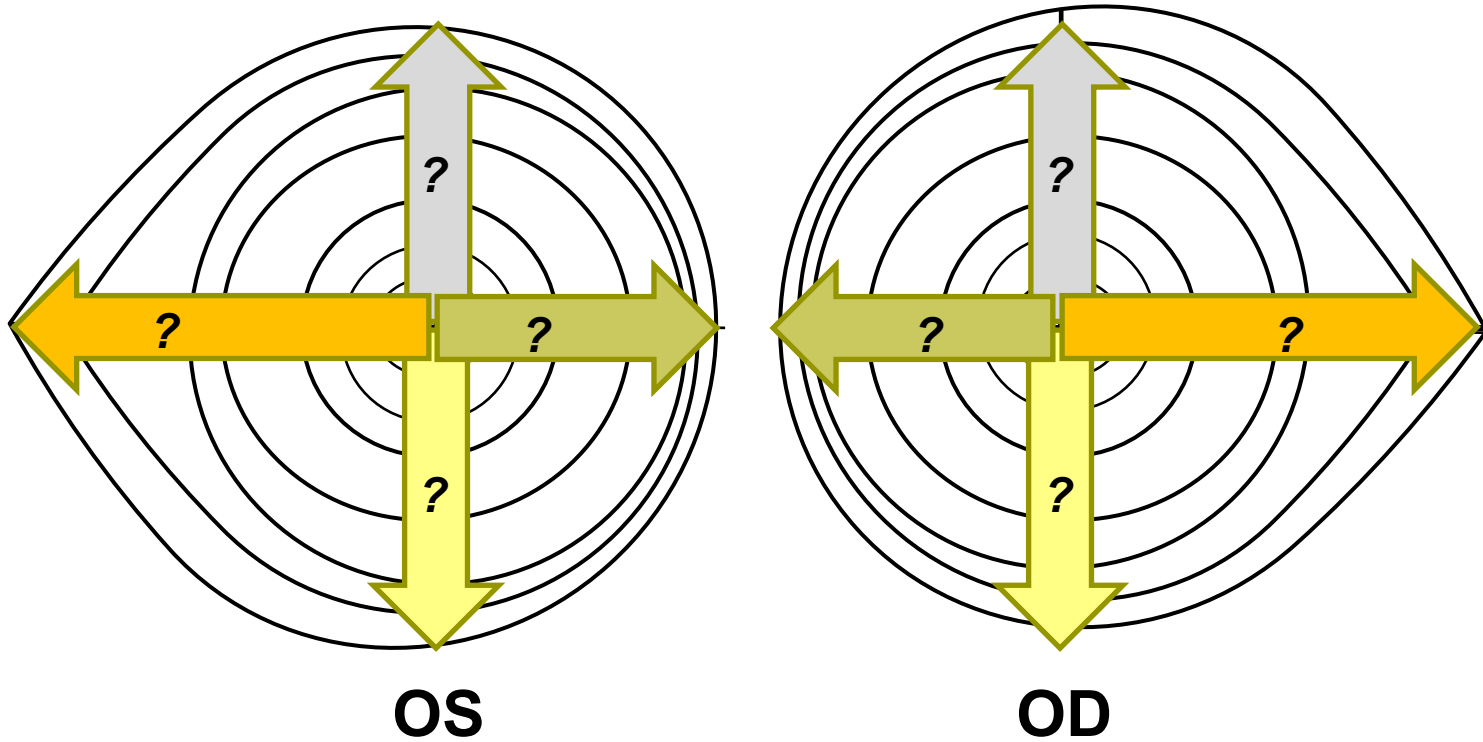
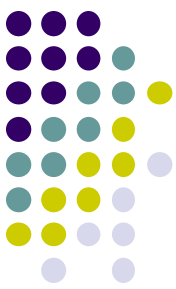


OS

OD

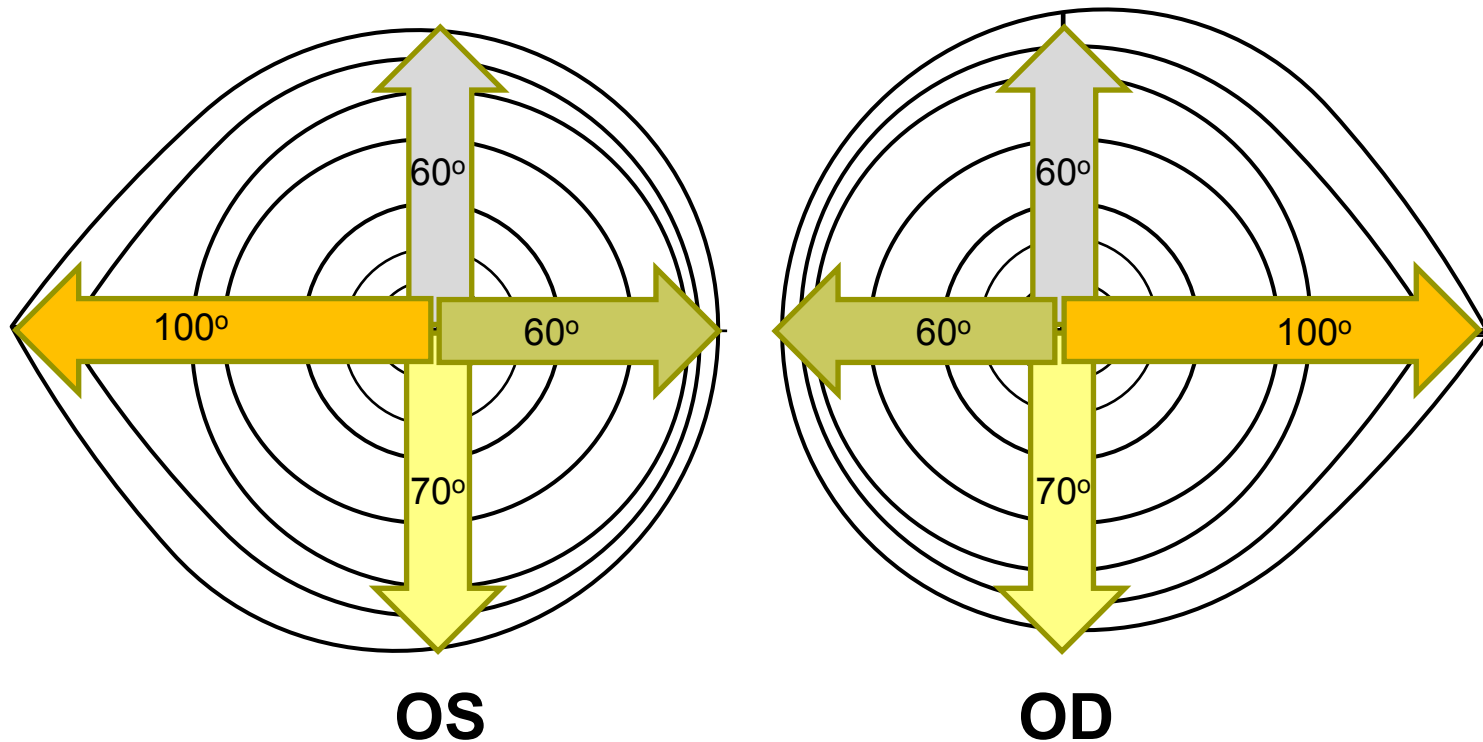
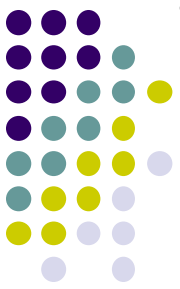
*Here is a representation of the VF for each eye. Which is OD, and which OS? Remember, VFs are **not** drawn as if the pt is looking at you; they're drawn as if **you** are the pt!*

Visual Field Defects



Measured in degrees from fixation, how far does the normal VF extend superiorly, inferiorly, nasally and temporally?

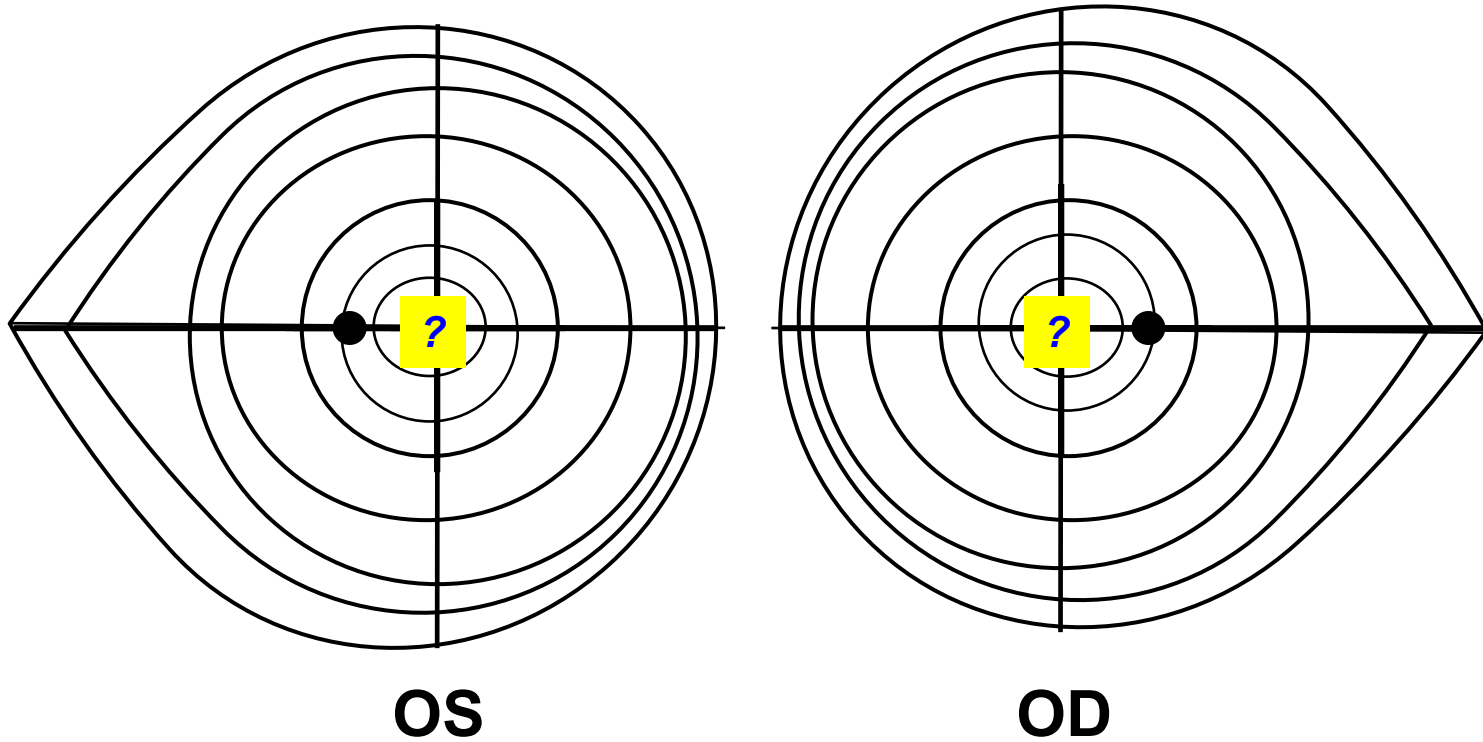
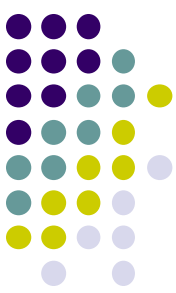
Visual Field Defects



Measured in degrees from fixation, how far does the normal VF extend superiorly, inferiorly, nasally and temporally?

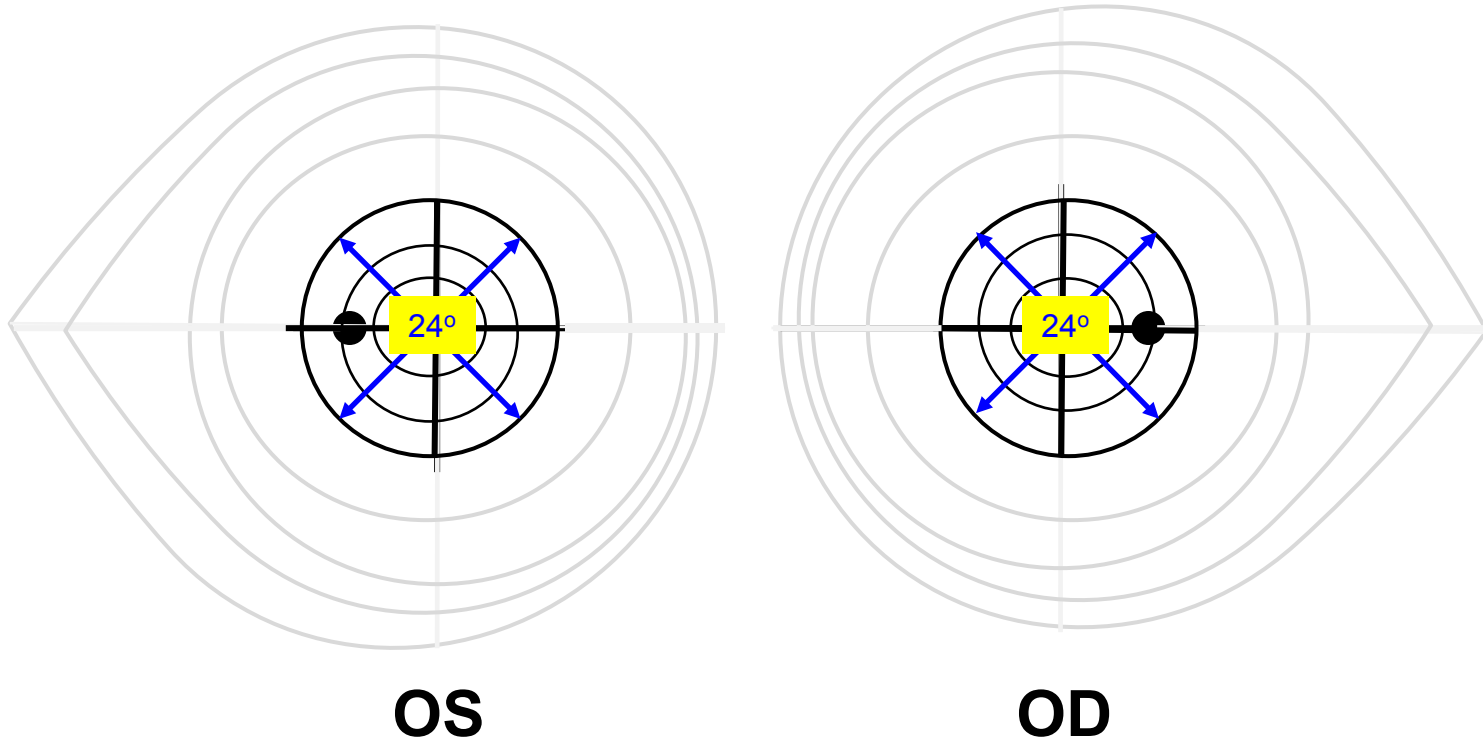
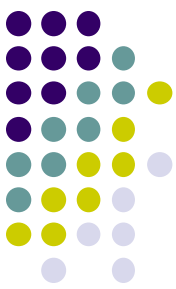
(Don't get too fixated on these specific numbers--different sources will give slightly different values.)

Visual Field Defects



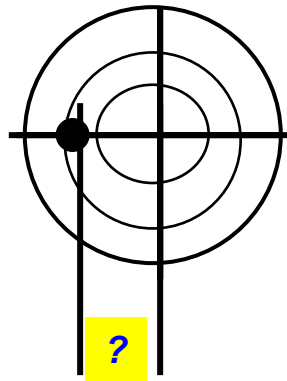
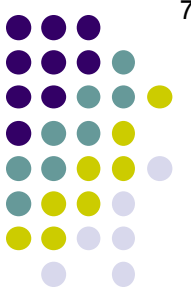
Measured in degrees from fixation, how much of the VF is assessed via the automated perimetry machines found in most ophthalmology practices?

Visual Field Defects

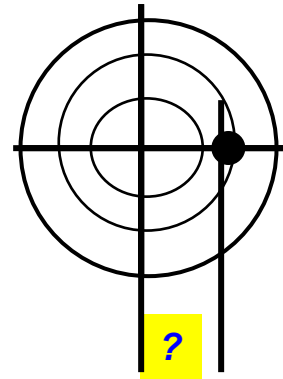


Measured in degrees from fixation, how much of the VF is assessed via the automated perimetry machines found in most ophthalmology practices?
The central 24 degrees

Visual Field Defects



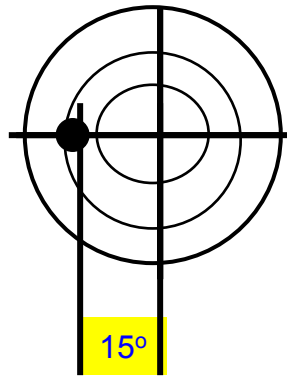
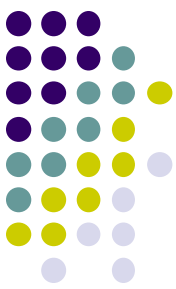
OS



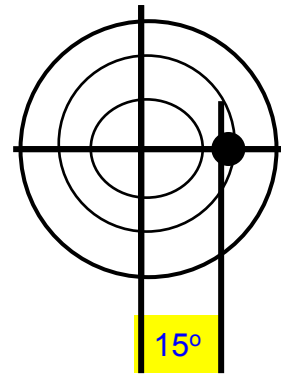
OD

How far in degrees from fixation is the blind spot?

Visual Field Defects



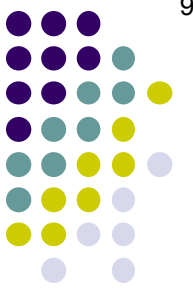
OS



OD

How far in degrees from fixation is the blind spot?
About 15 (again, don't get too hung up on that specific number.)

Visual Field Defects

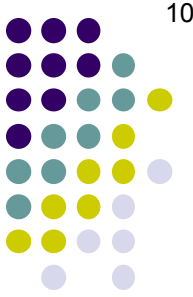


most anterior location



Anatomic locations for lesions producing VF defects

Visual Field Defects

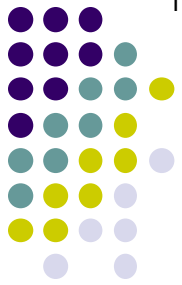


Retina

next location

Anatomic locations for lesions producing VF defects

Visual Field Defects



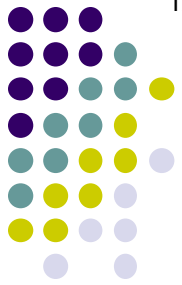
Retina

Optic nerve

next location

Anatomic locations for lesions producing VF defects

Visual Field Defects



Retina

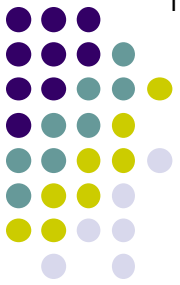
Optic nerve

Optic chiasm

Anatomic locations for lesions producing VF defects

general term for all locations posterior to the previous one

Visual Field Defects



Retina

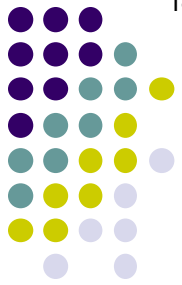
Optic nerve

Optic chiasm

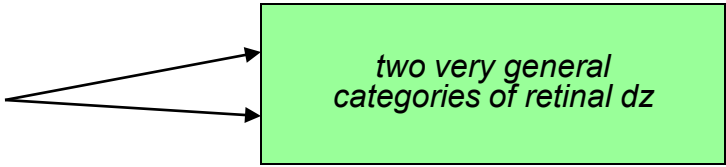
Retrochiasmal

Anatomic locations for lesions producing VF defects

Visual Field Defects



Retina



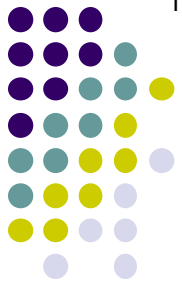
two very general categories of retinal dz

Optic nerve

Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz

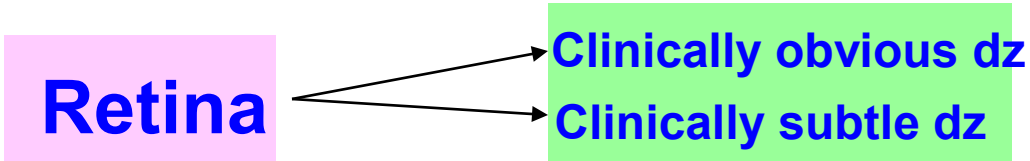
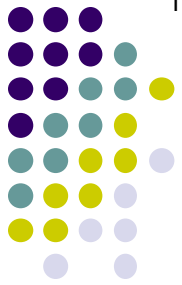
Clinically subtle dz

Optic nerve

Optic chiasm

Retrochiasmal

Visual Field Defects



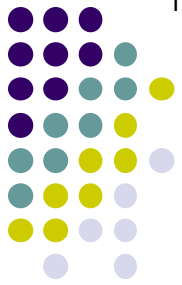
What is meant by clinically obvious vs clinically subtle retinal dz?

Optic nerve

Optic chiasm

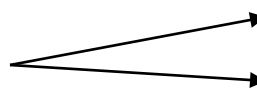
Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz
Clinically subtle dz



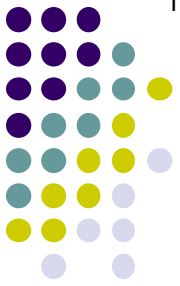
Optic nerve

What is meant by clinically obvious vs clinically subtle retinal dz?
In clinically obvious disease, the retina will appear abnormal on DFE, whereas in clinically subtle disease it will look normal

Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz (eg...?)

Clinically subtle dz

Optic nerve

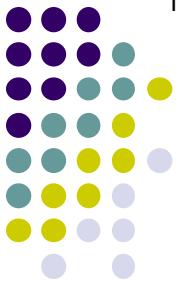
What is meant by clinically obvious vs clinically subtle retinal dz?
In clinically obvious disease, the retina will appear abnormal on DFE, whereas in clinically subtle disease it will look normal

*What is an example of...
...clinically obvious disease?*

Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz (eg...RP)

Clinically subtle dz

Optic nerve

What is meant by clinically obvious vs clinically subtle retinal dz?
In clinically obvious disease, the retina will appear abnormal on DFE, whereas in clinically subtle disease it will look normal

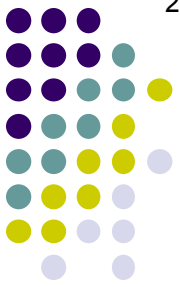
What is an example of...

...clinically obvious disease? 'Typical' retinitis pigmentosa

Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz (eg...RP)

Clinically subtle dz (eg...?)

Optic nerve

What is meant by clinically obvious vs clinically subtle retinal dz?
In clinically obvious disease, the retina will appear abnormal on DFE, whereas in clinically subtle disease it will look normal

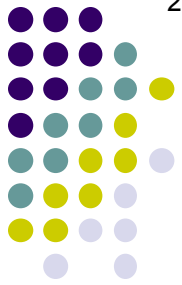
What is an example of...

...clinically obvious disease? 'Typical' retinitis pigmentosa
---clinically subtle disease?

Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz (eg...RP)

Clinically subtle dz (eg...CAR)

Optic nerve

What is meant by clinically obvious vs clinically subtle retinal dz?
In clinically obvious disease, the retina will appear abnormal on DFE, whereas in clinically subtle disease it will look normal

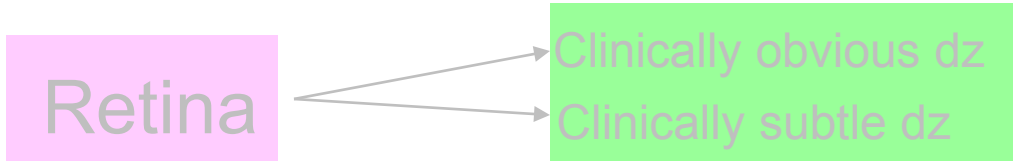
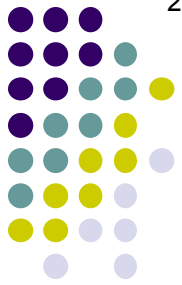
What is an example of...

...clinically obvious disease? 'Typical' retinitis pigmentosa
---clinically subtle disease? Cancer-associated retinopathy

Optic chiasm

Retrochiasmal

Visual Field Defects



Optic nerve

Let's take a brief aside to cover optic nerve fundamentals before we address optic nerve VF defects

Optic chiasm

Retrochiasmal

Visual Field Defects

The optic nerves are composed of what?

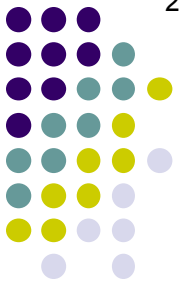


Visual Field Defects

The optic nerves are composed of what?
The axons of retinal ganglion cells



Visual Field Defects

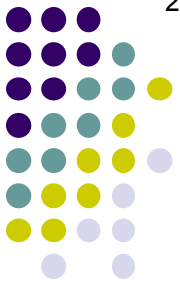


The optic nerves are composed of what?

The axons of retinal ganglion cells

How many fibers (axons) comprise an optic nerve?

Visual Field Defects



The optic nerves are composed of what?

The axons of retinal ganglion cells

How many fibers (axons) comprise an optic nerve?

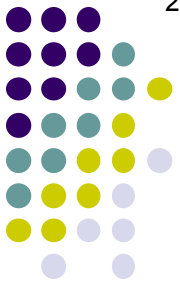
Depends upon which book you ask, but the answer **1.2M** works

Glaucoma book: 1.2-1.5M

Neuro: 1-1.2M

Fundamentals: "more than a million"

Visual Field Defects



The optic nerves are composed of what?

The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?

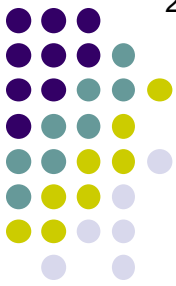
Visual Field Defects

The optic nerves are composed of what?

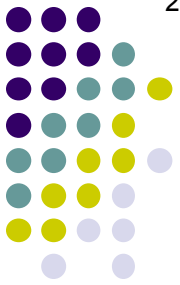
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?

No



Visual Field Defects



The optic nerves are composed of what?

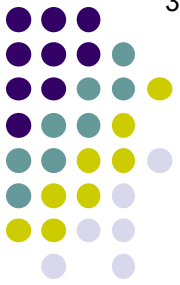
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?

No

Where will they synapse?

Visual Field Defects



The optic nerves are composed of what?

The axons of retinal ganglion cells

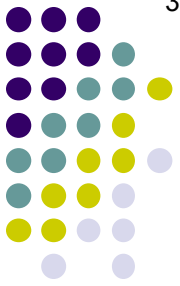
Do they synapse in the region of the optic nerve head?

No

Where will they synapse?

Most will synapse in the lateral geniculate nucleus (LGN)

Visual Field Defects



The optic nerves are composed of what?

The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?

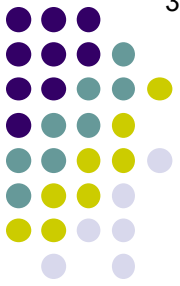
No

Where will they synapse?

Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?

Visual Field Defects



The optic nerves are composed of what?

The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?

No

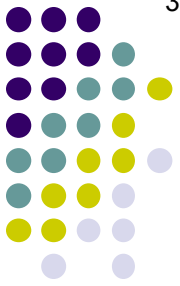
Where will they synapse?

Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?

Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

Visual Field Defects



The optic nerves are composed of what?

The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?

No

Where will they synapse?

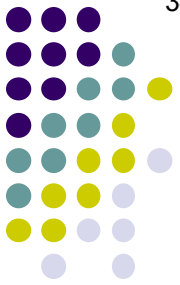
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Visual Field Defects



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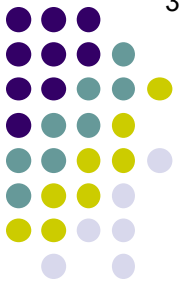
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'Most'? Where will the others synapse, and what are they responsible for?

The hypothalamus, where they are involved in modulating circadian responses

Visual Field Defects



The optic nerves are composed of what?

The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?

No

Where will they synapse?

Most will synapse in the lateral geniculate nucleus (LGN)

For a more in-depth look at the optic nerve, see slide-set FELT6

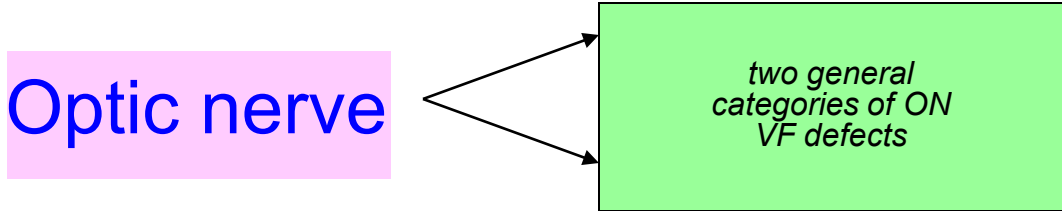
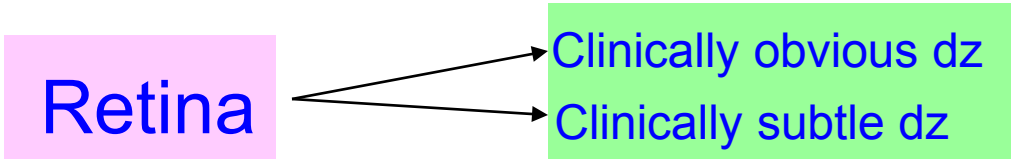
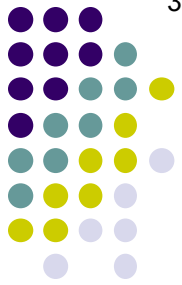
Most? Where will the others synapse, and what are they responsible for?

Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

'Most'? Where will the others synapse, and what are they responsible for?

The hypothalamus, where they are involved in modulating circadian responses

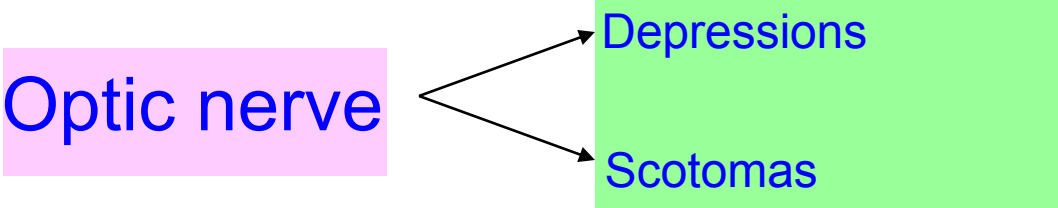
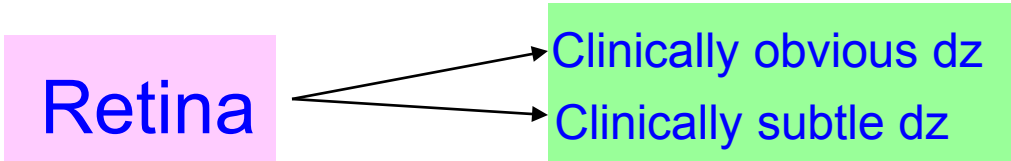
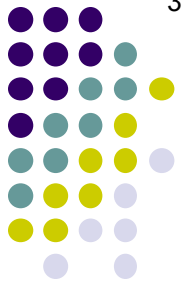
Visual Field Defects



Optic chiasm

Retrochiasmal

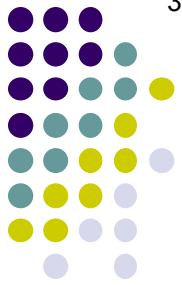
Visual Field Defects



Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz
Clinically subtle dz

Optic nerve

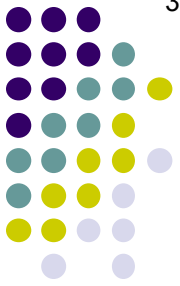
Depressions
Scotomas

What's the difference between a depression and a scotoma?

Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz

Clinically subtle dz

Optic nerve

Depressions

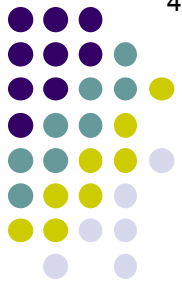
Scotomas

What's the difference between a depression and a scotoma?
A **depression** is an inward shifting of the outer limit of the visual field, whereas a **scotoma** is an area of field loss surrounded on all sides by areas of normal sensitivity.

Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz
Clinically subtle dz

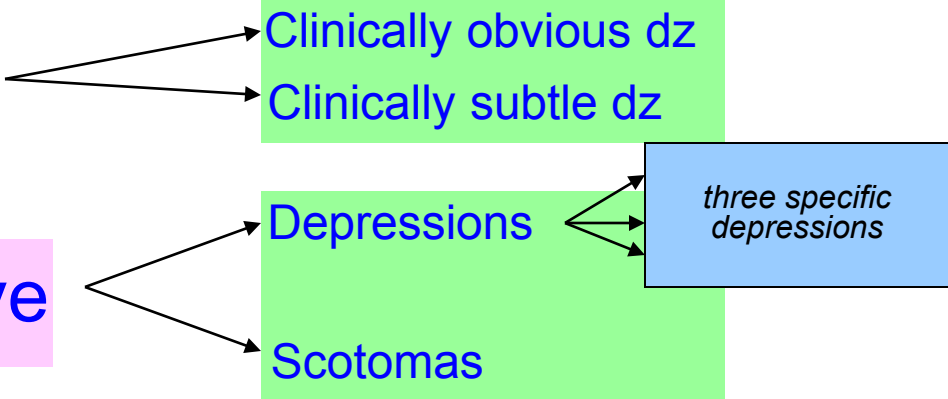
Optic nerve

Depressions
Scotomas

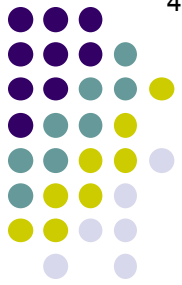
three specific depressions

Optic chiasm

Retrochiasmal



Visual Field Defects



Retina

Clinically obvious dz
Clinically subtle dz

Optic nerve

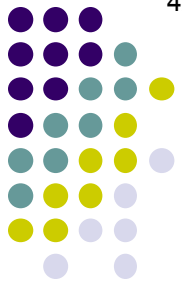
Depressions
Scotomas

Nasal step
Altitudinal
Temporal wedge

Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz
Clinically subtle dz

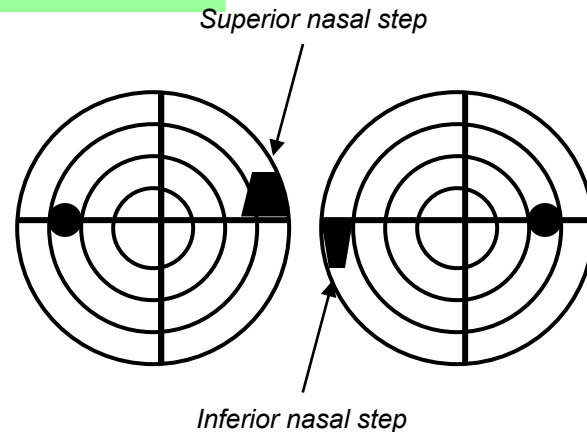
Optic nerve

Depressions
Scotomas

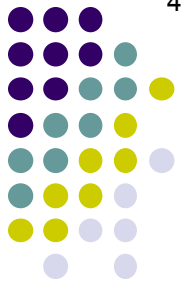
Nasal step
Altitudinal
Temporal wedge

Optic chiasm

Retrochiasmal



Visual Field Defects



Retina

Clinically obvious dz
Clinically subtle dz

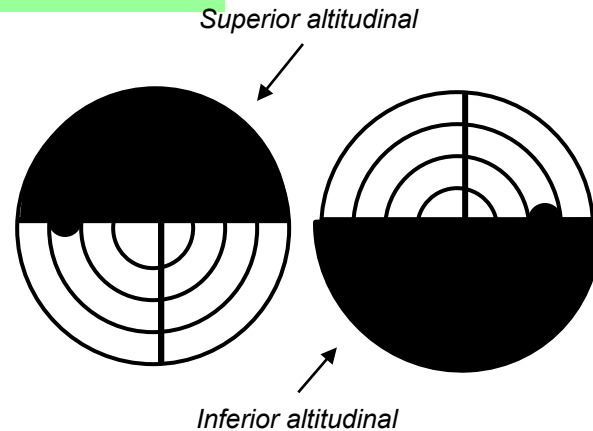
Optic nerve

Depressions
Scotomas

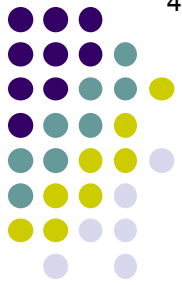
Nasal step
Altitudinal
Temporal wedge

Optic chiasm

Retrochiasmal



Visual Field Defects



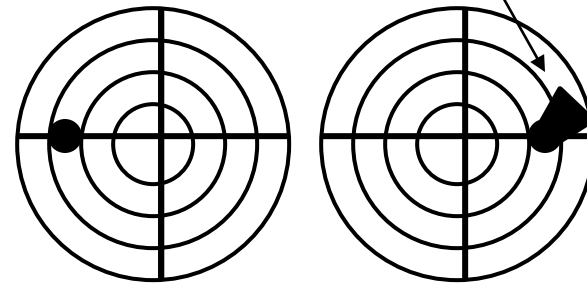
Retina

Clinically obvious dz
Clinically subtle dz

Optic nerve

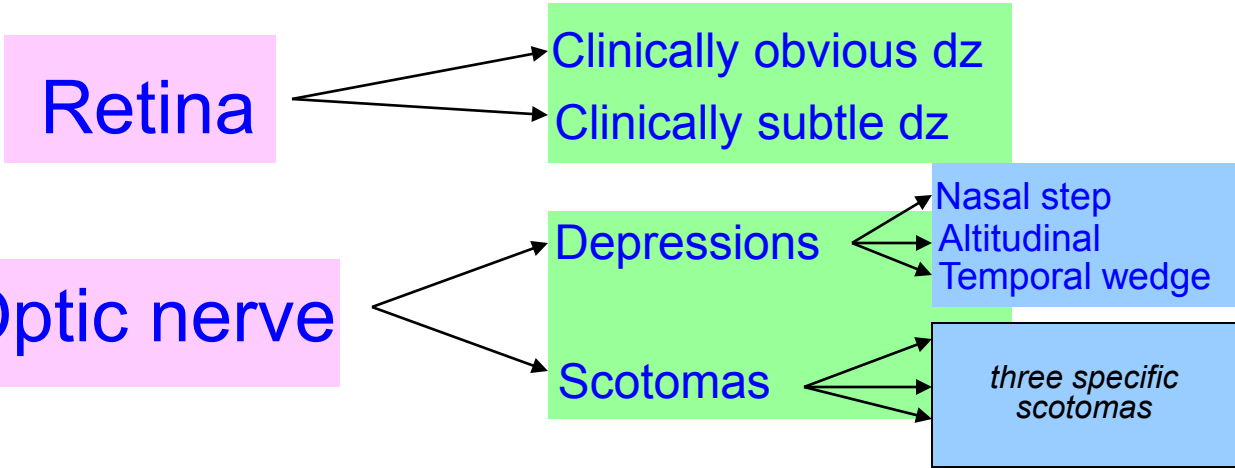
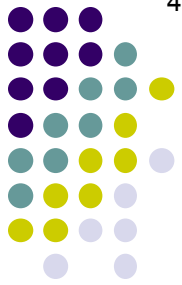
Depressions
Scotomas
Nasal step
Altitudinal
Temporal wedge

Optic chiasm



Retrochiasmal

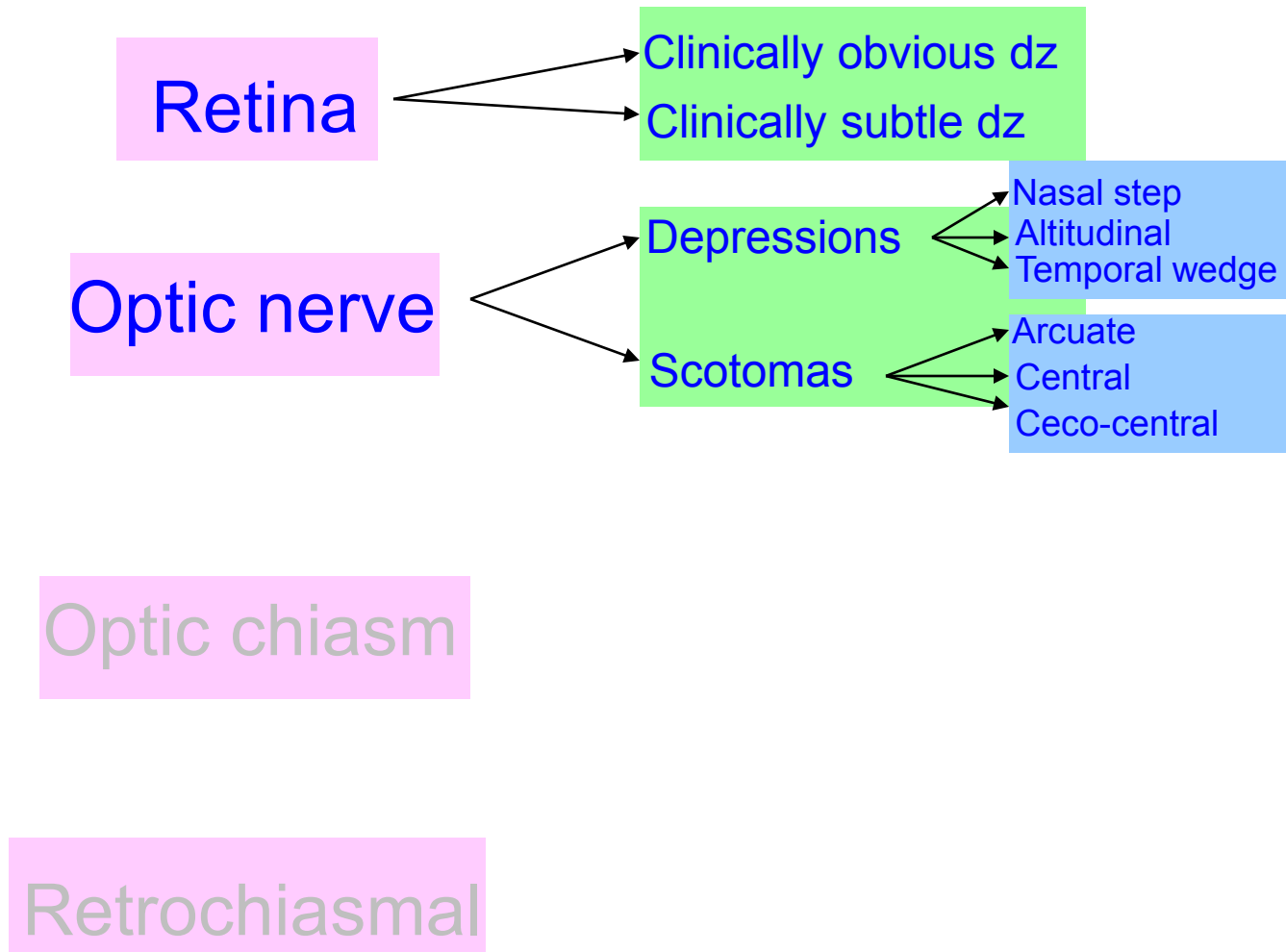
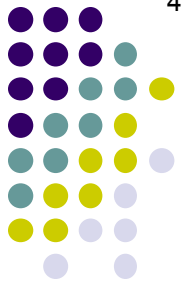
Visual Field Defects



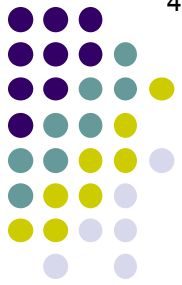
Optic chiasm

Retrochiasmal

Visual Field Defects



Visual Field Defects



Retina

Clinically obvious dz
Clinically subtle dz

Optic nerve

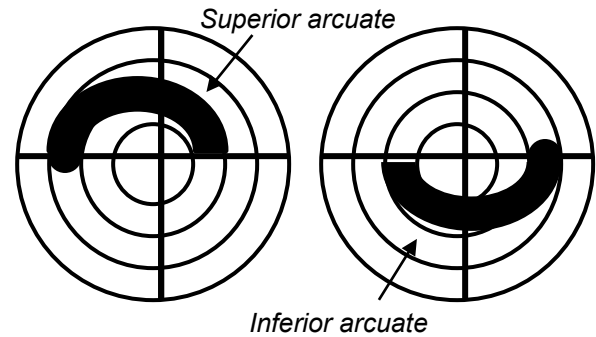
Depressions

Nasal step
Altitudinal
Temporal wedge

Scotomas

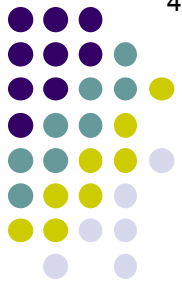
Arcuate
Central
Ceco-central

Optic chiasm



Retrochiasmal

Visual Field Defects



Retina

What's the difference between a central and a ceco-central scotoma?

Optic nerve

Scotomas

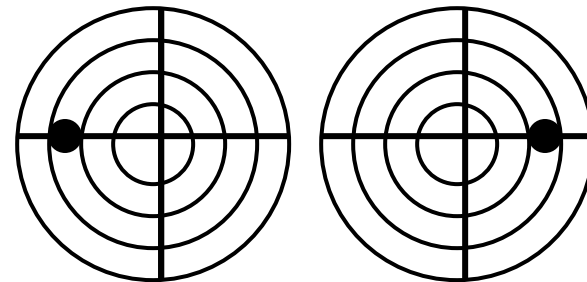
Arcuate

Central

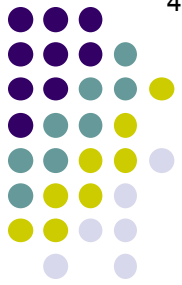
Ceco-central

Optic chiasm

Retrochiasmal



Visual Field Defects



Retina

What's the difference between a central and a ceco-central scotoma?
A **central scotoma** involves only fixation, whereas...

Optic nerve

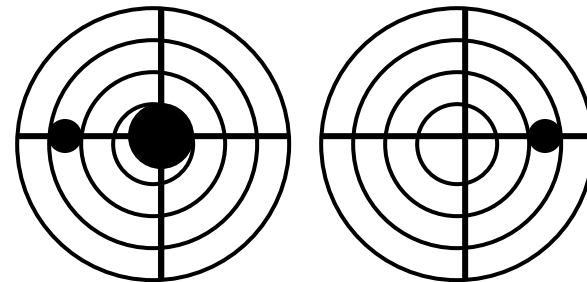
Scotomas

Arcuate

Central

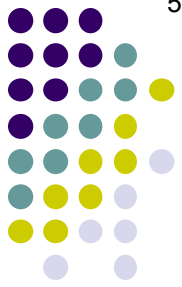
Ceco-central

Optic chiasm



Retrochiasmal

Visual Field Defects



Retina

Optic nerve

Optic chiasm

Retrochiasmal

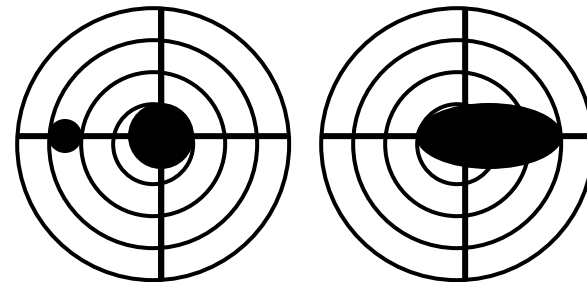
What's the difference between a central and a ceco-central scotoma?
A **central scotoma** involves only fixation, whereas...
a **ceco-central scotoma** involves fixation *and* extends all the way to the blind spot

Scotomas

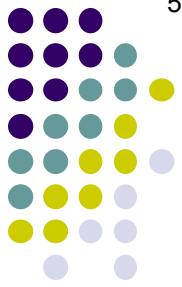
Arcuate

Central

Ceco-central



Visual Field Defects



Retina

Optic nerve

Optic chiasm

Retrochiasmal

Clinically obvious defects

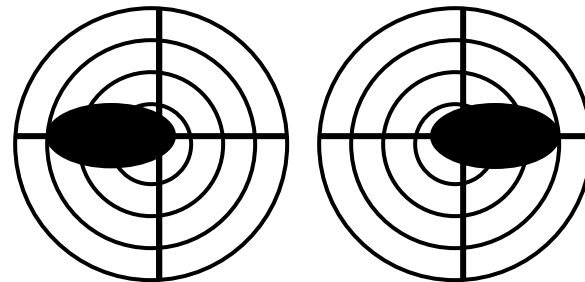
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A **central scotoma** involves only fixation, whereas...
a **ceco-central scotoma** involves fixation *and* extends all the way to the blind spot

Scotomas

Arcuate

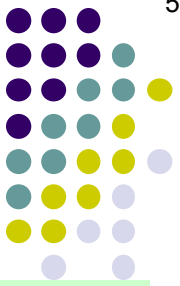
Central

Ceco-central



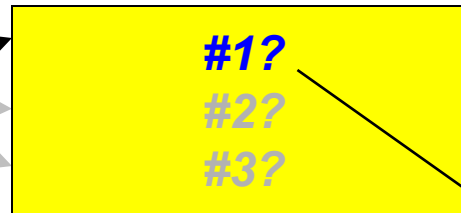
(Take note: Bilateral ceco-central scotomas could be mistaken for bitemporal VF loss!)

Visual Field Defects

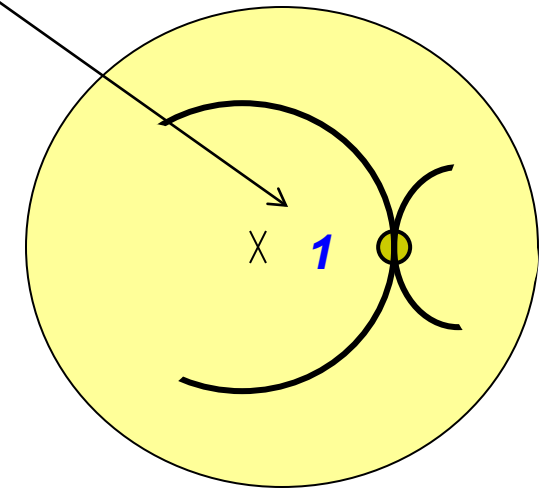


Another way to think about the optic nerve is with respect to its topography at the optic nerve head. Specifically, the retinal nerve fibers composing the optic nerve can be divided into three groups:

**Optic nerve
head**

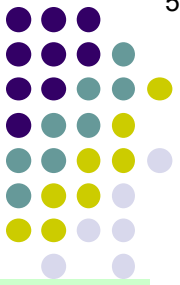


Optic chiasm



Retrochiasmal

Visual Field Defects



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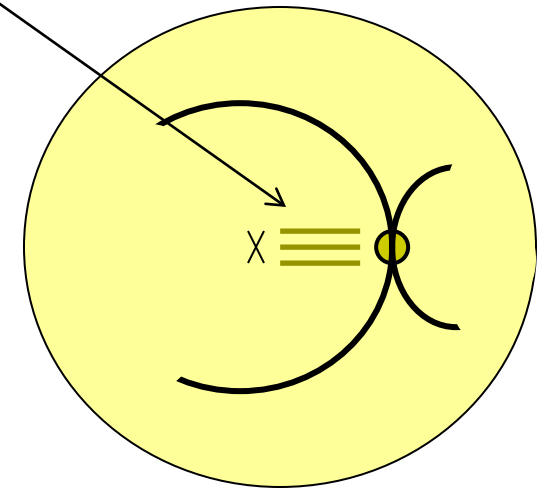
Optic nerve head

Papillomacular bundle

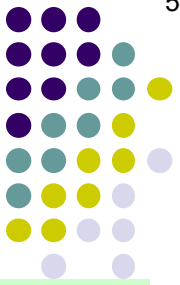
#2?
#3?

Optic chiasm

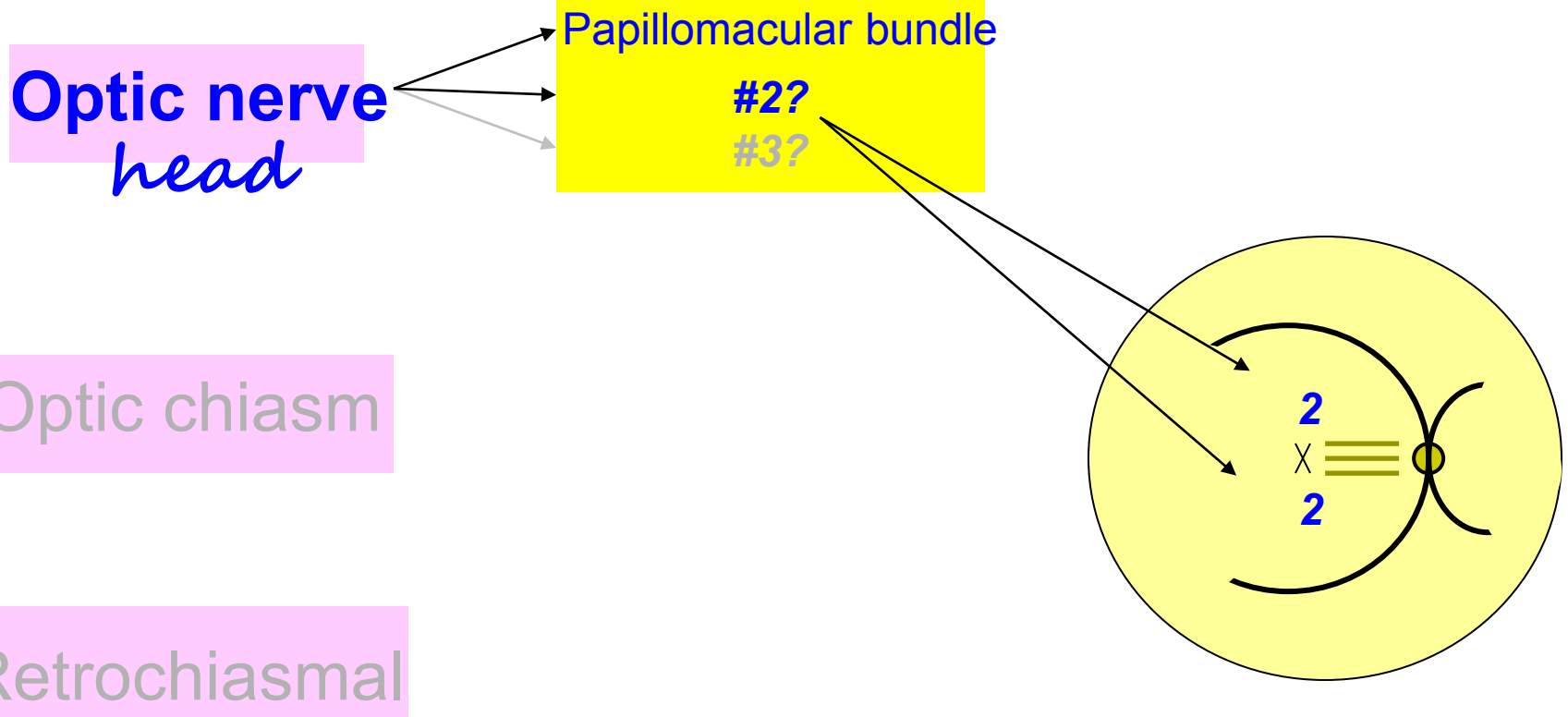
Retrochiasmal



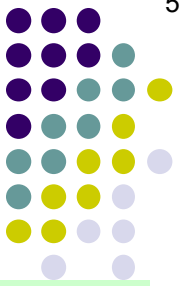
Visual Field Defects



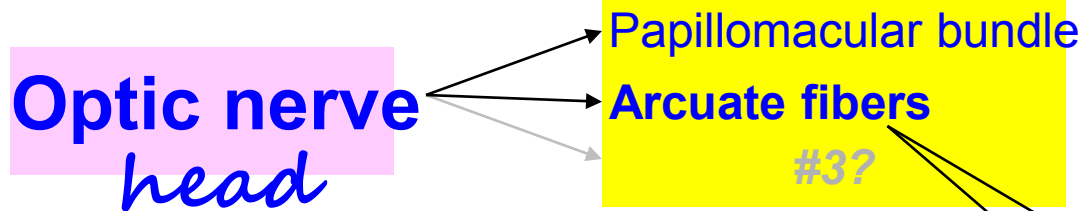
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Visual Field Defects

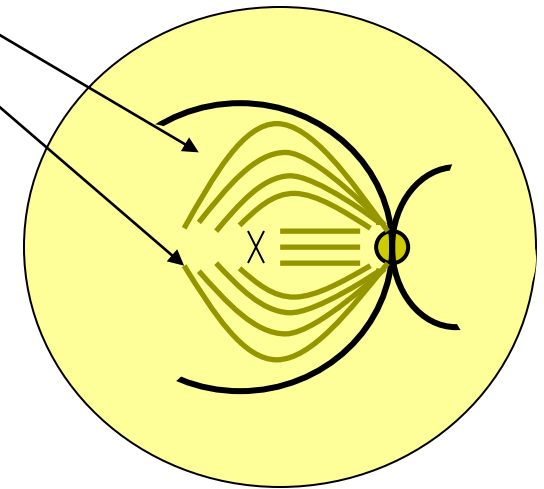


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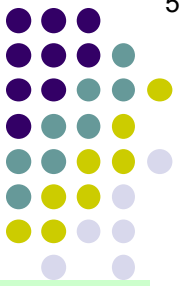


Optic chiasm

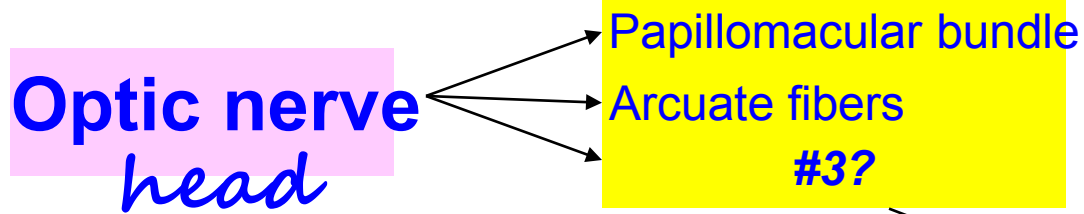
Retrochiasmal



Visual Field Defects

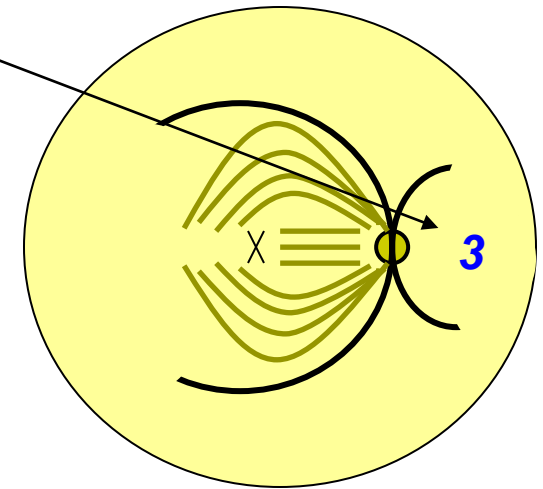


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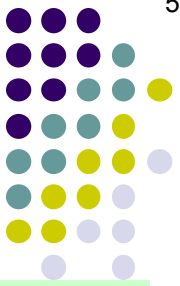


Optic chiasm

Retrochiasmal



Visual Field Defects



Another way to think about the optic nerve is with respect to its topography at the optic nerve head. Specifically, the retinal nerve fibers composing the optic nerve can be divided into three groups:

Optic nerve
head

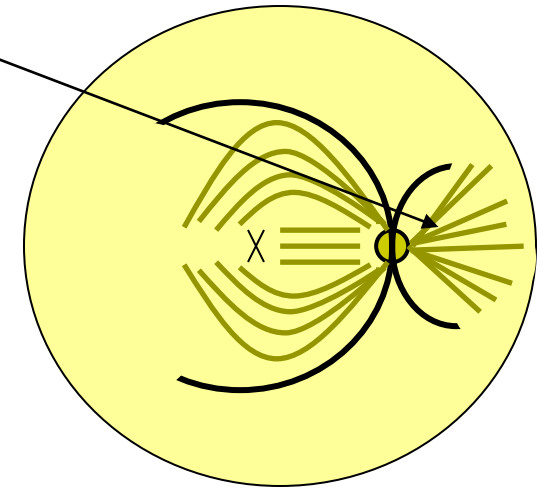
Papillomacular bundle

Arcuate fibers

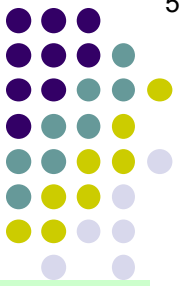
Nasal radiating fibers

Optic chiasm

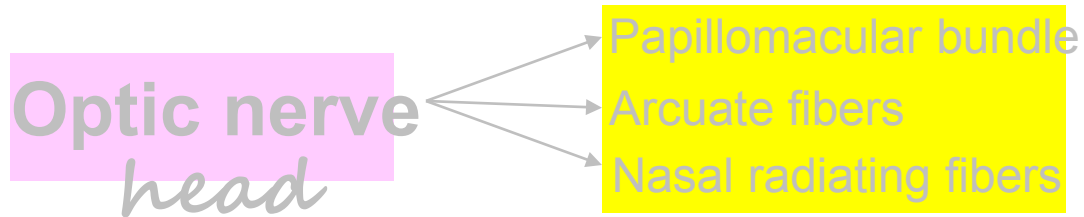
Retrochiasmal



Visual Field Defects

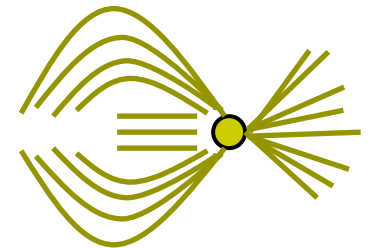


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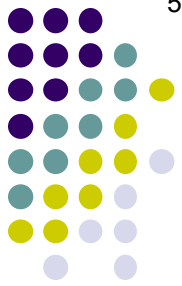
Optic chiasm

The basic topography of the RNFL looks a lot like a fish!



Retrochiasmal

Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Optic nerve head

Papillomacular bundle

Arcuate fibers

Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

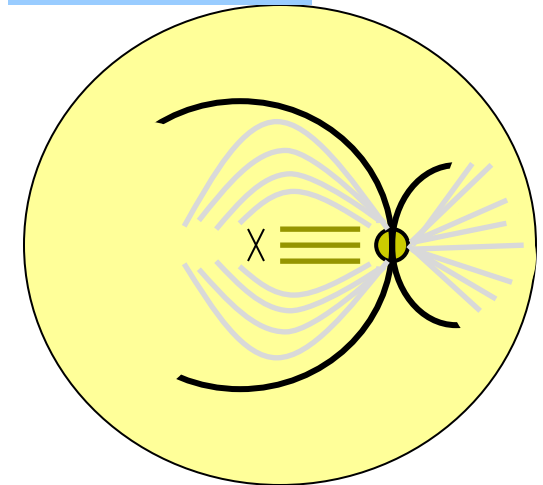
?

Arcuate
Central
Ceco-central

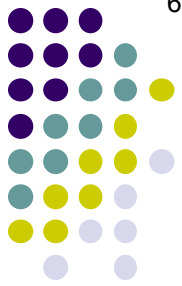
?

Optic chiasm

Retrochiasmal



Visual Field Defects



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Optic nerve head

Papillomacular bundle

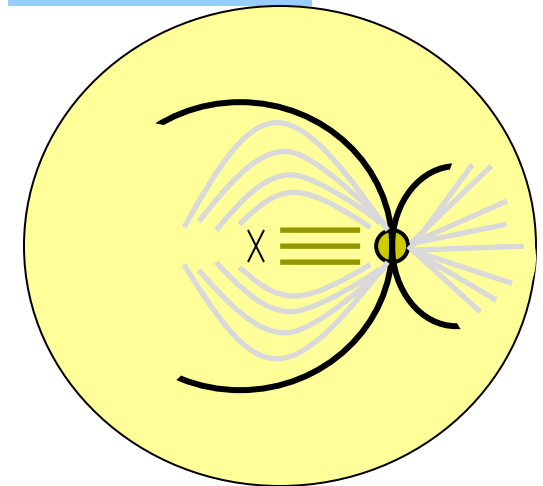
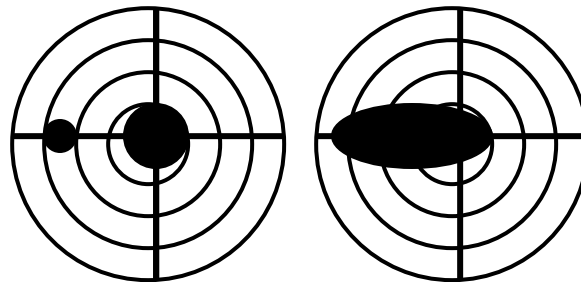
Arcuate fibers

Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

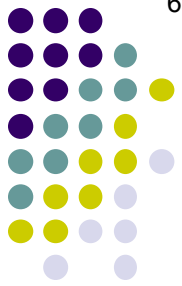
Arcuate
Central
Ceco-central

Optic chiasm



Retrochiasmal

Visual Field Defects



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Optic nerve head

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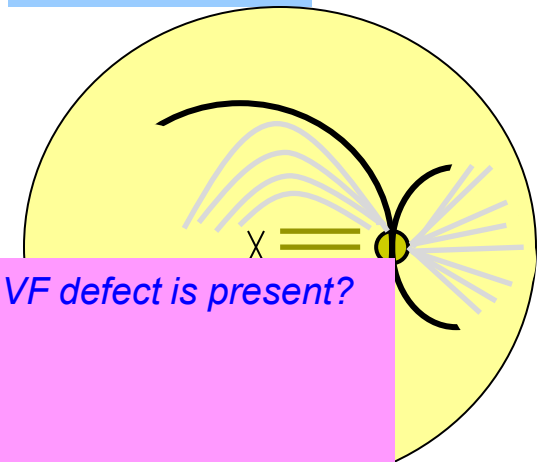
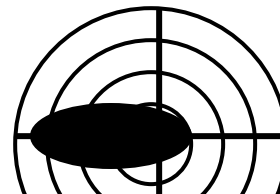
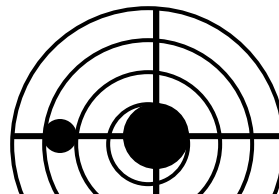
Arcuate fibers

Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

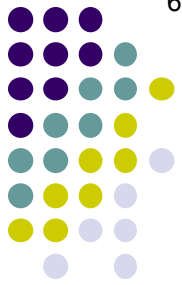
Optic chiasm



Which sorts of optic neuropathy are implicated if a P-M bundle VF defect is present?

Retr

Visual Field Defects



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Optic nerve head

Papillomacular bundle

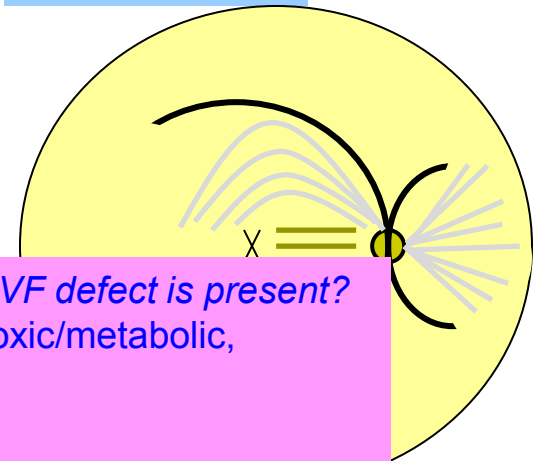
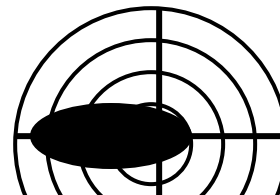
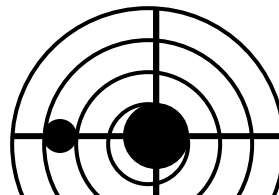
Arcuate fibers

Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

Optic chiasm



Which sorts of optic neuropathy are implicated if a P-M bundle VF defect is present?
Conditions involving compromised cellular metabolism: Think toxic/metabolic, nutritional deficiencies, inherited mitochondrial dz, etc

Retr

Visual Field Defects



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Optic nerve head

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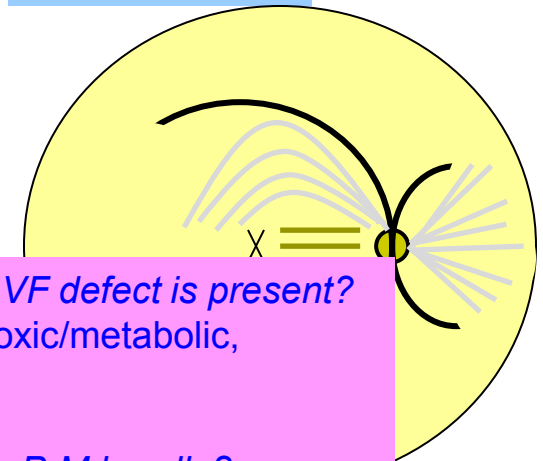
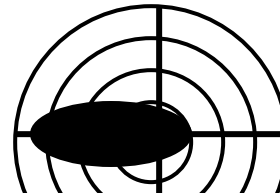
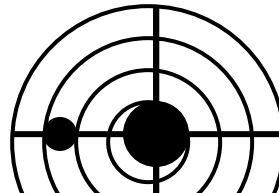
Arcuate fibers

Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

Optic chiasm

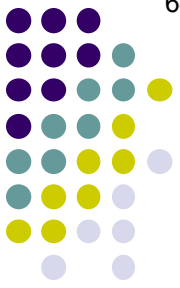


Which sorts of optic neuropathy are implicated if a P-M bundle VF defect is present?
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Retr

Why do conditions affecting metabolism preferentially affect the P-M bundle?

Visual Field Defects



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Optic nerve head

Clinically obvious dz

Papillomacular bundle

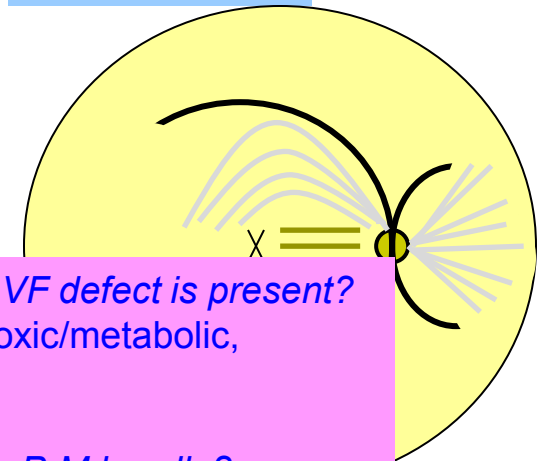
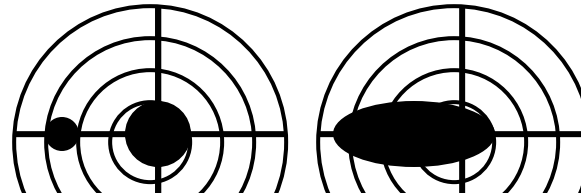
Arcuate fibers

Nasal radiating fibers

Nasal step
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Temporal wedge

Arcuate
Central
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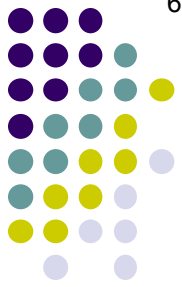
Optic chiasm



Which sorts of optic neuropathy are implicated if a P-M bundle VF defect is present?
Conditions involving compromised cellular metabolism: Think toxic/metabolic, nutritional deficiencies, inherited mitochondrial dz, etc

Retr

Why do conditions affecting metabolism preferentially affect the P-M bundle?
Because the P-M fibers are small, unmyelinated, and extremely active metabolically. Taken together, these characteristics make them more vulnerable than the rest of the optic nerve to factors that adversely impact metabolism.



Visual Field Defects

Toxins that shouldn't be ingested at all:

-
-
-

--(many others)

Toxins that shouldn't be ingested in large quantities for prolonged periods:

-
-

Toxins you were told to ingest by a doc:

-
-
-
-
-
-

Nutrients that weren't ingested in sufficient quantity:

-
-
-

Inherited mitochondrial diseases:

-
-

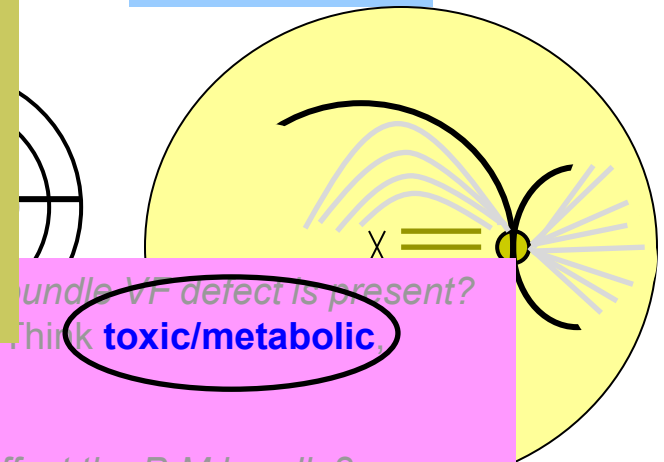
When a P-M bundle VF defect is present? Think **toxic/metabolic**. Conditions involving compromised cellular metabolism: nutritional deficiencies, inherited mitochondrial dz, etc

Retr Why do conditions affecting metabolism preferentially affect the P-M bundle? Because the P-M fibers are small, unmyelinated, and extremely active metabolically. Taken together, these characteristics make them more vulnerable than the rest of the optic nerve to factors that adversely impact metabolism.

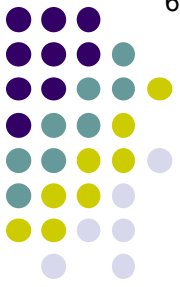
with damage to each group?

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



Visual Field Defects



Toxins that shouldn't be ingested at all:

- Methanol
- Ethylene glycol
- Lead (in children)
- (many others)

Toxins that shouldn't be ingested in large quantities for prolonged periods:

-
-

Toxins you were told to ingest by a doc:

-
-
-
-
-
-

Nutrients that weren't ingested in sufficient quantity:

-
-
-

Inherited mitochondrial diseases:

-
-

Conditions involving compromised cellular metabolism: Think nutritional deficiencies, inherited mitochondrial dz, etc

Retr

Why do conditions affecting metabolism preferentially affect the P-M bundle?

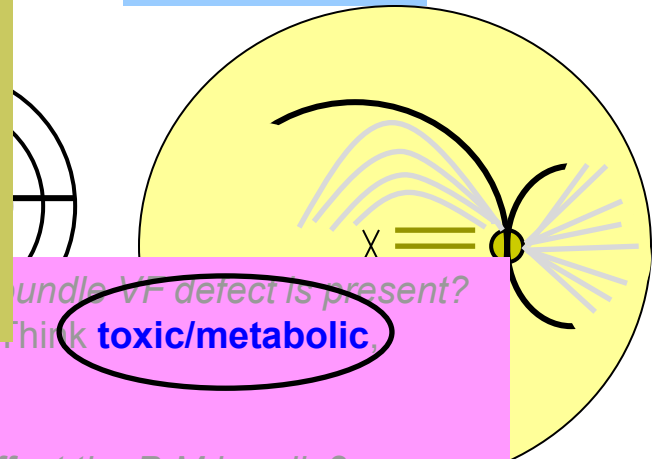
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with damage to each group?

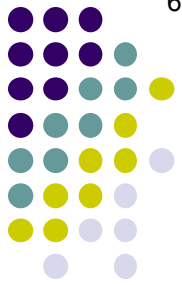
bundle

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



toxic/metabolic



Visual Field Defects

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- Methanol
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-
-

Toxins you were told to ingest by a doc:

-
-
-
-
-
-

Nutrients that weren't ingested in sufficient quantity:

-
-
-

Inherited mitochondrial diseases:

-
-

When a **P-M bundle VF defect is present?**
Conditions involving compromised central metabolism. Think **toxic/metabolic**, nutritional deficiencies, inherited mitochondrial dz, etc

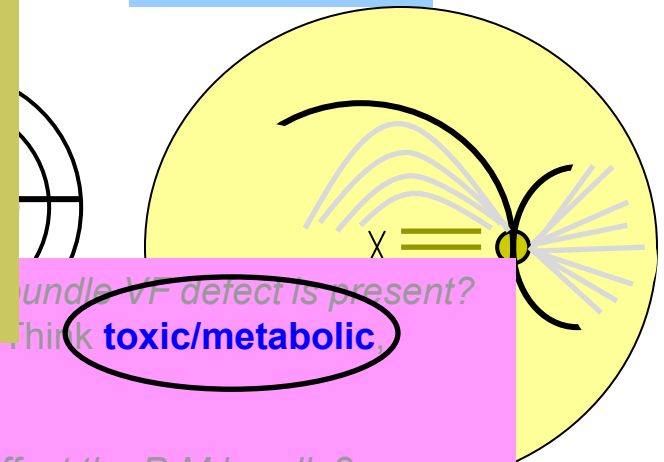
Retr

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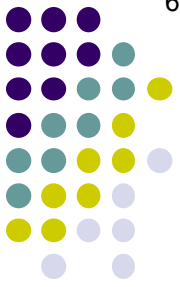
with damage to each group?

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



Visual Field Defects



Toxins that shouldn't be ingested at all:

- Methanol
- Ethylene glycol
- Lead (in children)
- (many others)

Toxins that shouldn't be ingested in large quantities for prolonged periods:

- Ethanol
- Tobacco

Toxins you were told to ingest by a doc:

-
-
-
-
-

Nutrients that weren't ingested in sufficient quantity:

-
-
-

Inherited mitochondrial diseases:

-
-

When a **P-M bundle VF defect is present?** Think **toxic/metabolic**.
 Conditions involving compromised central metabolism: Think nutritional deficiencies, inherited mitochondrial dz, etc

Retr

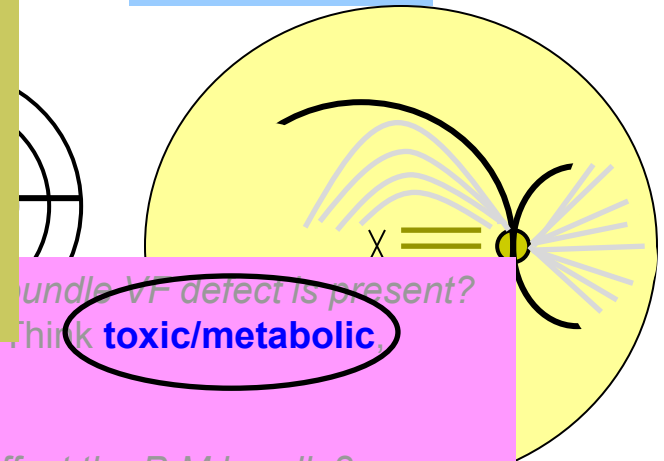
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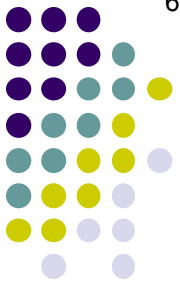
with damage to each group?

Nasal step
 Altitudinal
 Temporal wedge

Arcuate
Central
Ceco-central



Visual Field Defects



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- (many others)

Toxins that shouldn't be ingested in large quantities for prolonged periods:

- Ethanol
- Tobacco

Toxins you were told to ingest by a doc:

-
-
-
-

--(many others)

Nutrients that weren't ingested in sufficient quantity:

-
-
-

Inherited mitochondrial diseases:

-
-

When a **P-M bundle VF defect is present?** Think **toxic/metabolic**.
 Conditions involving compromised central metabolism: Think nutritional deficiencies, inherited mitochondrial dz, etc

Retr

Why do conditions affecting metabolism preferentially affect the P-M bundle?

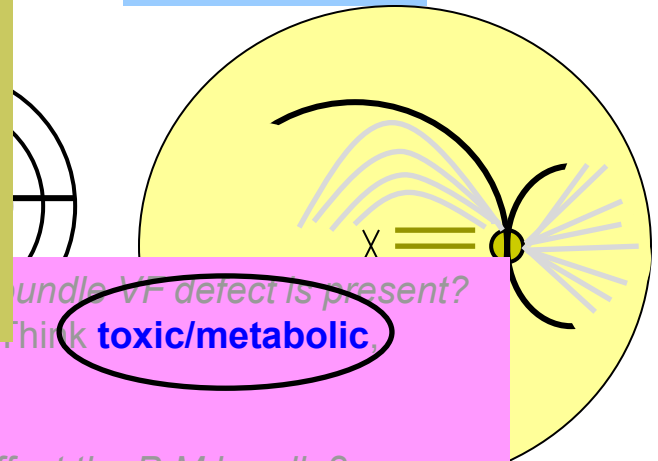
Because the P-M fibers are small, unmyelinated, and extremely active metabolically. Taken together, these characteristics make them more vulnerable than the rest of the optic nerve to factors that adversely impact metabolism.

with damage to each group?

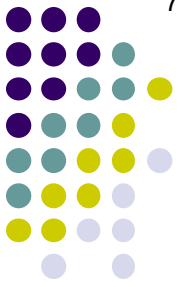
bundle

Nasal step
 Altitudinal
 Temporal wedge

Arcuate
Central
Ceco-central



Visual Field Defects



Toxins that shouldn't be ingested at all:

- Methanol
- Ethylene glycol
- Lead (in children)
- (many others)

Toxins that shouldn't be ingested in large quantities for prolonged periods:

- Ethanol
- Tobacco

Toxins you were told to ingest by a doc:

- Amiodarone
- Ethambutol
- Isoniazid
- Linezolid
- (many others)

Nutrients that weren't ingested in sufficient quantity:

-
-
-

Inherited mitochondrial diseases:

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When a **P-M bundle VF defect is present?** Think **toxic/metabolic**.
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Retr

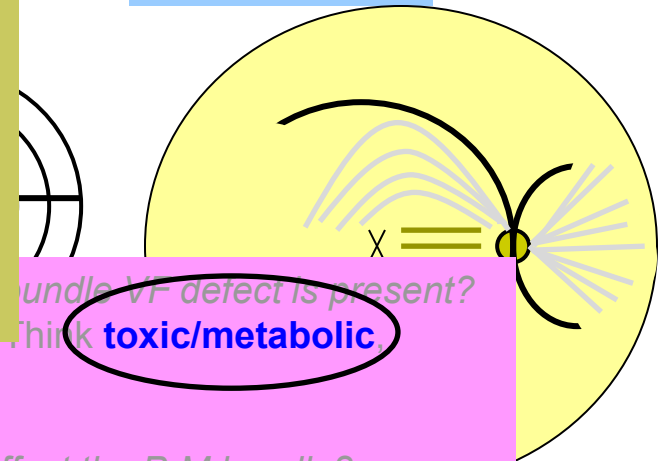
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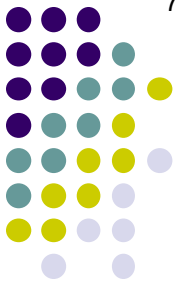
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Nasal step
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-
-
-

Inherited mitochondrial diseases:

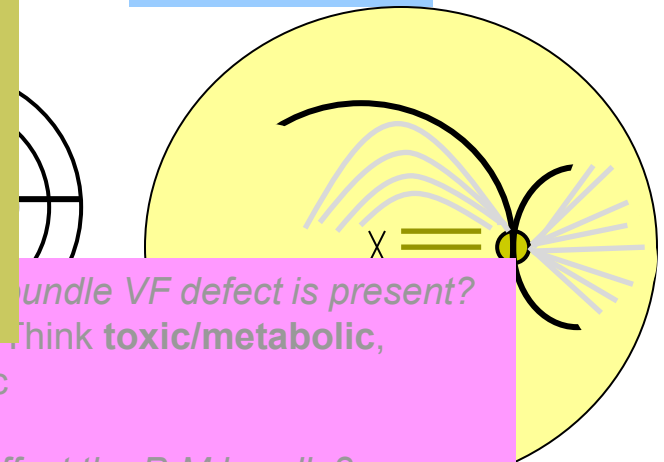
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-

nutritional deficiencies

with damage to each group?

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



bundle VF defect is present?

Conditions involving compromised central metabolism. Think **toxic/metabolic**, inherited mitochondrial dz, etc

Retr

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Visual Field Defects



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- Vitamin B₁₂
- Folate
- Thiamine

Inherited mitochondrial diseases:

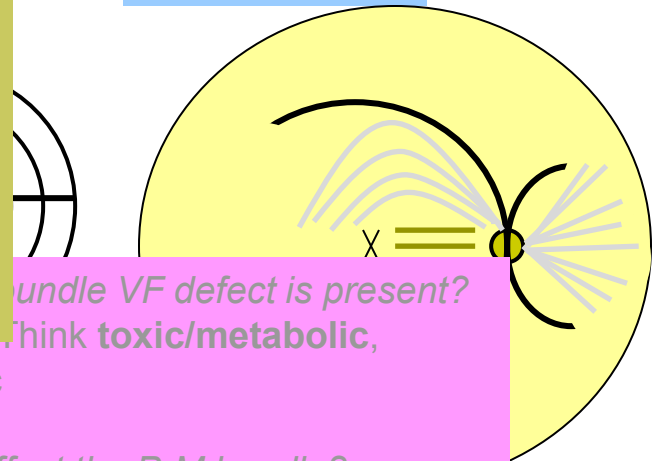
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-

nutritional deficiencies

with damage to each group?

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



P-M bundle VF defect is present?

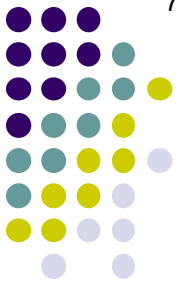
Think **toxic/metabolic**,

etc

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Visual Field Defects



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Inherited mitochondrial diseases:

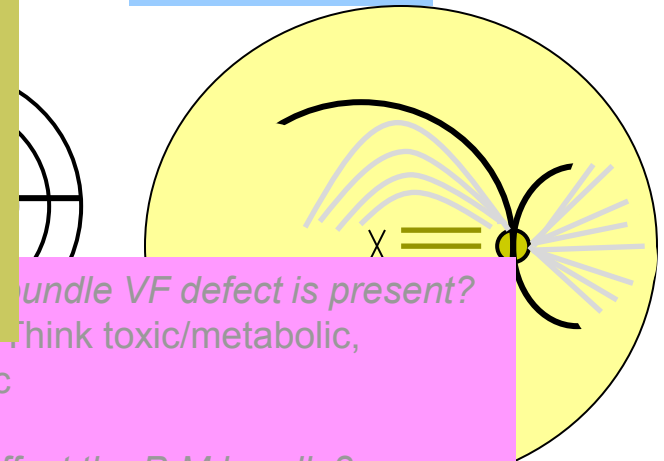
-
-

When a **P-M bundle VF defect** is present? Conditions involving compromised cellular metabolism. Think toxic/metabolic, nutritional deficiencies, **inherited mitochondrial dz**, etc

with damage to each group?

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

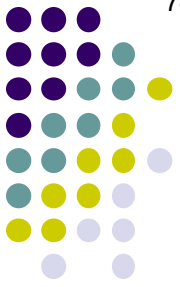


Retr

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Visual Field Defects



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- (many others)

Nutrients that weren't ingested in sufficient quantity:

- Vitamin B₁₂
- Folate
- Thiamine

Inherited mitochondrial diseases:

- Leber's hereditary optic neuropathy
- Autosomal dominant optic atrophy

Why do conditions involving compromised cellular metabolism (think toxic/metabolic, nutritional deficiencies, etc) preferentially affect the P-M bundle?

inherited mitochondrial dz

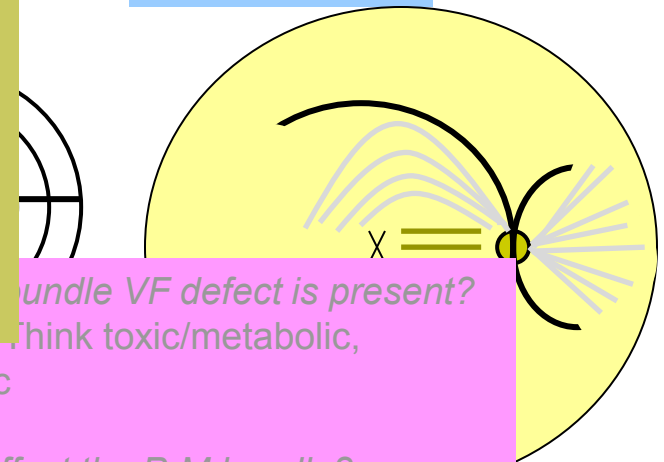
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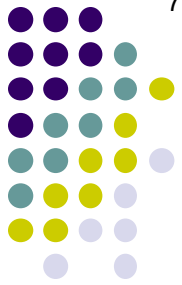
with damage to each group?

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Optic nerve head

Papillomacular bundle

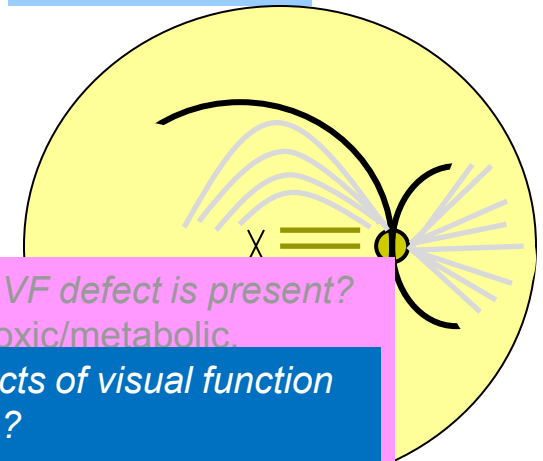
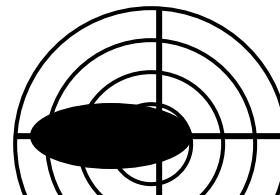
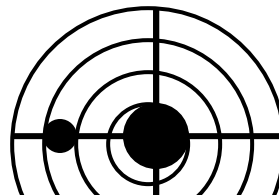
Arcuate fibers

Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

Optic chiasm



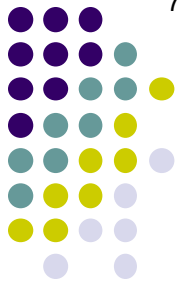
Which sorts of optic neuropathy are implicated if a P-M bundle VF defect is present?
Conditions involving compromised cellular metabolism: Think toxic/metabolic.

In addition to central/ceco-central VF defects, what other aspects of visual function are invariably degraded by pathology affecting the P-M bundle?

Retr

--
--

Taken together, these characteristics make them more vulnerable than the rest of the optic nerve to factors that adversely impact metabolism.



Visual Field Defects

R Which of these VF defects are associated with damage to each group?

Optic nerve head

Papillomacular bundle

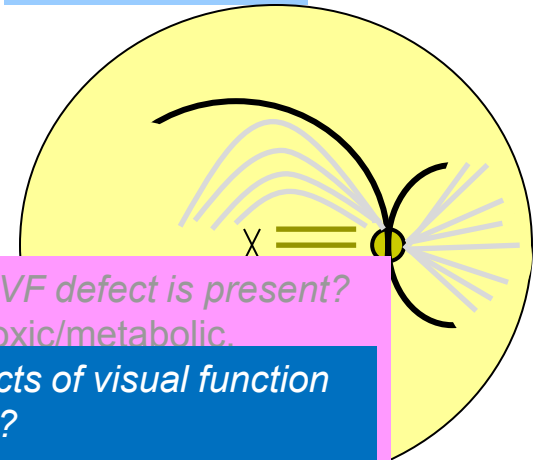
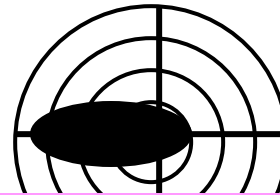
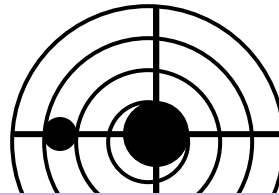
Arcuate fibers

Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

Optic chiasm



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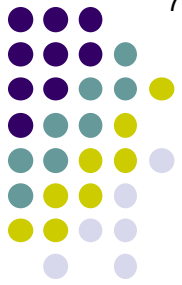
Retr

- Visual acuity*
- Color vision

*Which makes sense—after all, a central VF defect is present

Taken together, these characteristics make them more vulnerable than the rest of the optic nerve to factors that adversely impact metabolism.

Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Optic nerve head

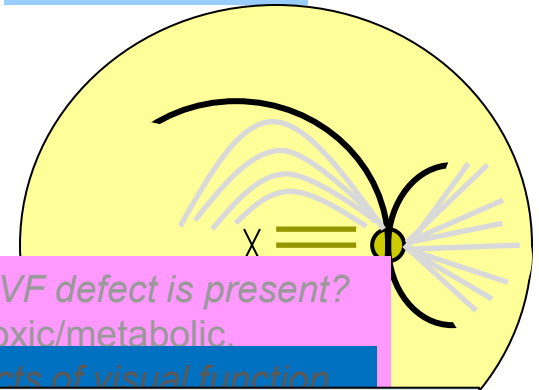
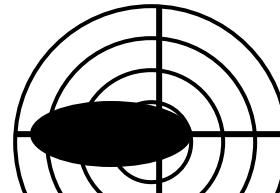
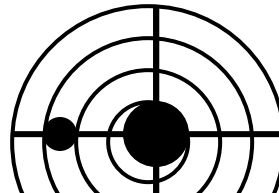
Clinically obvious dz

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

- Nasal step
- Altitudinal
- Temporal wedge

- Arcuate
- Central**
- Ceco-central**

Optic chiasm



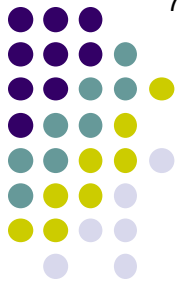
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 In addition to central/ceco-central VF defects, what other aspects of visual function

For more on PMB-related optic neuropathy, see slide-set N9

Ret

-Color vision *Which makes sense—after all, a central VF defect is present
 Taken together, these characteristics make them more vulnerable than the rest of the
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Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Optic nerve head

Clinically obvious dz

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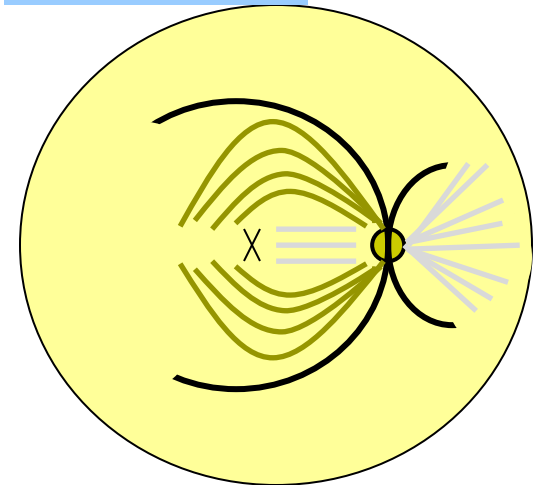
?

- Arcuate
- Central
- Ceco-central

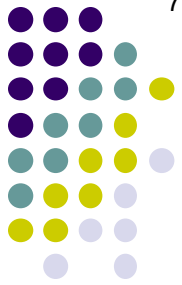
?

Optic chiasm

Retrochiasmal



Visual Field Defects



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Optic nerve head

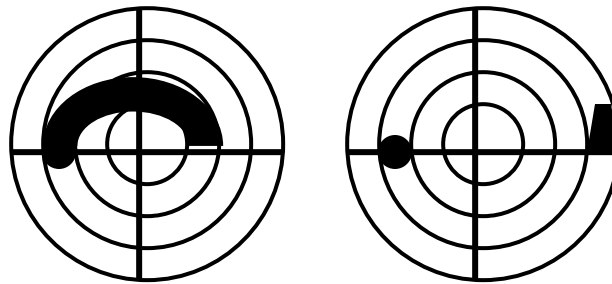
Clinically obvious dz

Papillomacular bundle
 Arcuate fibers
 Nasal radiating fibers

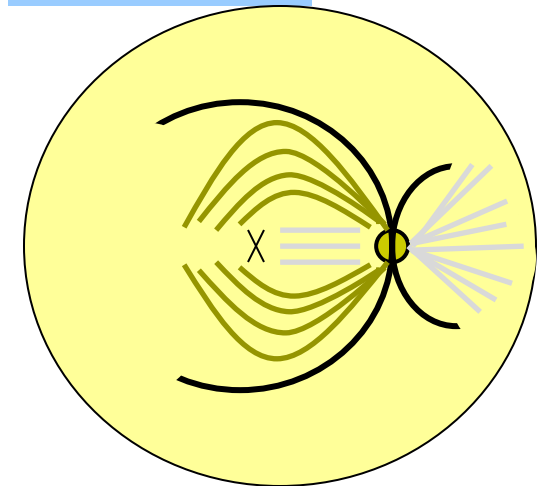
Nasal step
 Altitudinal
 Temporal wedge

Arcuate
 Central
 Ceco-central

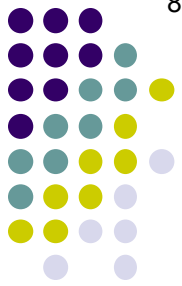
Optic chiasm



Retrochiasmal



Visual Field Defects



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Clinically obvious dz

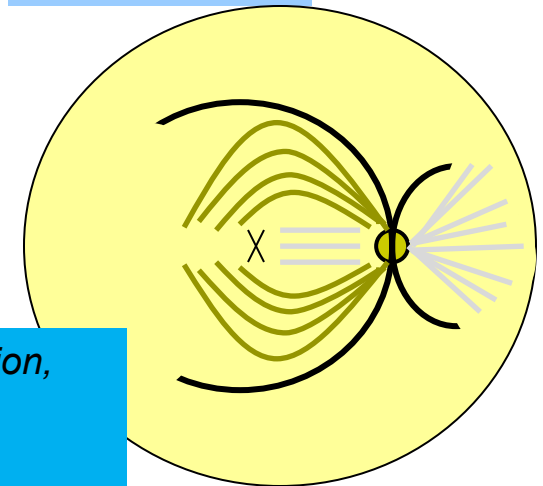
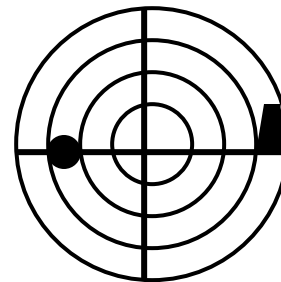
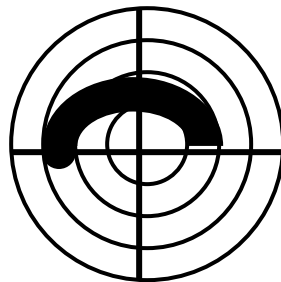
Optic nerve head

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Nasal step
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 Temporal wedge

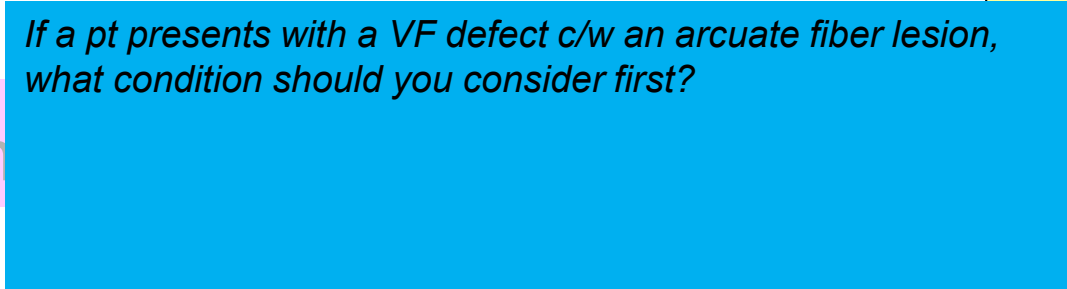
Arcuate
 Central
 Ceco-central

Optic chiasm

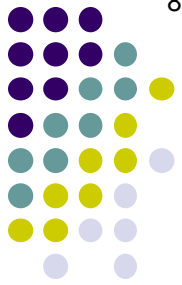


If a pt presents with a VF defect c/w an arcuate fiber lesion, what condition should you consider first?

Retrochiasm



Visual Field Defects



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Clinically obvious dz

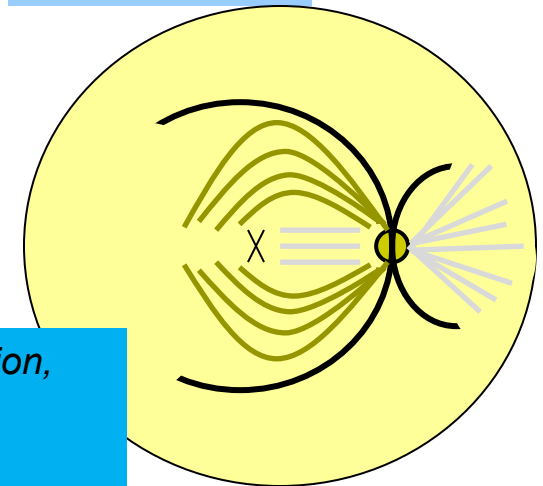
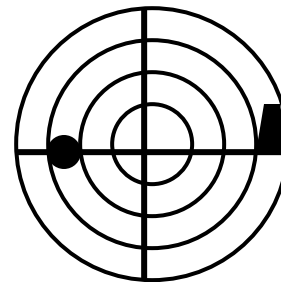
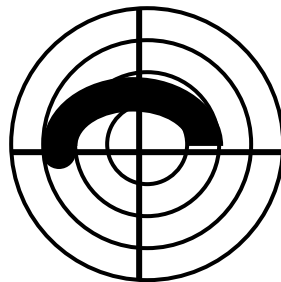
Optic nerve head

Papillomacular bundle
Arcuate fibers
 Nasal radiating fibers

Nasal step
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 Temporal wedge

Arcuate
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 Ceco-central

Optic chiasm

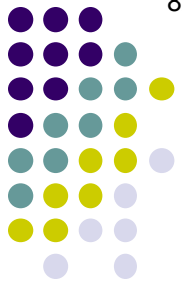


If a pt presents with a VF defect c/w an arcuate fiber lesion, what condition should you consider first?

Glaucoma

Retrochiasm

Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Clinically obvious dz

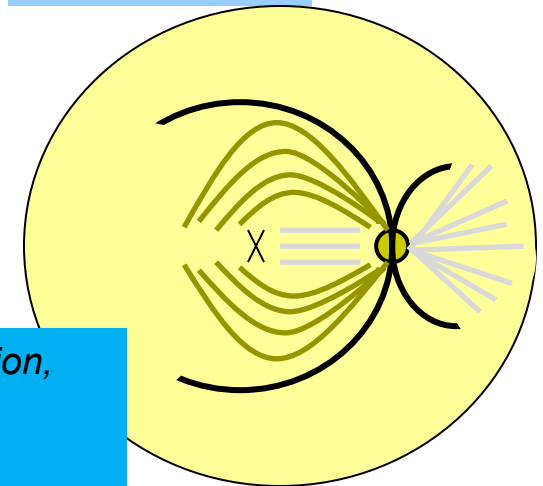
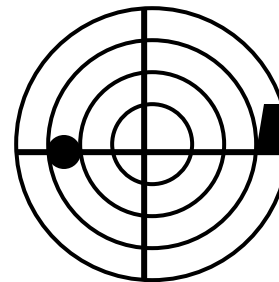
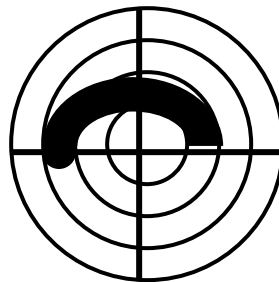
Optic nerve head

- Papillomacular bundle
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Nasal step
 Altitudinal
 Temporal wedge

Arcuate
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 Ceco-central

Optic chiasm



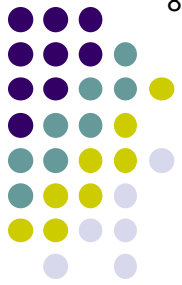
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Glaucoma

Retrochiasm

Why does glaucoma preferentially damage arcuate fibers?

Visual Field Defects



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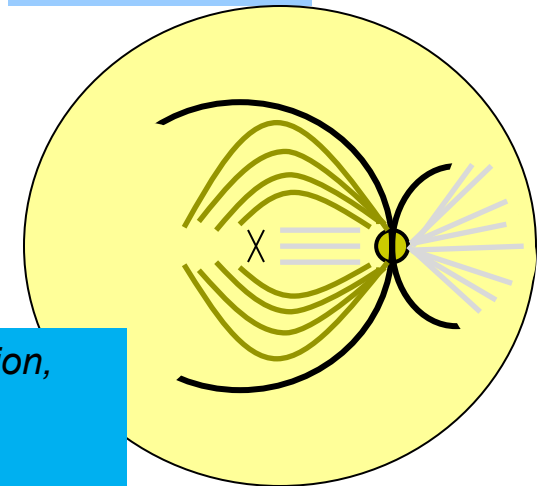
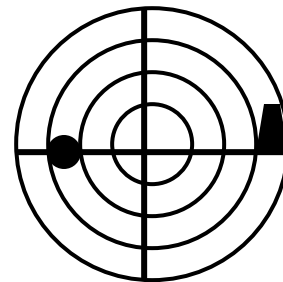
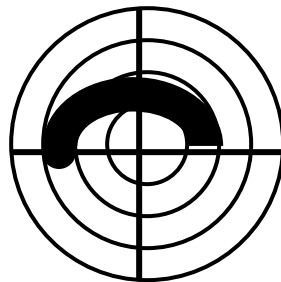
Clinically obvious dz

Papillomacular bundle
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 Nasal radiating fibers

Nasal step
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Arcuate
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 Ceco-central

Optic chiasm



Retrochiasm

If a pt presents with a VF defect c/w an arcuate fiber lesion, what condition should you consider first?

Glaucoma

Why does glaucoma preferentially damage arcuate fibers?

It's unclear at this time

Compare the distribution of arcuate-fiber defects with those associated with a P-M bundle dysfunction. What important difference do you see?

Optic nerve head

Arcuate fibers

Nasal radiating fibers

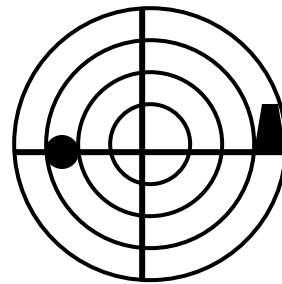
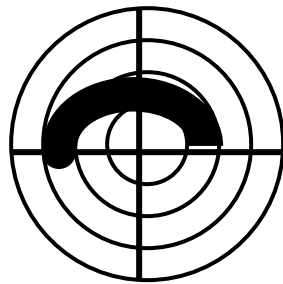
Temporal wedge

Arcuate

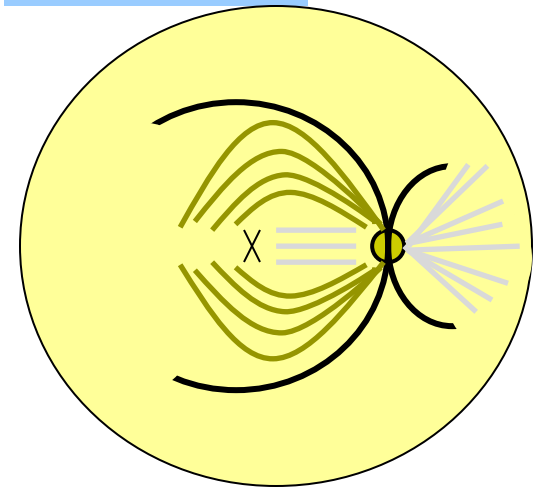
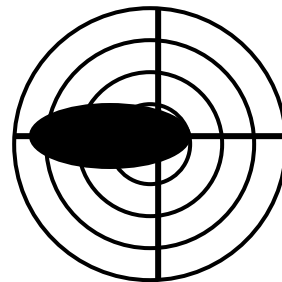
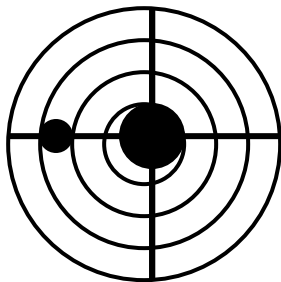
Central

Ceco-central

Optic chiasm



Retrochiasmal



Compare the distribution of arcuate-fiber defects with those associated with a P-M bundle dysfunction. What important difference do you see?

Unlike P-M defects, arcuate fiber bundle defects do not cross (ie, they 'respect') the horizontal midline

Optic nerve head

Arcuate fibers

Nasal radiating fibers

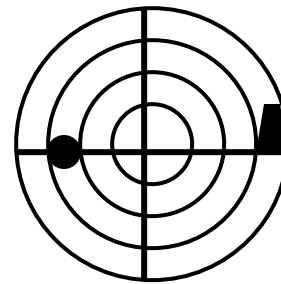
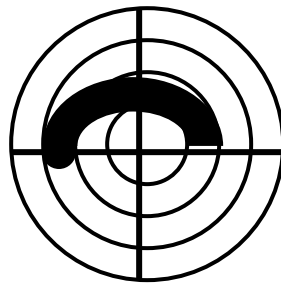
Temporal wedge

Arcuate

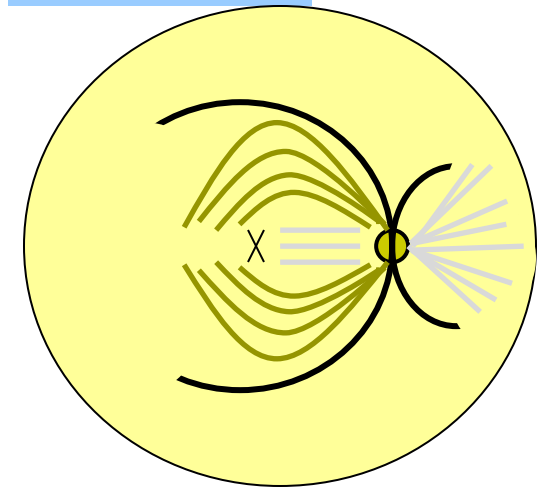
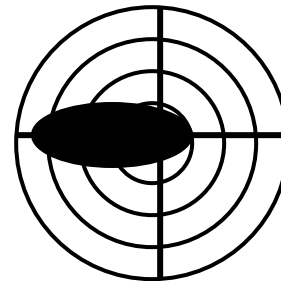
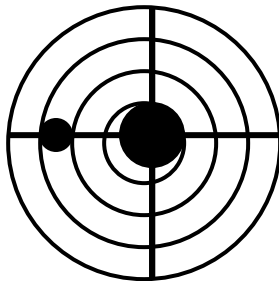
Central

Ceco-central

Optic chiasm



Retrochiasmal



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Why not?

Optic nerve
head

Arcuate fibers

Nasal radiating fibers

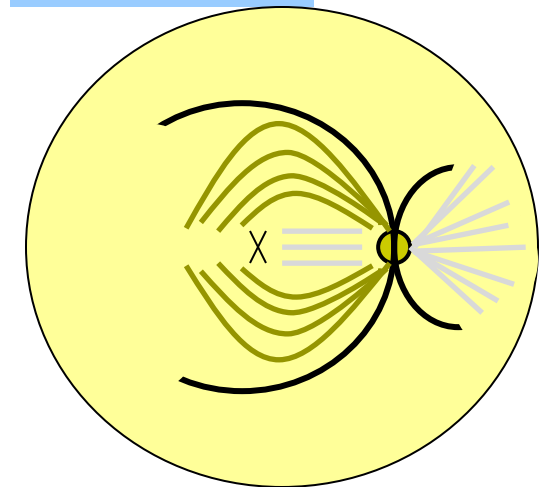
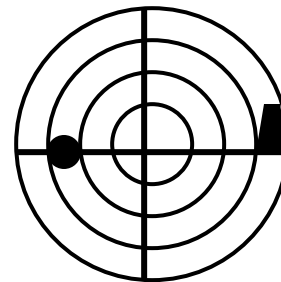
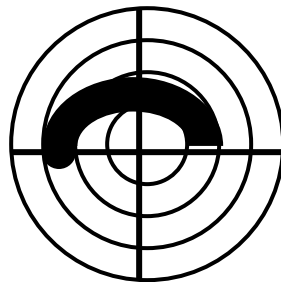
Temporal wedge

Arcuate

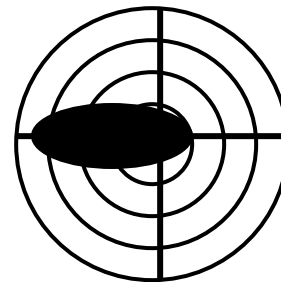
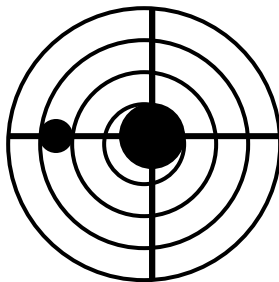
Central

Ceco-central

Optic chiasm



Retrochiasmal



Compare the distribution of arcuate-fiber defects with those associated with a P-M bundle dysfunction. What important difference do you see?

Unlike P-M defects, arcuate fiber bundle defects do not cross (ie, they 'respect') the horizontal midline

Why not?

Because fibers on the temporal side of the ONH approach, but do **not** cross, the horizontal midline. The arcuate fibers arc around the P-M bundle, and meet along a horizontal demarcation line.

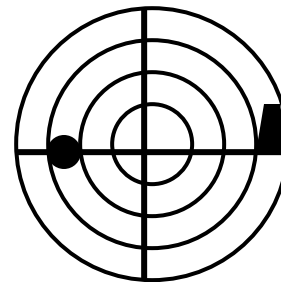
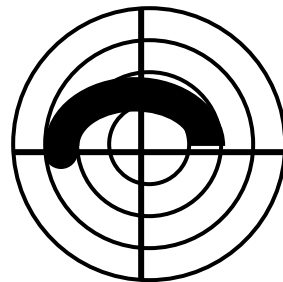
Optic nerve
head

Arcuate fibers

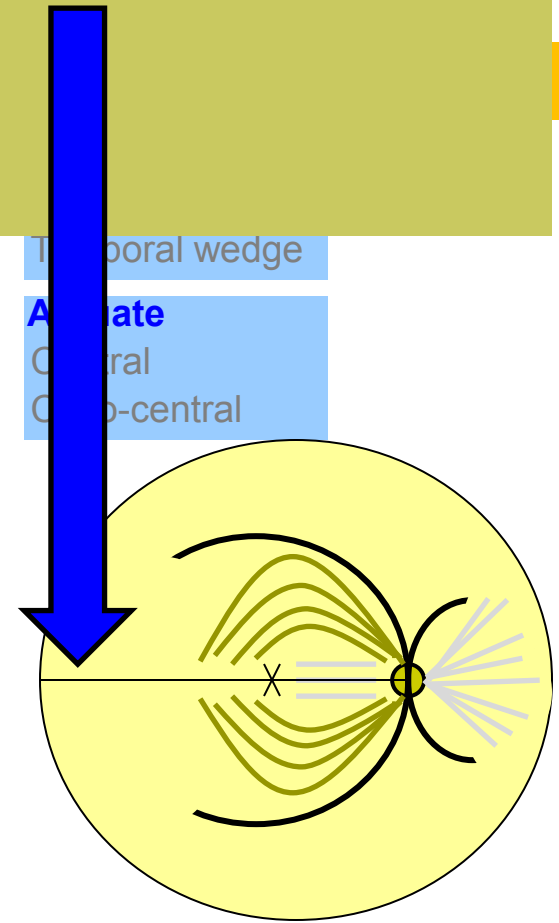
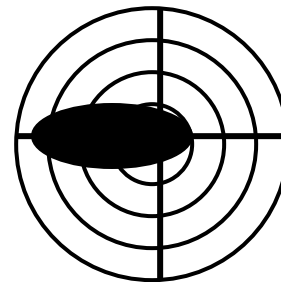
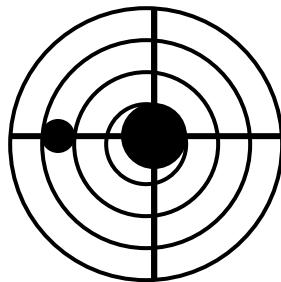
Nasal radiating fibers

Temporal wedge
Arcuate
Central
Circulo-central

Optic chiasm



Retrochiasmal



Compare the distribution of arcuate-fiber defects with those associated with a P-M bundle dysfunction. What important difference do you see?

Unlike P-M defects, arcuate fiber bundle defects do not cross (ie, they 'respect') the horizontal midline

Why not?

Because fibers on the temporal side of the ONH approach, but do **not** cross, the horizontal midline. The arcuate fibers arc around the P-M bundle, and meet along a horizontal demarcation line. Thus, damage to these fibers always result in VF defects that are limited to either the superior or the inferior portion of the field.

Optic nerve
head

Arcuate fibers

Nasal radiating fibers

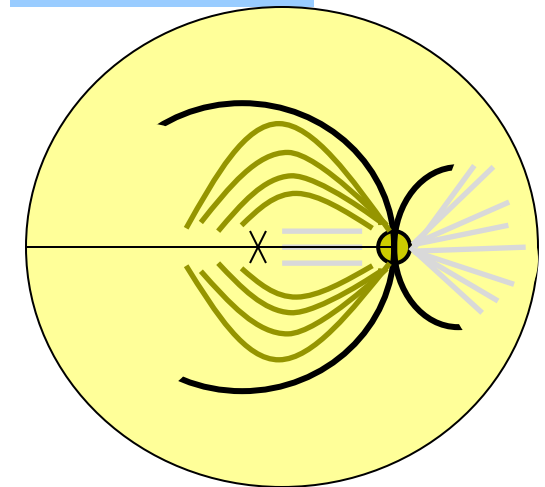
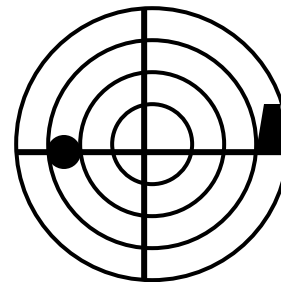
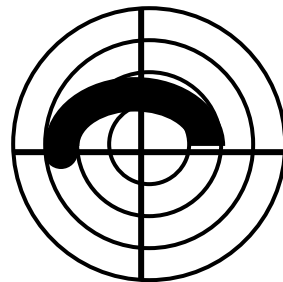
Temporal wedge

Arcuate

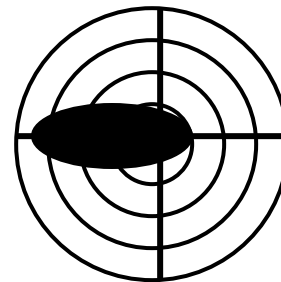
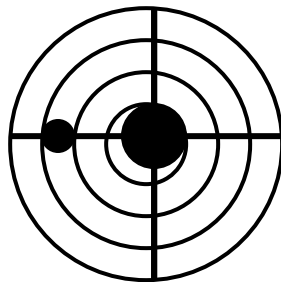
Central

Ceco-central

Optic chiasm



Retrochiasmal



Compare the distribution of arcuate-fiber defects with those associated with a P-M bundle dysfunction. What important difference do you see?

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What is this horizontal demarcation line called?

Optic nerve
head

Arcuate fibers

Nasal radiating fibers

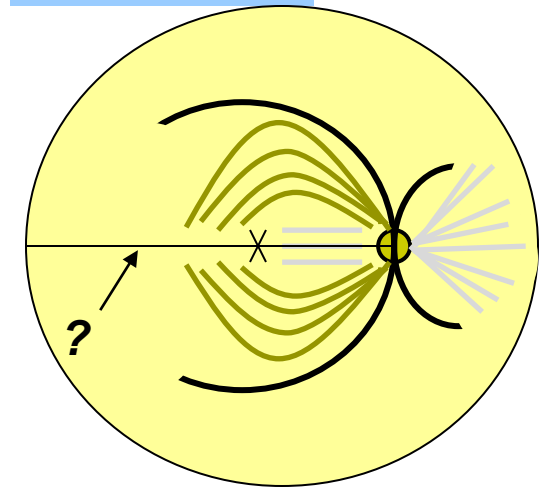
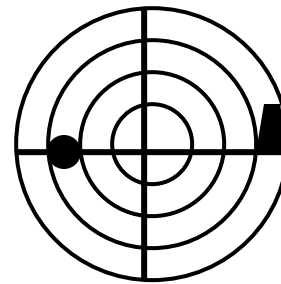
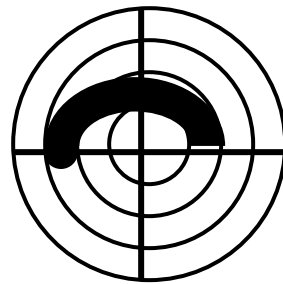
Temporal wedge

Arcuate

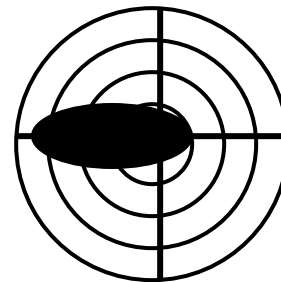
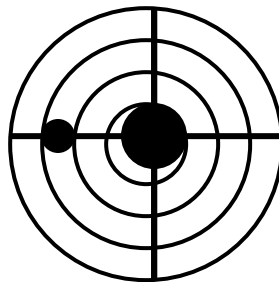
Central

Ceco-central

Optic chiasm



Retrochiasmal



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What is this horizontal demarcation line called?

The **horizontal raphe**

Optic nerve
head

Arcuate fibers

Nasal radiating fibers

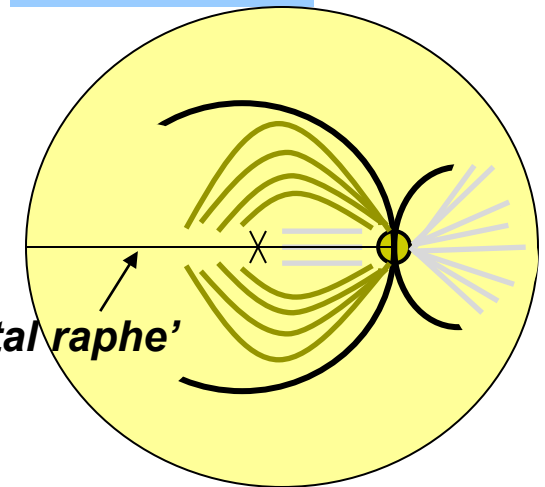
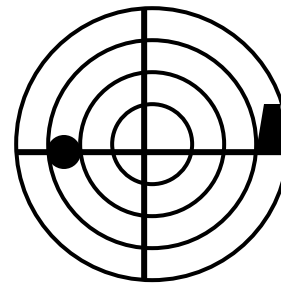
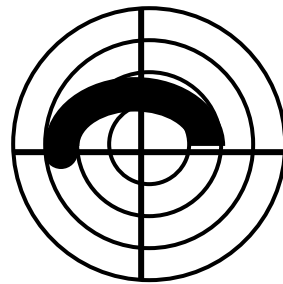
Temporal wedge

Arcuate

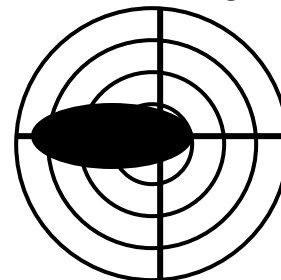
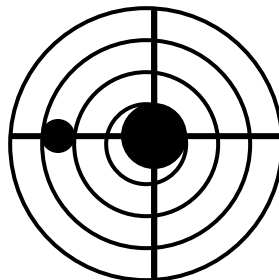
Central

Ceco-central

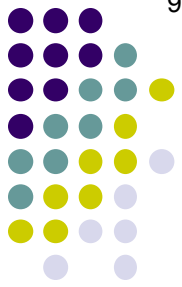
Optic chiasm



Retrochiasmal



Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Optic nerve head

Clinically obvious dz

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers**

- Nasal step
- Altitudinal
- Temporal wedge

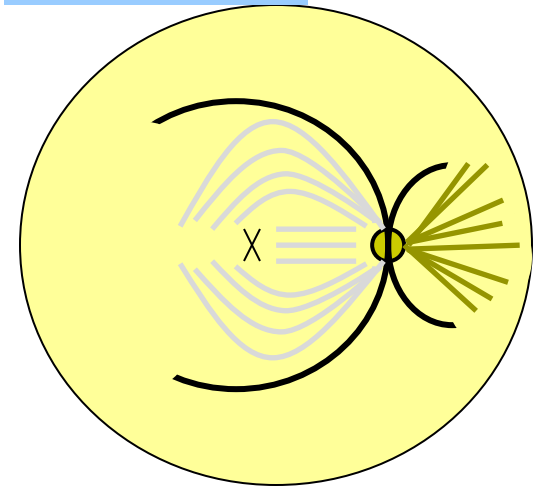
?

- Arcuate
- Central
- Ceco-central

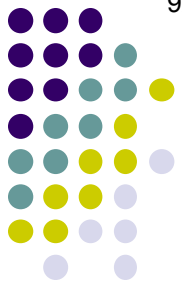
?

Optic chiasm

Retrochiasmal



Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Optic nerve head

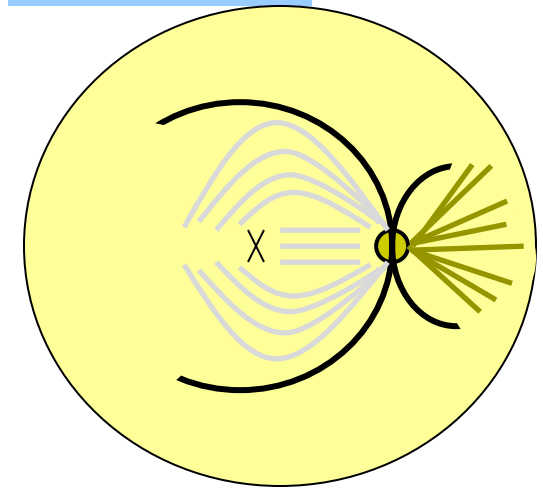
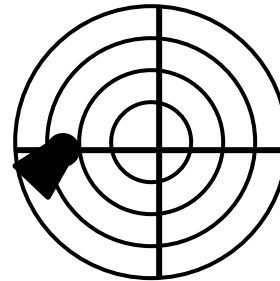
Clinically obvious dz

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

- Nasal step
- Altitudinal
- Temporal wedge

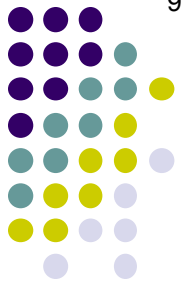
- Arcuate
- Central
- Ceco-central

Optic chiasm



Retrochiasmal

Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Clinically obvious dz

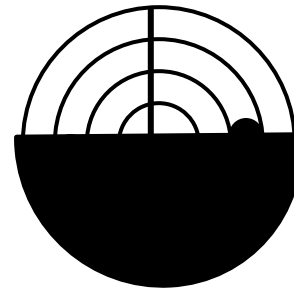
Optic nerve head

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

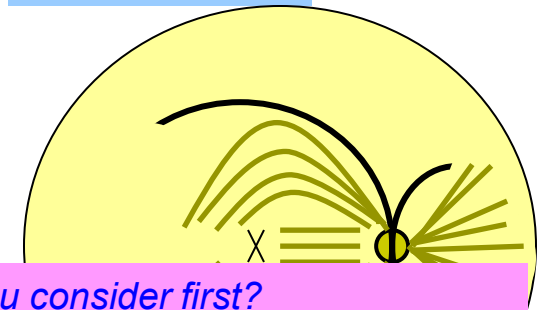
Nasal step
Altitudinal
Temporal wedge

?

Arcuate
Central
Ceco-central



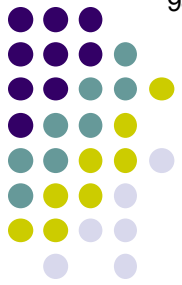
Optic chiasm



If a pt presents with an altitudinal VF defect, what condition should you consider first?

F

Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Clinically obvious dz

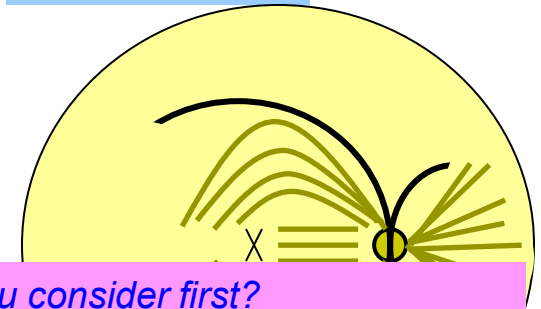
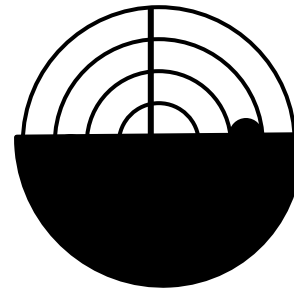
Optic nerve head

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

?

Arcuate
Central
Ceco-central



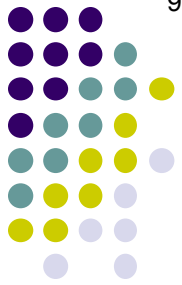
Optic chiasm

If a pt presents with an altitudinal VF defect, what condition should you consider first?

Two conditions should come to mind:

-
-

F



Visual Field Defects

R Which of these VF defects are associated with damage to each group?

Clinically obvious dz

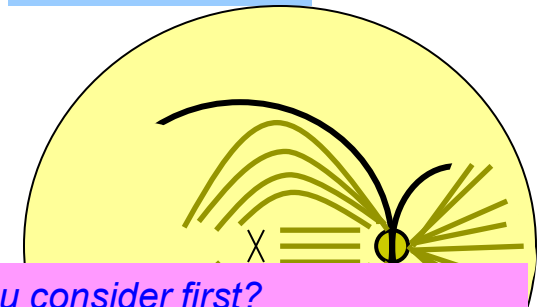
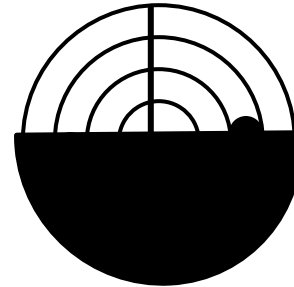
Optic nerve head

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge



Arcuate
Central
Ceco-central



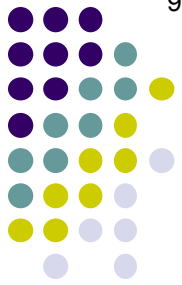
Optic chiasm

If a pt presents with an altitudinal VF defect, what condition should you consider first?

Two conditions should come to mind:

- If the pt is a **age and condition**, it's likely nonarteritic anterior ischemic optic neuropathy (NAION)
- If the pt has glaucoma, it likely represents advanced glaucomatous optic neuropathy

F



Visual Field Defects

R Which of these VF defects are associated with damage to each group?

Clinically obvious dz

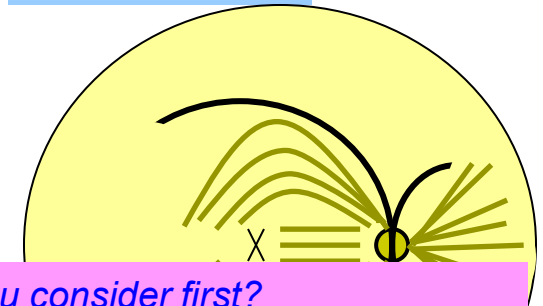
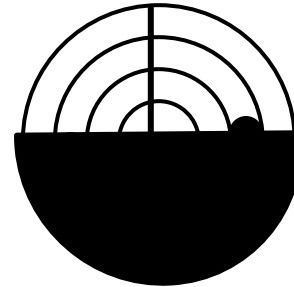
Optic nerve head

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge



Arcuate
Central
Ceco-central



Optic chiasm

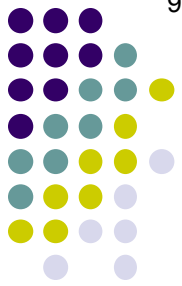
If a pt presents with an altitudinal VF defect, what condition should you consider first?

Two conditions should come to mind:

- If the pt is a 50+ vasculopath, it's likely nonarteritic anterior ischemic optic neuropathy (NAION)
- If the pt has glaucoma, it likely represents advanced glaucomatous optic neuropathy

F

Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Clinically obvious dz

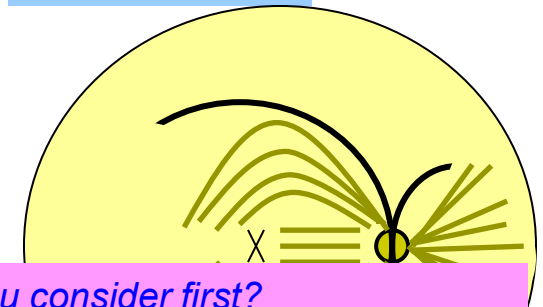
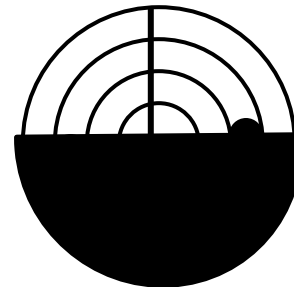
Optic nerve head

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

?

Arcuate
Central
Ceco-central



Optic chiasm

If a pt presents with an altitudinal VF defect, what condition should you consider first?

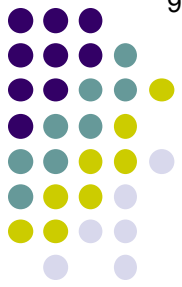
Two conditions should come to mind:

- If the pt is a 50+ vasculopath, it's likely nonarteritic anterior ischemic optic neuropathy (NAION)
- If the pt has glaucoma, it likely represents advanced glaucomatous optic neuropathy

F

How can you differentiate between these two conditions?

Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Clinically obvious dz

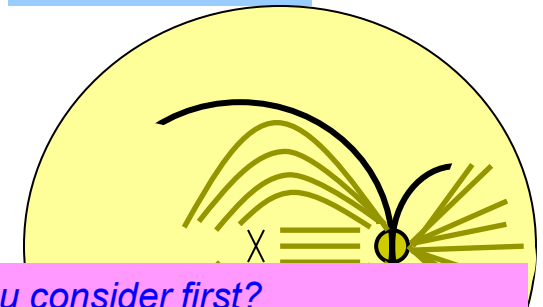
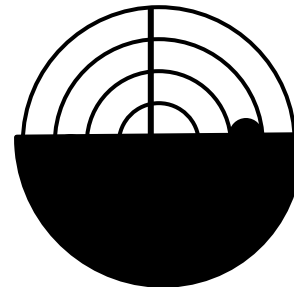
Optic nerve head

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge



Arcuate
Central
Ceco-central



Optic chiasm

If a pt presents with an altitudinal VF defect, what condition should you consider first?

Two conditions should come to mind:

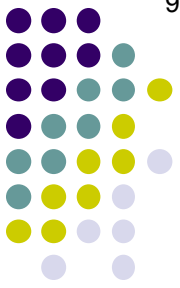
- If the pt is a 50+ vasculopath, it's likely nonarteritic anterior ischemic optic neuropathy (NAION)
- If the pt has glaucoma, it likely represents advanced glaucomatous optic neuropathy

F

How can you differentiate between these two conditions?

There are a number of ways, but the most straightforward would be to inspect the ONH, which will be one word in NAION, and two words in advanced glaucoma

Visual Field Defects



R Which of these VF defects are associated with damage to each group?

Optic nerve head

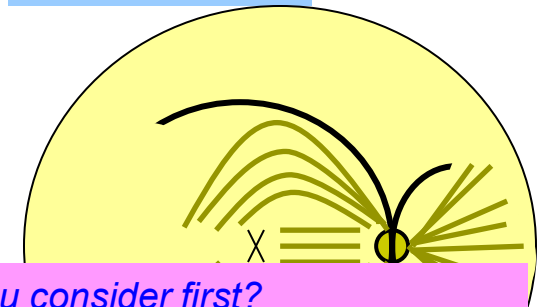
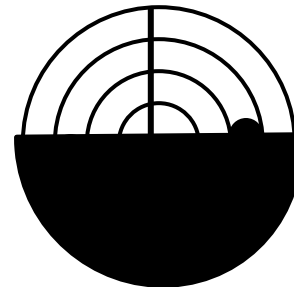
Clinically obvious dz

Papillomacular bundle
Arcuate fibers
Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

?

Arcuate
Central
Ceco-central



Optic chiasm

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F

How can you differentiate between these two conditions?

There are a number of ways, but the most straightforward would be to inspect the ONH, which will be edematous in NAION, and severely cupped in advanced glaucoma

Visual Field Defects



Retina

- Clinically obvious dz
- Clinically subtle dz

Optic nerve

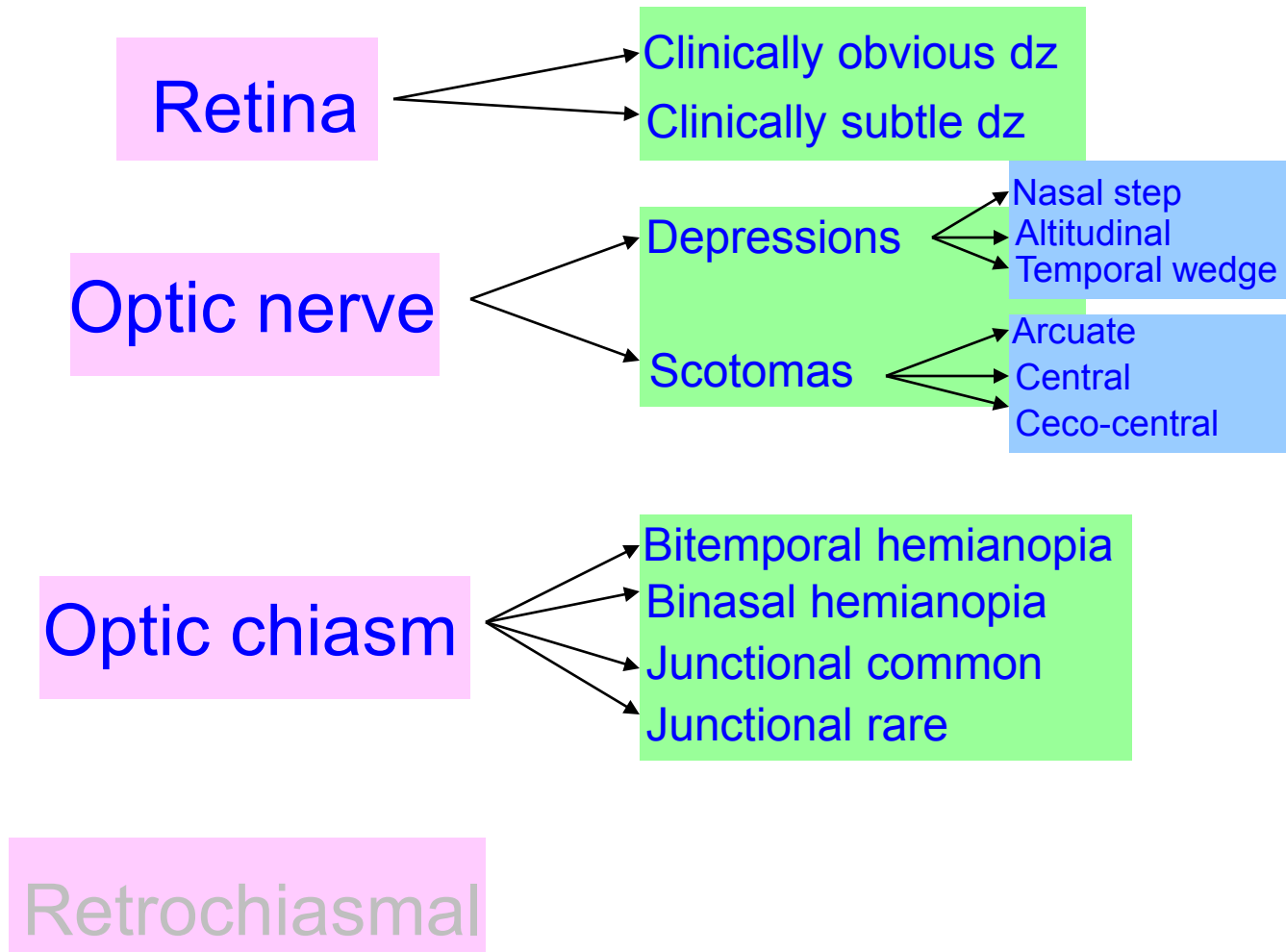
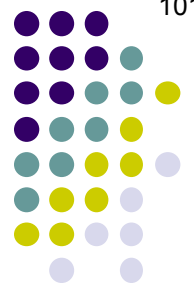
- Depressions
 - Nasal step
 - Altitudinal
 - Temporal wedge
- Scotomas
 - Arcuate
 - Central
 - Ceco-central

Optic chiasm

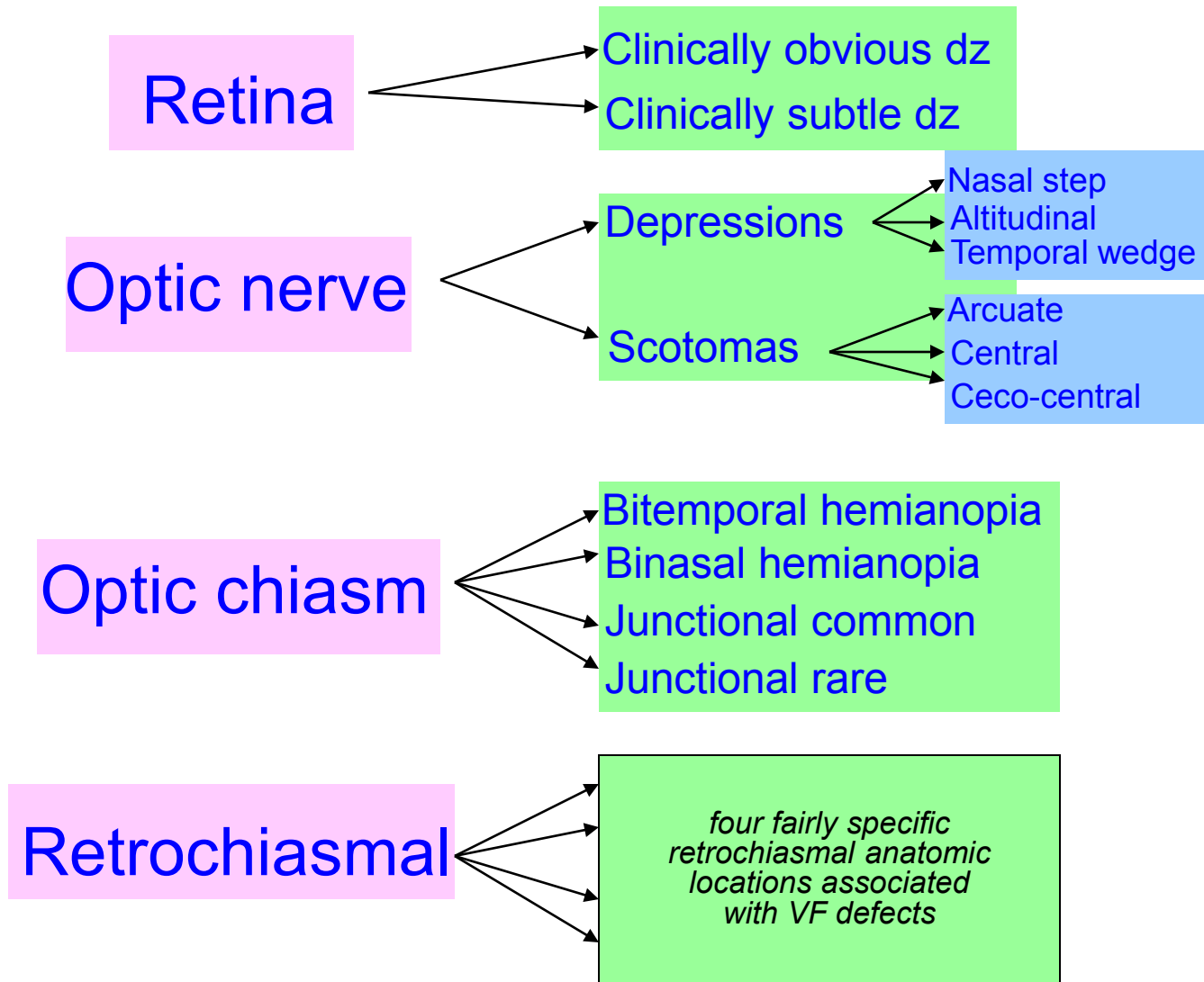
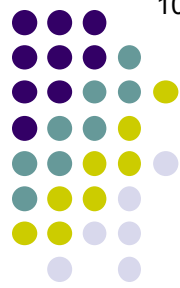
four very specific types of chiasmal VF defects

Retrochiasmal

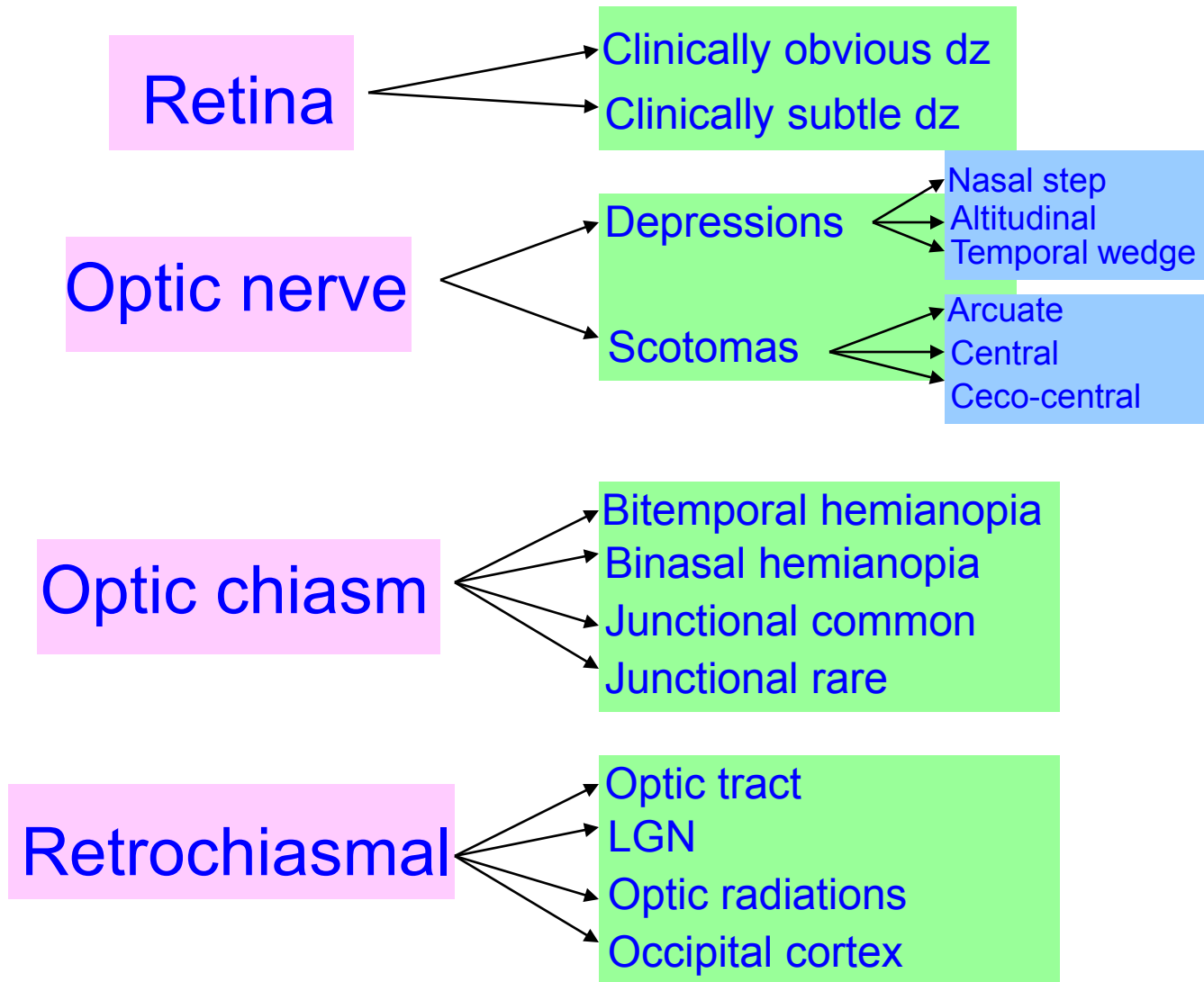
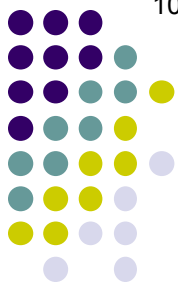
Visual Field Defects

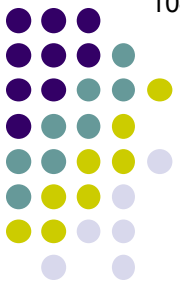


Visual Field Defects

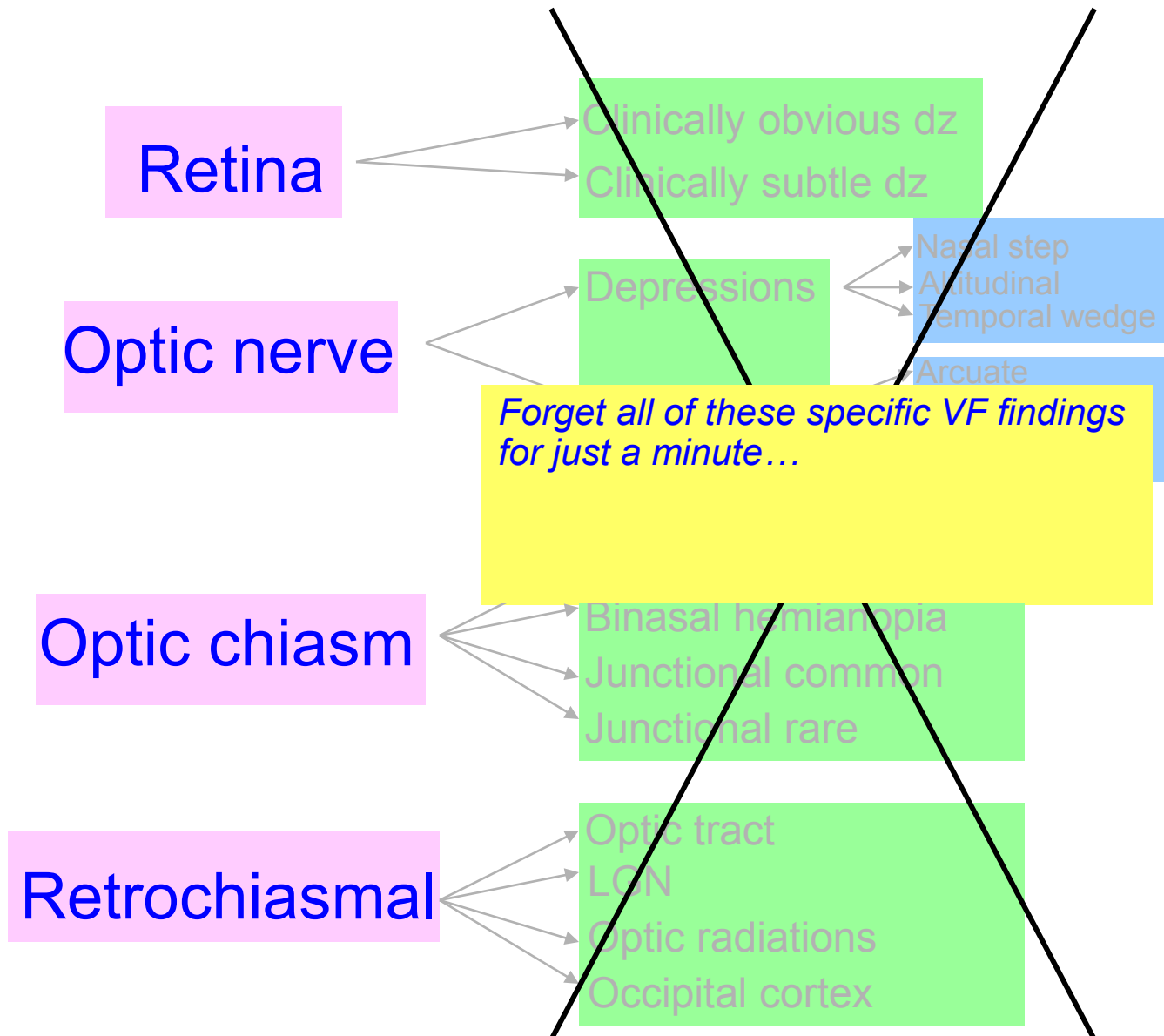


Visual Field Defects



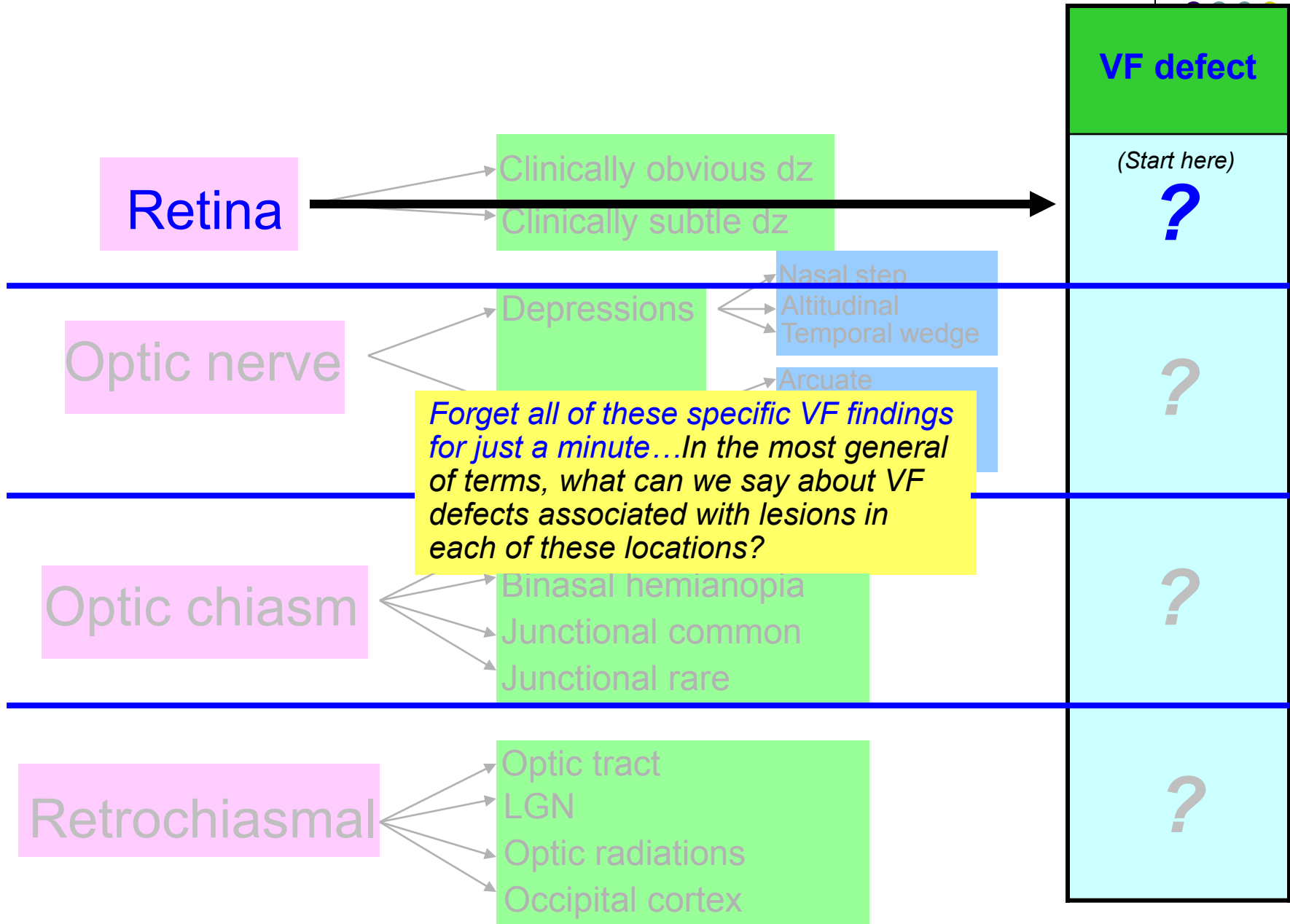


Visual Field Defects

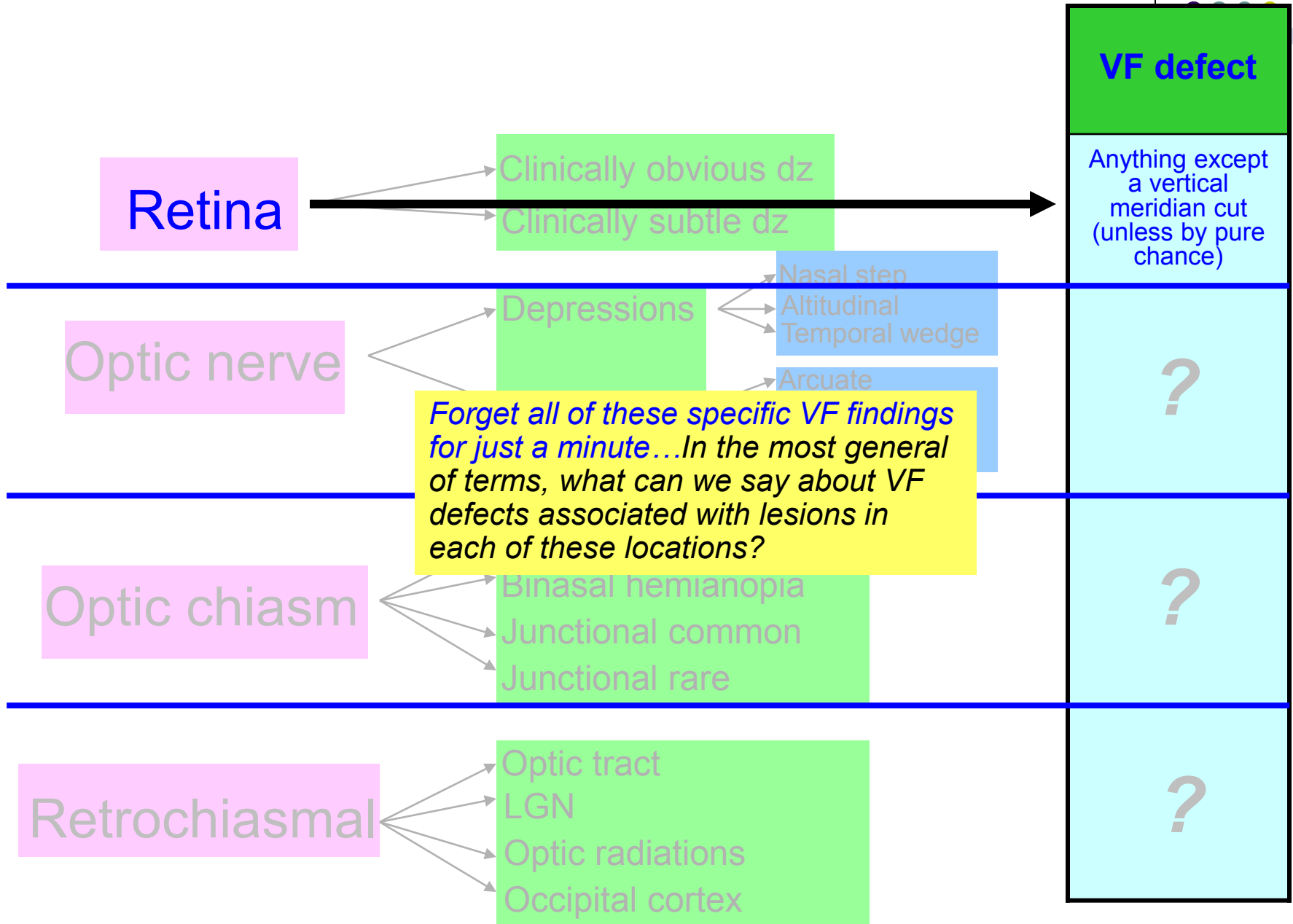




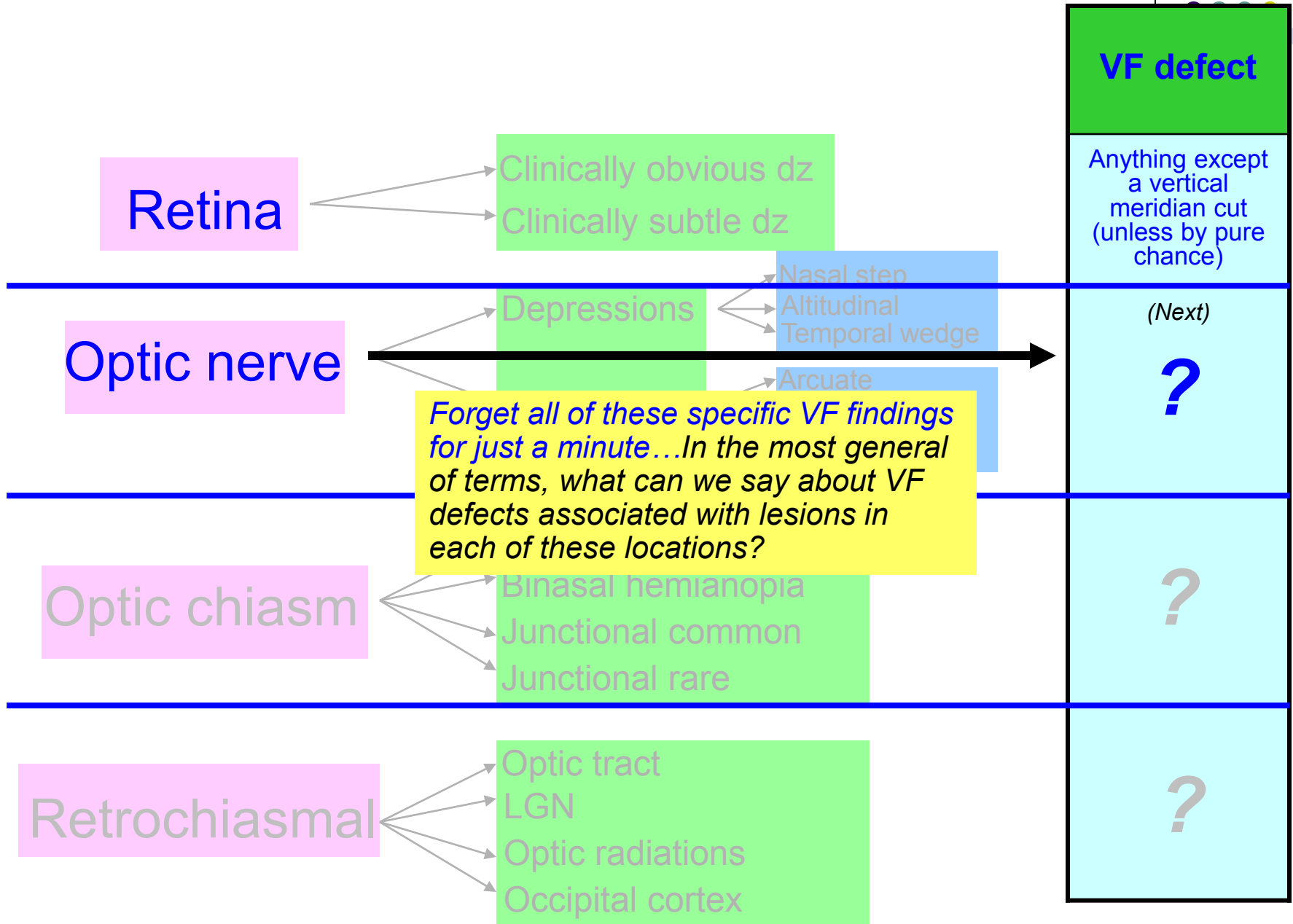
Visual Field Defects



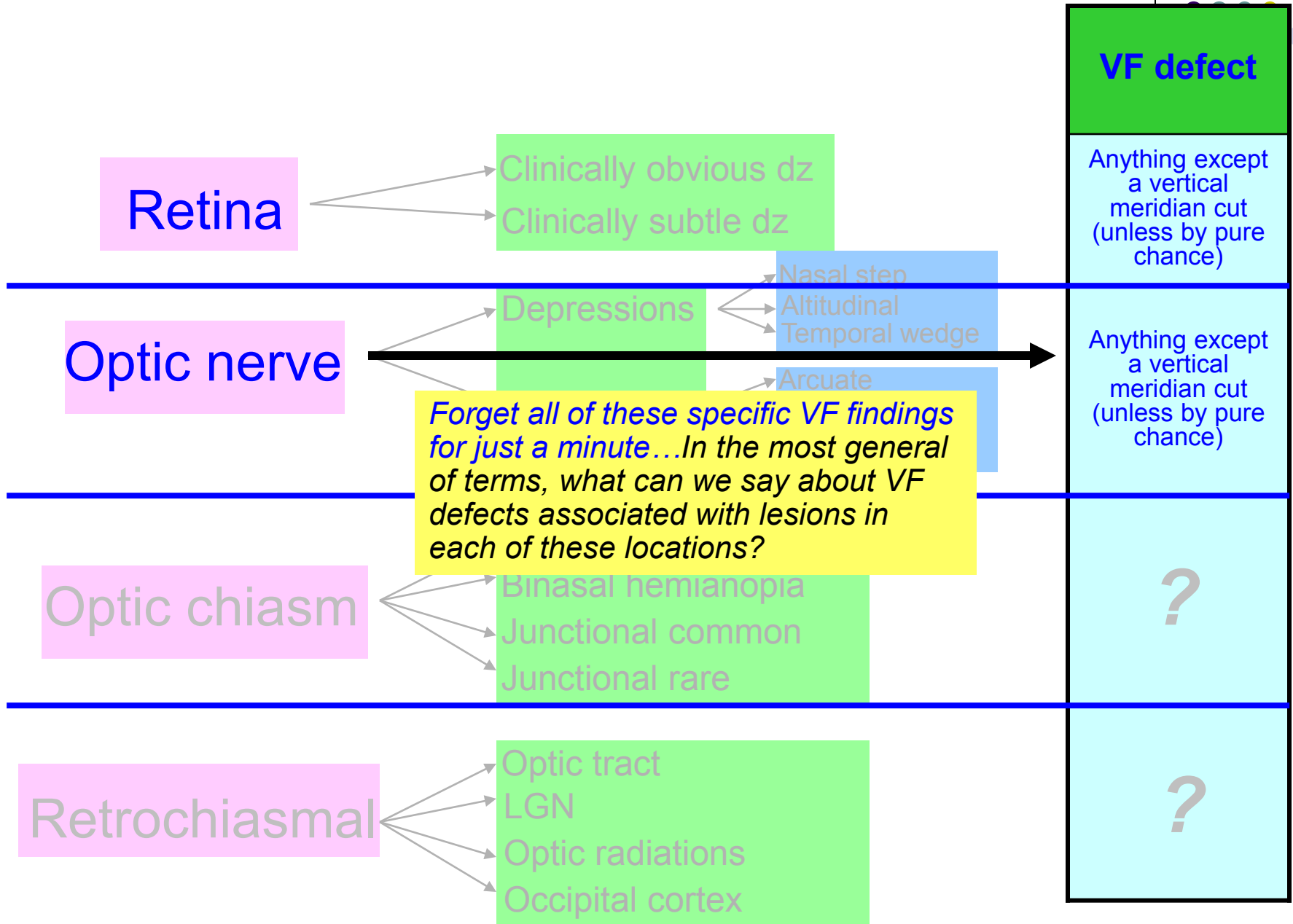
Visual Field Defects



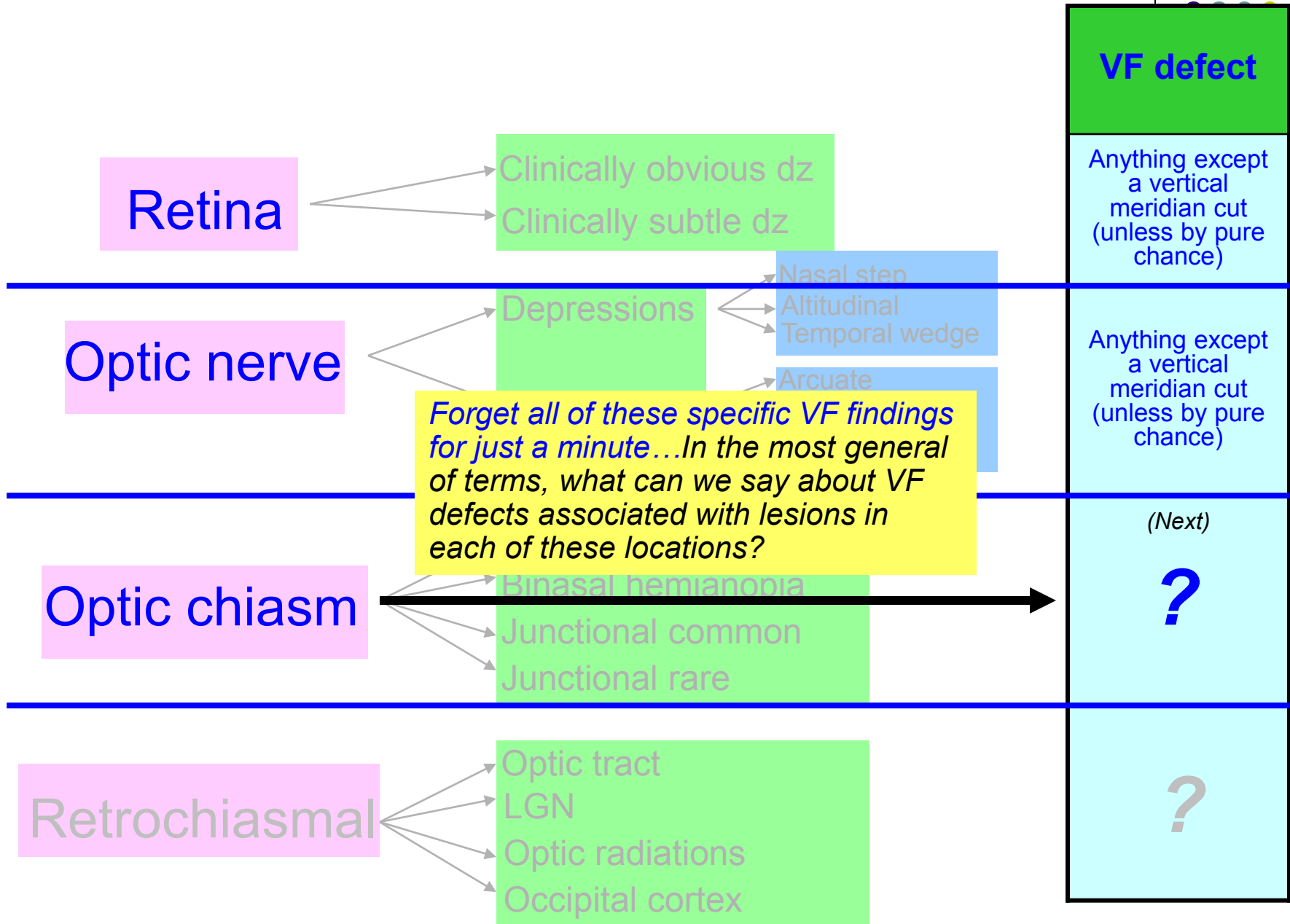
Visual Field Defects



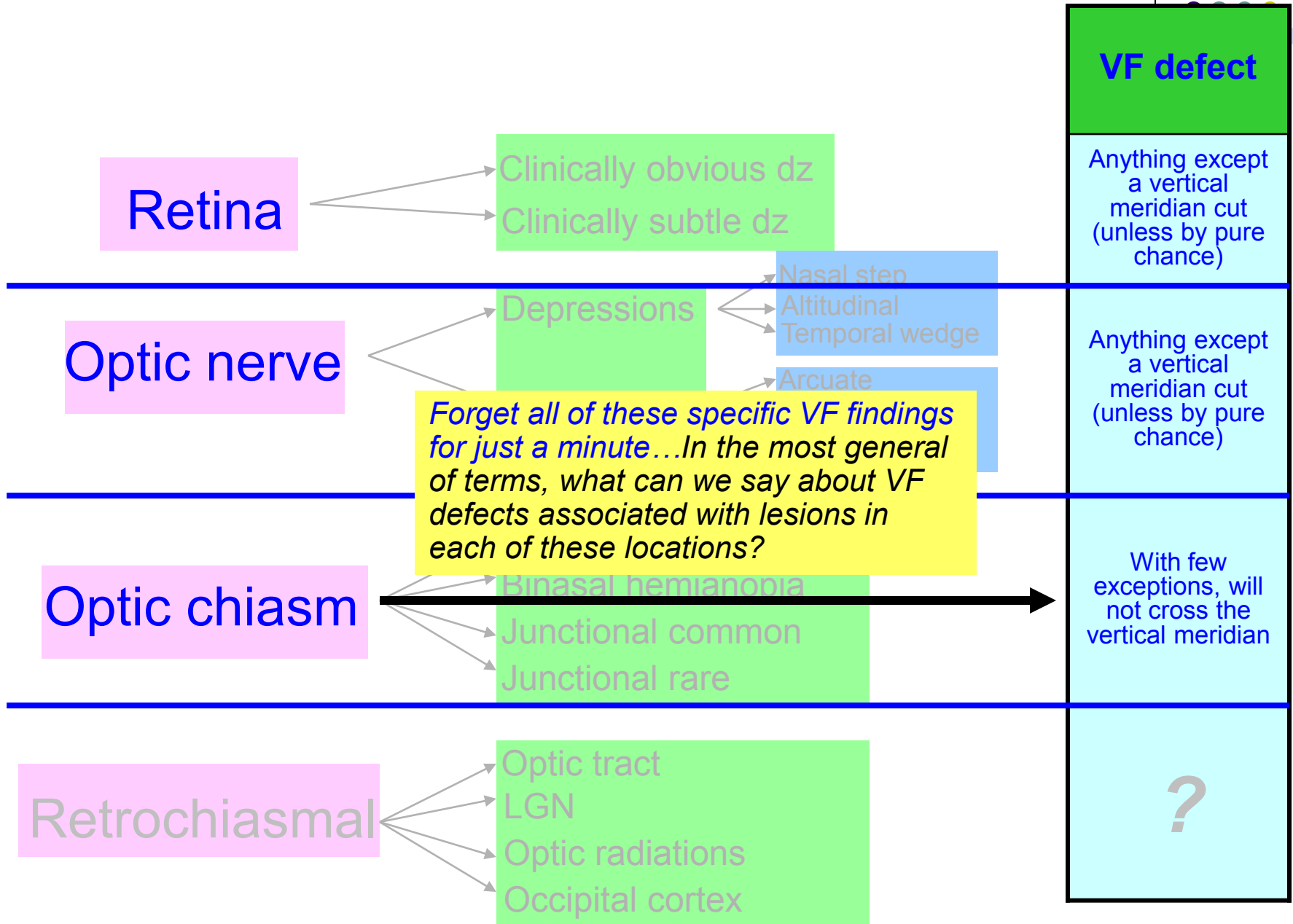
Visual Field Defects



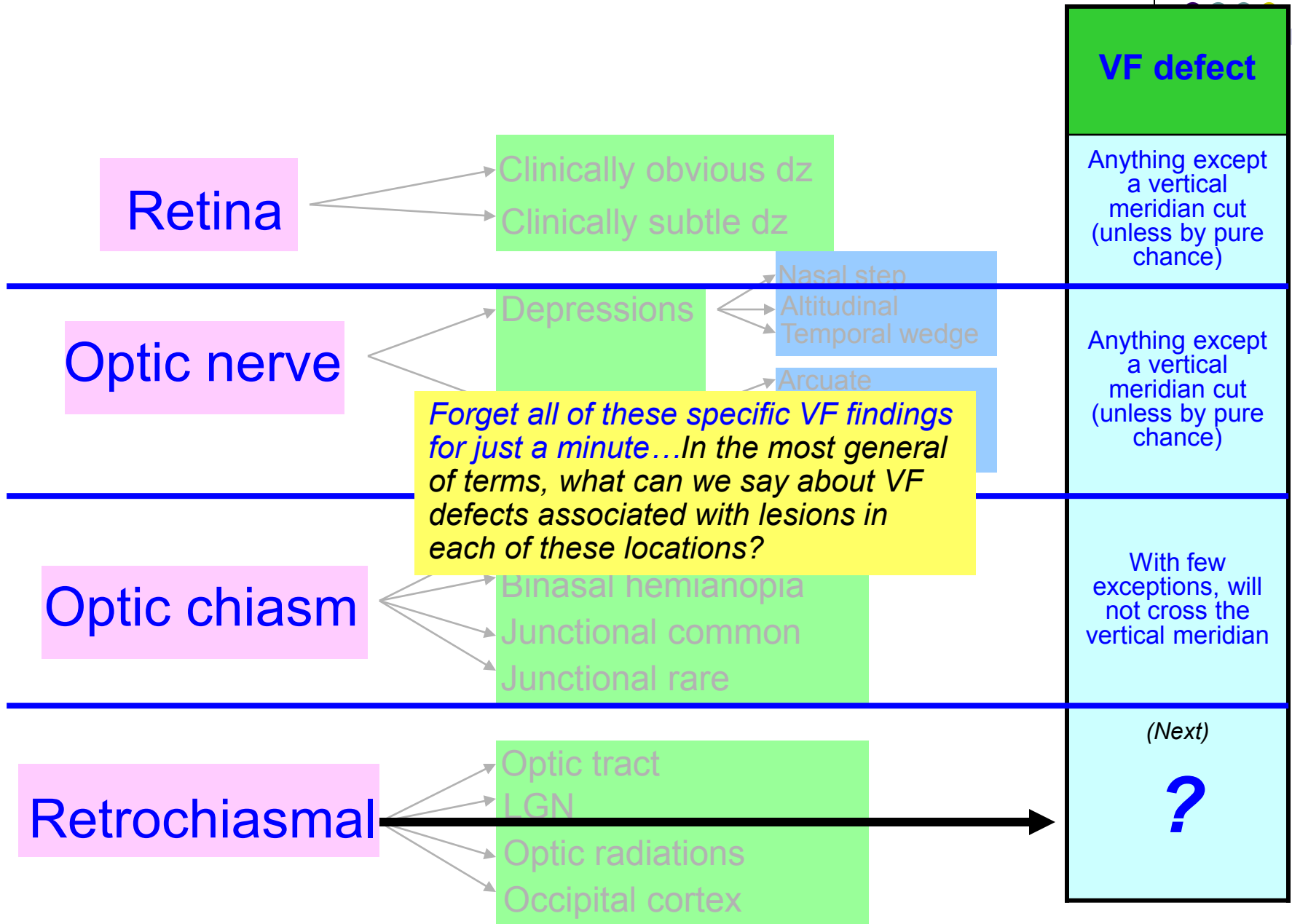
Visual Field Defects



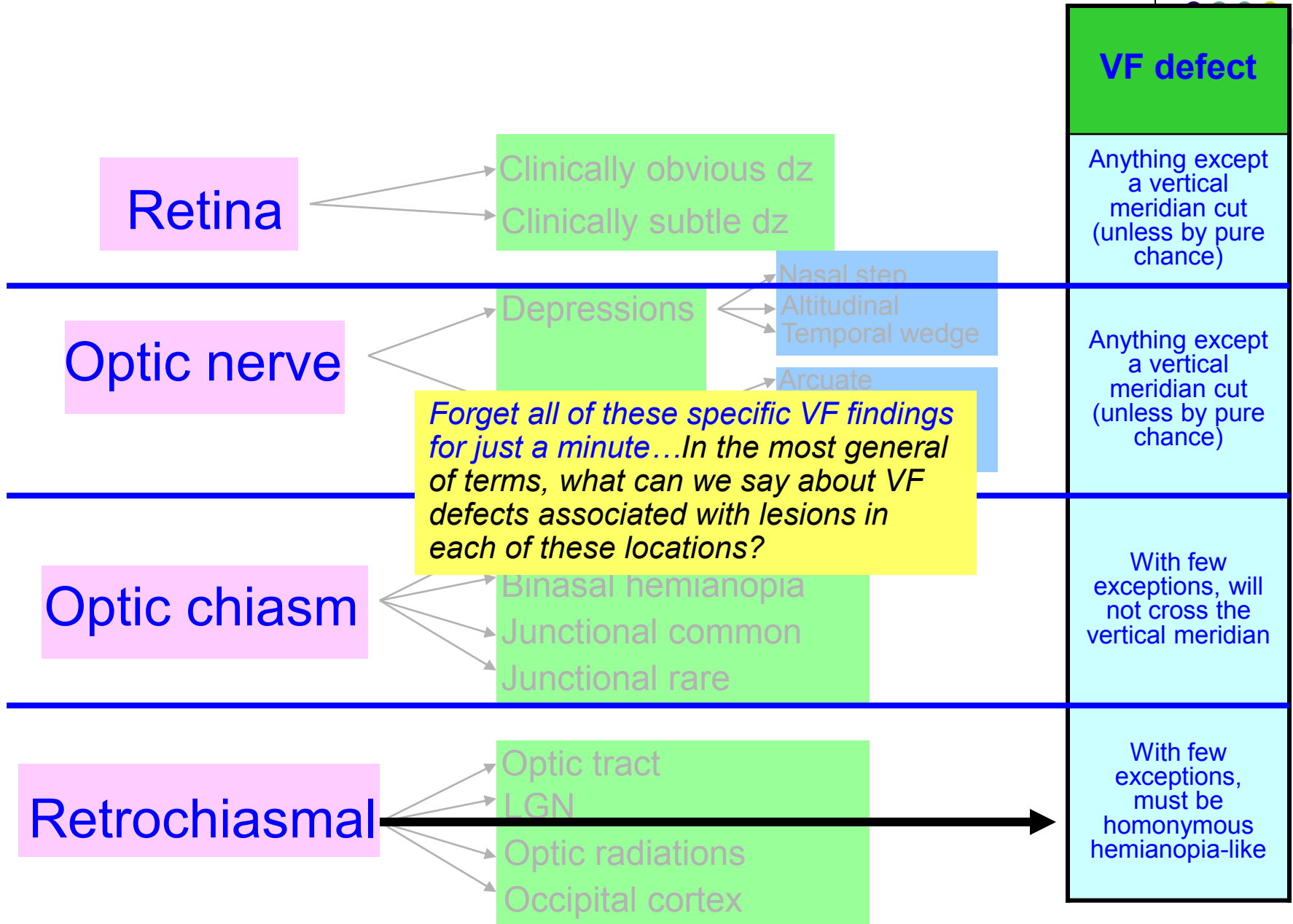
Visual Field Defects

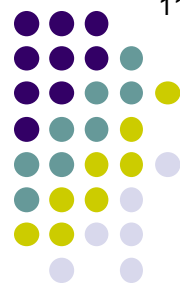


Visual Field Defects

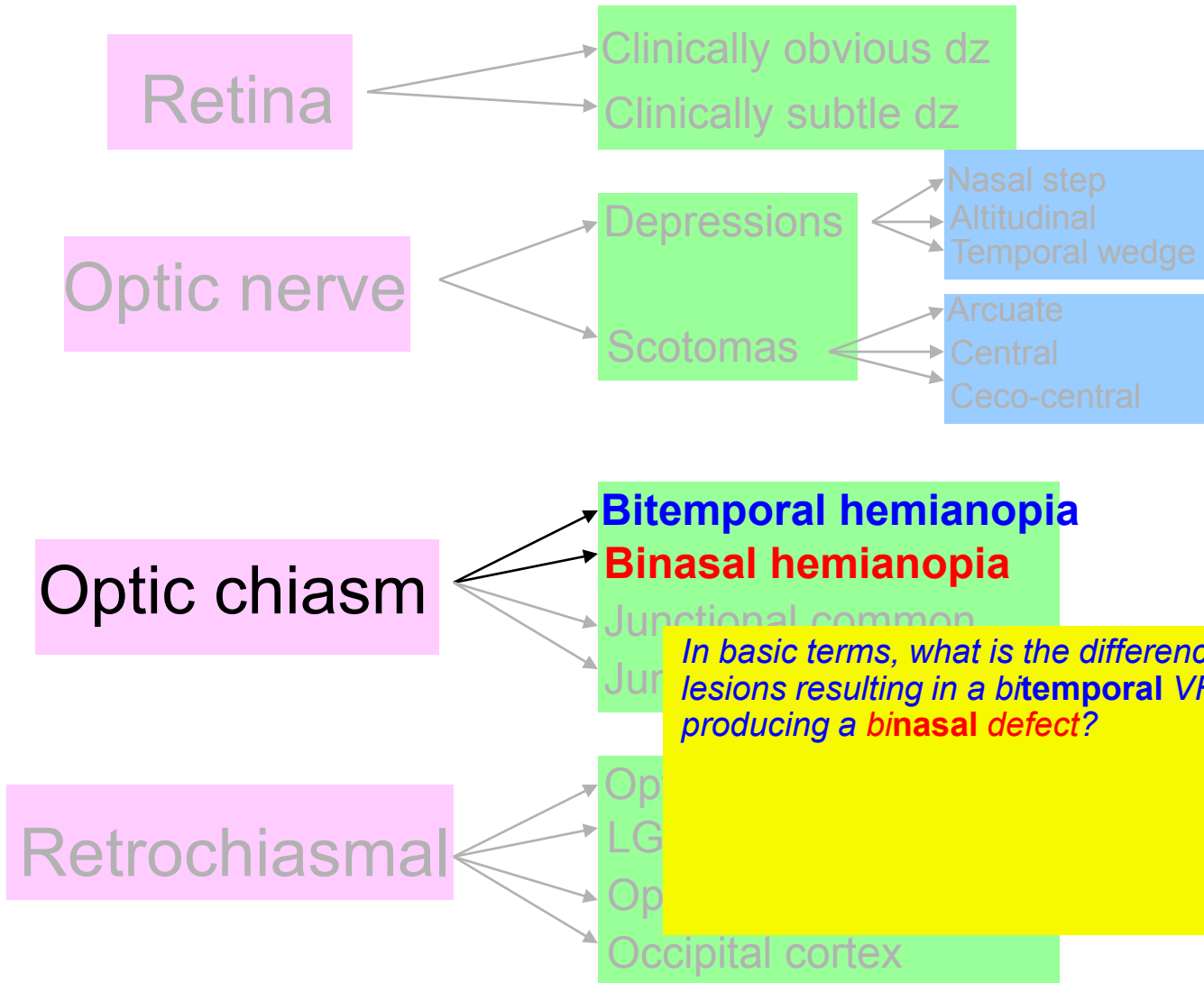


Visual Field Defects



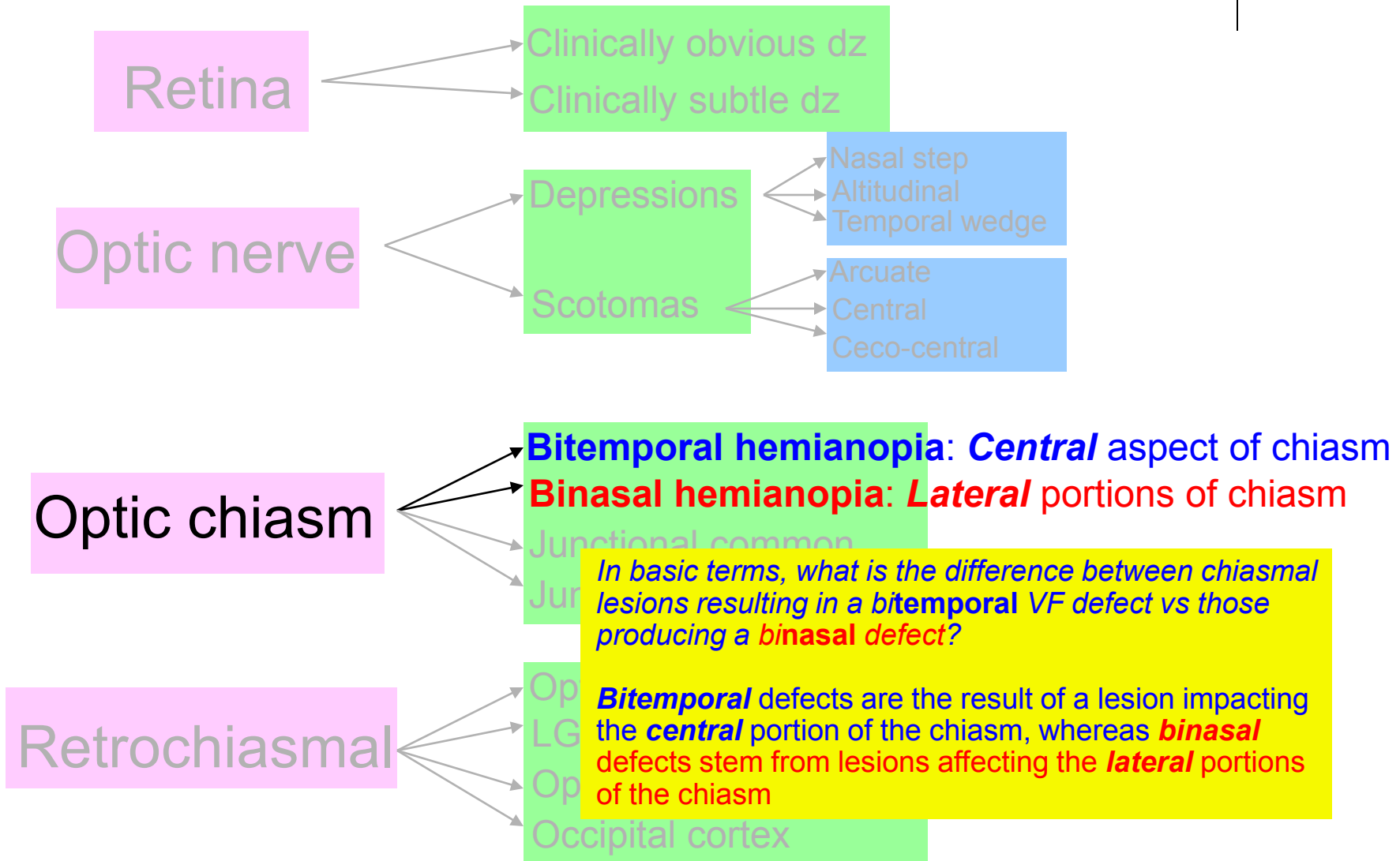
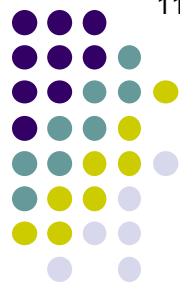


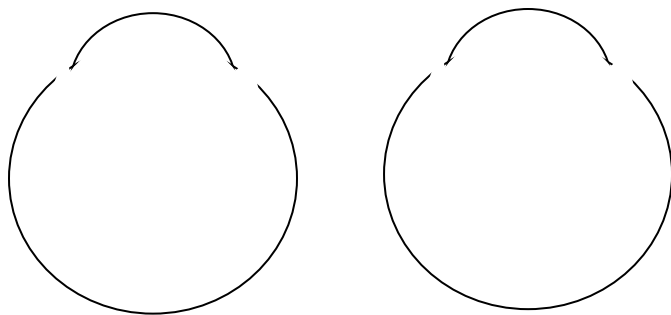
Visual Field Defects



*In basic terms, what is the difference between chiasmal lesions resulting in a **bitemporal** VF defect vs those producing a **binasal** defect?*

Visual Field Defects





Here's why:

Bitemporal hemianopia: *Central* aspect of chiasm

Binasal hemianopia: *Lateral* portions of chiasm

In basic terms, what is the difference between chiasmal lesions resulting in a bitemporal VF defect vs those producing a binasal defect?

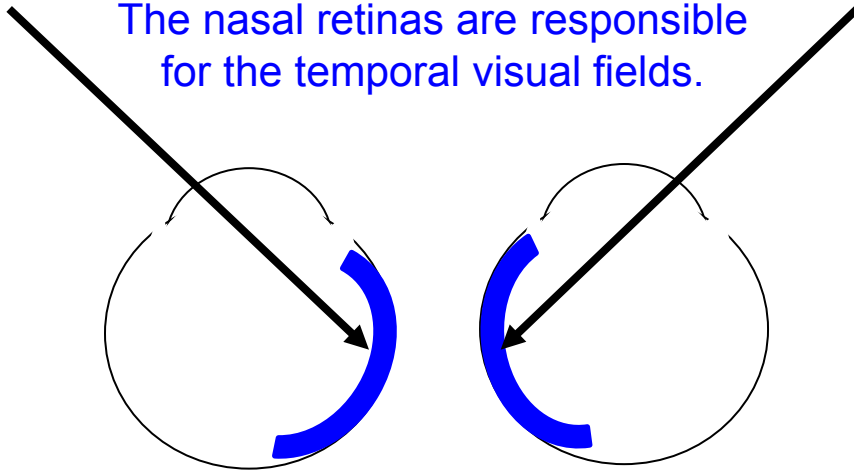
Bitemporal defects are the result of a lesion impacting the ***central*** portion of the chiasm, whereas ***binasal*** defects stem from lesions affecting the ***lateral*** portions of the chiasm



Temporal VF

The nasal retinas are responsible for the temporal visual fields.

Temporal VF



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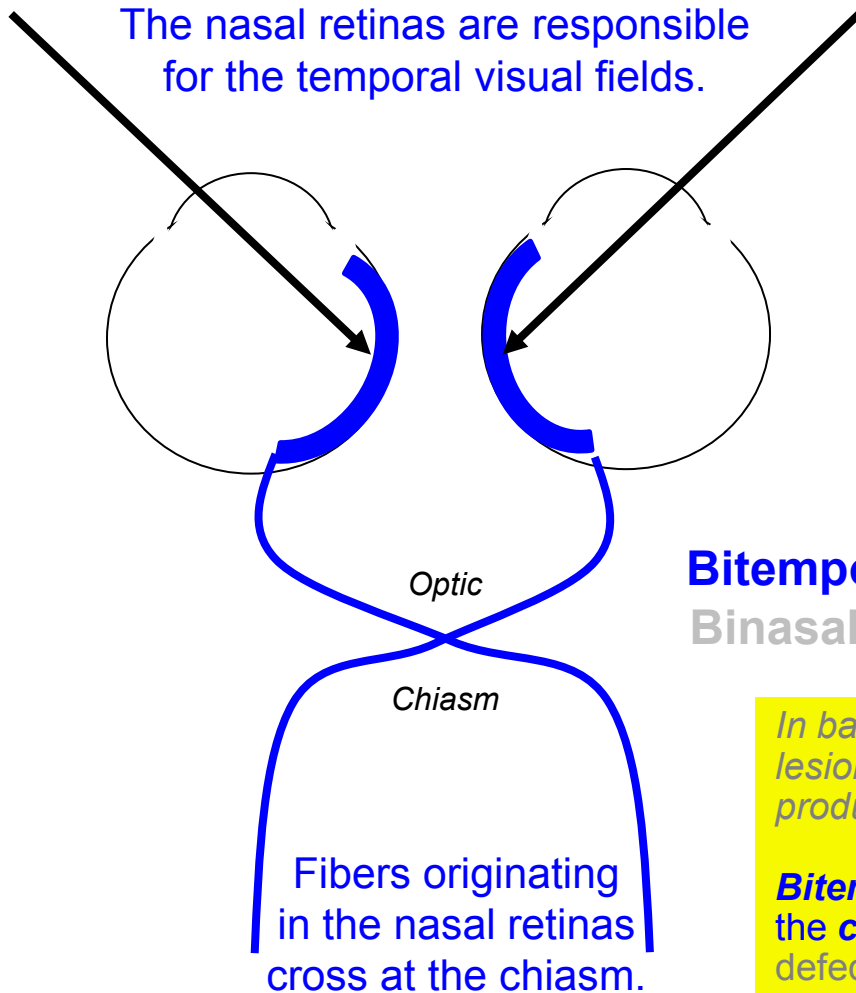
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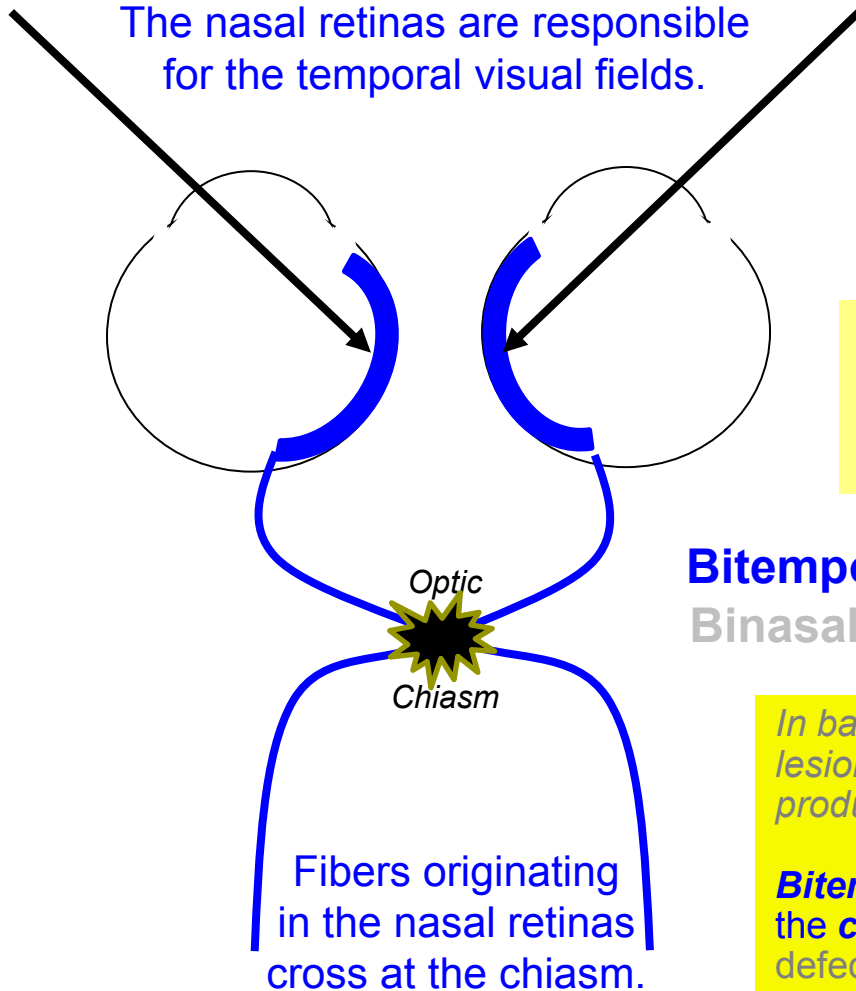
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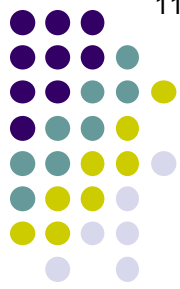
So a lesion of the central chiasm will bag these fibers, and thus tend to cause bitemporal defects

Bitemporal hemianopia: *Central* aspect of chiasm

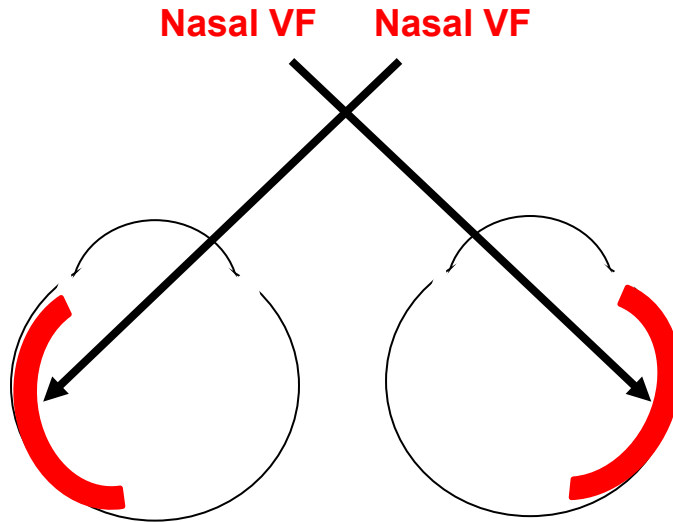
Binasal hemianopia: *Lateral* portions of chiasm

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The *temporal* retinas are responsible for the *nasal* visual fields.



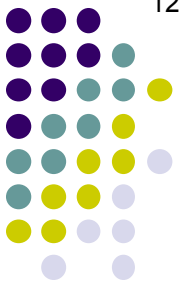
Here's why:

Bitemporal hemianopia: *Central* aspect of chiasm

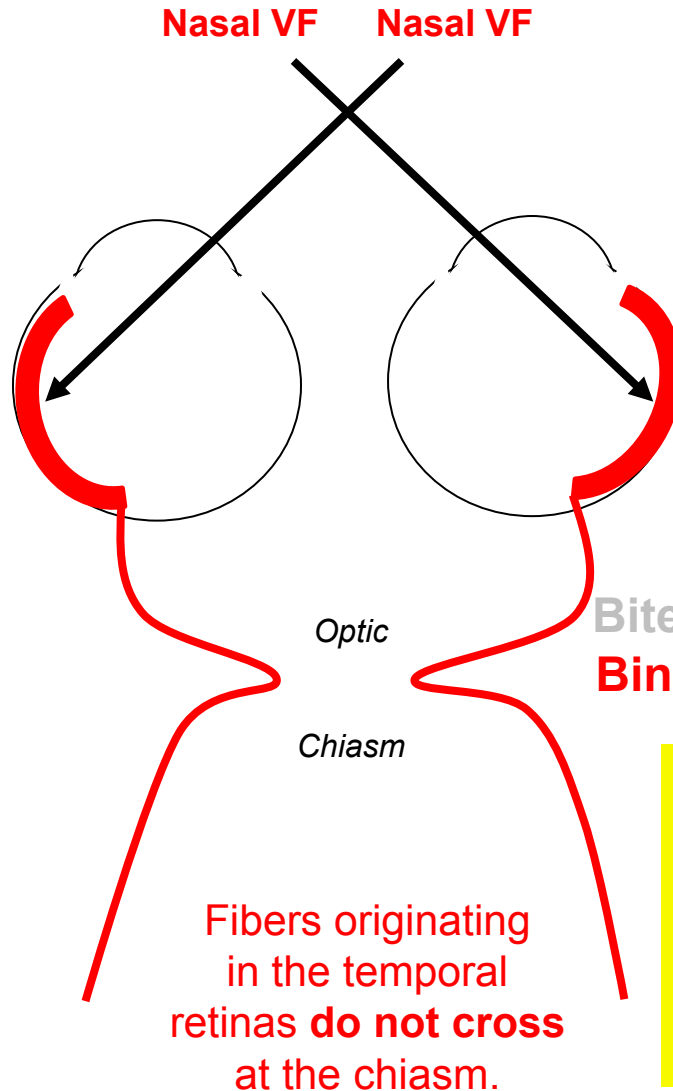
Binasal hemianopia: *Lateral* portions of chiasm

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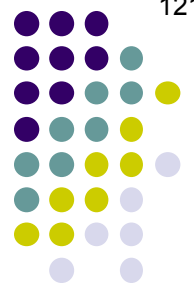
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Bitemporal hemianopia: *Central* aspect of chiasm

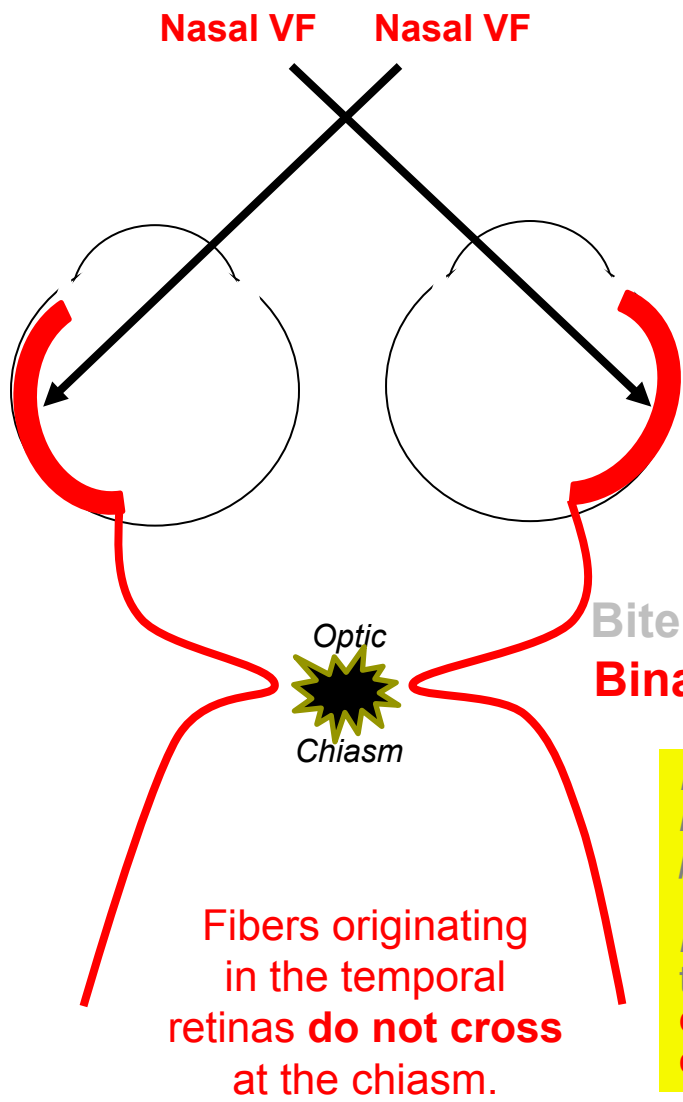
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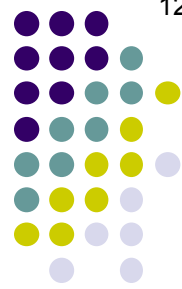
Here's why:

So lesions of the central chiasm will miss these fibers...

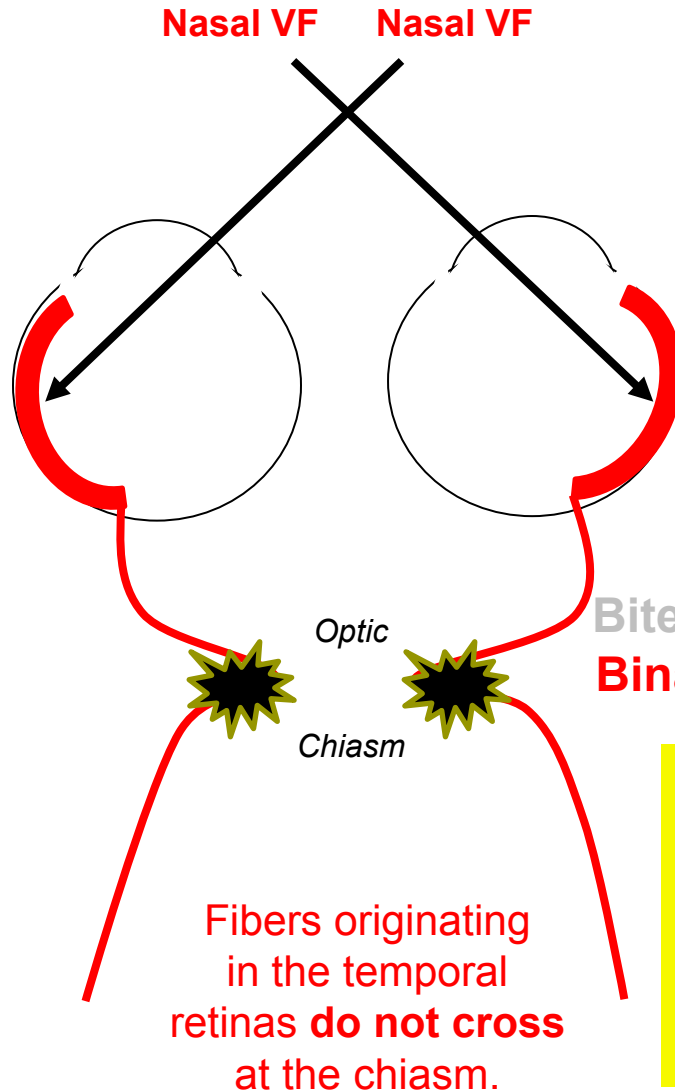
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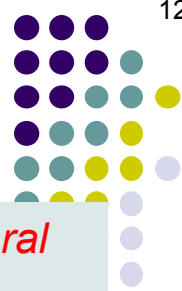
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So lesions of the central chiasm will miss these fibers...But lesions of the **lateral** chiasm will bag them, thereby causing binasal defects (note that **two** lesions are required to do this)

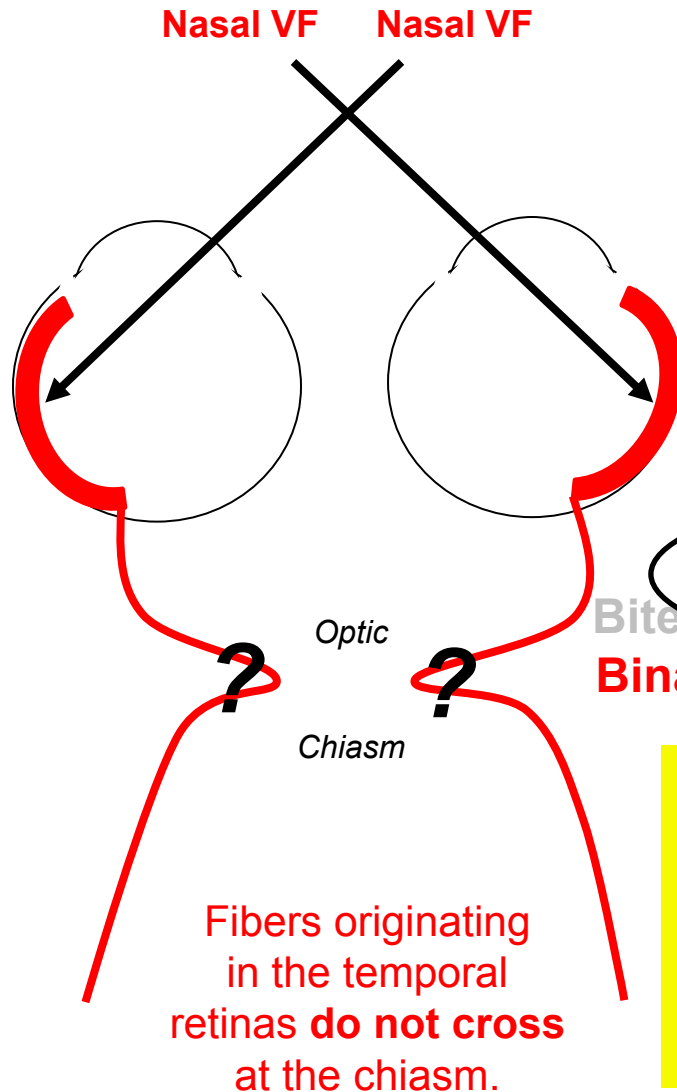
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The *temporal* retinas are responsible for the *nasal* visual fields.



What structures are located at the lateral aspects of the chiasm?

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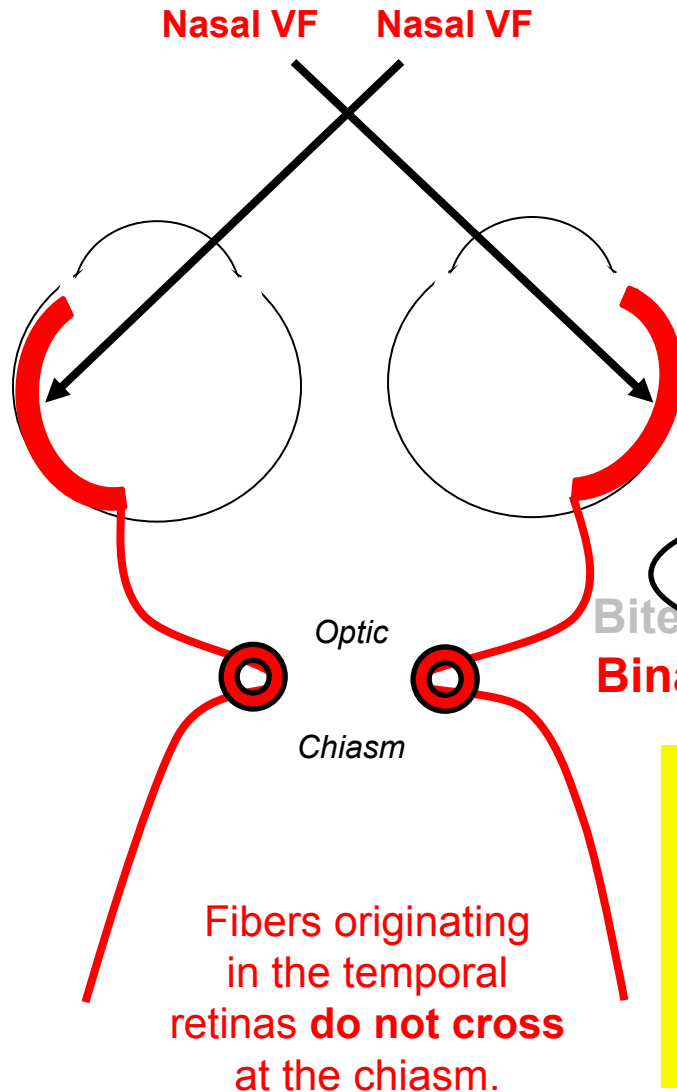
Binasal hemianopia: Lateral portions of chiasm

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The *temporal* retinas are responsible for the *nasal* visual fields.



What structures are located at the lateral aspects of the chiasm?
The internal carotid arteries

Here's why:

So lesions of the central chiasm will miss these fibers... But lesions of the **lateral** chiasm will bag them, thereby causing binasal defects (note that **two lesions are required to do this**)

Binasal hemianopia: Lateral portions of chiasm

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Visual Field Defects



What is the classic cause of a bitemporal hemianopia?

Retina

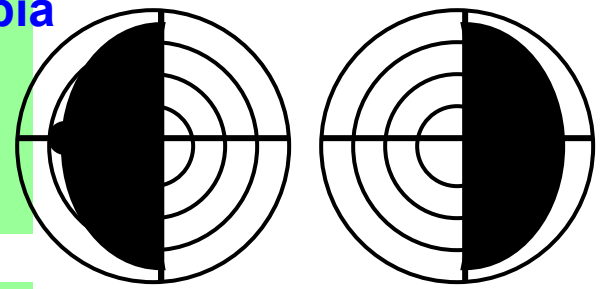
- Clin
- Clin

Optic nerve

- Dep
- Scot

Optic chiasm

- Bitemporal hemianopia**
- Binasal hemianopia
- Junctional common
- Junctional rare



Retrochiasmal

- Optic tract
- LGN
- Optic radiations
- Occipital cortex

Visual Field Defects



What is the classic cause of a bitemporal hemianopia?
 Pituitary adenoma

Retina

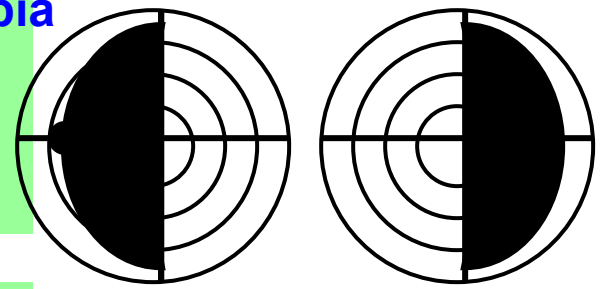
Clin
 Clin

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Dep
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Retrochiasmal

Optic tract
 LGN
 Optic radiations
 Occipital cortex

Visual Field Defects



Retina

Clin

Clin

*What is the classic cause of a bitemporal hemianopia?
Pituitary adenoma*

Is the hemianopia usually inferior, superior or complete?

Optic nerve

Dep

Scot

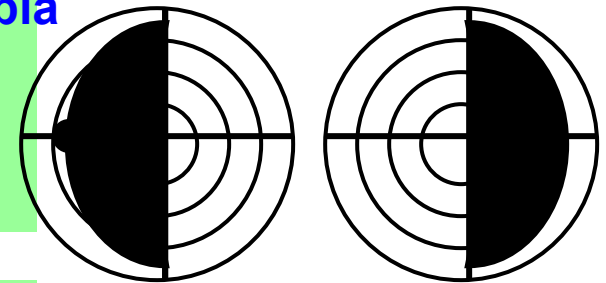
Optic chiasm

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Binasal hemianopia

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Visual Field Defects



Retina

Clin

Clin

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*Is the hemianopia usually inferior, superior or complete?
Superior*

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Dep

Scot

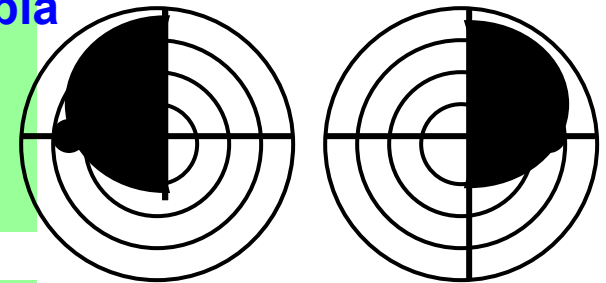
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Visual Field Defects



Retina

Clin
Clin

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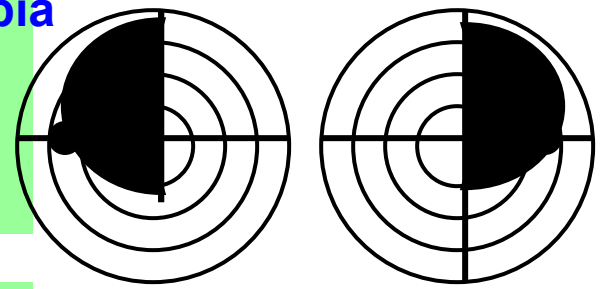
Why usually superior?

Optic nerve

Dep
Scot

Optic chiasm

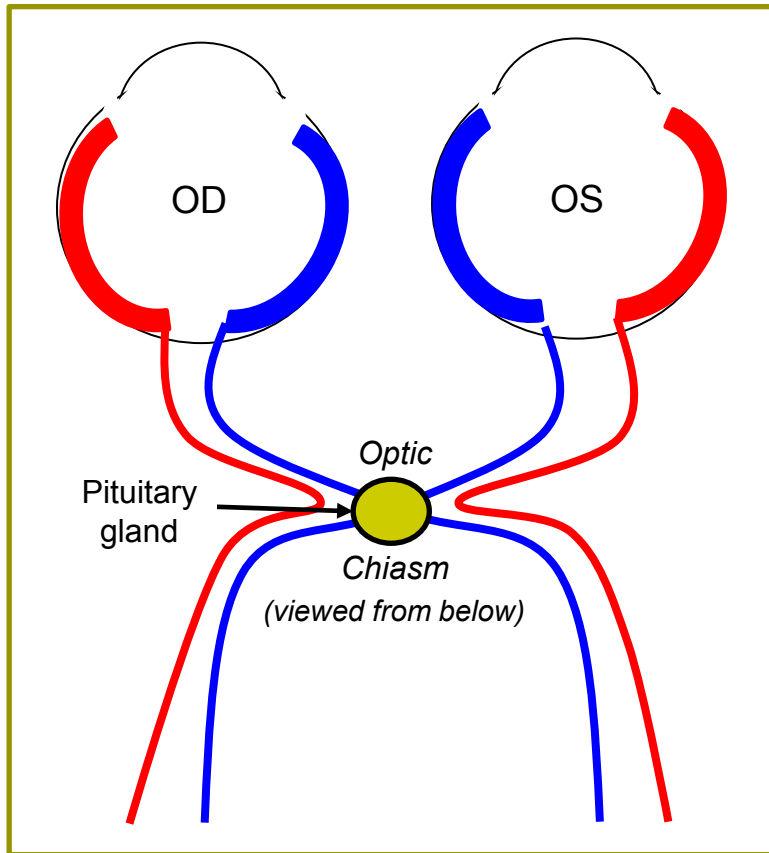
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Retrochiasmal

Optic tract
LGN
Optic radiations
Occipital cortex

Visual Field Defects



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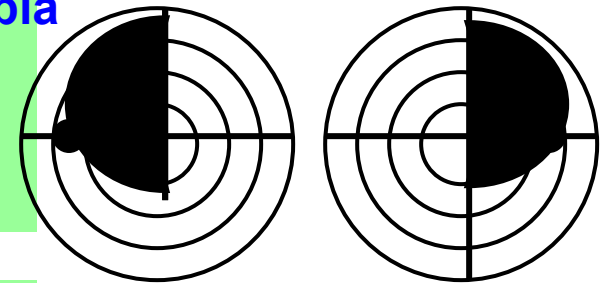
The pituitary gland is **below** the chiasm, therefore, pituitary lesions affect the inferior chiasmal fibers primarily. These fibers account for the **superior** visual field.

temporal hemianopia

nasal hemianopia

junctional common

Junctional rare



Retrochiasmal

Optic tract
LGN
Optic radiations
Occipital cortex

Visual Field Defects



Retina

Clin

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Dep

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Sci

Is it usually congruous or incongruous?

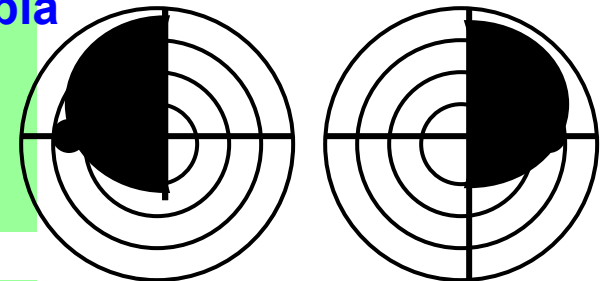
Optic chiasm

Bitemporal hemianopia

Binasal hemianopia

Junctional common

Junctional rare



Retrochiasmal

Optic tract

LGN

Optic radiations

Occipital cortex

Visual Field Defects



Retina

Clin

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Optic nerve

Dep

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Sci

Is it usually congruous or incongruous?
Incongruous

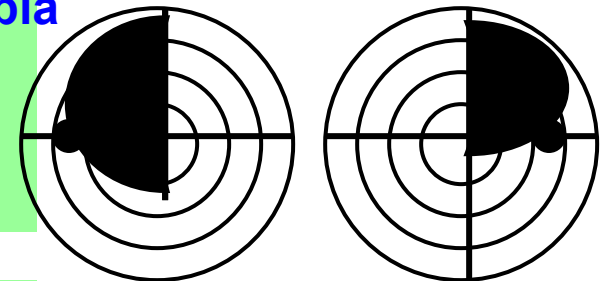
Optic chiasm

Bitemporal hemianopia

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Junctional common

Junctional rare



Retrochiasmal

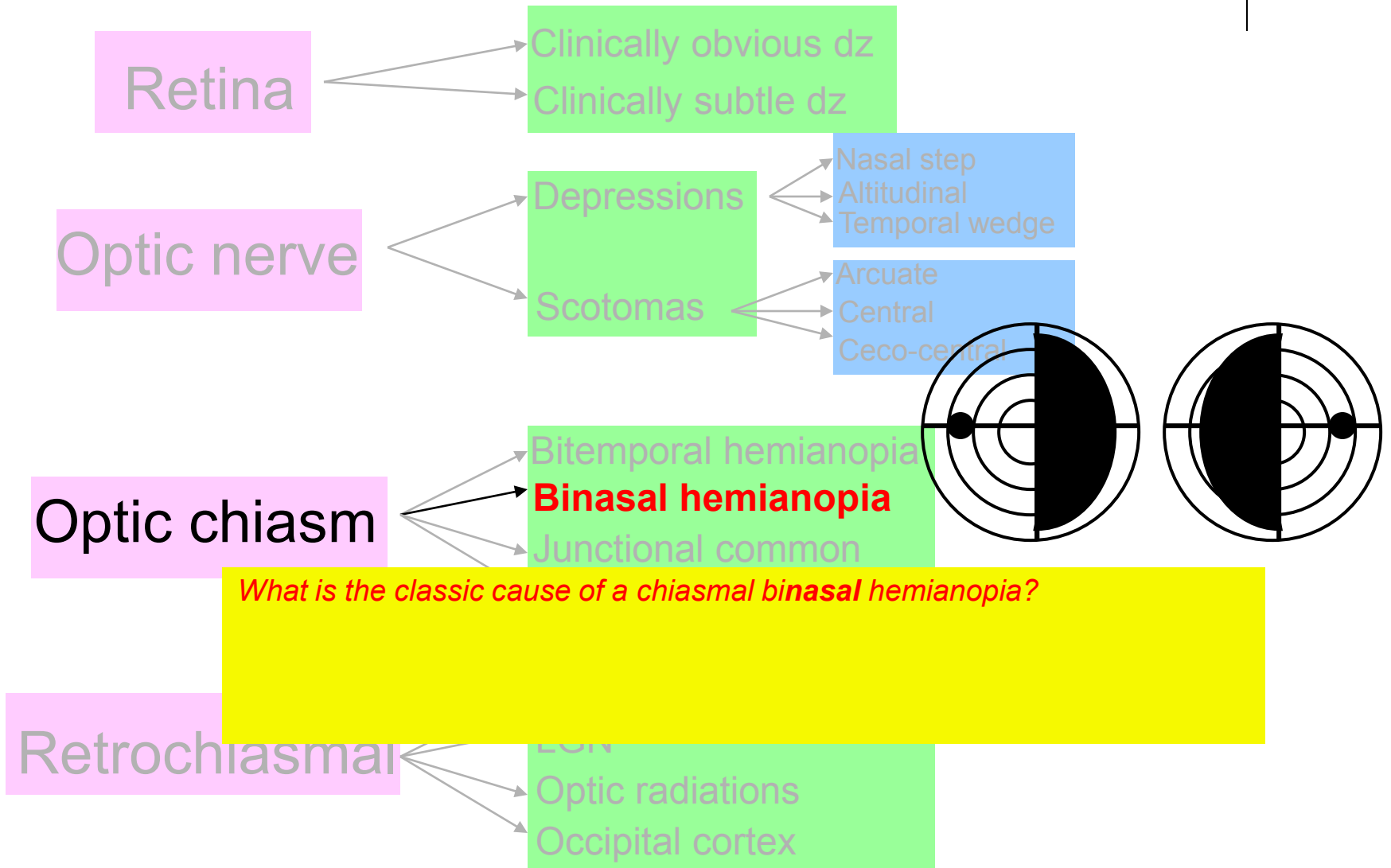
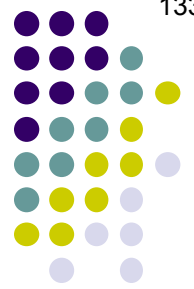
Optic tract

LGN

Optic radiations

Occipital cortex

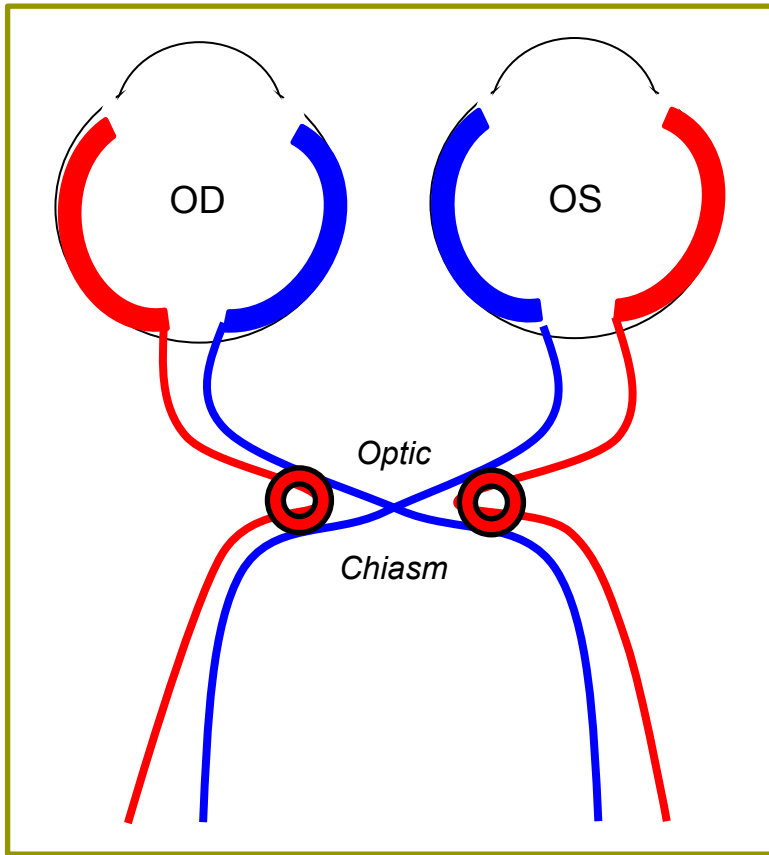
Visual Field Defects



What is the classic cause of a chiasmal binasal hemianopia?



ffects



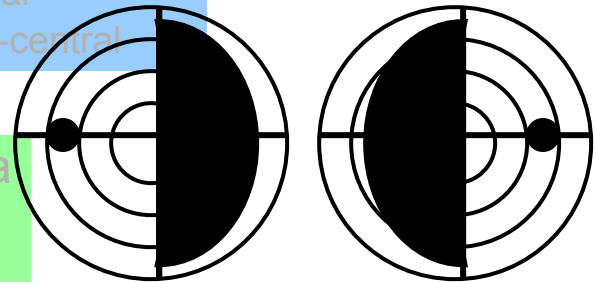
ically obvious dz
ically subtle dz

pressions

- Nasal step
- Altitudinal
- Temporal wedge

tomas

- Arcuate
- Central
- Ceco-central



Optic chiasm

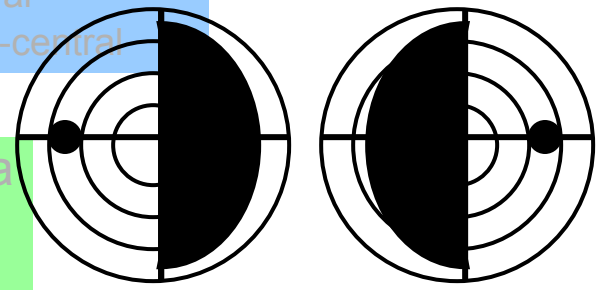
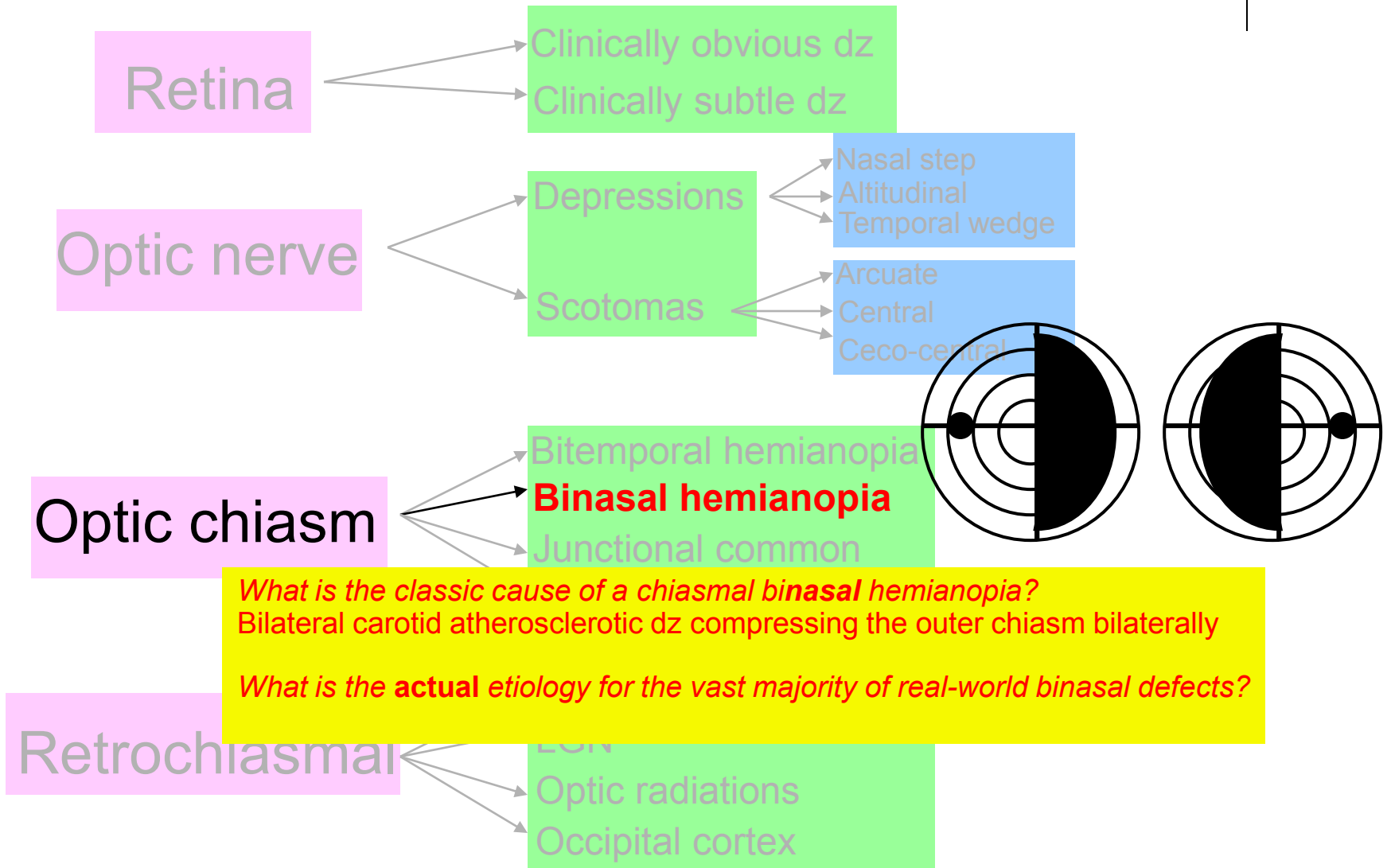
- Bitemporal hemianopia
- Binasal hemianopia**
- Junctional common

What is the classic cause of a chiasmal binasal hemianopia?
Bilateral carotid atherosclerotic dz compressing the outer chiasm bilaterally

Retrochiasmal

- Optic radiations
- Occipital cortex

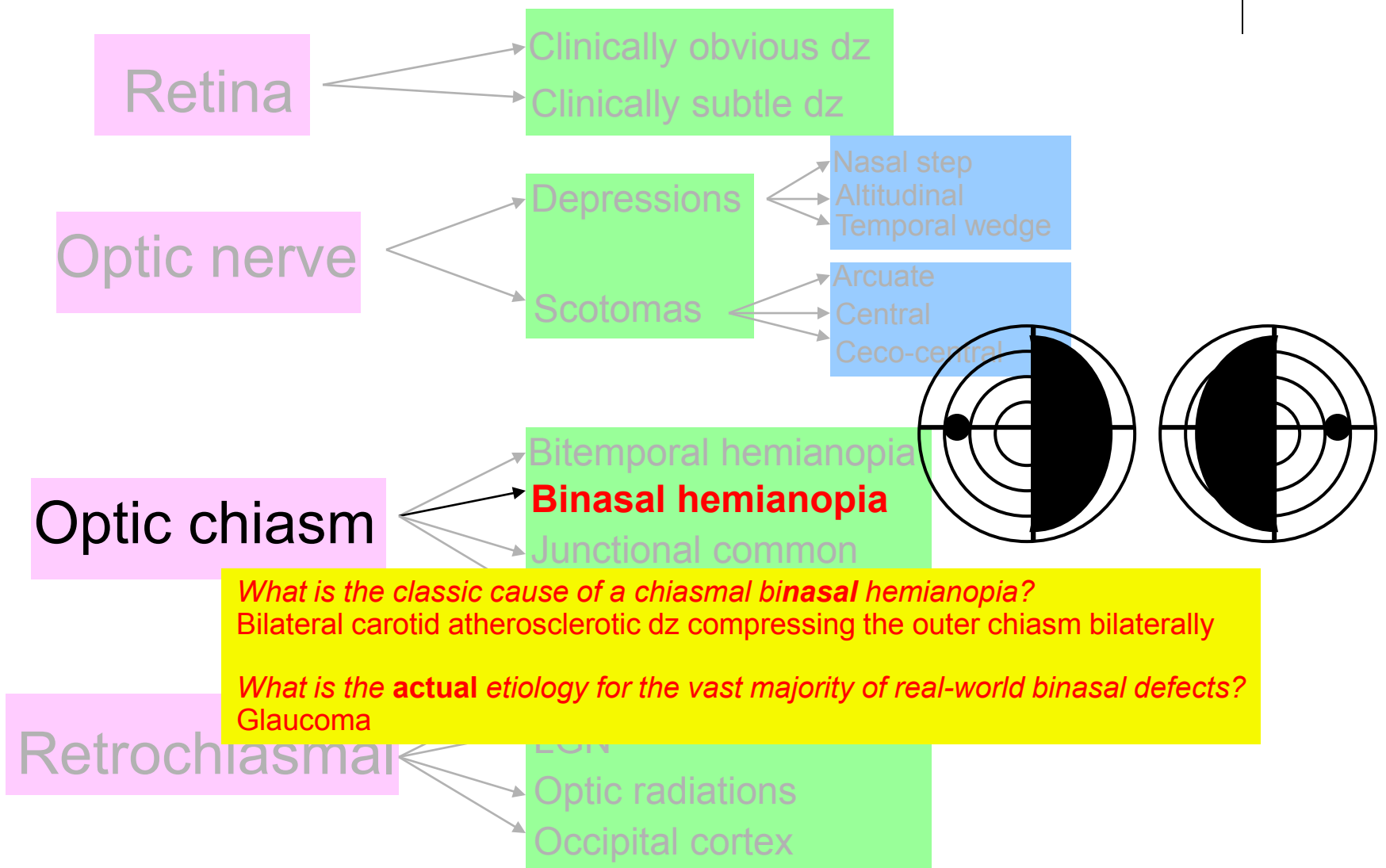
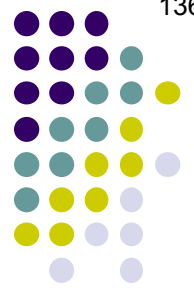
Visual Field Defects

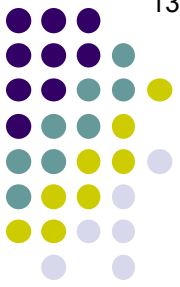


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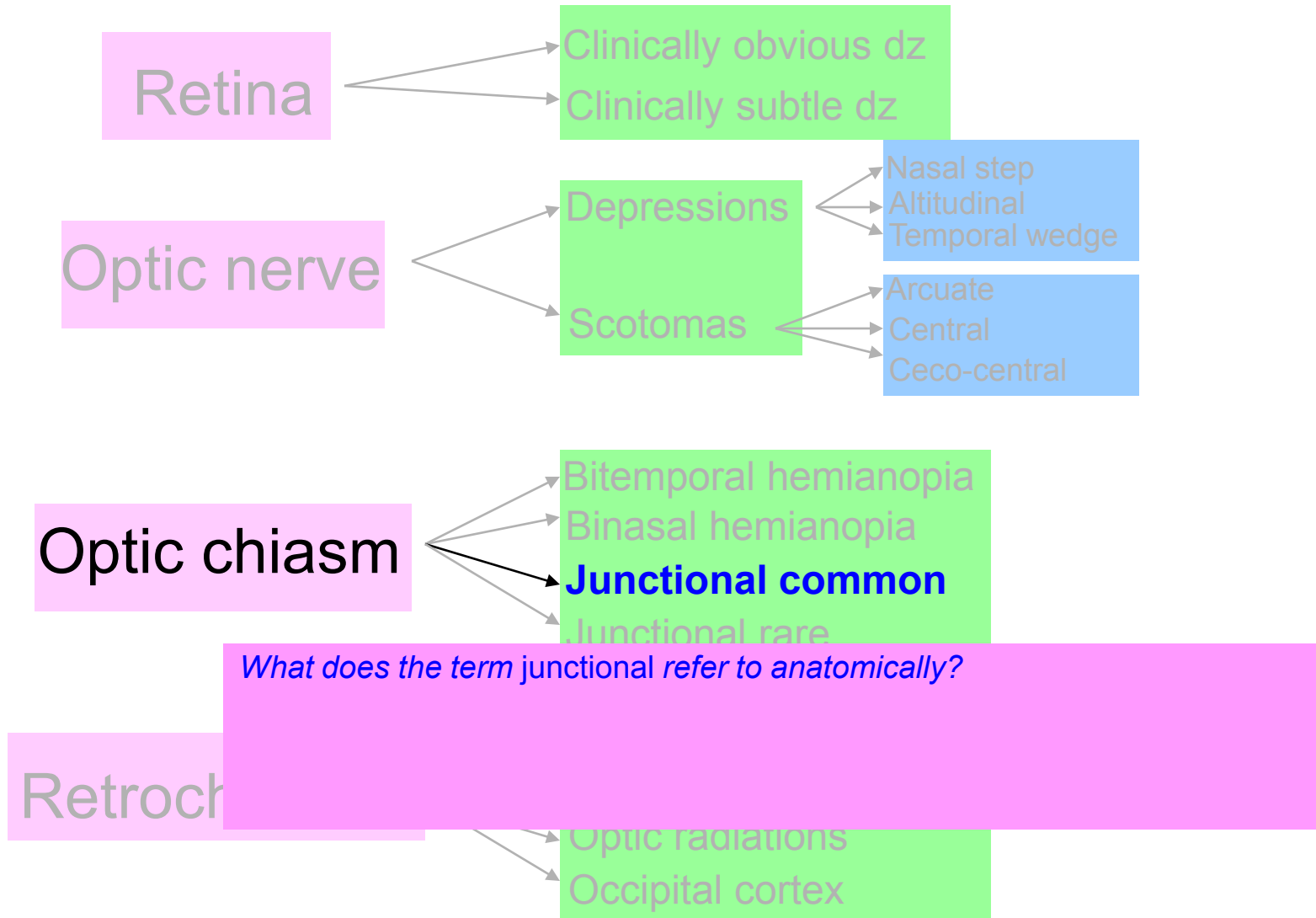
*What is the **actual** etiology for the vast majority of real-world binasal defects?*

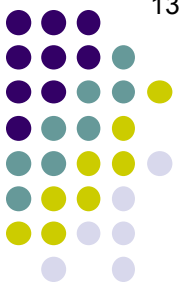
Visual Field Defects



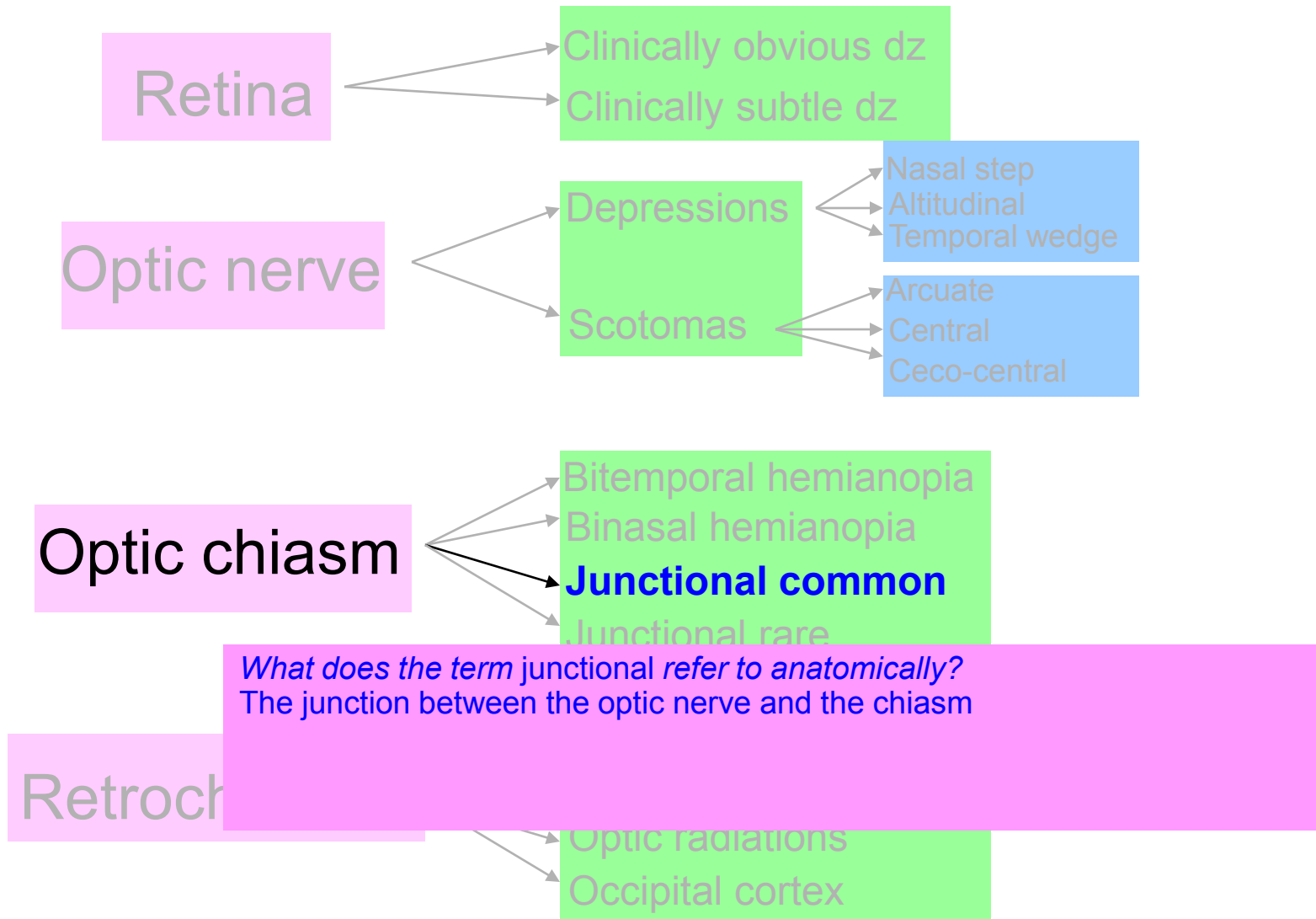


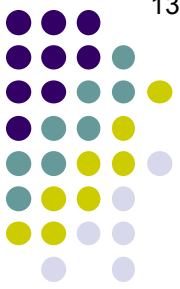
Visual Field Defects



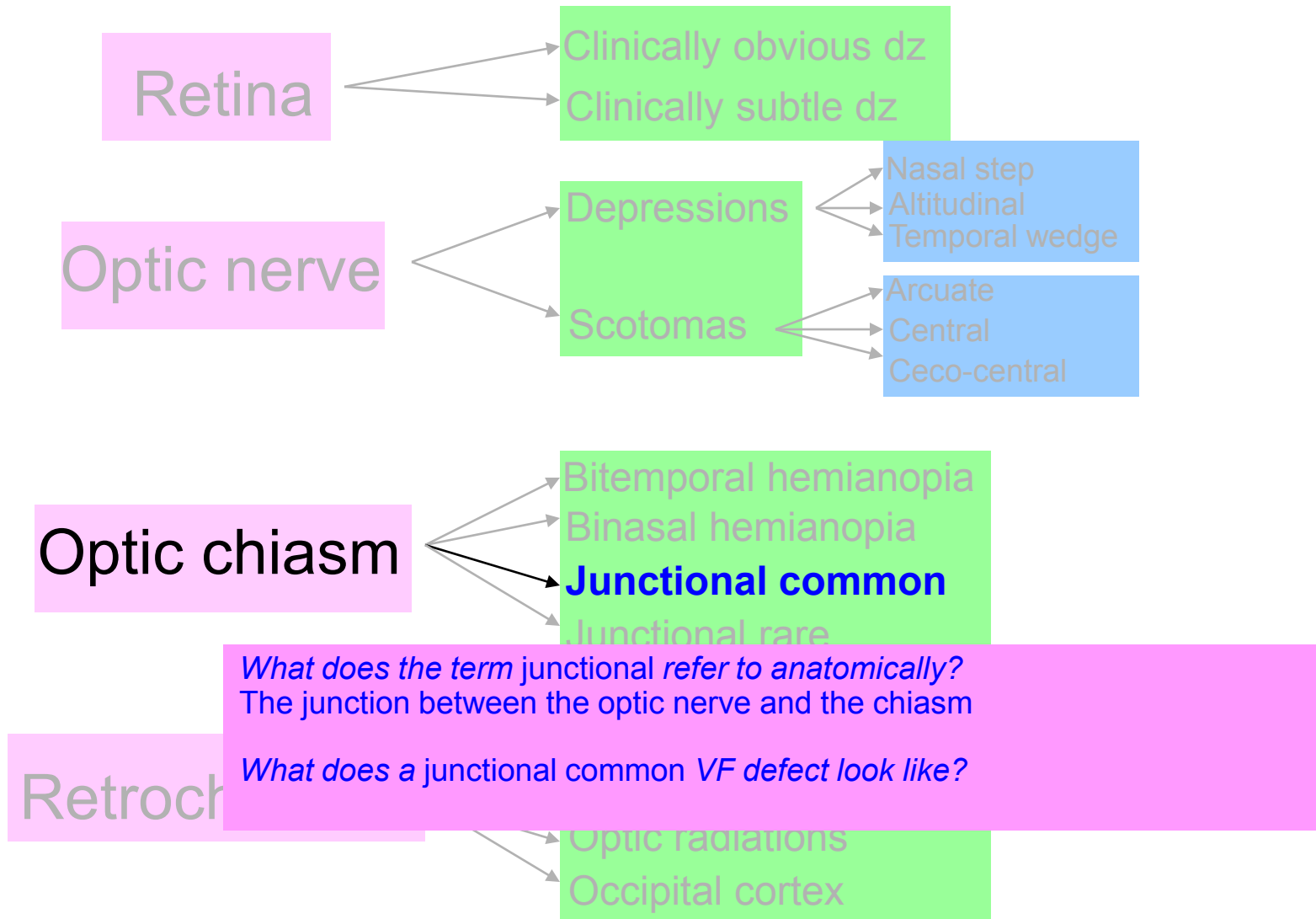


Visual Field Defects

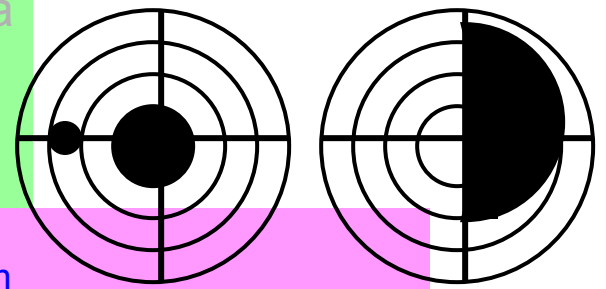
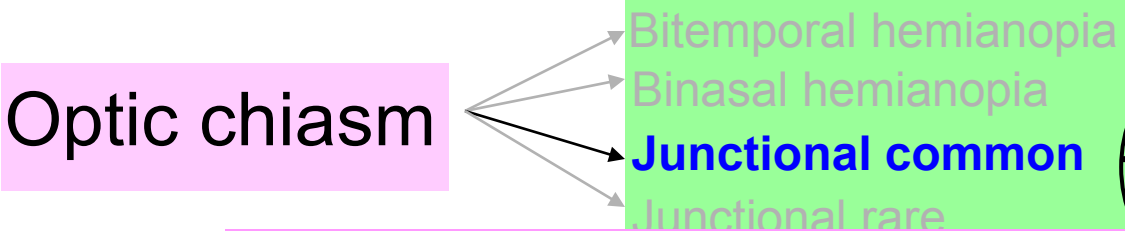
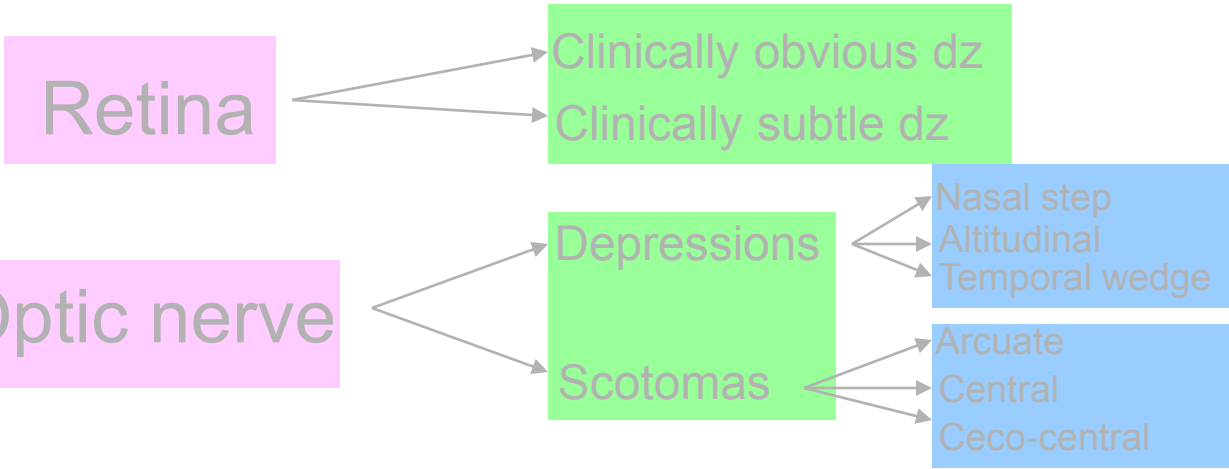
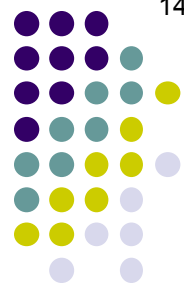




Visual Field Defects

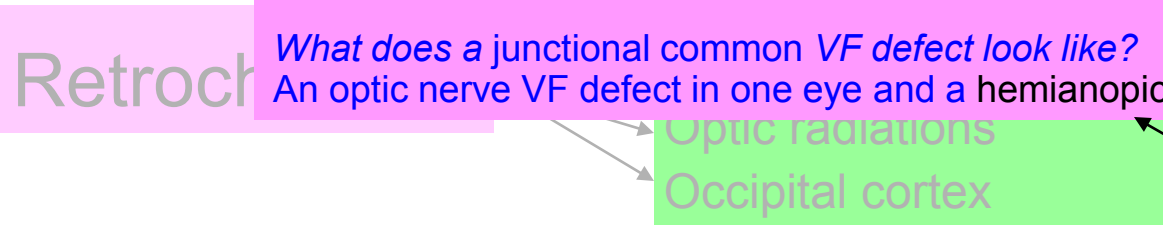


Visual Field Defects

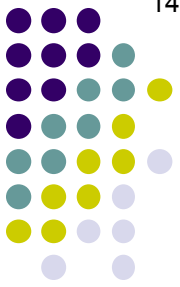


What does the term junctional refer to anatomically?
The junction between the optic nerve and the chiasm

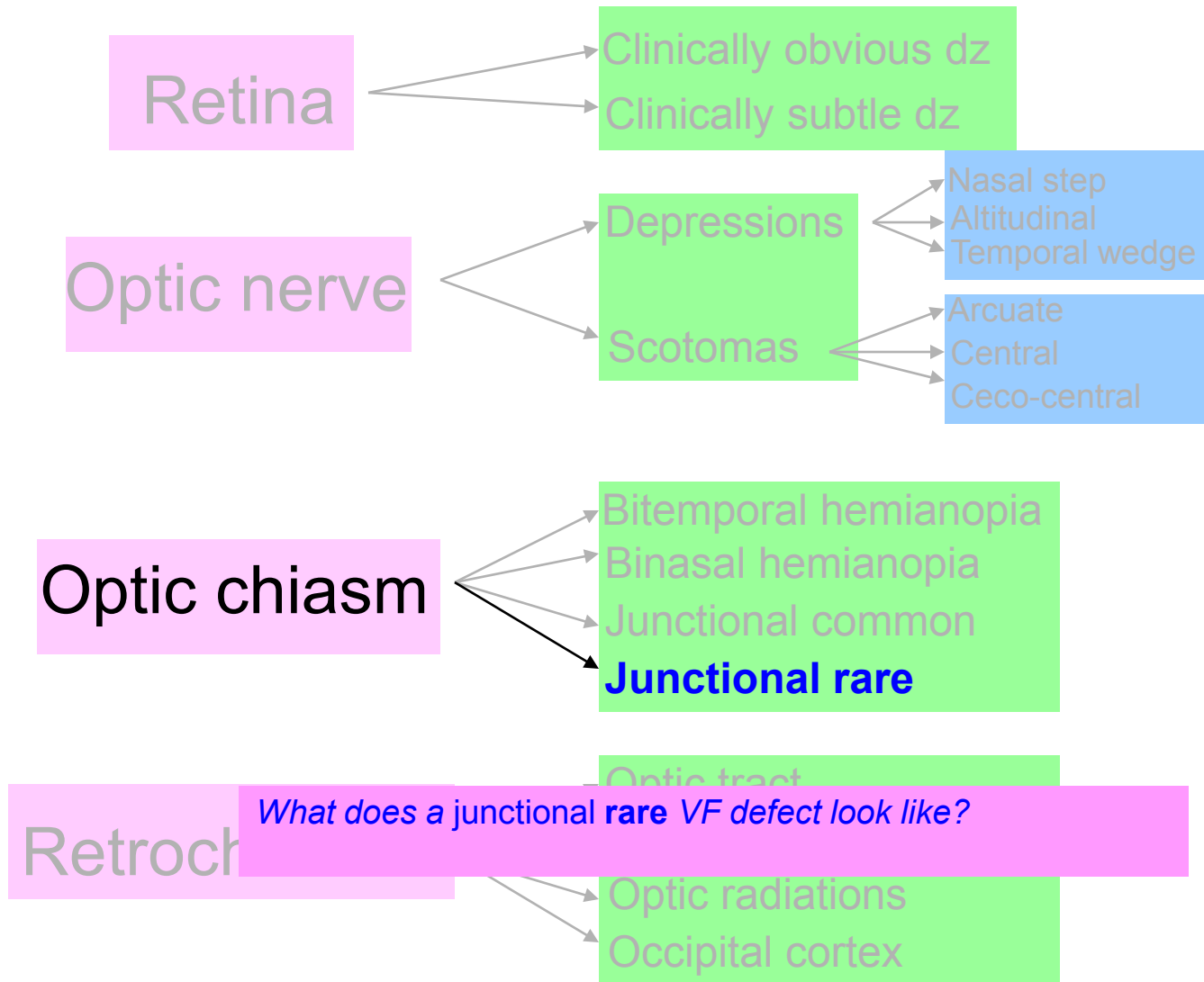
What does a junctional common VF defect look like?
An optic nerve VF defect in one eye and a hemianopic-like defect in the other



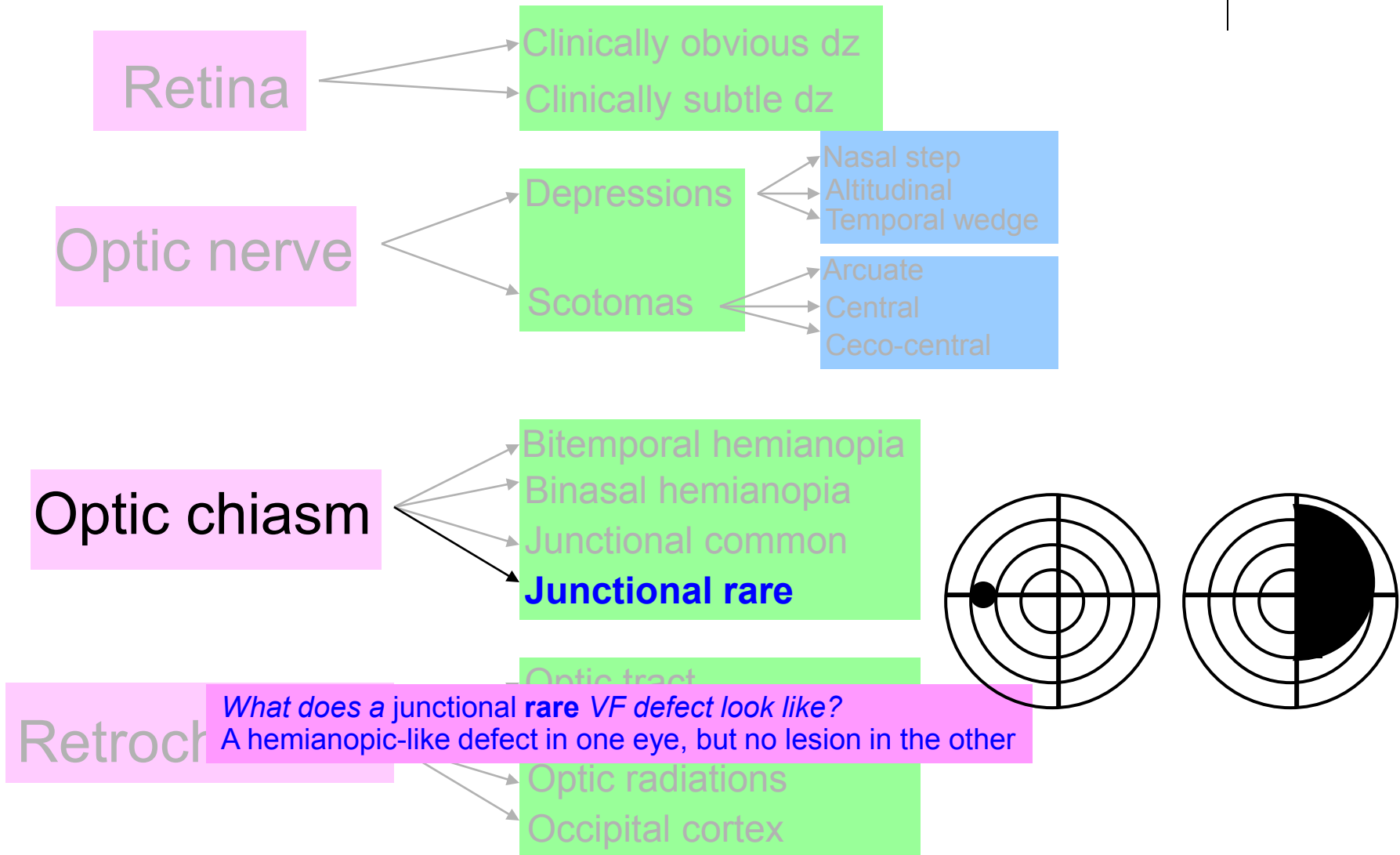
i.e., it respects the vertical meridian



Visual Field Defects

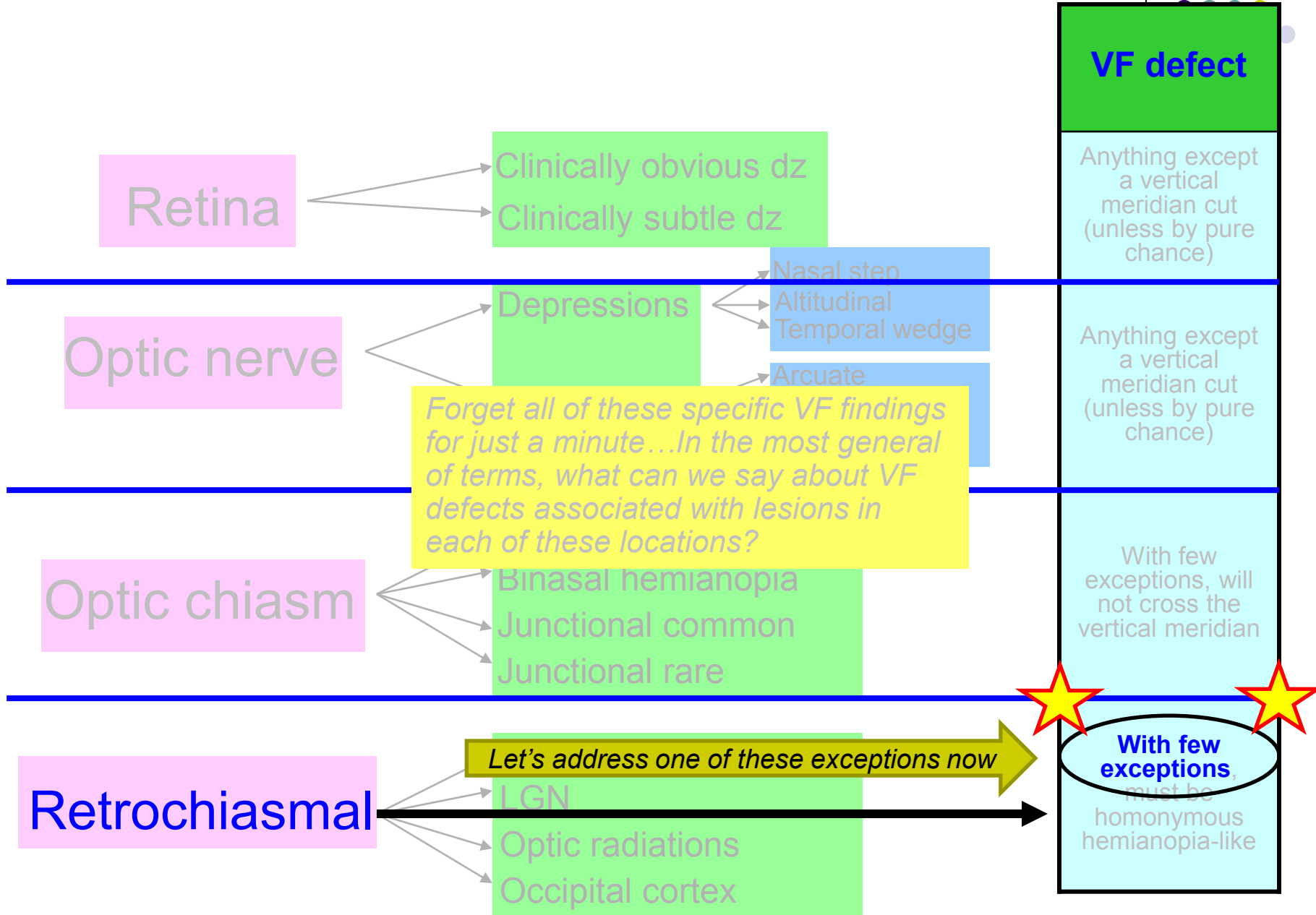


Visual Field Defects





Visual Field Defects



Visual Field Defects



VF defect

An elderly vasculopath presents c/o things 'sneaking up on her from the left.' You check her CVFs—they're fine. You get a 24-2—WNL OU. You send her on her way with reassurances that everything's fine.

Junctional common
Junctional rare

vertical meridian

Retrochiasmal

Let's address one of these exceptions now

LGN
Optic radiations
Occipital cortex

With few exceptions, must be homonymous hemianopia-like

Visual Field Defects



VF defect

An elderly vasculopath presents c/o things 'sneaking up on her from the left.' You check her CVFs—they're fine. You get a 24-2—WNL OU. You send her on her way with reassurances that everything's fine. *Two weeks later she's on your schedule again with the same complaint. Just to be sure you repeat the VF, but with the rarely-used 30-2 protocol—again, WNL. Reassure, discharge.*

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vertical meridian

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Visual Field Defects

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Junctional common
Junctional rare

vertical meridian

Retrochiasmal

Let's address one of these exceptions now

LGN
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Occipital cortex

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Visual Field Defects



VF defect

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Junctional common
Junctional rare

vertical meridian

Retrochiasmal

Let's address one of these exceptions now

LGN
Optic radiations
Occipital cortex

With few exceptions, must be homonymous hemianopia-like



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You missed a classic case of loss of the temporal crescent.

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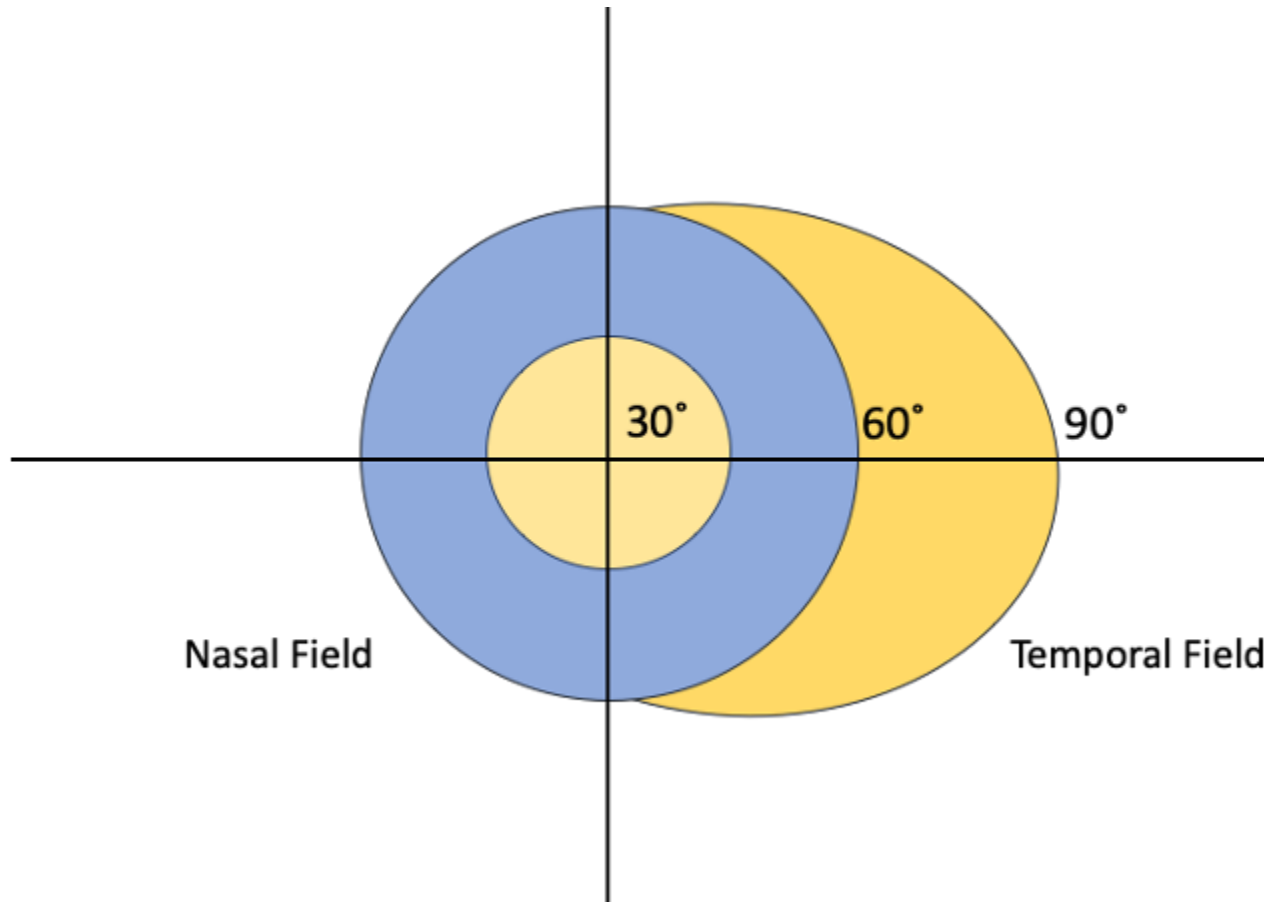
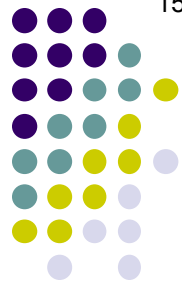


Diagram of the nasal VF (60 degrees) and temporal VF (90-100 degrees).
The temporal 60-90° region is the temporal crescent.

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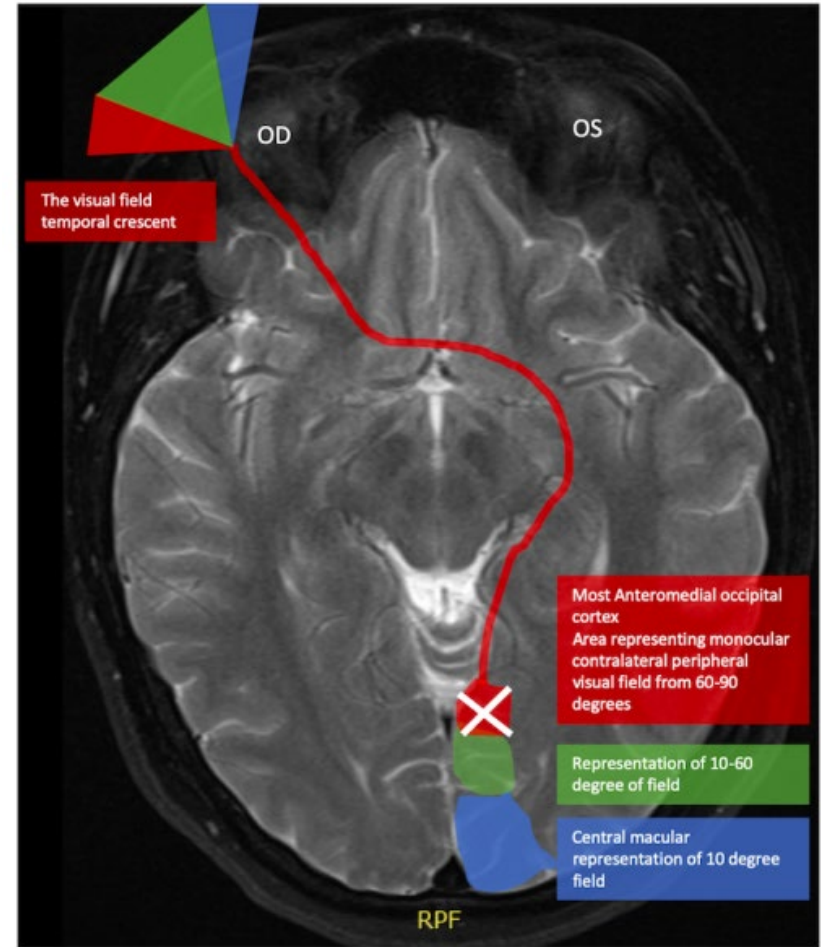
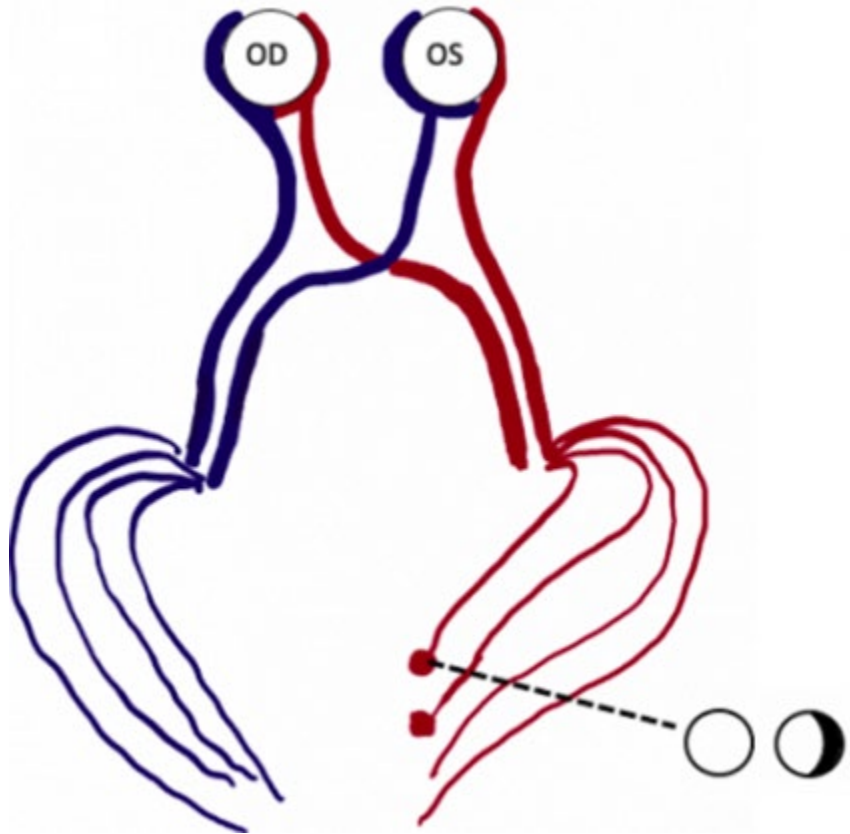
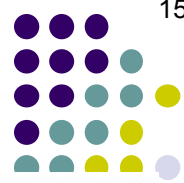
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Images showcasing the location of a lesion producing Temporal Crescent Syndrome



Q

- Which of the following is ***not*** associated with bitemporal visual-field loss?
 - Sectoral RP
 - Glaucoma
 - Fuchs coloboma
 - Chiasmal lesion
 - Toxic/hereditary/nutritional optic neuropathy

Q/A



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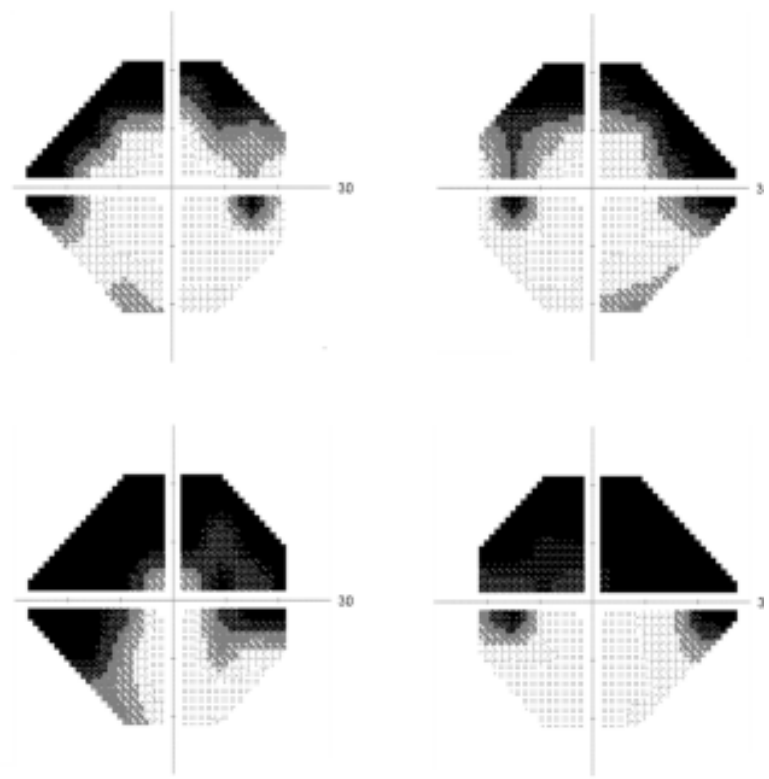
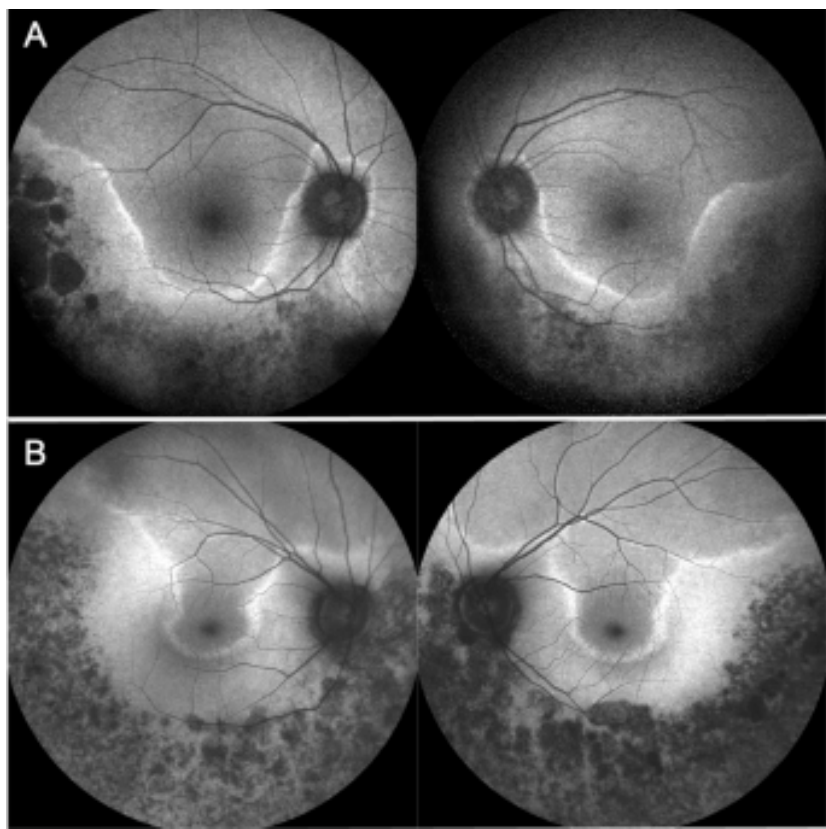
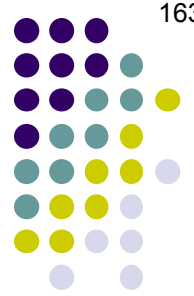
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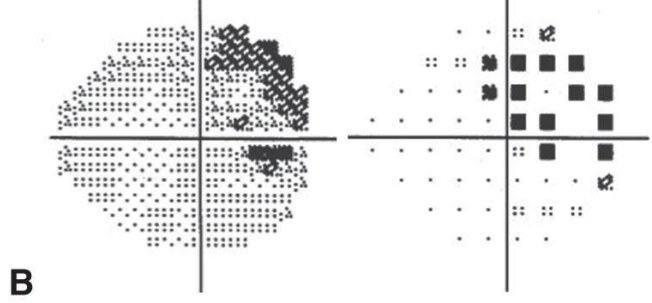
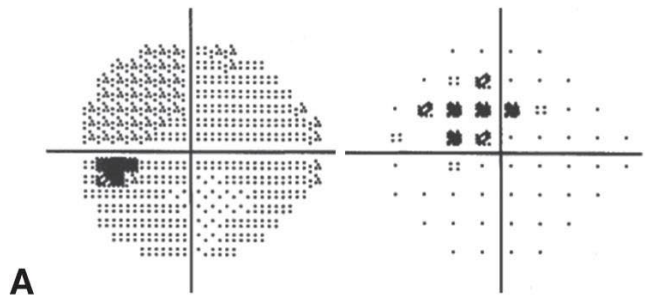
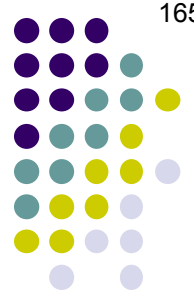
Sectoral RP

Images from JP Marques et al, *EYS*-Associated Sector Retinitis Pigmentosa. *Graefe's Archives for Clinical and Experimental Ophthalmology*, 2022 Apr;260(4):1405-1413. With kind permission of the first author.



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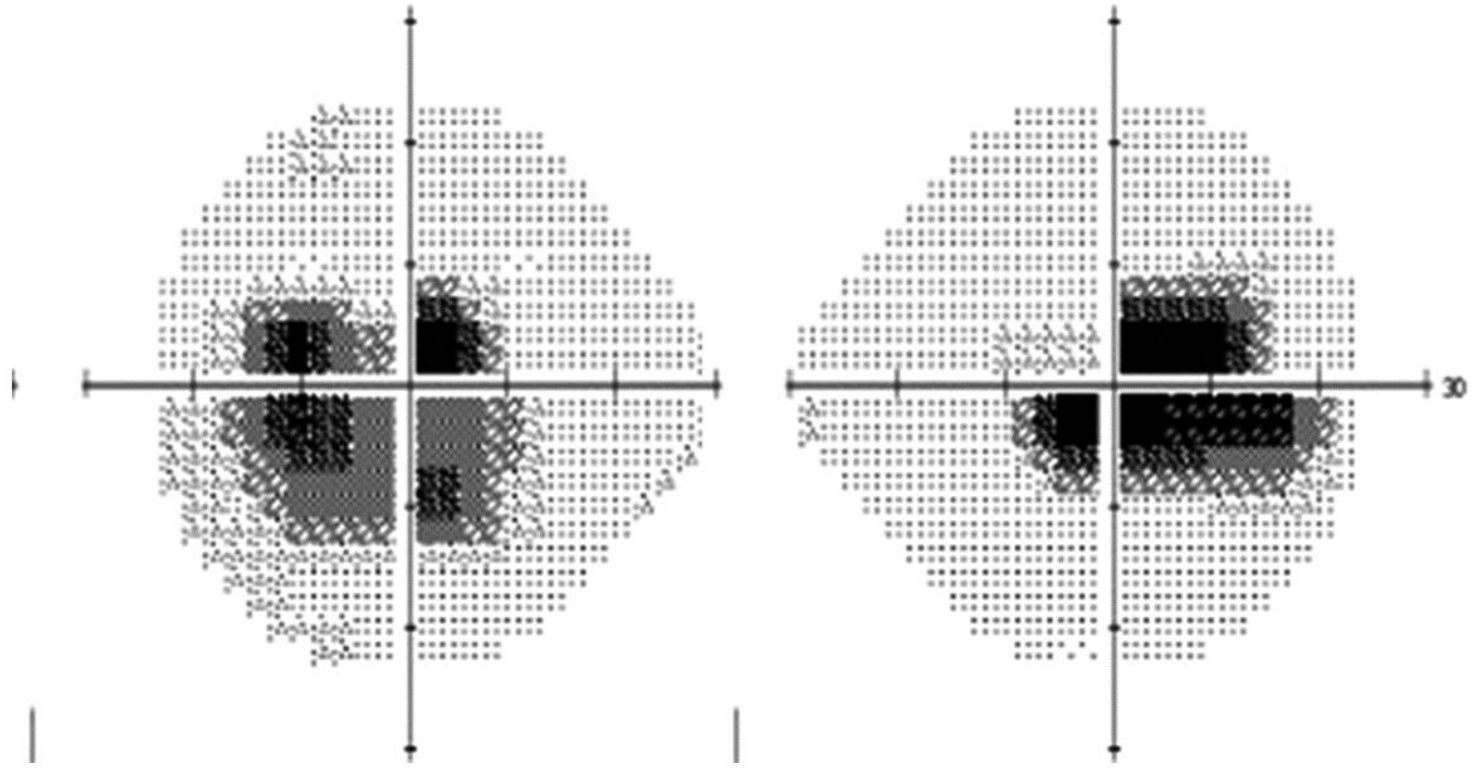
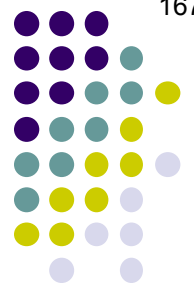


Tilted disc: Superior bitemporal VF defects



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Visual field defects characteristic of toxic and metabolic optic neuropathies



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How on earth does a tilted disc produce a bitemporal VF defect, and how can the defect be resolved via refraction?

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It's actually pretty straightforward.

The area including and adjacent to the inferior pole of a tilted disc is staphylomatous. This means the 'axial length' of the photoreceptors within this region is greater than that of the rest of the posterior pole. Because of this extra axial length, the correction used during VF testing (which is based on the refraction of the non-staphylomatous fovea) is not myopic enough for the inferior peripapillary region.

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