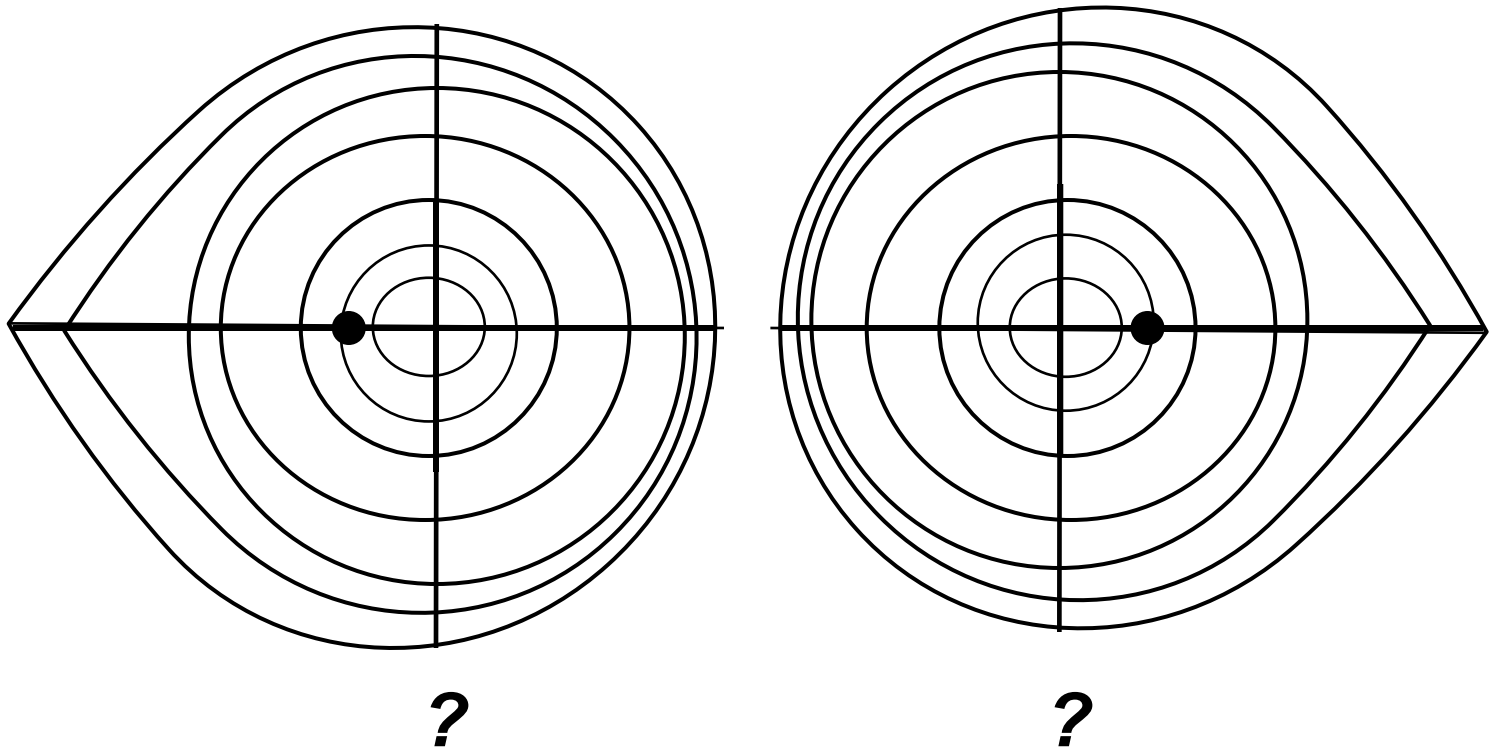
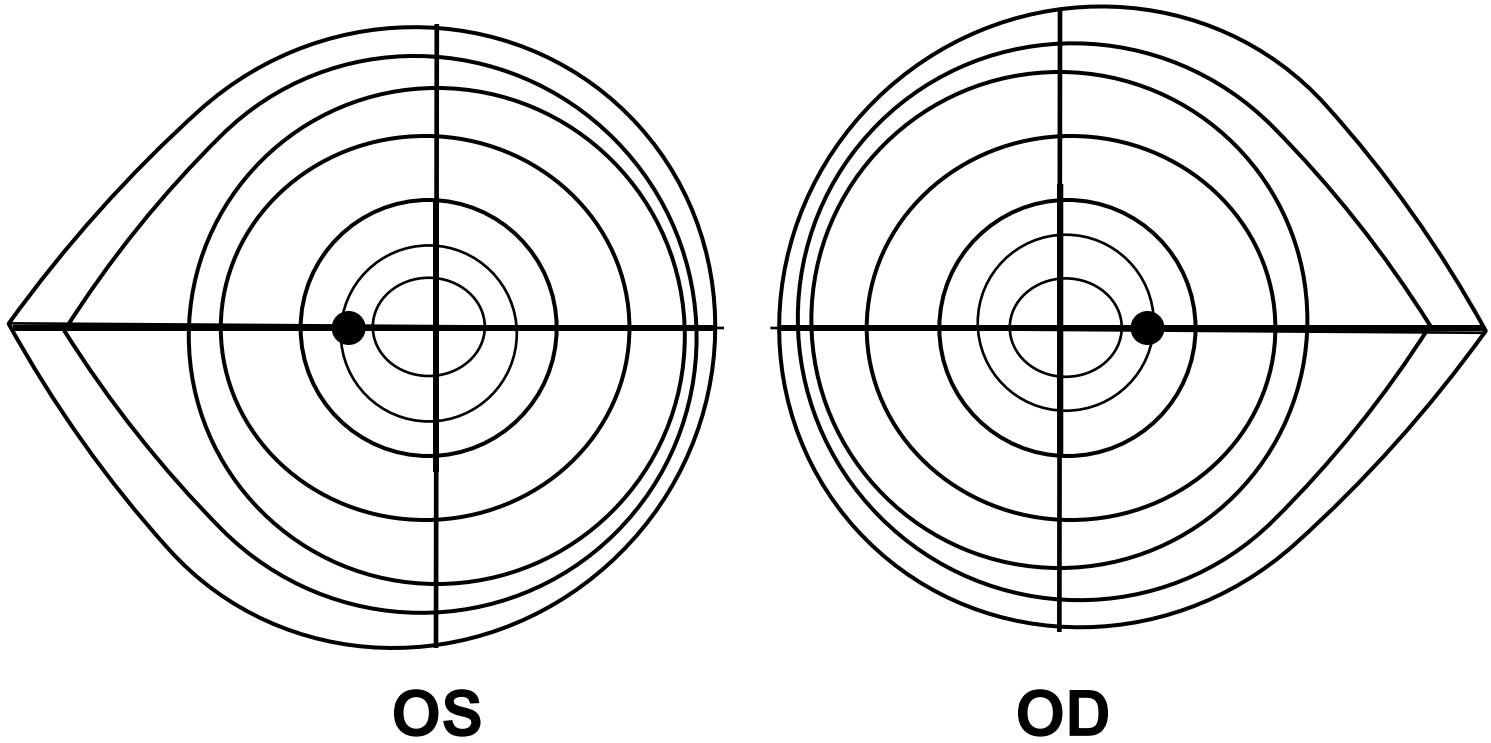


Visual Field Defects



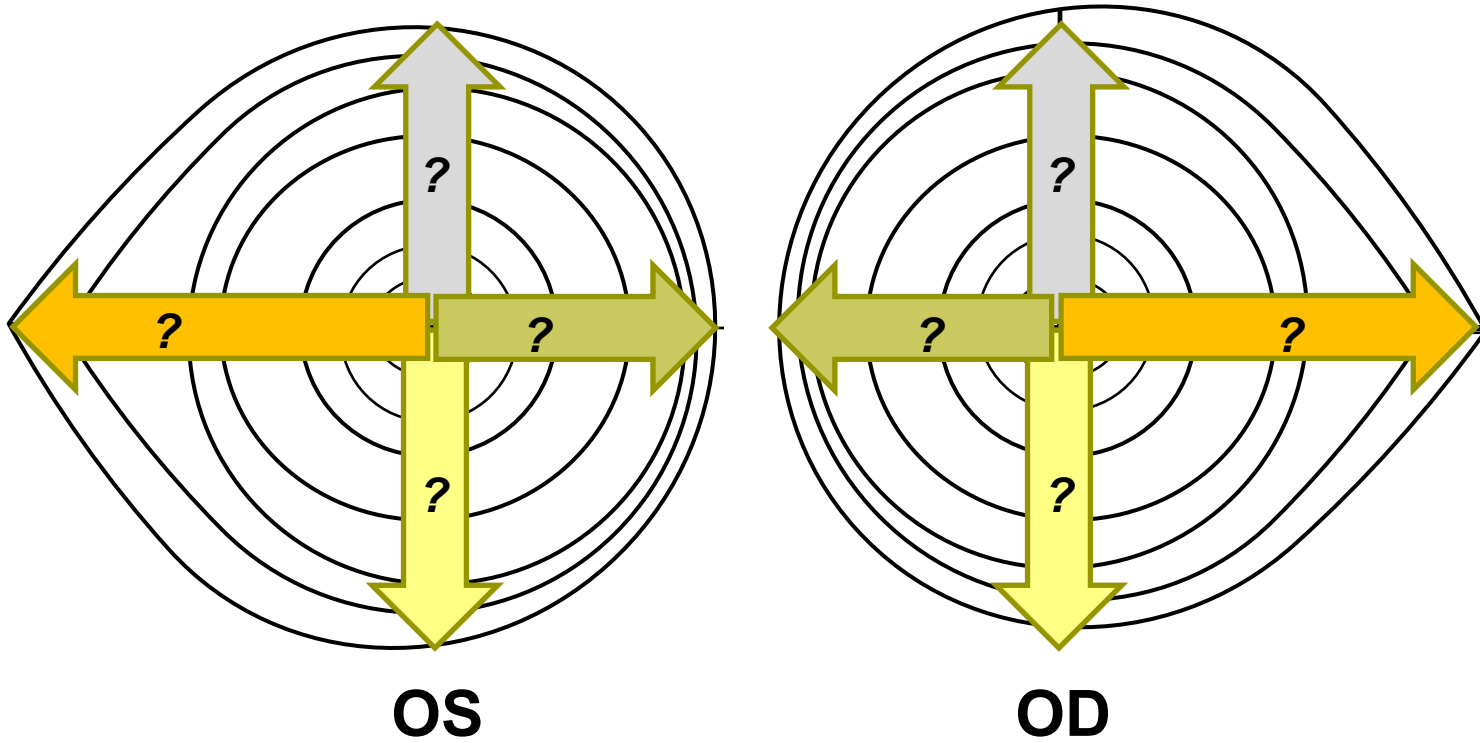
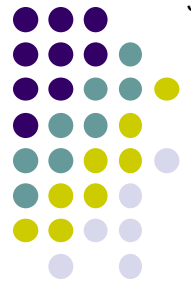
Here is a representation of the VF for each eye. Which is OD, and which OS?

Visual Field Defects

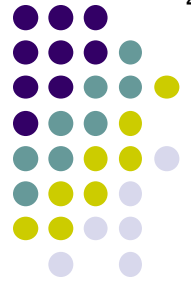


*Here is a representation of the VF for each eye. Which is OD, and which OS? Remember, VFs are **not** drawn as if the pt is looking at you; they're drawn as if **you** are the pt!*

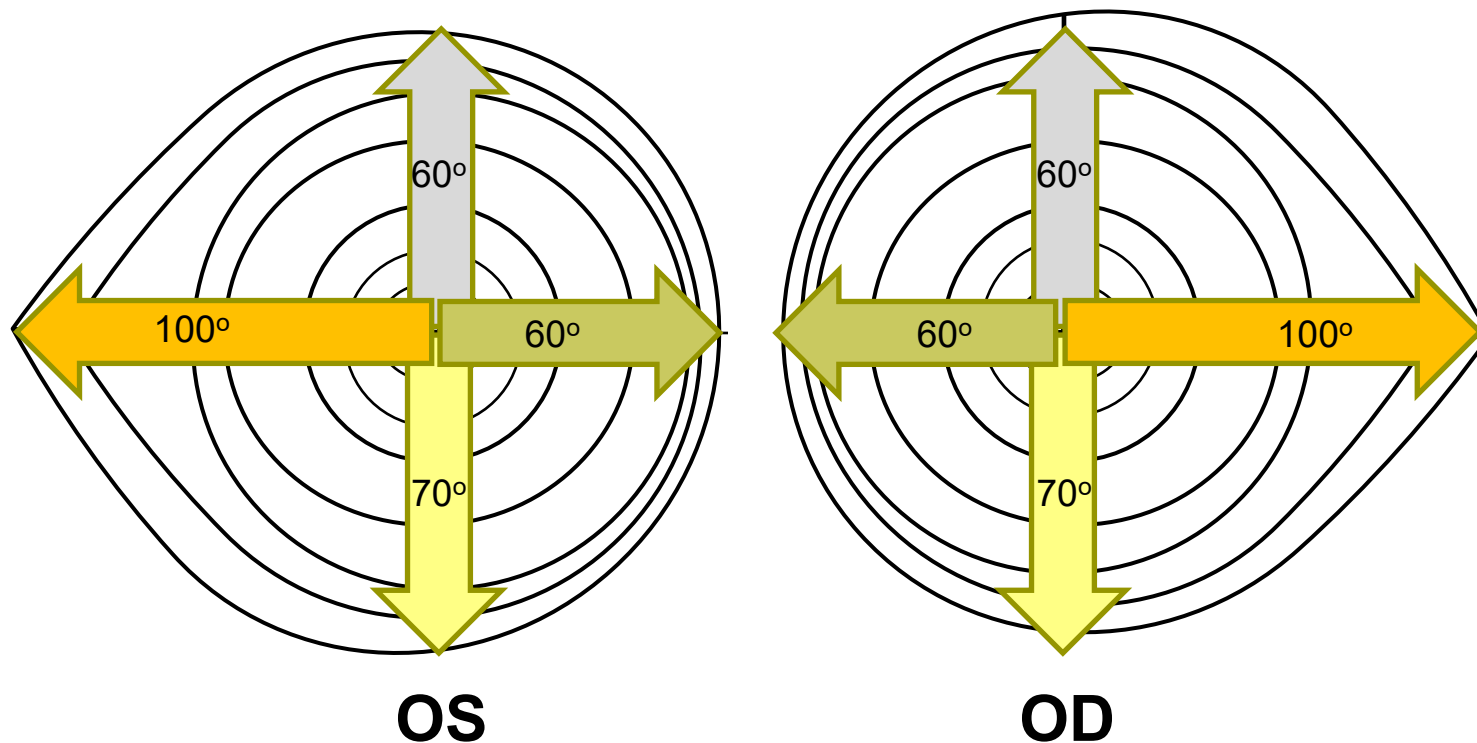
Visual Field Defects



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



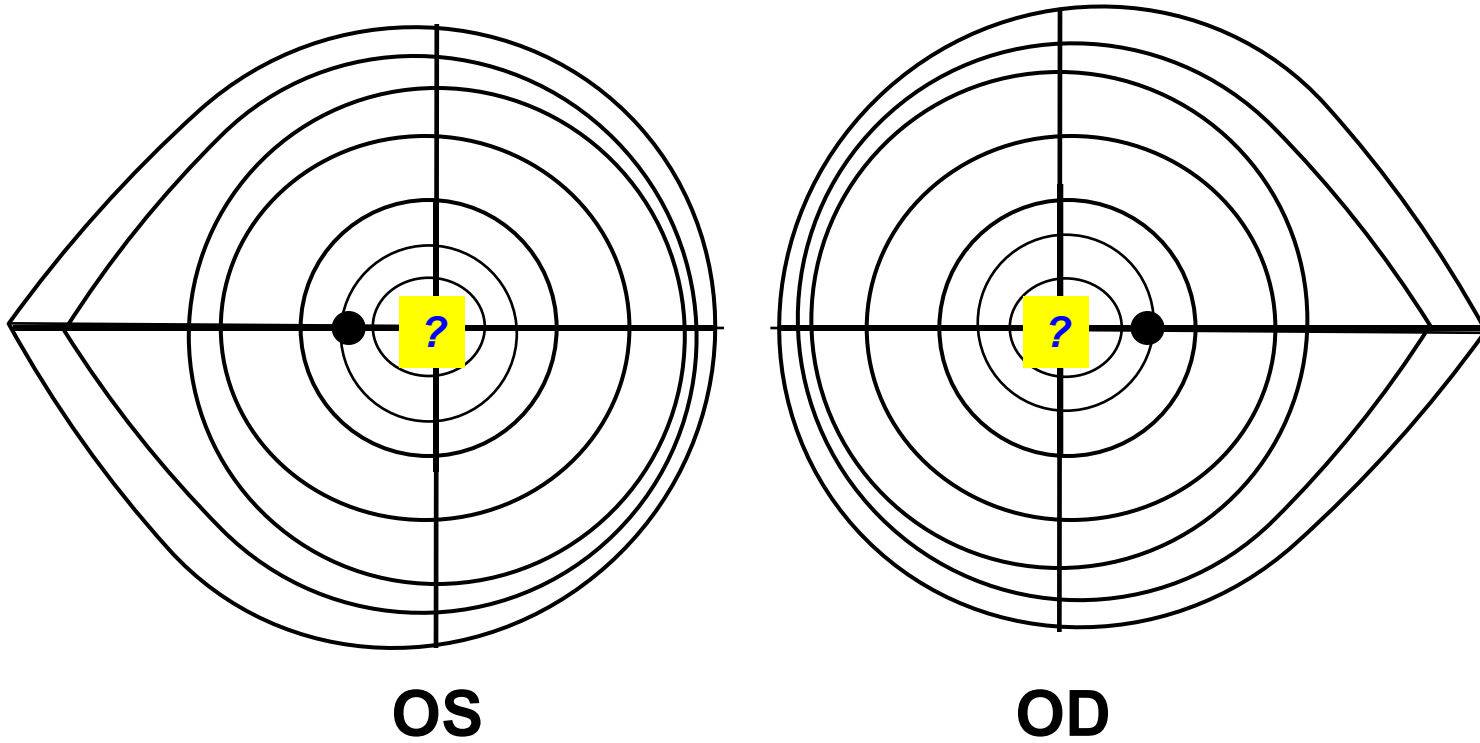
Visual Field Defects



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

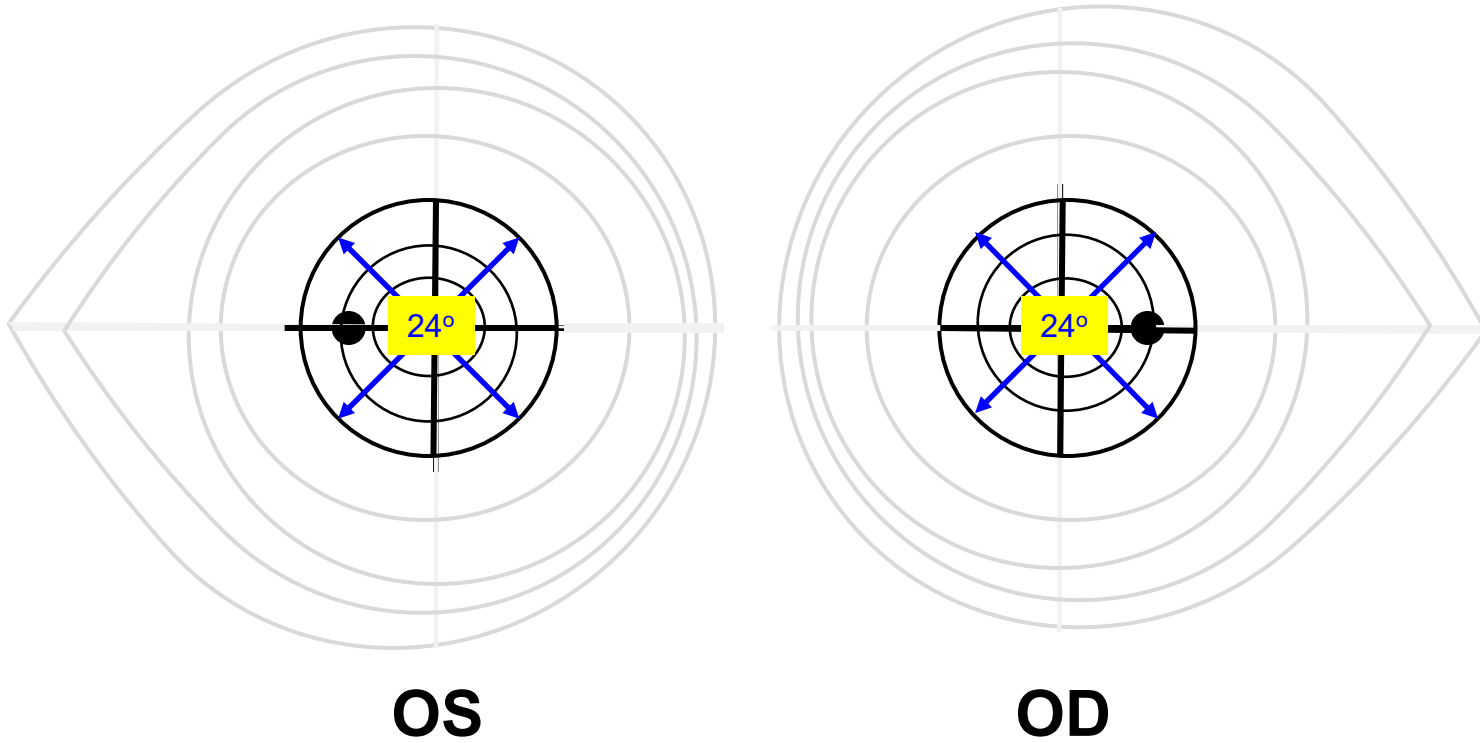
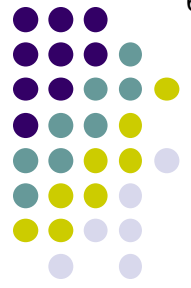
(Don't get too fixated on these specific numbers--different sources will give slightly different values.)

Visual Field Defects



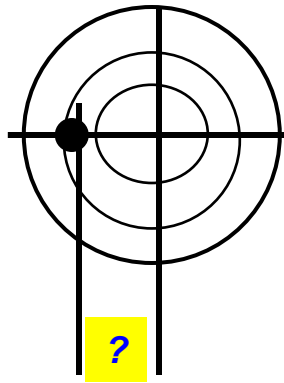
Measured in degrees from fixation, how much of the VF is assessed via the automated perimetry machines found in most ophthalmology practices?

Visual Field Defects

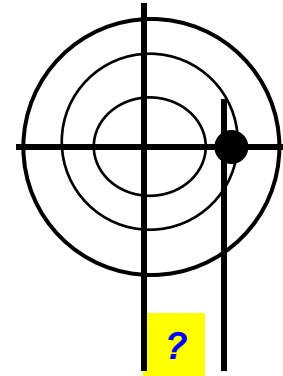


Measured in degrees from fixation, how much of the VF is assessed via the automated perimetry machines found in most ophthalmology practices?
The central 24 degrees

Visual Field Defects



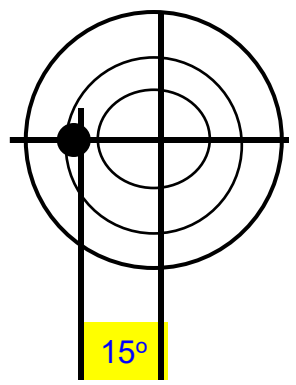
OS



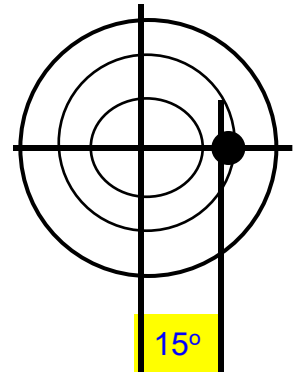
OD

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

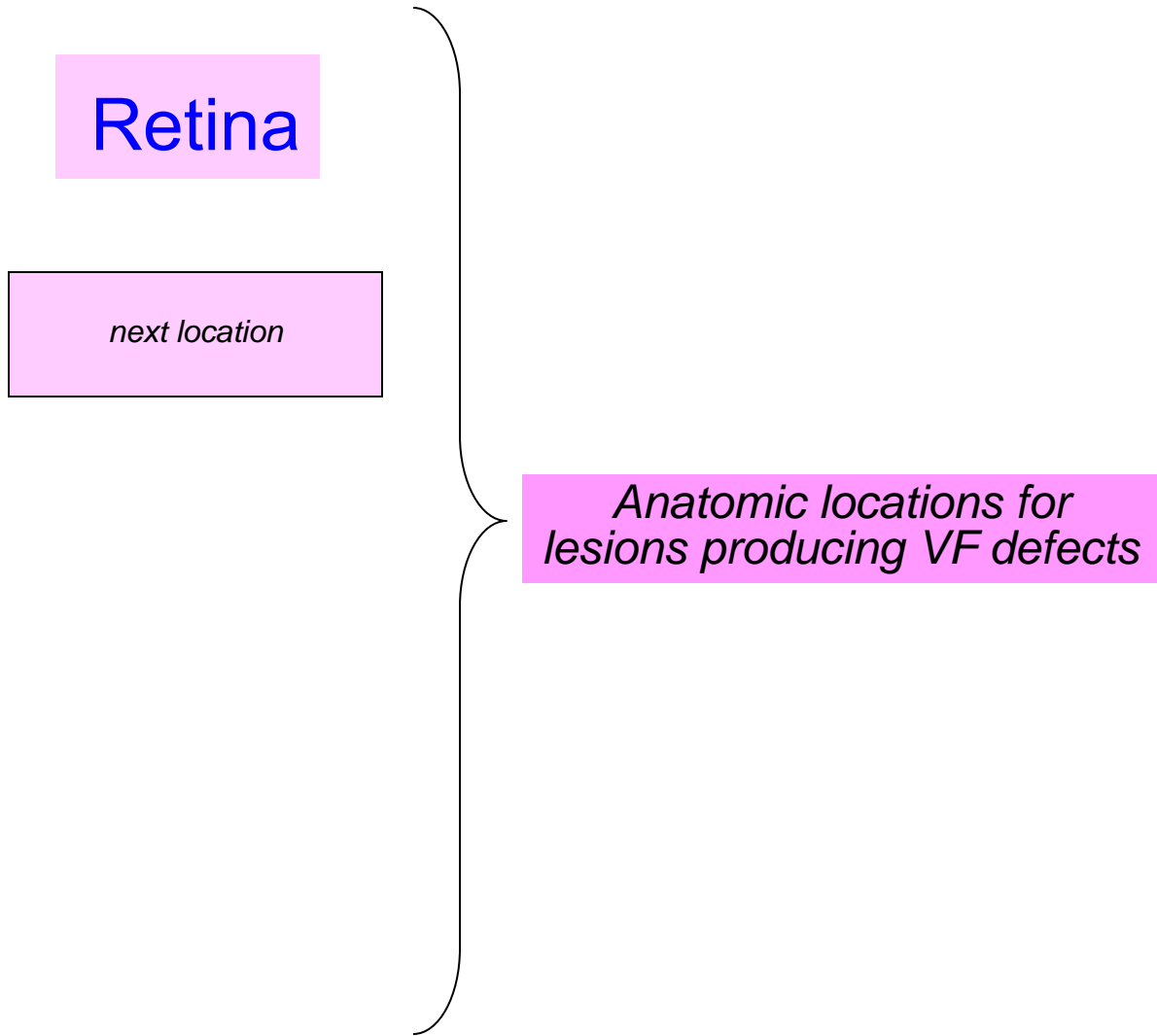


most anterior location

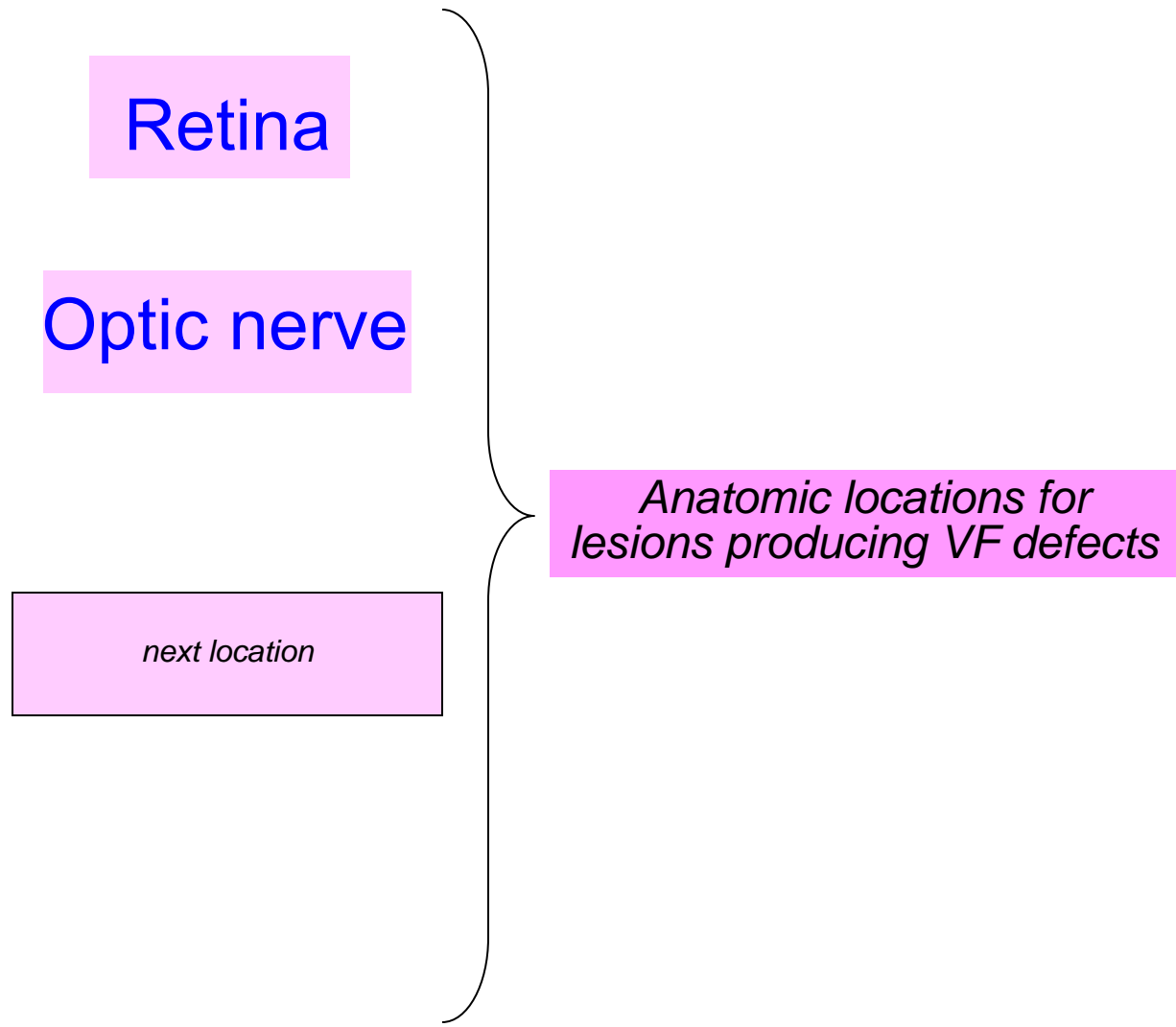


Anatomic locations for lesions producing VF defects

Visual Field Defects



Visual Field Defects



Visual Field Defects



Retina

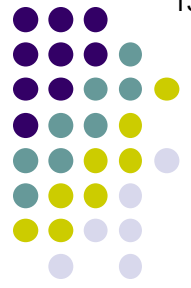
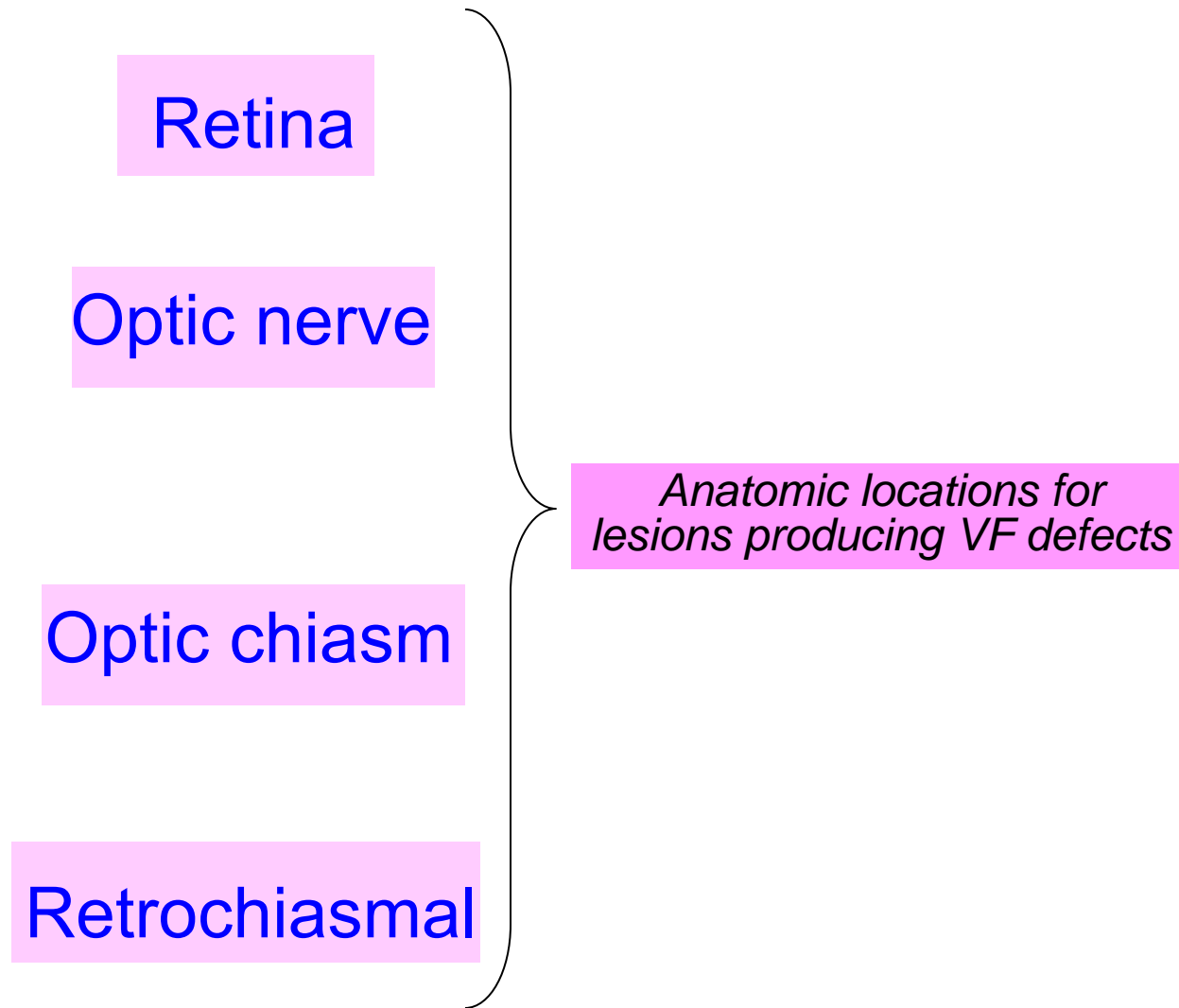
Optic nerve

Optic chiasm

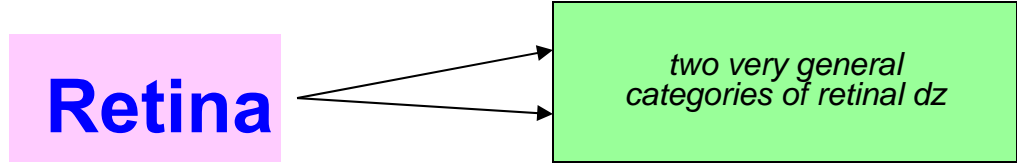
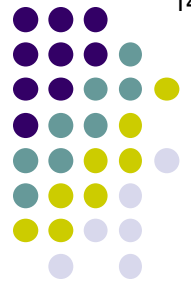
Anatomic locations for lesions producing VF defects

general term for all locations posterior to the previous one

Visual Field Defects



Visual Field Defects

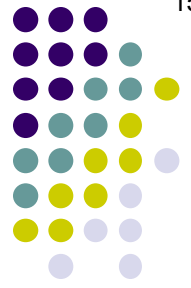


Optic nerve

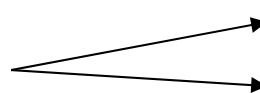
Optic chiasm

Retrochiasmal

Visual Field Defects



Retina



Clinically obvious dz

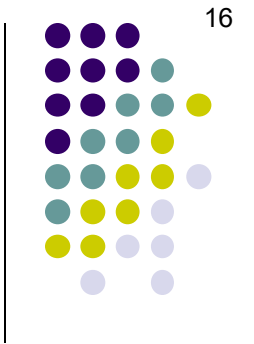
Clinically subtle dz

Optic nerve

Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

Clinically obvious dz
Clinically subtle dz

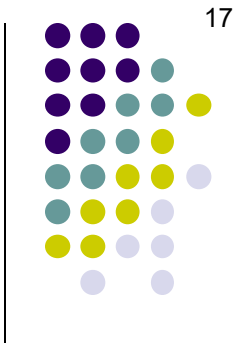
What is meant by clinically obvious vs clinically subtle retinal dz?

Optic nerve

Optic chiasm

Retrochiasmal

Visual Field Defects



Retina

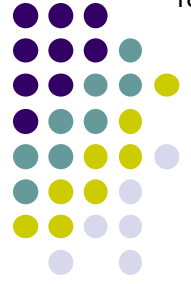
Clinically obvious dz
Clinically subtle dz

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

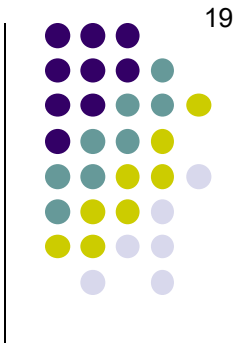
What is meant by clinically obvious vs clinically subtle retinal dz?
In clinically obvious disease, the retina will appear abnormal on DFE, whereas in clinically subtle disease it will look normal

*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...?)

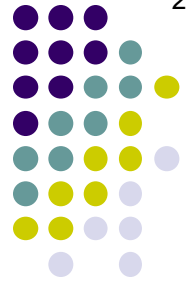
Optic nerve

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

Retina

Clinically obvious dz

Clinically subtle dz

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

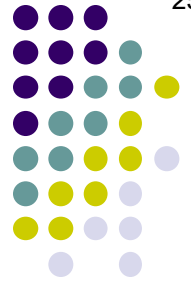


Visual Field Defects

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

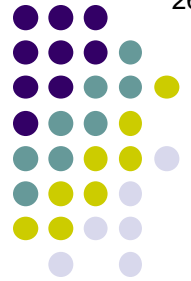
How many fibers (axons) comprise an optic nerve?

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"

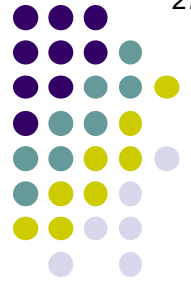


Visual Field Defects

The optic nerves are composed of what?

The axons of retinal ganglion cells

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



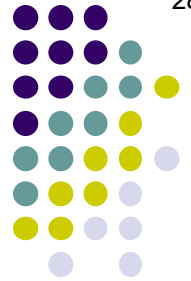
Visual Field Defects

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

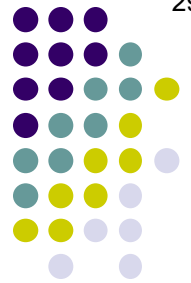
The optic nerves are composed of what?

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?

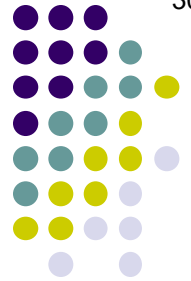
The axons of retinal ganglion cells

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

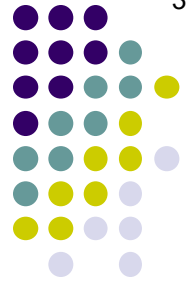
Do they synapse in the region of the optic nerve head?

No

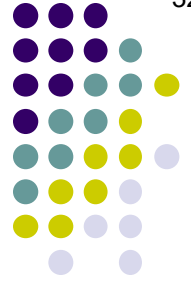
Where will they synapse?

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?

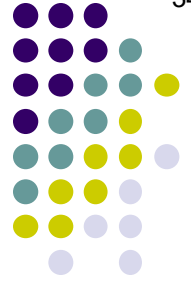
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Visual Field Defects



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'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

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No

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Most will synapse in the lateral geniculate nucleus (LGN)

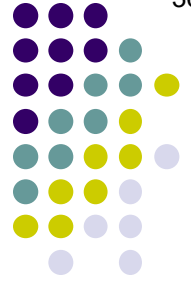
For a more in-depth look at the optic nerve, see slide-set FELT6

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

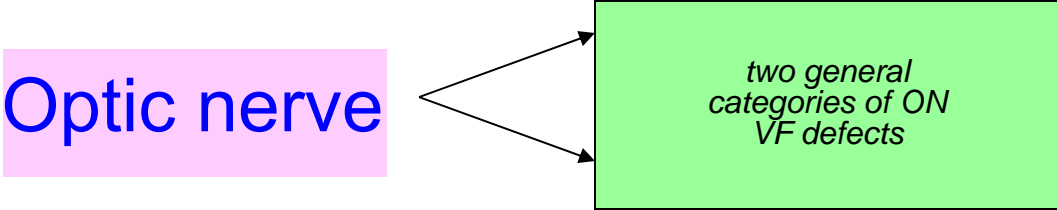
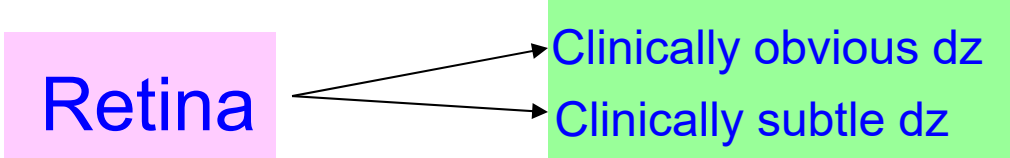
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'Most'? Where will the others synapse, and what are they responsible for?

The hypothalamus, where they are involved in modulating circadian responses



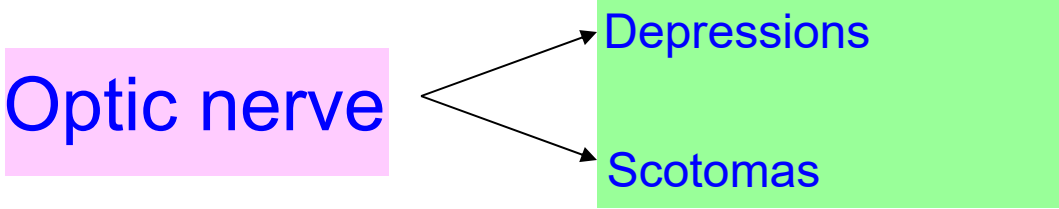
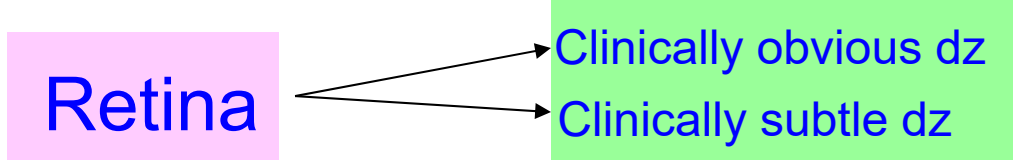
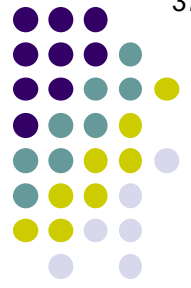
Visual Field Defects



Optic chiasm

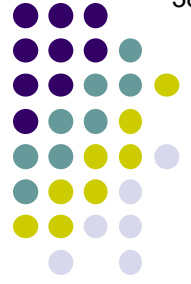
Retrochiasmal

Visual Field Defects

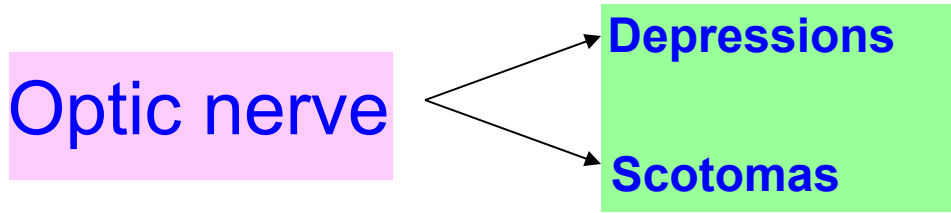
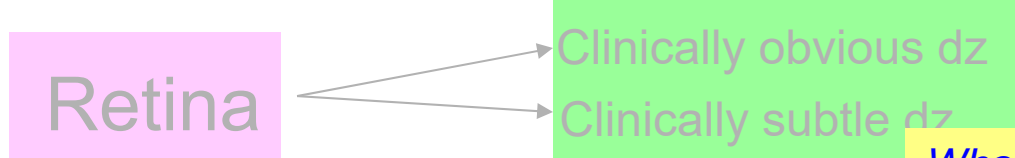


Optic chiasm

Retrochiasmal



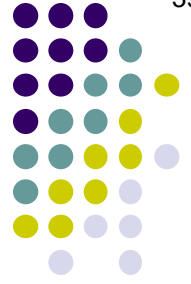
Visual Field Defects



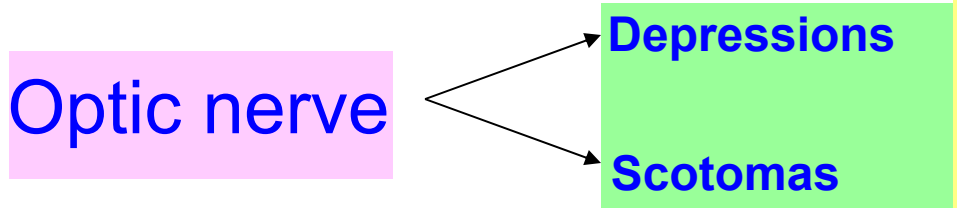
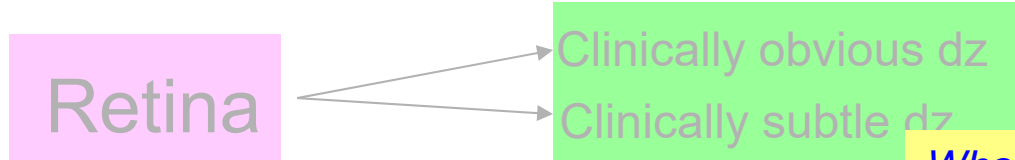
Optic chiasm

Retrochiasmal

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



Visual Field Defects



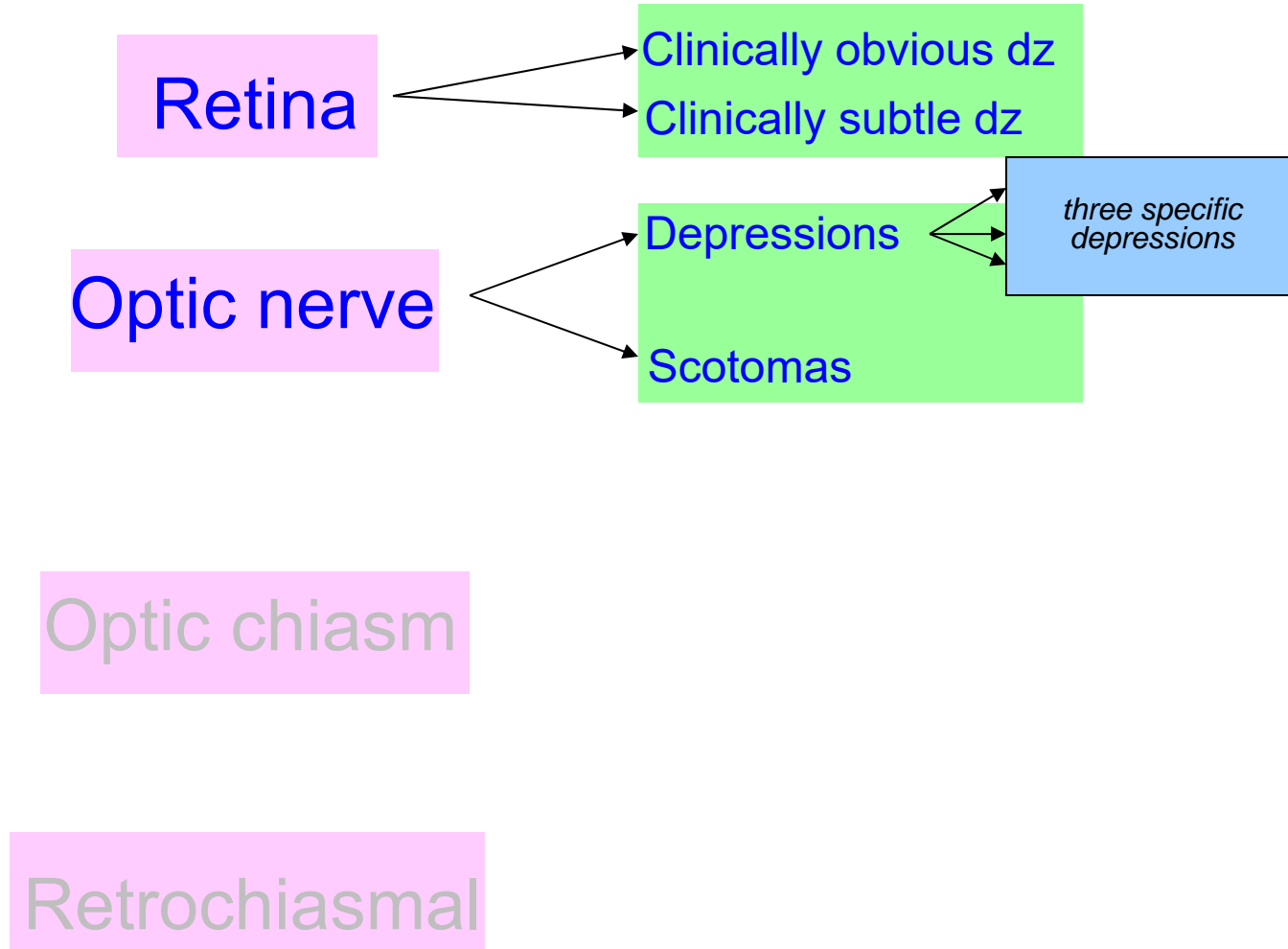
What's the difference between a depression and a scotoma?
 A **depression** is an inward shifting of the outer limit of the visual field, whereas a **scotoma** is an area of field loss surrounded on all sides by areas of normal sensitivity.

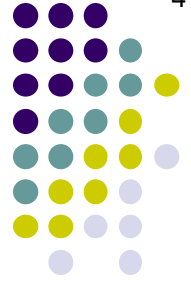
Optic chiasm

Retrochiasmal

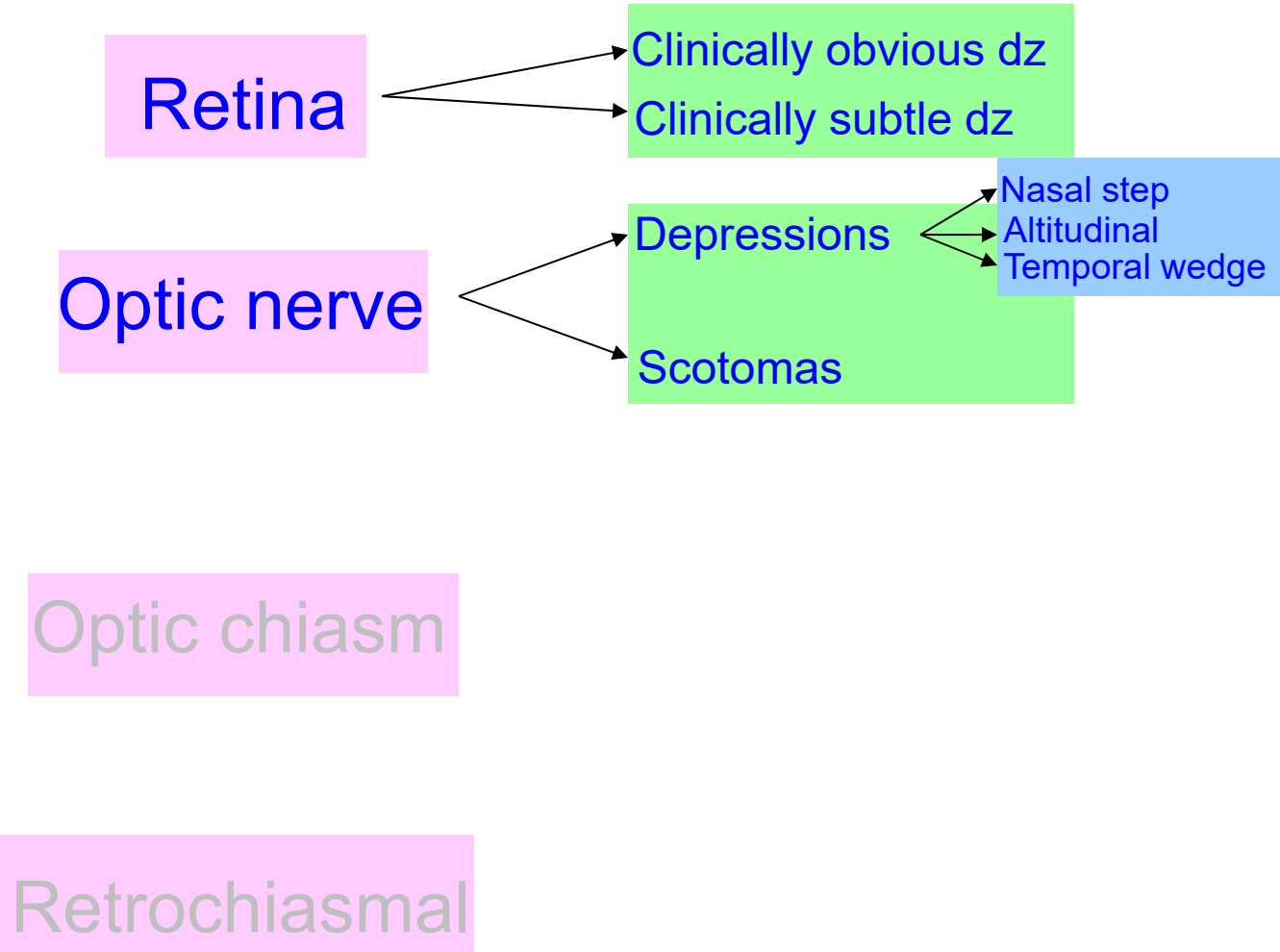


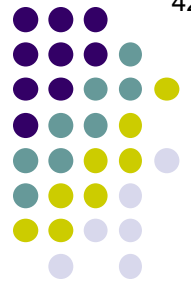
Visual Field Defects



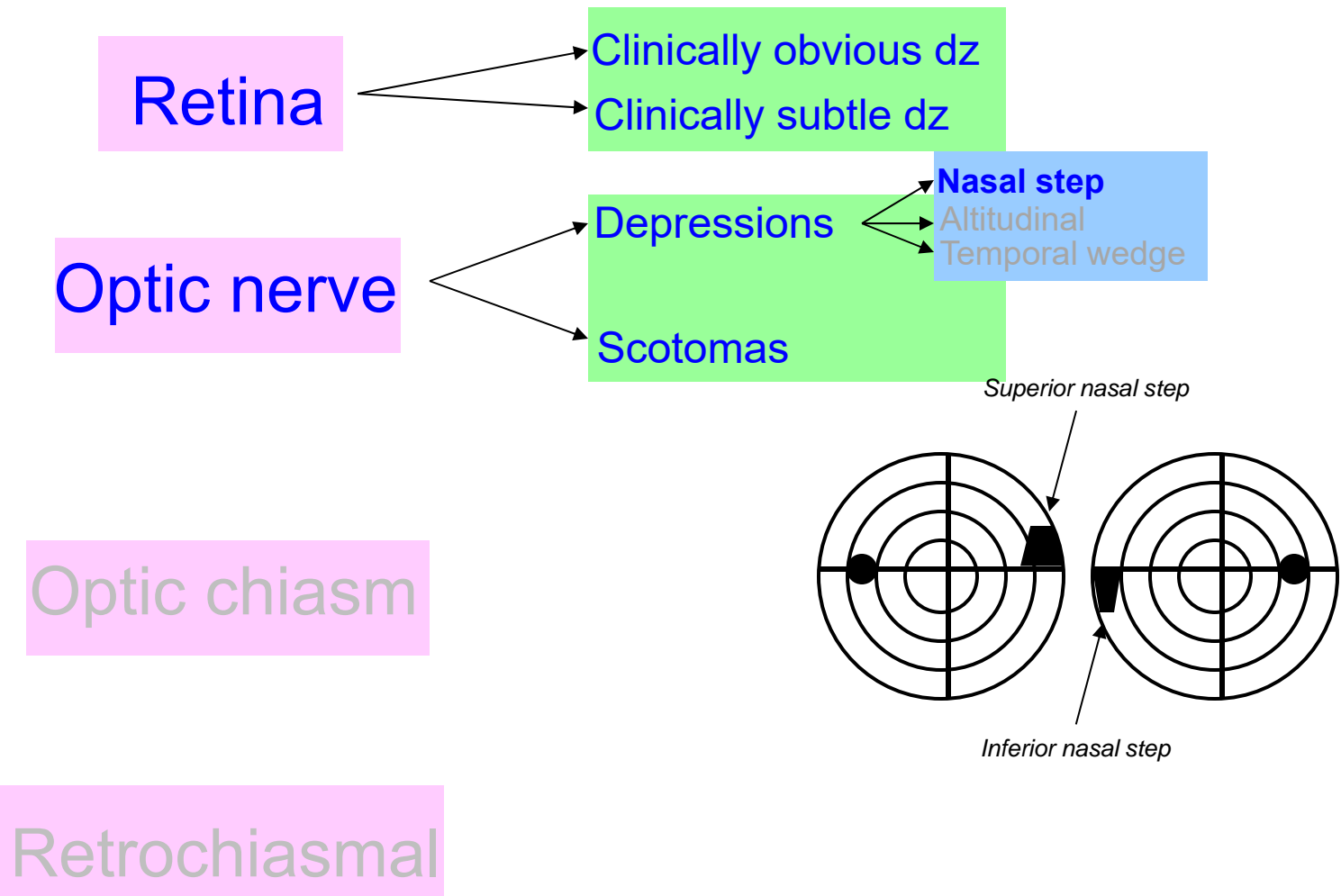


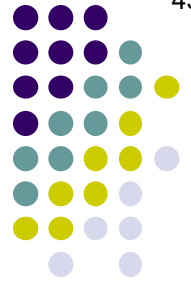
Visual Field Defects





Visual Field Defects





Visual Field Defects

Retina

Clinically obvious dz
Clinically subtle dz

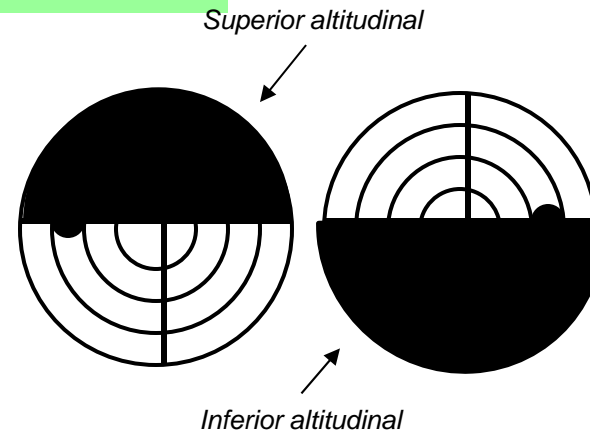
Optic nerve

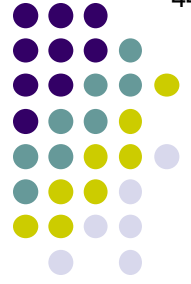
Depressions
Scotomas

Nasal step
Altitudinal
Temporal wedge

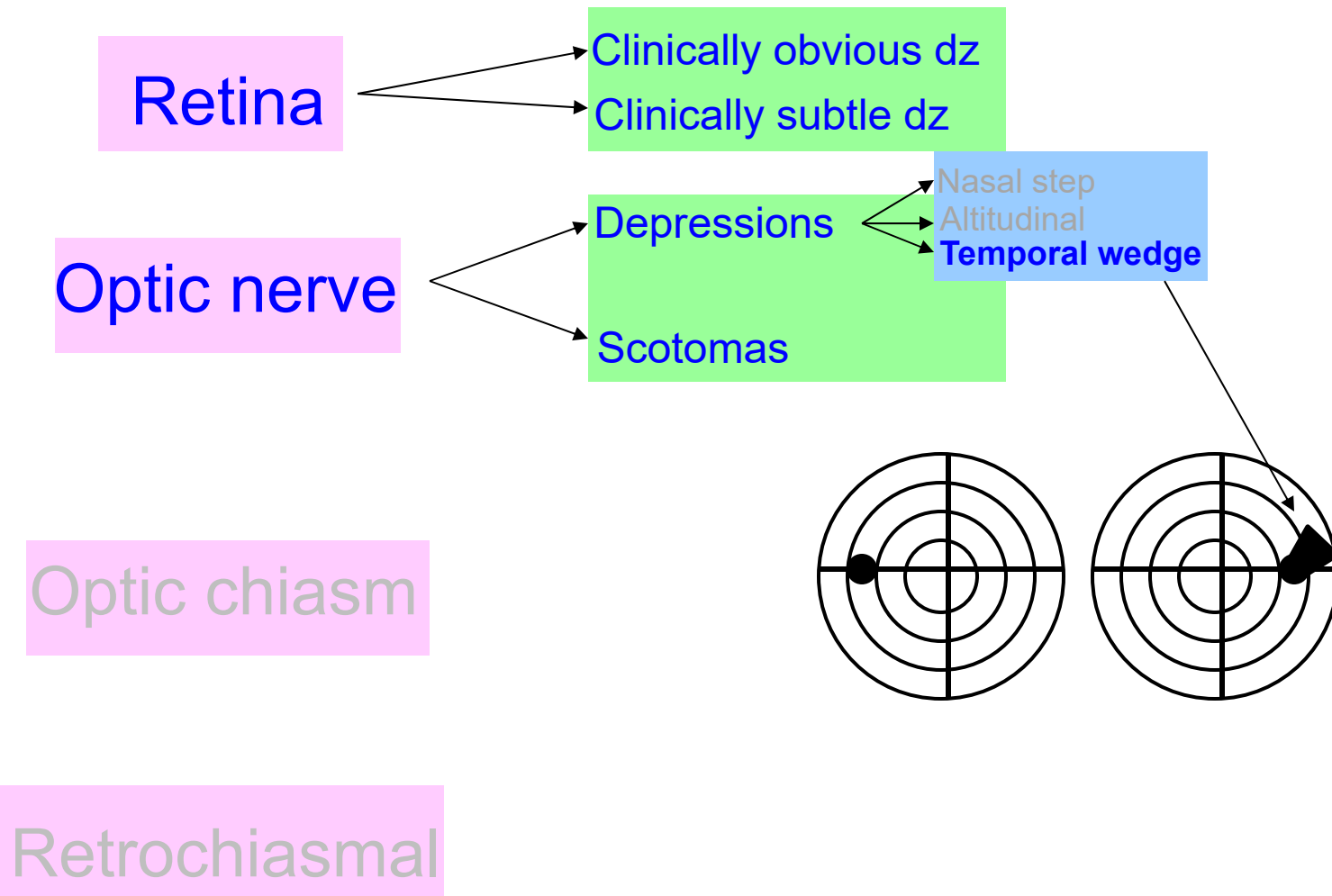
Optic chiasm

Retrochiasmal



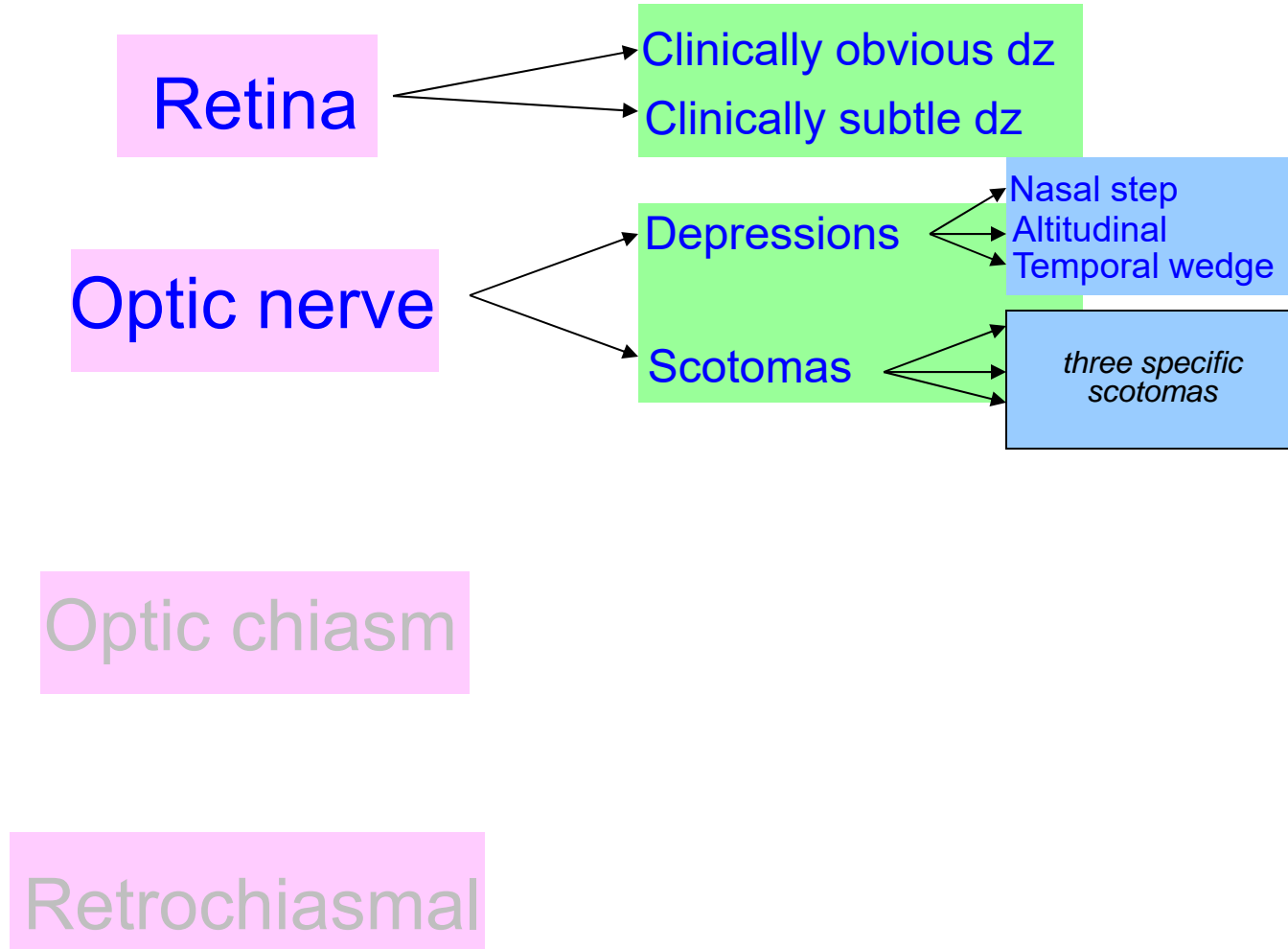


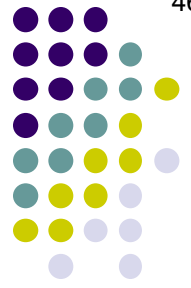
Visual Field Defects



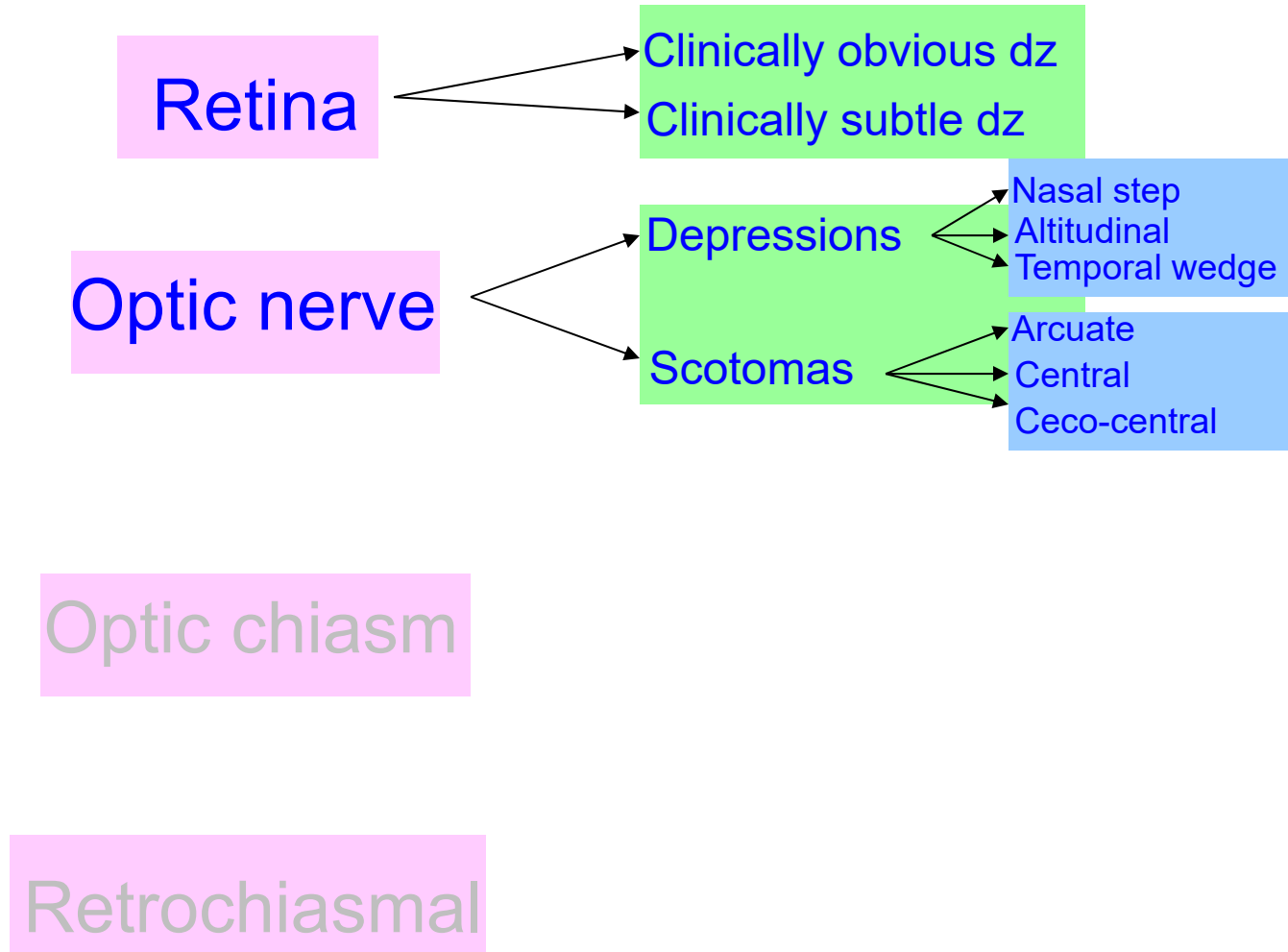


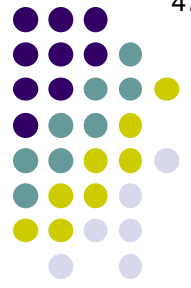
Visual Field Defects



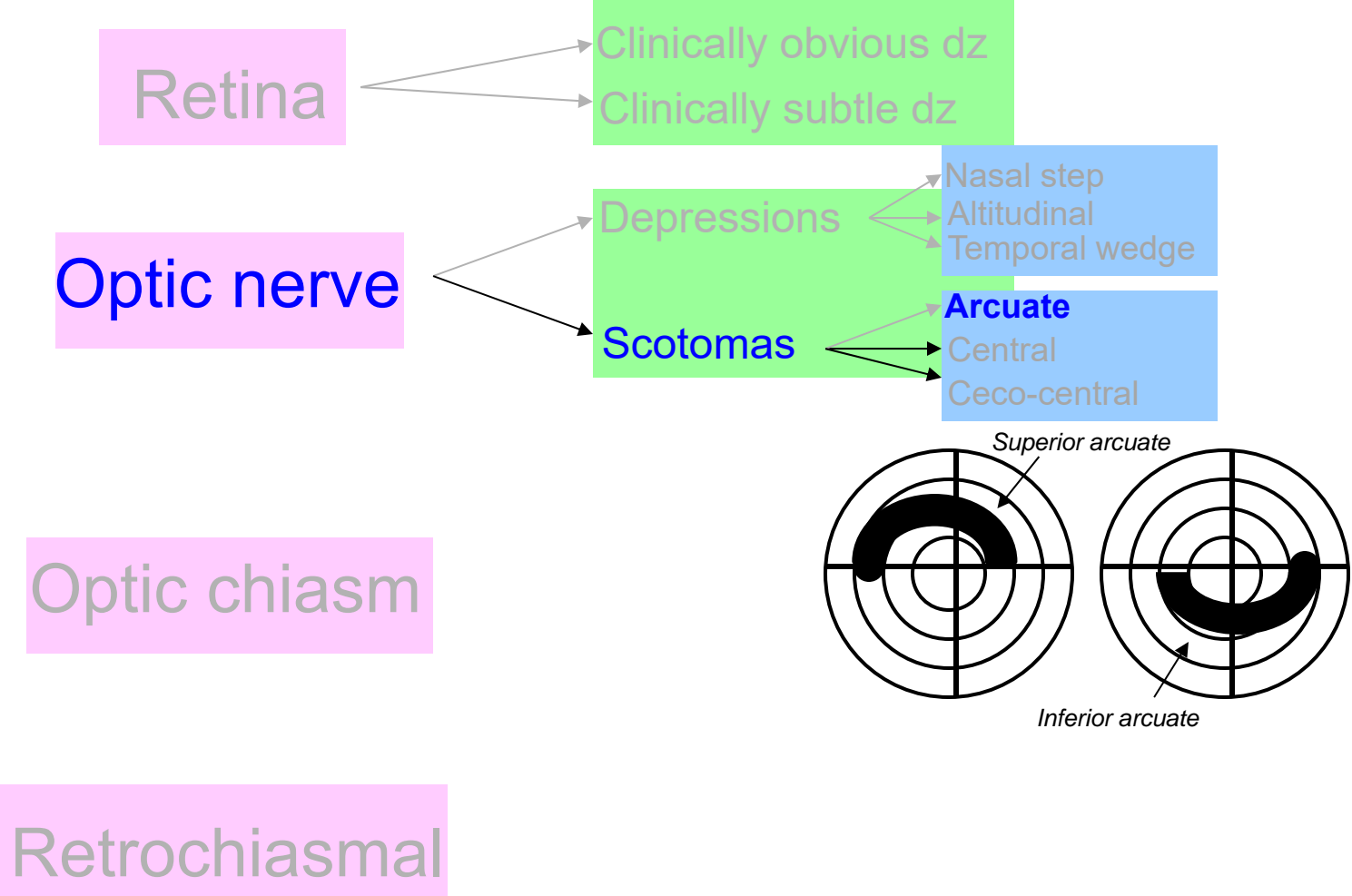


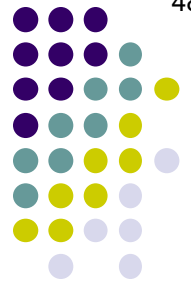
Visual Field Defects





Visual Field Defects





Visual Field Defects

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Clinically obvious defects

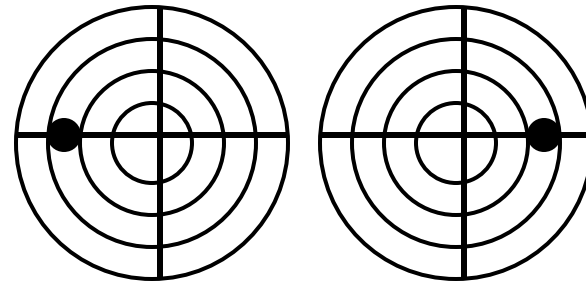
What's the difference between a central and a ceco-central scotoma?

Scotomas

Arcuate

Central

Ceco-central





Visual Field Defects

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Clinically, chiasmatic

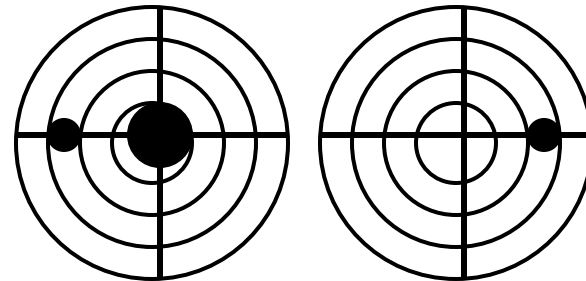
What's the difference between a central and a ceco-central scotoma?
A **central scotoma** involves only fixation, whereas...

Scotomas

Arcuate

Central

Ceco-central





Visual Field Defects

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Clinically obvious

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

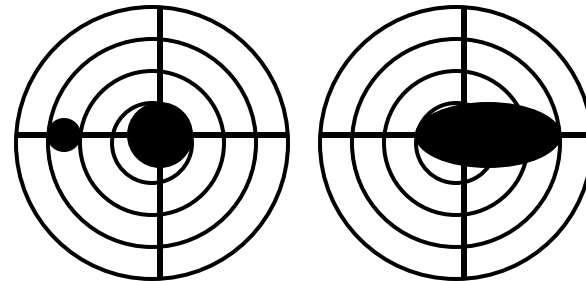
A **central scotoma** involves only fixation, whereas... a **ceco-central scotoma** involves fixation *and* extends all the way to the blind spot

Scotomas

Arcuate

Central

Ceco-central





Visual Field Defects

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Clinically obvious defects

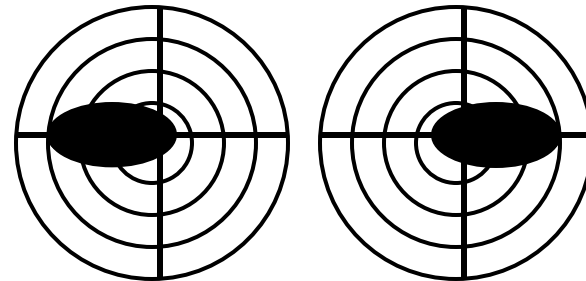
What's the difference between a central and a ceco-central scotoma?
A **central scotoma** involves only fixation, whereas...
a **ceco-central scotoma** involves fixation *and* extends all the way to the blind spot

Scotomas

Arcuate

Central

Ceco-central



(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

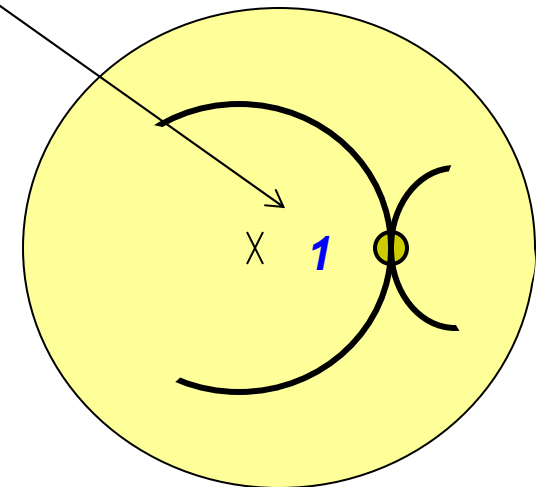
#1?

#2?

#3?

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:

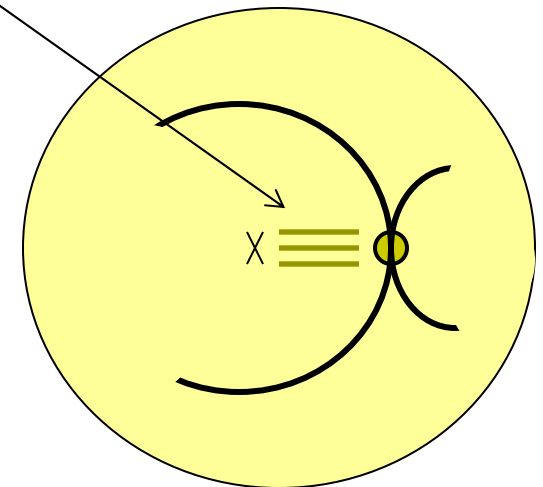
**Optic nerve
head**

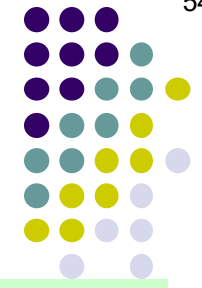
Papillomacular bundle

#2?
#3?

Optic chiasm

Retrochiasmal





Visual Field Defects

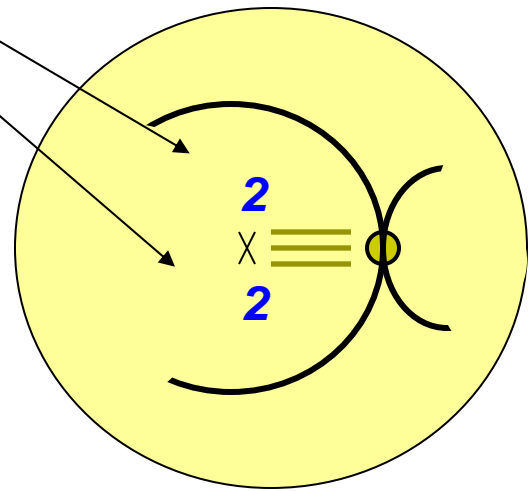
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Optic nerve head

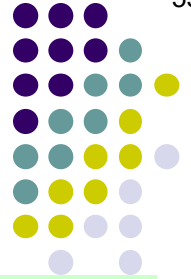
Papillomacular bundle
#2?
#3?

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

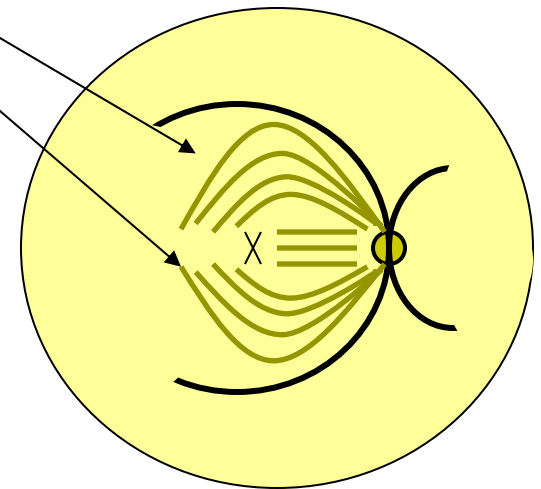
Papillomacular bundle

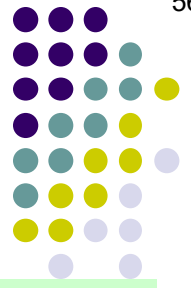
Arcuate fibers

#3?

Optic chiasm

Retrochiasmal





Visual Field Defects

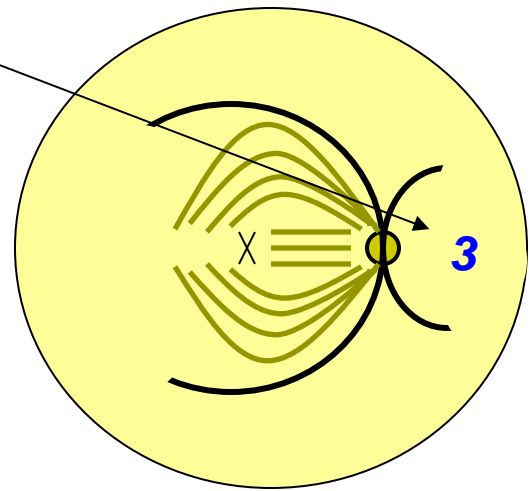
Another way to think about the optic nerve is with respect to its topography at the optic nerve head. Specifically, the retinal nerve fibers composing the optic nerve can be divided into three groups:

Optic nerve head

- Papillomacular bundle
- Arcuate fibers
- #3?

Optic chiasm

Retrochiasmal



Visual Field Defects



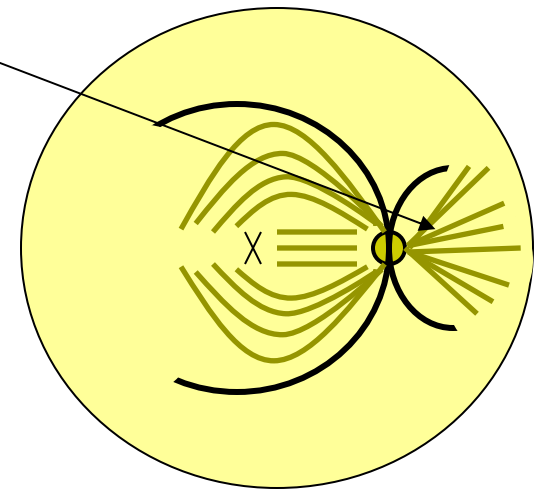
Another way to think about the optic nerve is with respect to its topography at the optic nerve head. Specifically, the retinal nerve fibers composing the optic nerve can be divided into three groups:

**Optic nerve
head**

Papillomacular bundle
Arcuate fibers
Nasal radiating fibers

Optic chiasm

Retrochiasmal



Visual Field Defects



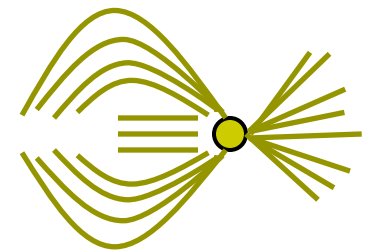
Another way to think about the optic nerve is with respect to its topography at the optic nerve head. Specifically, the retinal nerve fibers composing the optic nerve can be divided into three groups:

Optic nerve
head

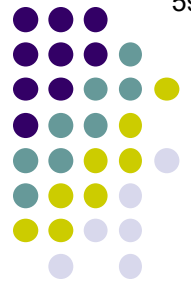
Papillomacular bundle
Arcuate fibers
Nasal radiating fibers

Optic chiasm

*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?

Clinically obvious dz

Optic nerve head

Papillomacular bundle

Arcuate fibers

Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

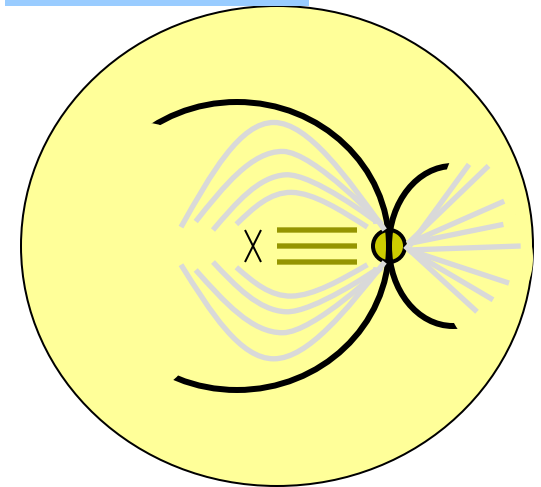
?

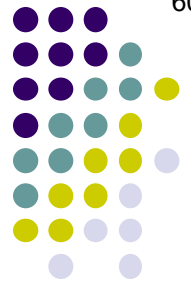
Arcuate
Central
Ceco-central

?

Optic chiasm

Retrochiasmal





Visual Field Defects

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

Clinically obvious dz

Optic nerve head

Papillomacular bundle

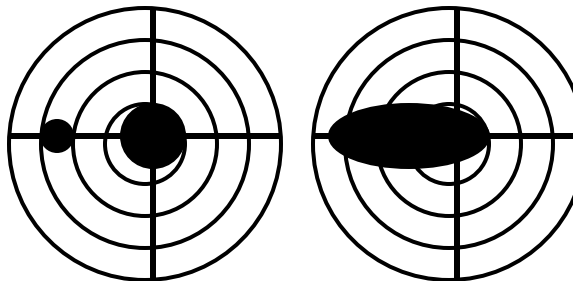
Arcuate fibers

Nasal radiating fibers

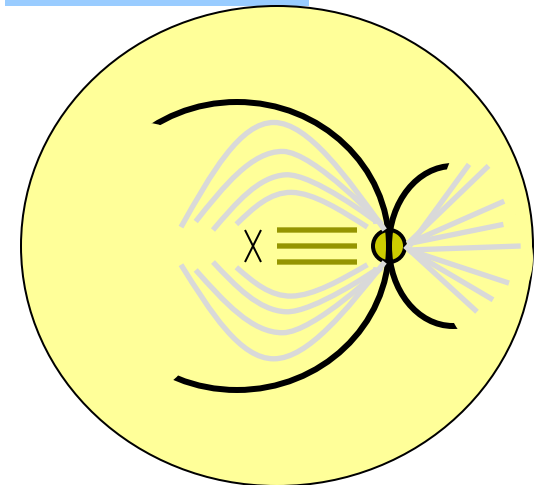
Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

Optic chiasm



Retrochiasmal





Visual Field Defects

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

Optic nerve head

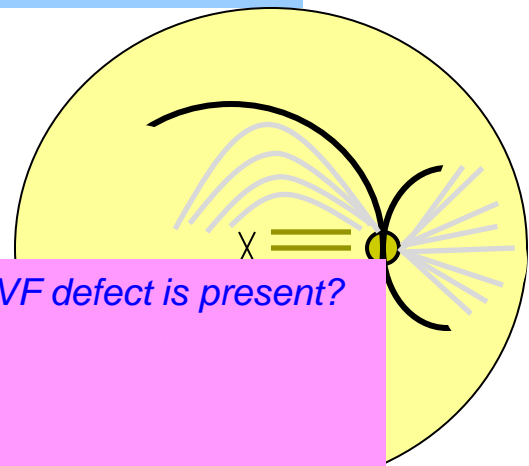
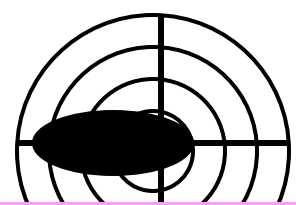
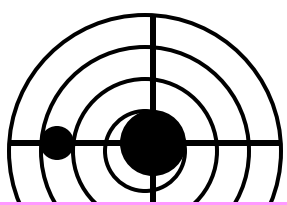
Clinically obvious dz

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

- Nasal step
- Altitudinal
- Temporal wedge

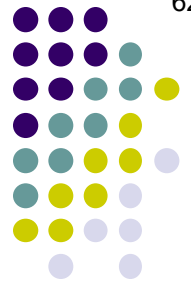
- Arcuate
- Central
- Ceco-central

Optic chiasm



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

Retr



Visual Field Defects

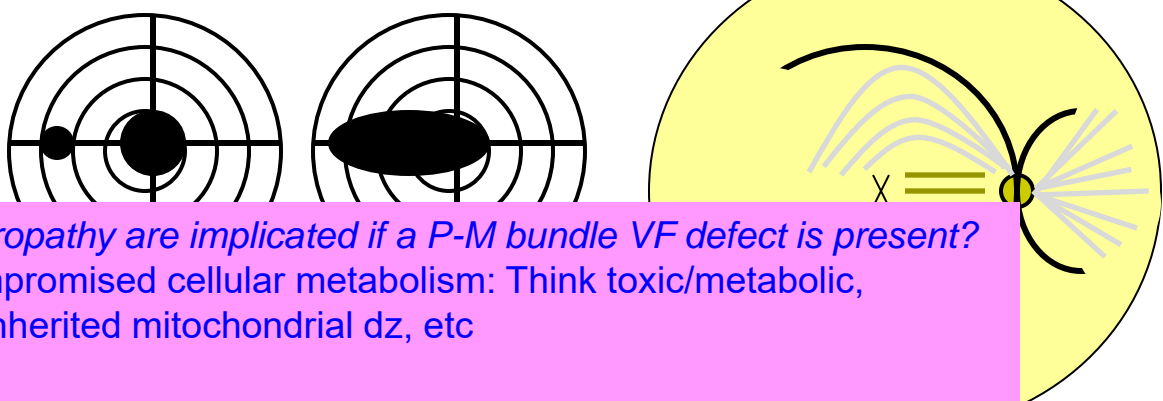
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Optic nerve head

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- Arcuate fibers
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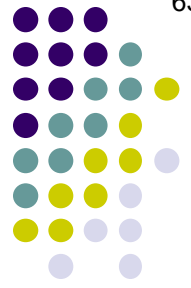
- Nasal step
- Altitudinal
- Temporal wedge
- Arcuate
- Central
- Ceco-central

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

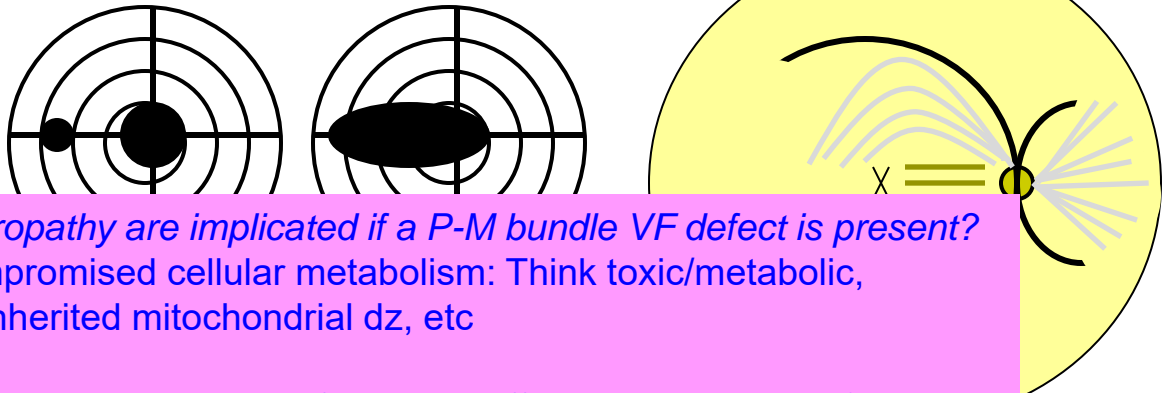
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Optic nerve head

- Papillomacular bundle**
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- Nasal step
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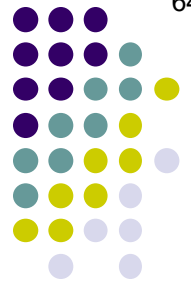
Optic chiasm



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?



Visual Field Defects

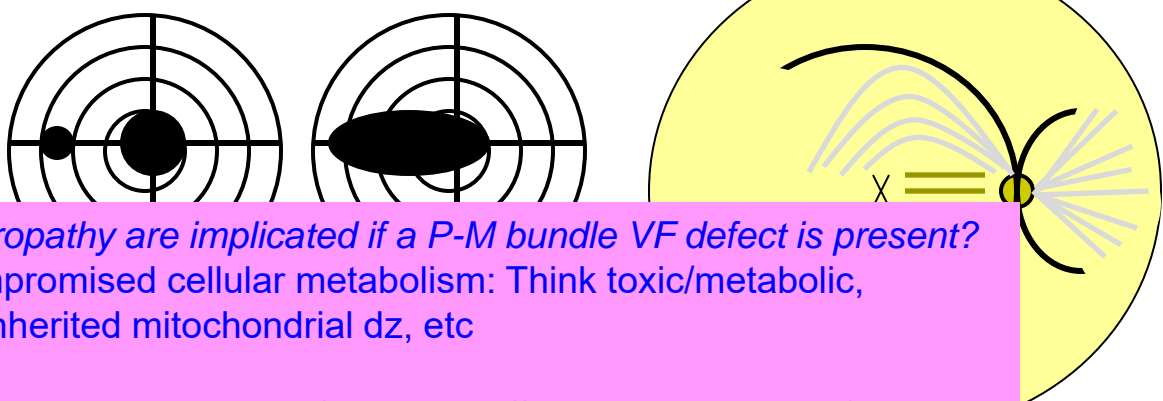
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Optic nerve head

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Optic chiasm

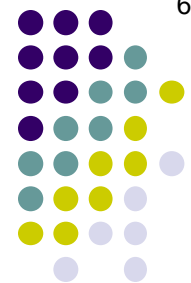


Which sorts of optic neuropathy are implicated if a P-M bundle VF defect is present?
Conditions involving compromised cellular metabolism: Think toxic/metabolic, nutritional deficiencies, inherited mitochondrial dz, etc

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:

-
-

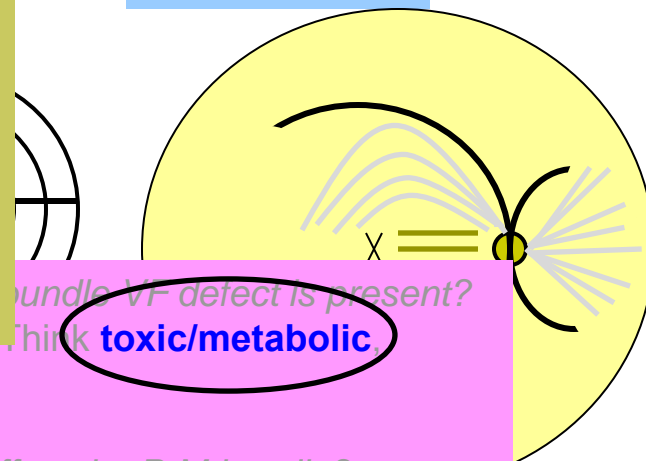
Conditions involving compromised cellular metabolism. Think nutritional deficiencies, inherited mitochondrial dz, etc

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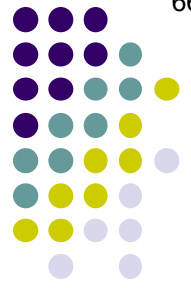
with damage to each group?

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



toxic/metabolic



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

R

Opti
↓

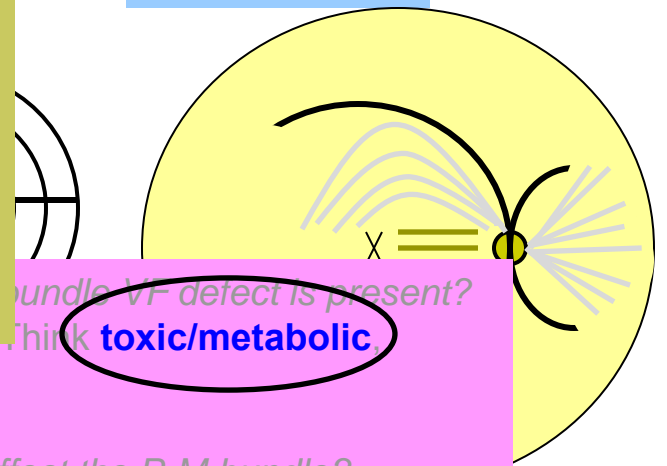
Optio

Retr

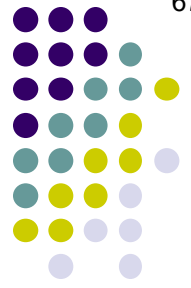
with damage to each group?

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



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-
-

Inherited mitochondrial diseases:

-
-

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R

Opti
↓

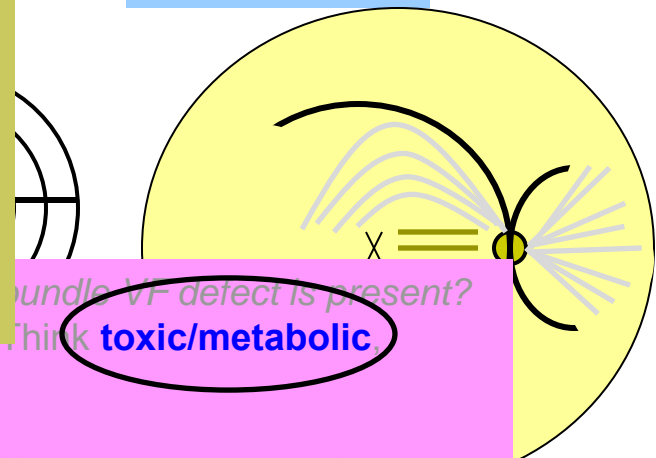
Optio

Retr

with damage to each group?

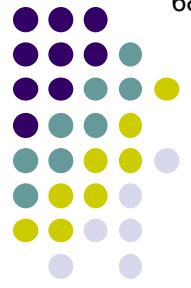
Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



bundle VF defect is present?
toxic/metabolic

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-
-
-
-
-

Nutrients that weren't ingested in sufficient quantity:

-
-
-
-

Inherited mitochondrial diseases:

-
-

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

R

Optic
↓

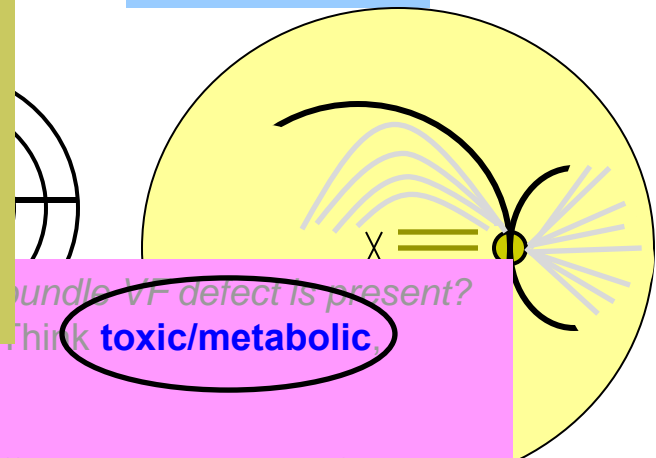
Optic

Retr

with damage to each group?

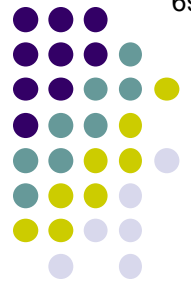
Nasal step
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Temporal wedge

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Central
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bundle VF defect is present?
toxic/metabolic

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

Inherited mitochondrial diseases:

-
-

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

R

Opti
↓

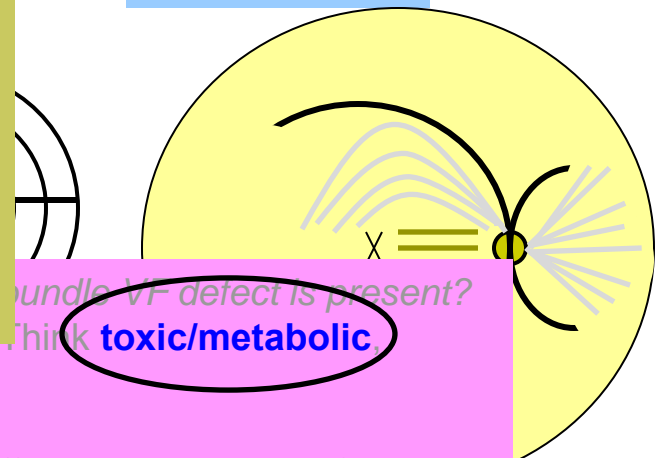
Optio

Retr

with damage to each group?

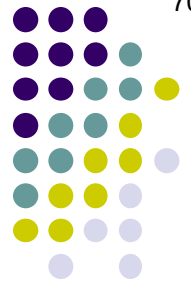
Nasal step
 Altitudinal
 Temporal wedge

Arcuate
Central
Ceco-central



bundle VF defect is present?
toxic/metabolic

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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:

-
-

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

R

Optic

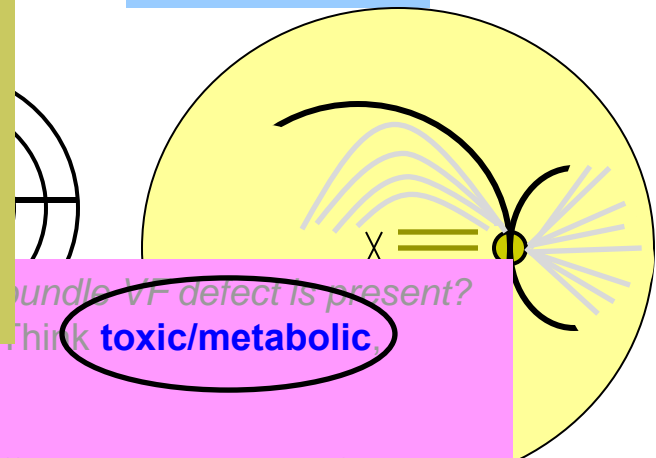
Optic

Retr

with damage to each group?

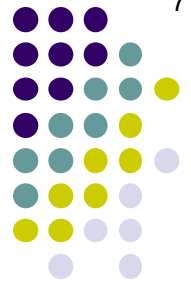
Nasal step
 Altitudinal
 Temporal wedge

Arcuate
Central
Ceco-central



bundle VF defect is present?
toxic/metabolic

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- Linezolid
- (many others)

Nutrients that weren't ingested in sufficient quantity:

-
-
-

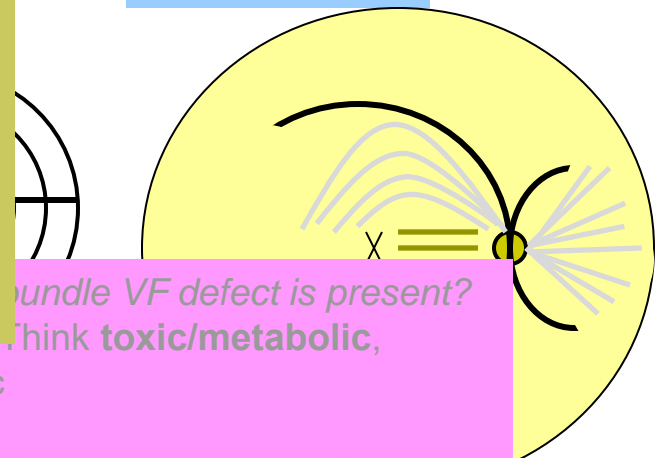
Inherited mitochondrial diseases:

-
-

nutritional deficiencies

with damage to each group?

- Nasal step
- Altitudinal
- Temporal wedge
- Arcuate
- Central**
- Ceco-central**

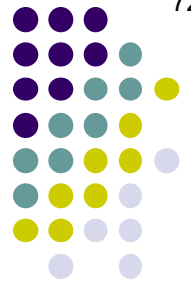


bundle VF defect is present? Think **toxic/metabolic**,

Optic

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.



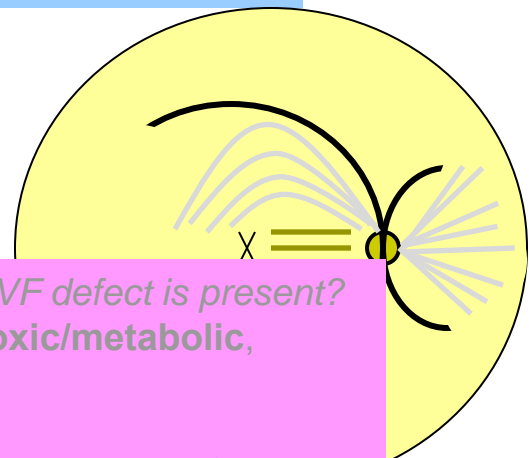
Visual Field Defects

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 - 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:*
 - Vitamin B₁₂
 - Folate
 - Thiamine
- Inherited mitochondrial diseases:*
 -
 -

nutritional deficiencies

with damage to each group?

- Nasal step
- Altitudinal
- Temporal wedge
- Arcuate
- Central**
- Ceco-central**



bundle VF defect is present? Think **toxic/metabolic,**

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

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 - Ethylene glycol
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 - (many others)
- Toxins that shouldn't be ingested in large quantities for prolonged periods:*
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- Toxins you were told to ingest by a doc:*
 - Amiodarone
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 - Isoniazid
 - Linezolid
 - (many others)
- Nutrients that weren't ingested in sufficient quantity:*
 - Vitamin B₁₂
 - Folate
 - Thiamine
- Inherited mitochondrial diseases:*
 -
 -

R

Opti
v

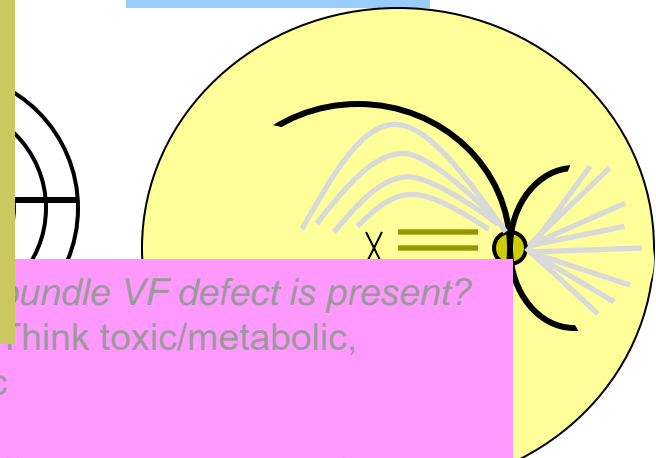
Optio

Retr

with damage to each group?

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



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

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

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- 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:*
 - Vitamin B₁₂
 - Folate
 - Thiamine
- Inherited mitochondrial diseases:*
 - Leber's hereditary optic neuropathy
 - Autosomal dominant optic atrophy

R

Optic

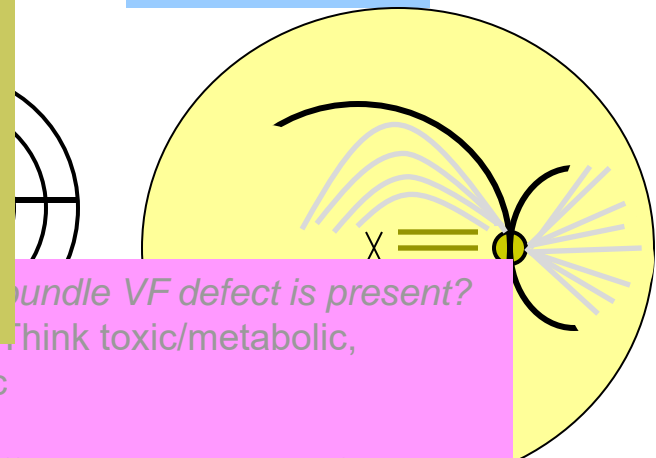
Optic

Retr

with damage to each group?

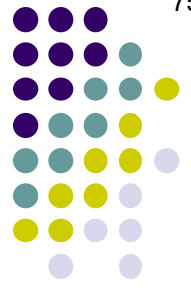
Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central



inherited mitochondrial dz

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

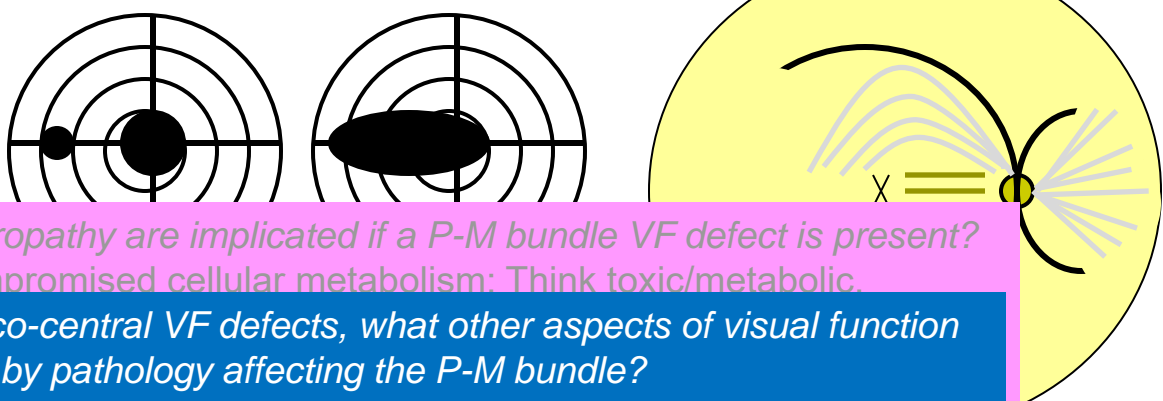
R Which of these VF defects are associated with damage to each group?

Optic nerve head

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

- Nasal step
- Altitudinal
- Temporal wedge
- Arcuate
- Central**
- Ceco-central**

Optic chiasm

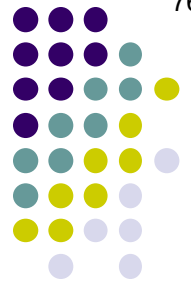


Which sorts of optic neuropathy are implicated if a P-M bundle VF defect is present? Conditions involving compromised cellular metabolism: Think toxic/metabolic.

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

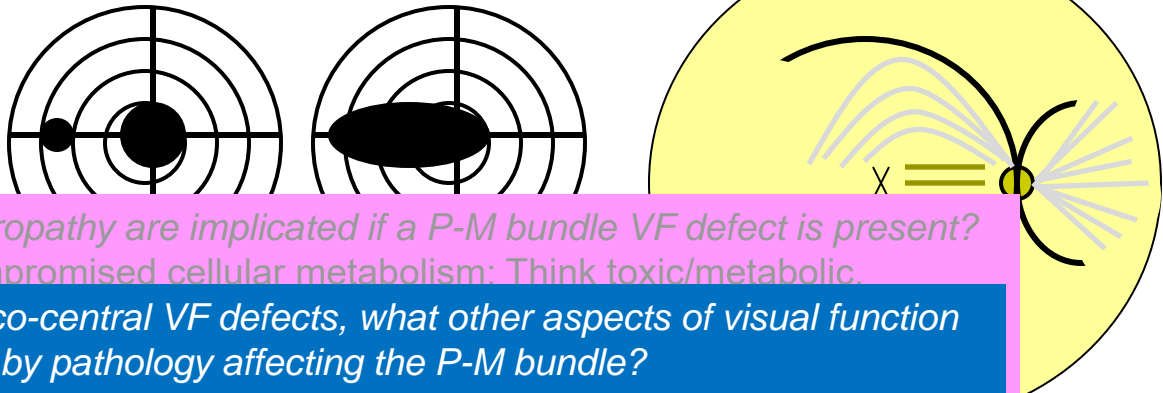
R Which of these VF defects are associated with damage to each group?

Optic nerve head

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

- Nasal step
- Altitudinal
- Temporal wedge
- Arcuate
- Central**
- Ceco-central**

Optic chiasm



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

Retr

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

- 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

Papillomacular bundle

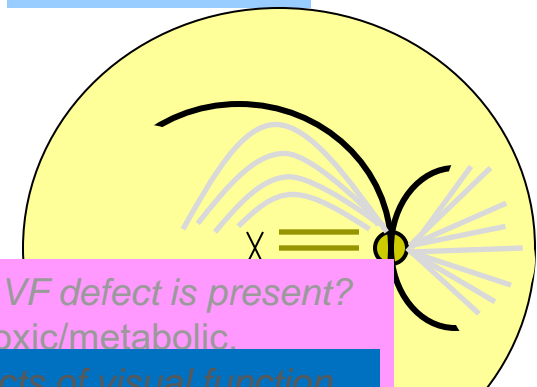
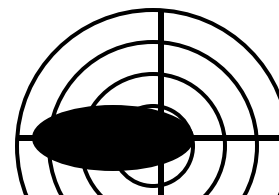
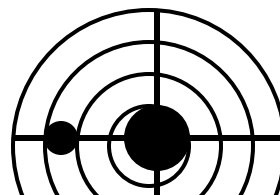
Arcuate fibers

Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

Optic chiasm



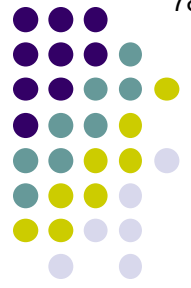
Which sorts of optic neuropathy are implicated if a P-M bundle VF defect is present?
Conditions involving compromised cellular metabolism: Think toxic/metabolic.
In addition to central/ceco-central VF defects, what other aspects of visual function

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

-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

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

- Nasal step
- Altitudinal
- Temporal wedge

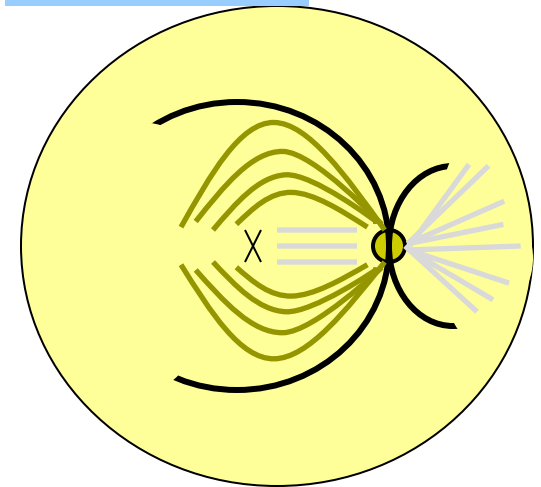
?

- 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

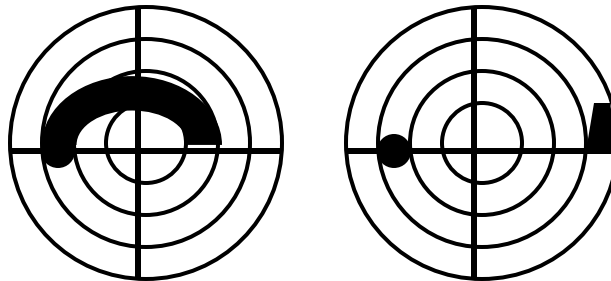
Optic nerve head

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

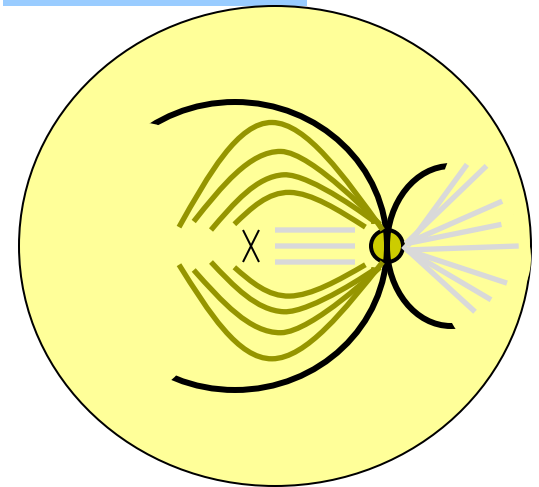
Nasal step
Altitudinal
Temporal wedge

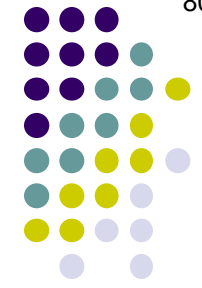
Arcuate
Central
Ceco-central

Optic chiasm



Retrochiasmal





Visual Field Defects

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

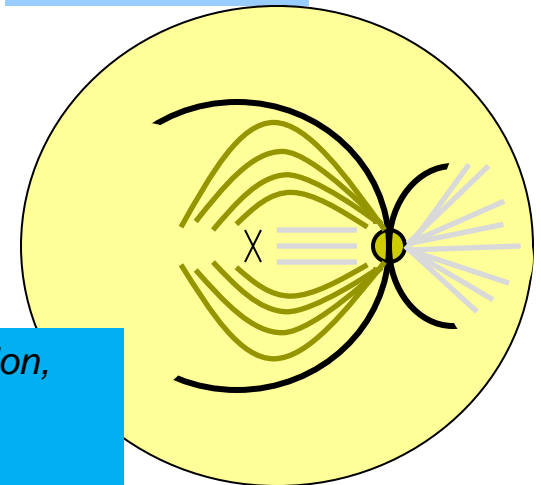
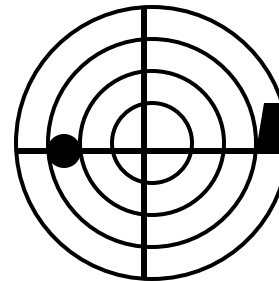
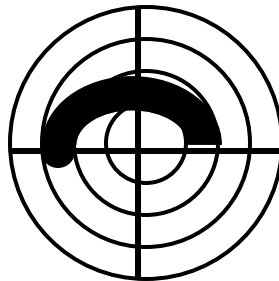
Optic nerve head

Clinically obvious dz

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

- Nasal step**
- Altitudinal
- Temporal wedge
- Arcuate**
- Central
- Ceco-central

Optic chiasm



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

Retroch



Visual Field Defects

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

Optic nerve head

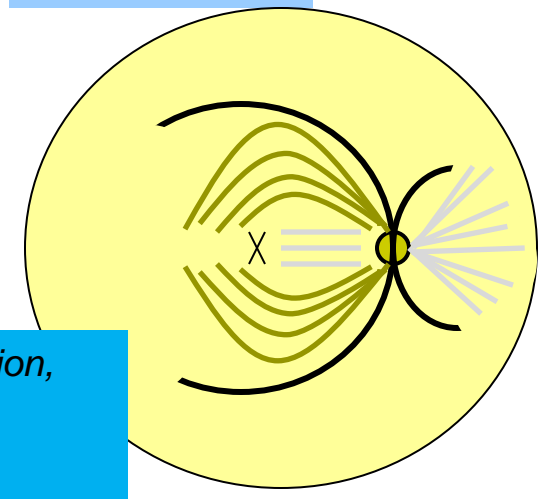
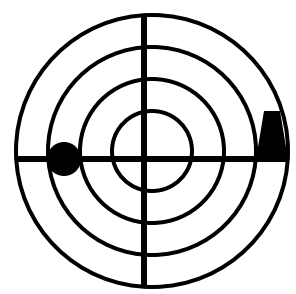
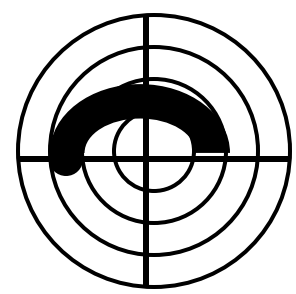
Clinically obvious dz

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

- Nasal step**
- Altitudinal
 - Temporal wedge

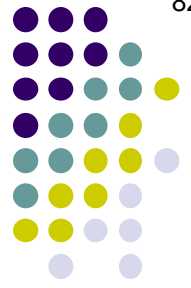
- Arcuate**
- Central
 - Ceco-central

Optic chiasm



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?

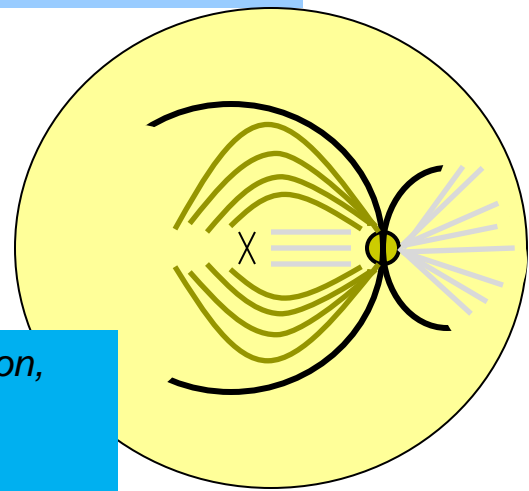
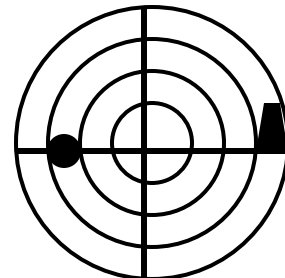
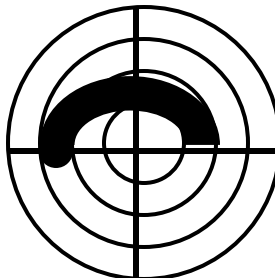
Optic nerve head

Clinically obvious dz

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

- Nasal step**
 - Altitudinal
 - Temporal wedge
- Arcuate**
 - Central
 - Ceco-central

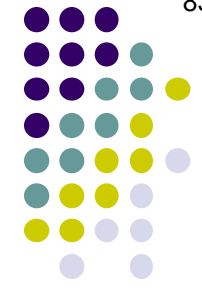
Optic chiasm



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?



Visual Field Defects

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

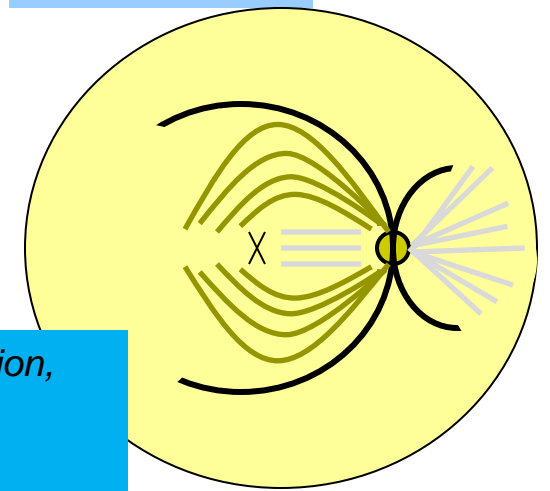
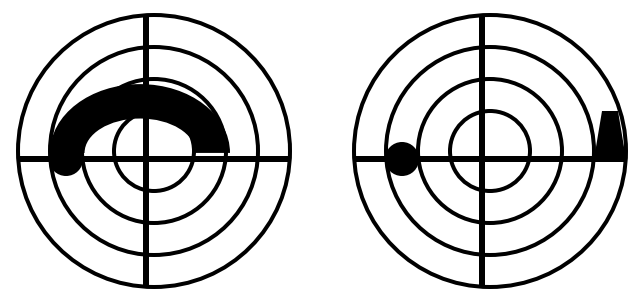
Optic nerve head

Clinically obvious dz

Papillomacular bundle
Arcuate fibers
Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge
Arcuate
Central
Ceco-central

Optic chiasm



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
head

Arcuate fibers

Nasal radiating fibers

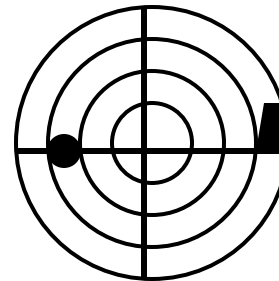
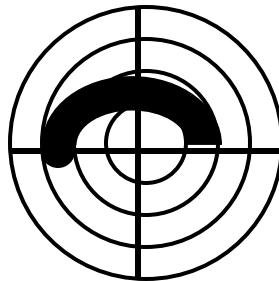
Temporal wedge

Arcuate

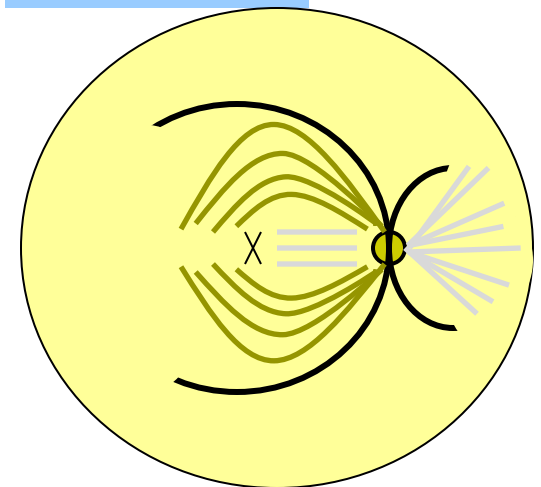
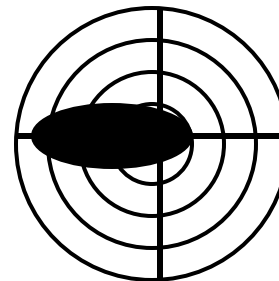
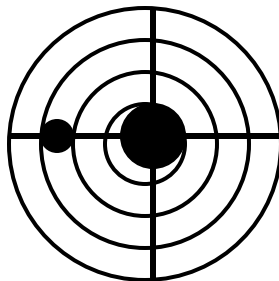
Central

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

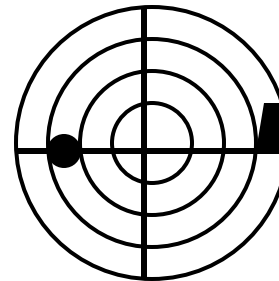
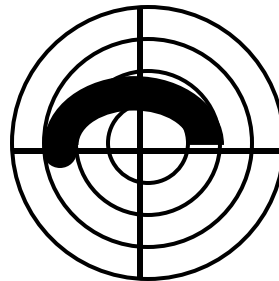
Temporal wedge

Arcuate

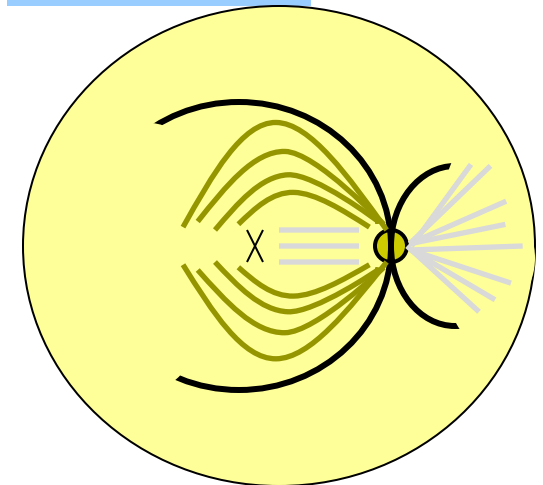
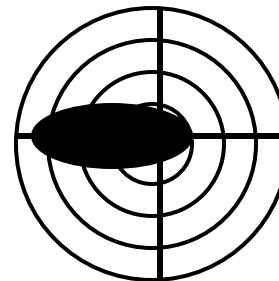
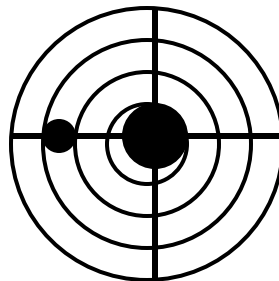
Central

Ceco-central

Optic chiasm



Retrochiasmal



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?

Optic nerve head
head

Arcuate fibers

Nasal radiating fibers

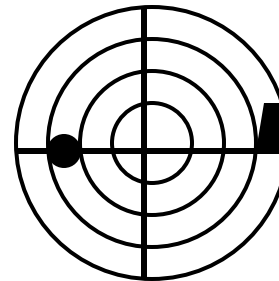
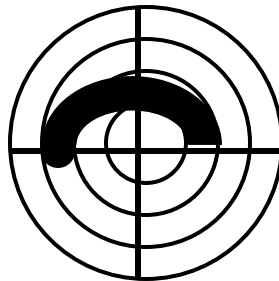
Temporal wedge

Arcuate

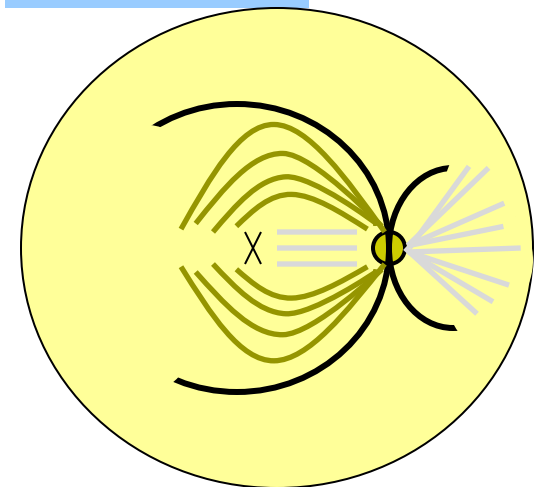
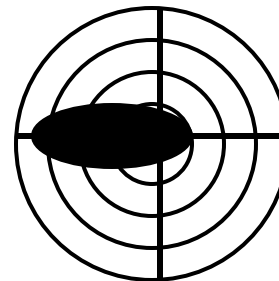
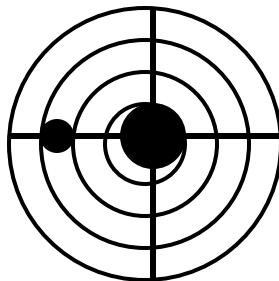
Central

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**.

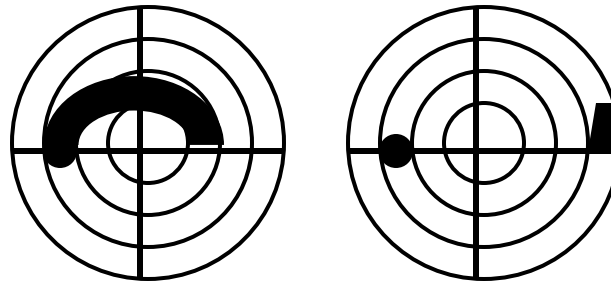
Optic nerve head

Arcuate fibers

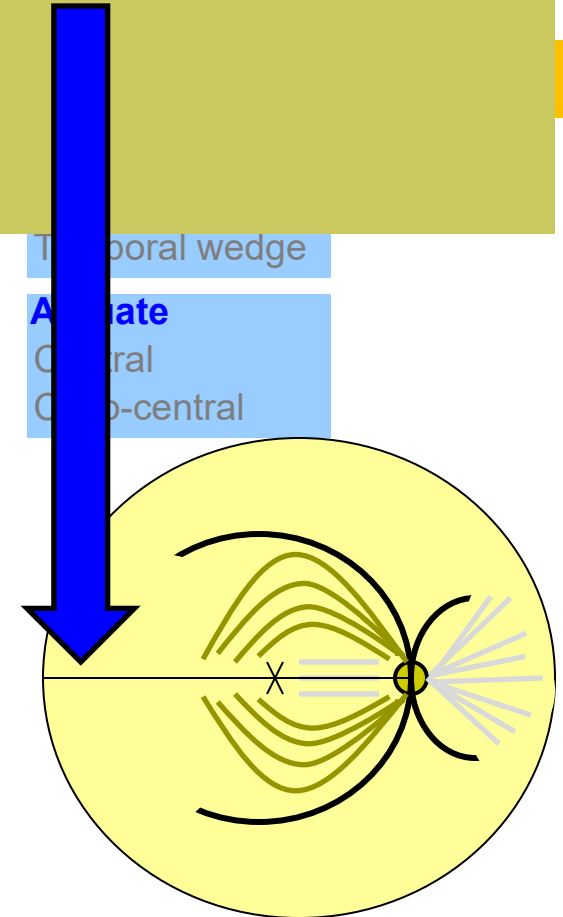
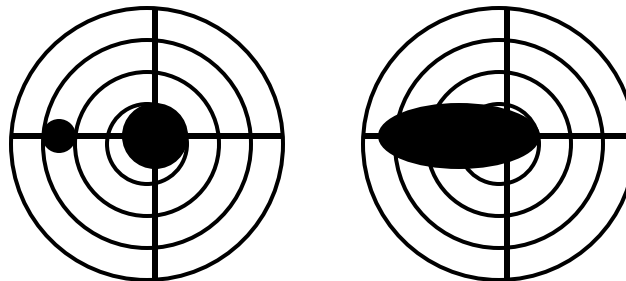
Nasal radiating fibers

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

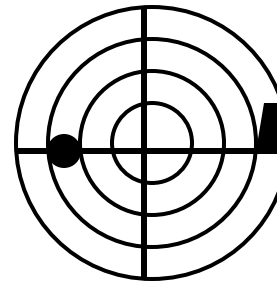
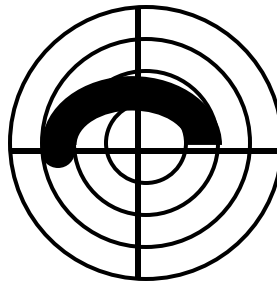
Temporal wedge

Arcuate

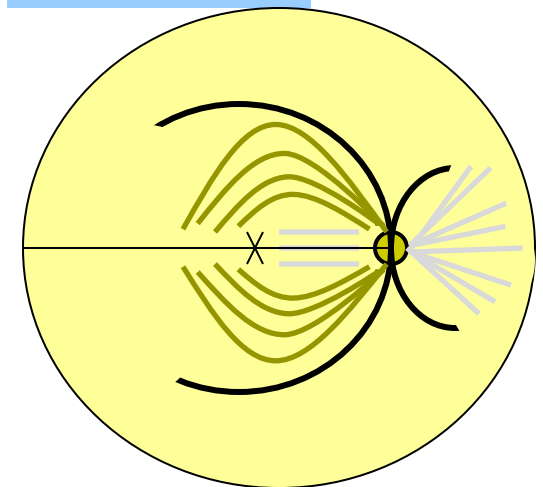
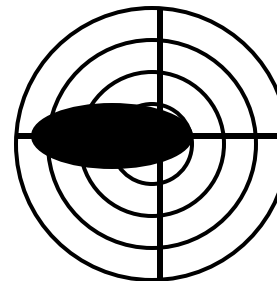
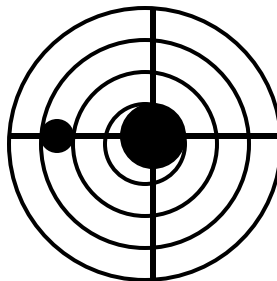
Central

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?

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.

What is this horizontal demarcation line called?

Optic nerve head

Arcuate fibers

Nasal radiating fibers

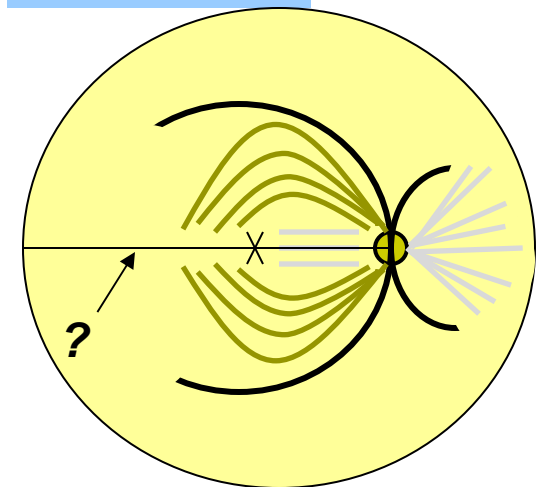
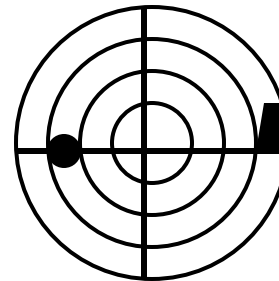
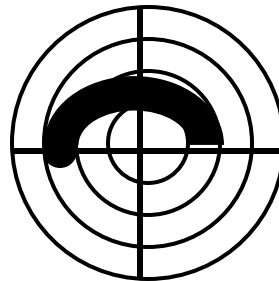
Temporal wedge

Arcuate

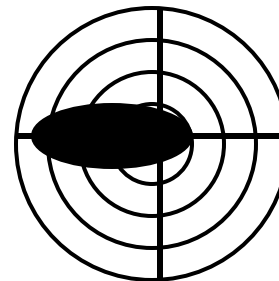
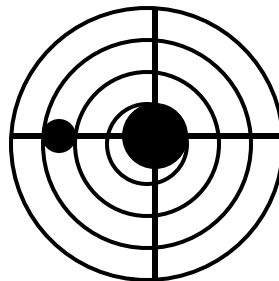
Central

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. Thus, damage to these fibers always result in VF defects that are limited to either the superior or the inferior portion of the field.

What is this horizontal demarcation line called?

The **horizontal raphe**

Optic nerve head

Arcuate fibers

Nasal radiating fibers

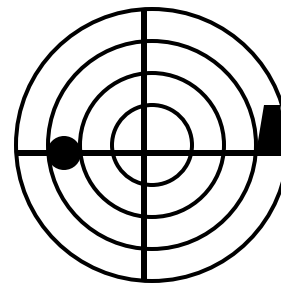
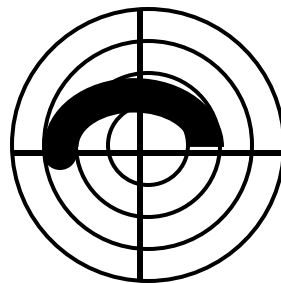
Temporal wedge

Arcuate

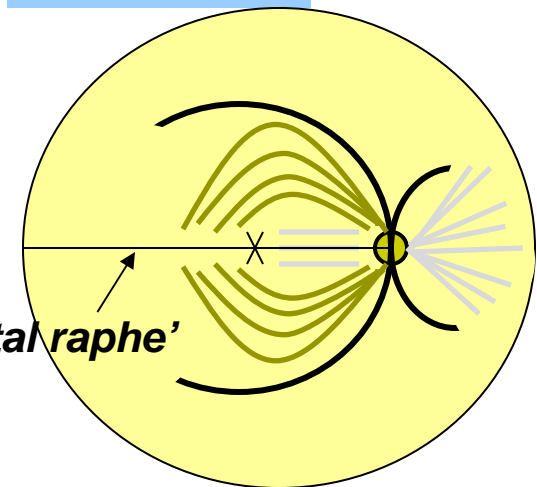
Central

Ceco-central

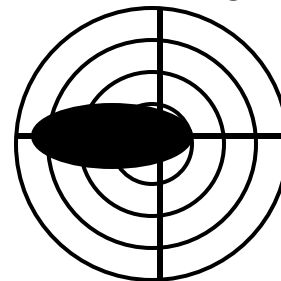
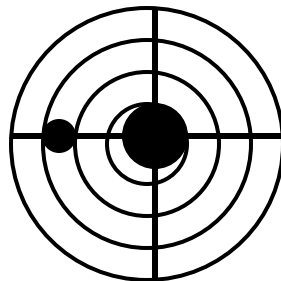
Optic chiasm



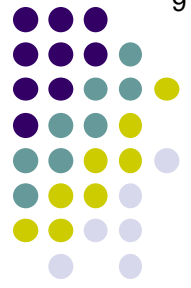
'Horizontal raphe'



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

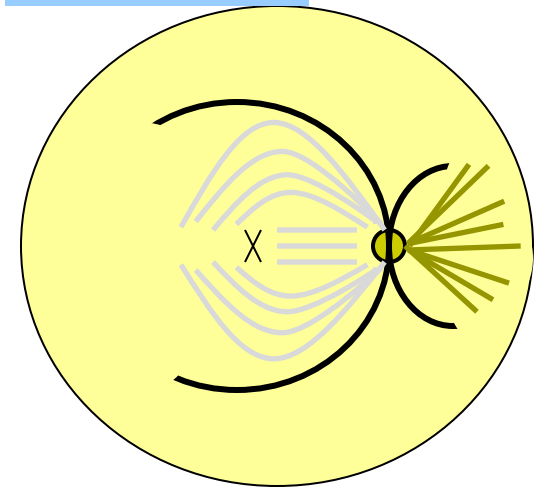
?

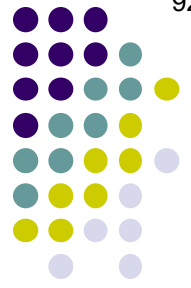
- Arcuate
- Central
- Ceco-central

?

Optic chiasm

Retrochiasmal





Visual Field Defects

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

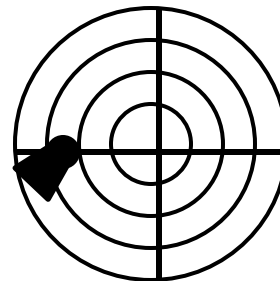
Optic nerve head

Clinically obvious dz

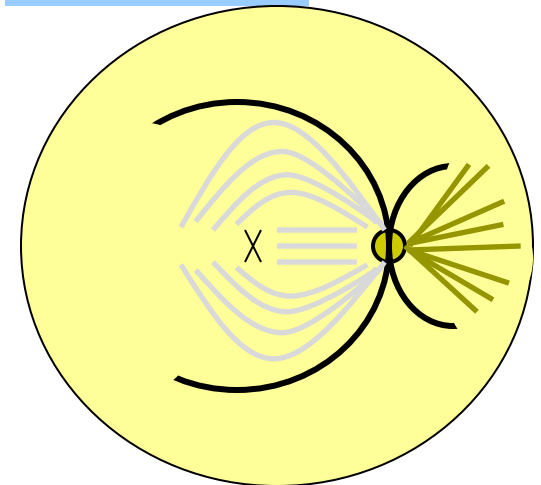
- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

- 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?

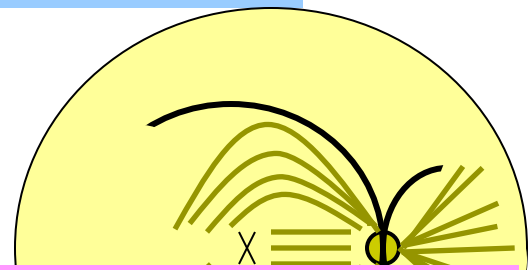
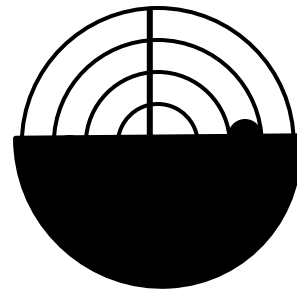
Clinically obvious dz

Optic nerve head

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

- Nasal step
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- Temporal wedge
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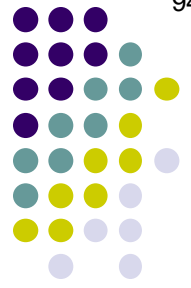
?



Optic chiasm

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

F



Visual Field Defects

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Clinically obvious dz

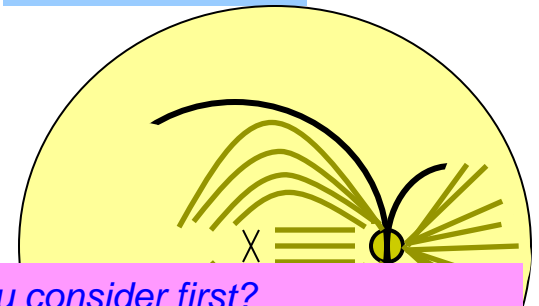
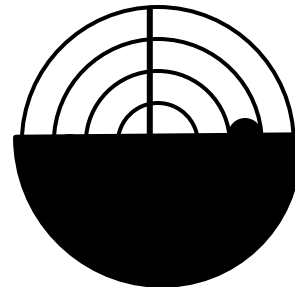
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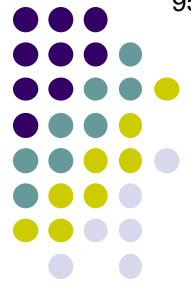


Optic chiasm

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-
-

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Visual Field Defects

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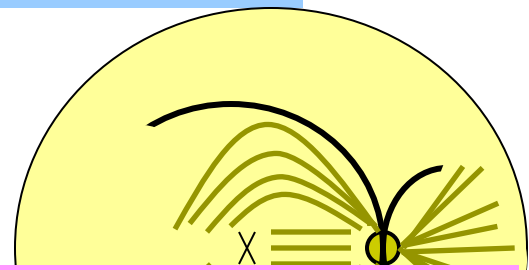
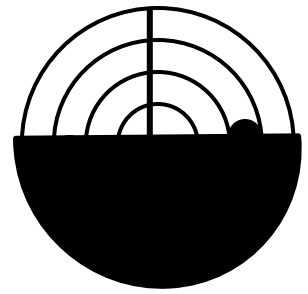
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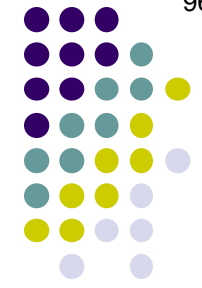
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Optic chiasm

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

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Visual Field Defects

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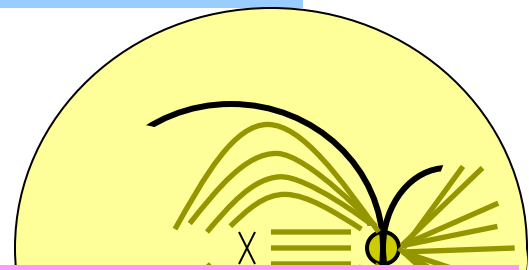
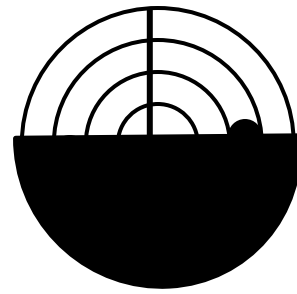
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Optic chiasm

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)
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F

Visual Field Defects

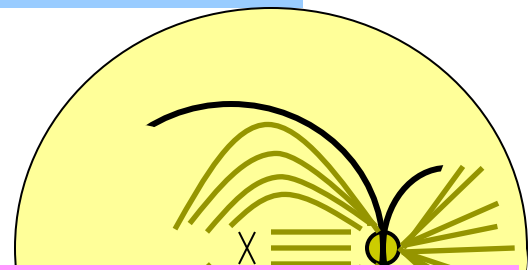
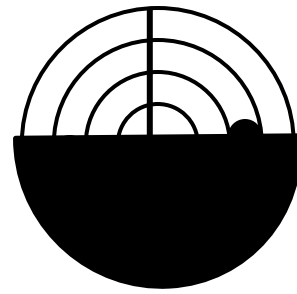


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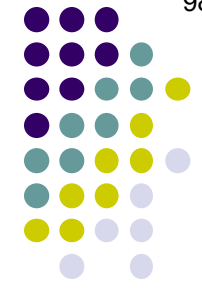


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How can you differentiate between these two conditions?



Visual Field Defects

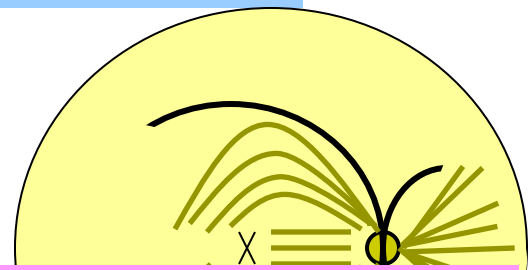
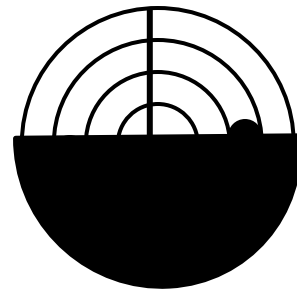
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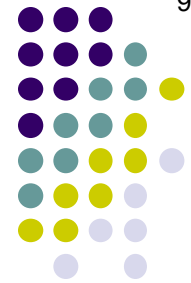
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F

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 **one word** in NAION, and **two words** in advanced glaucoma



Visual Field Defects

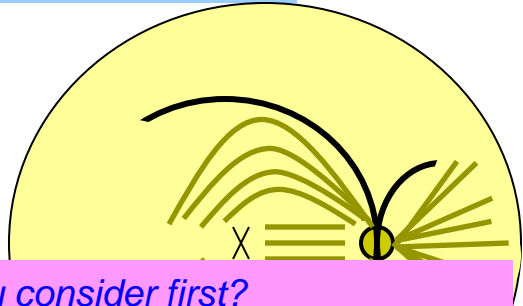
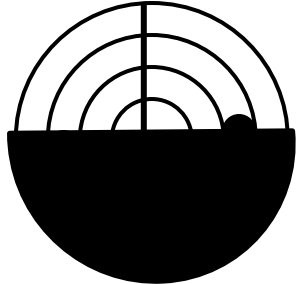
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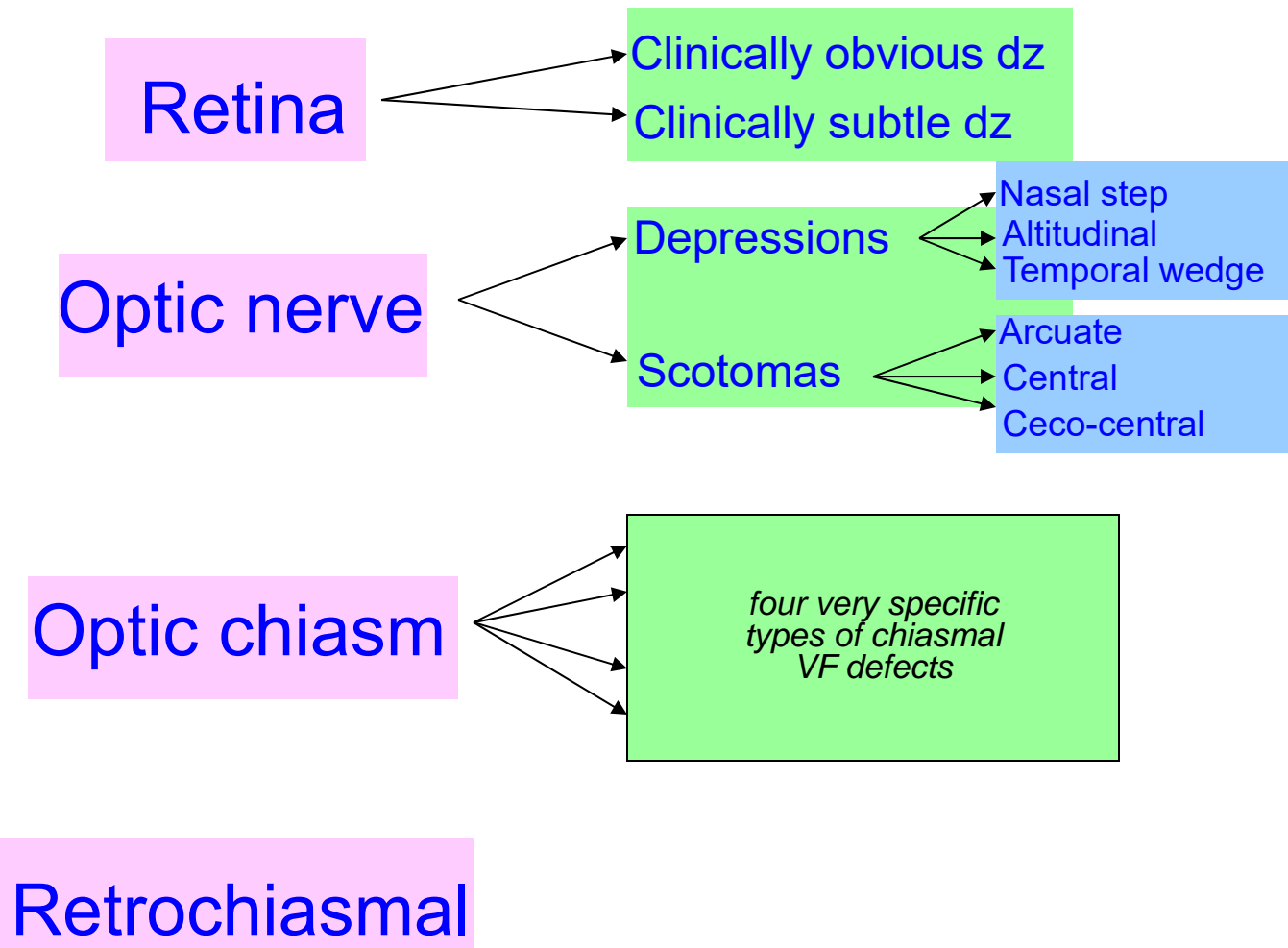
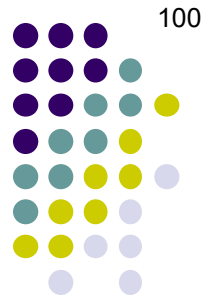
Optic chiasm

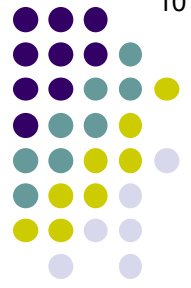
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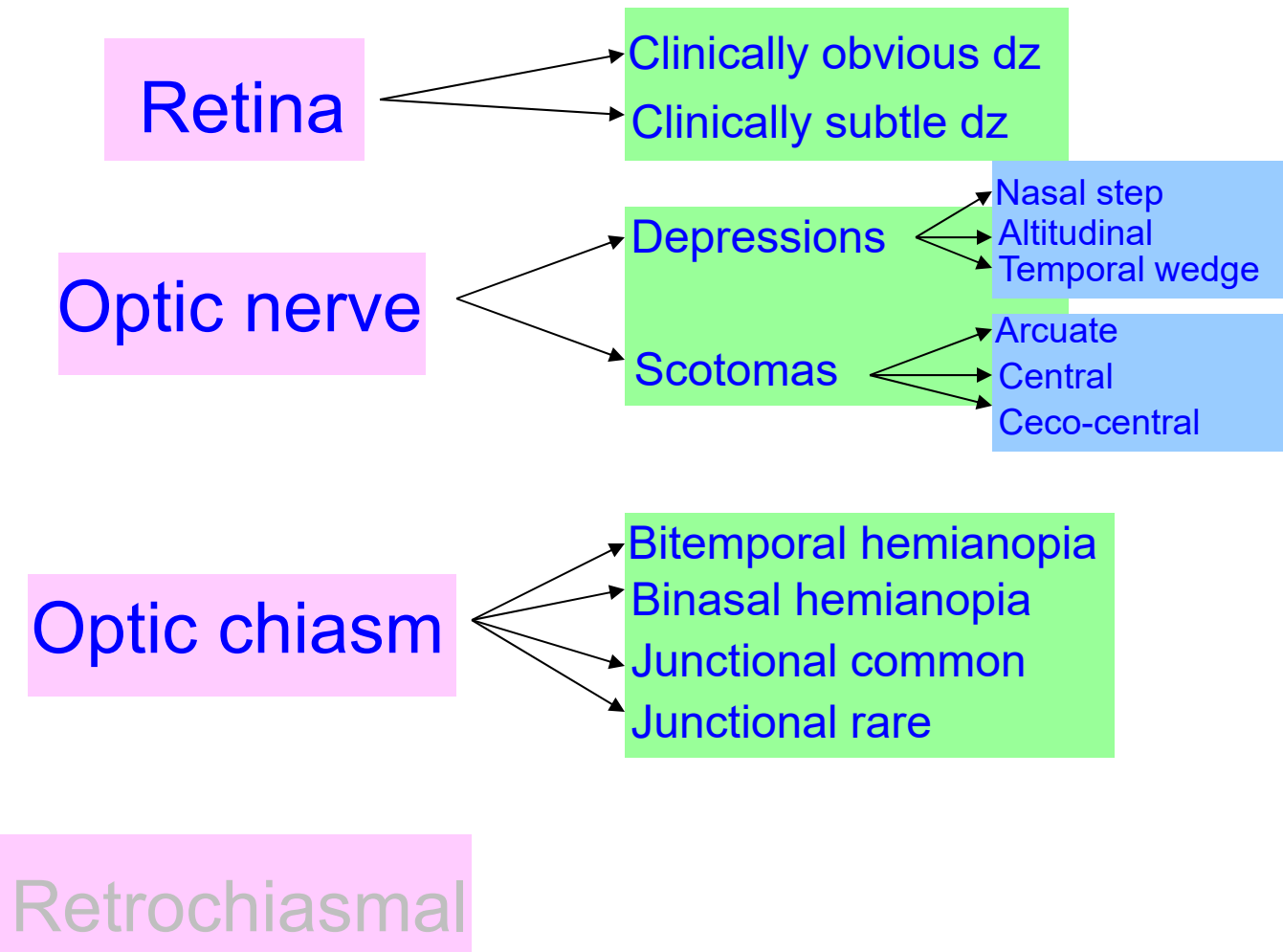
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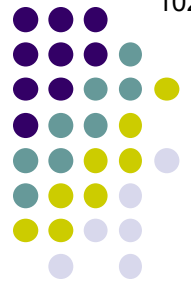
Visual Field Defects



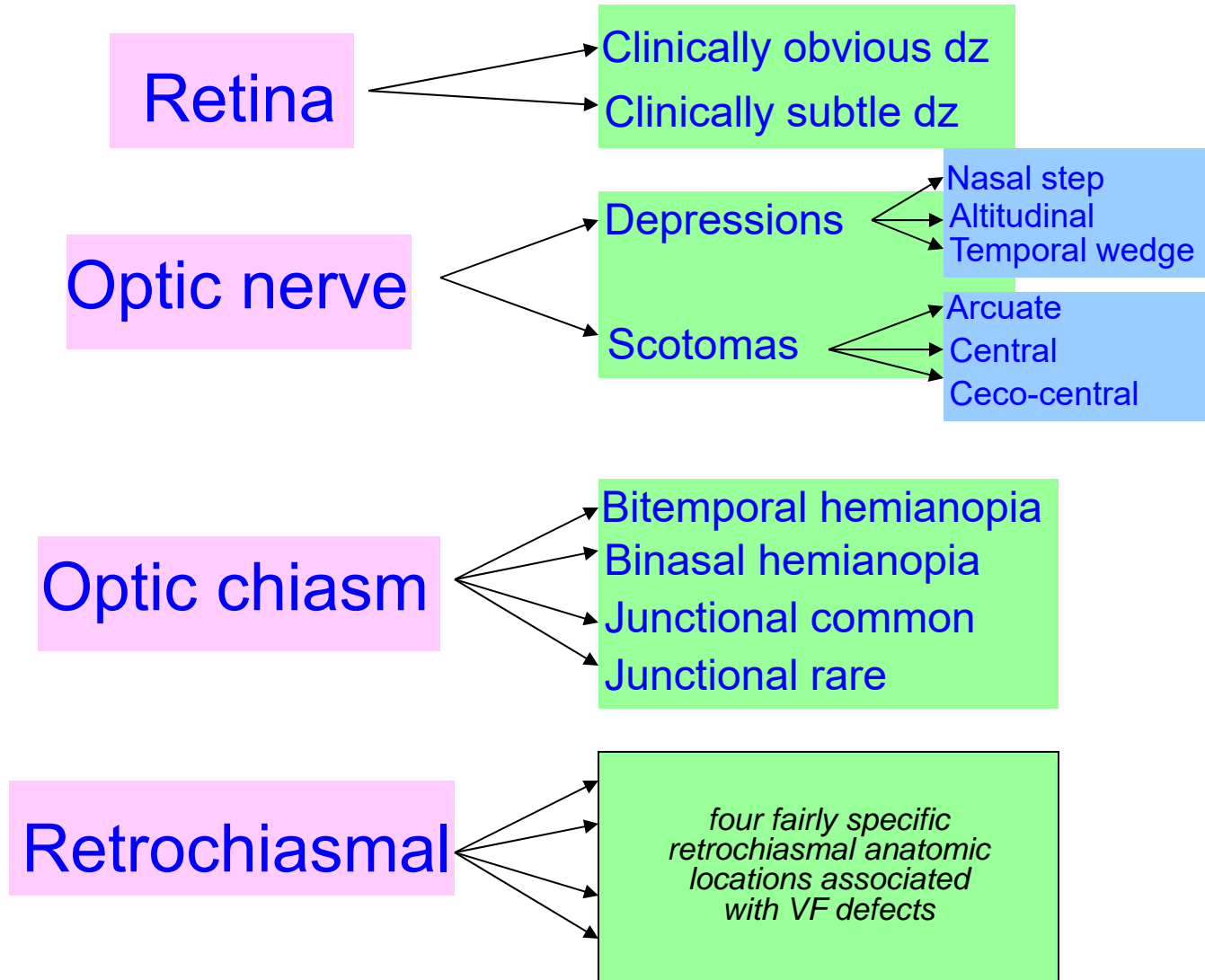


Visual Field Defects



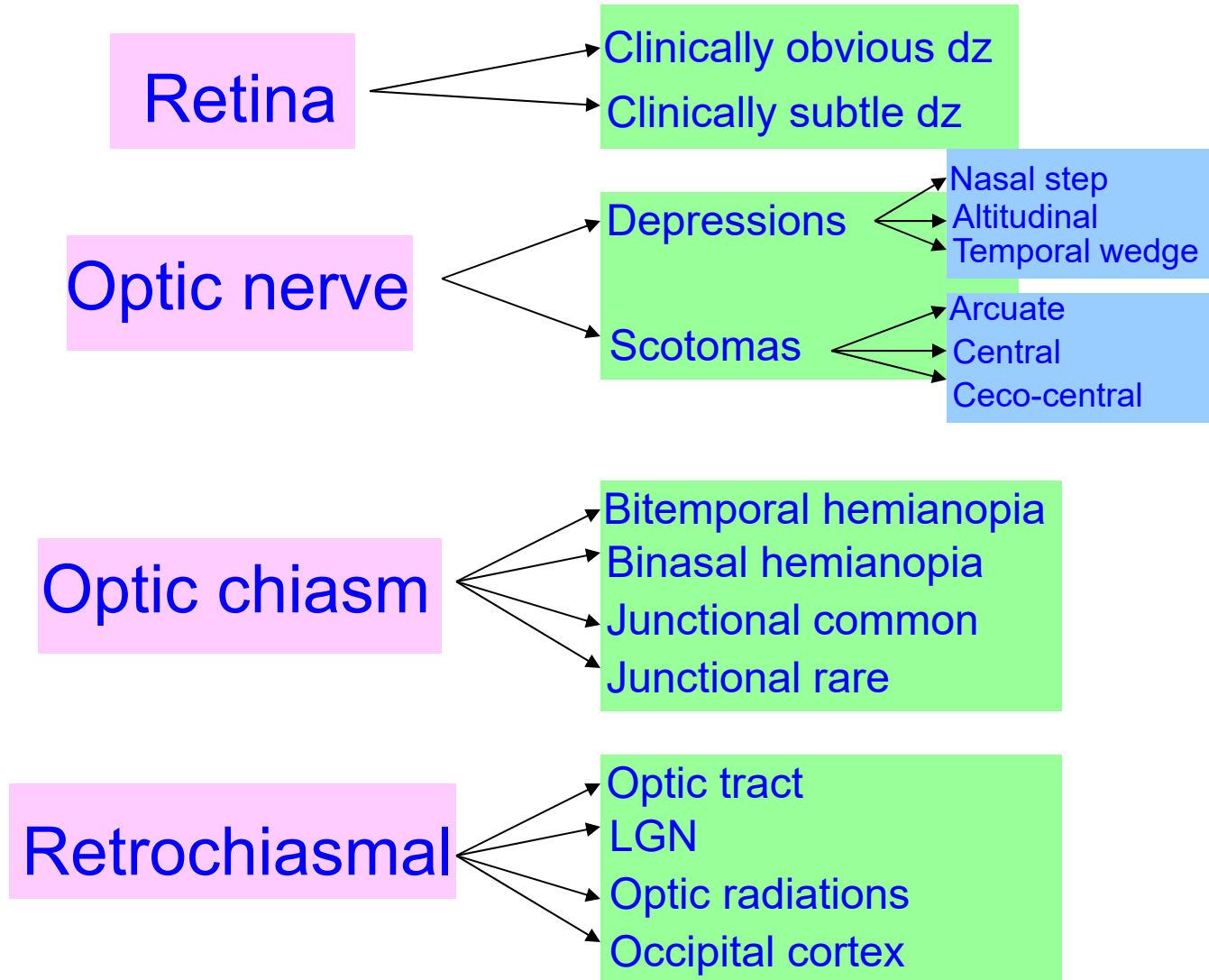


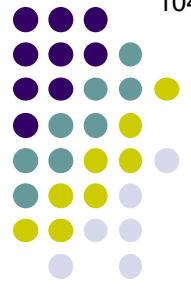
Visual Field Defects



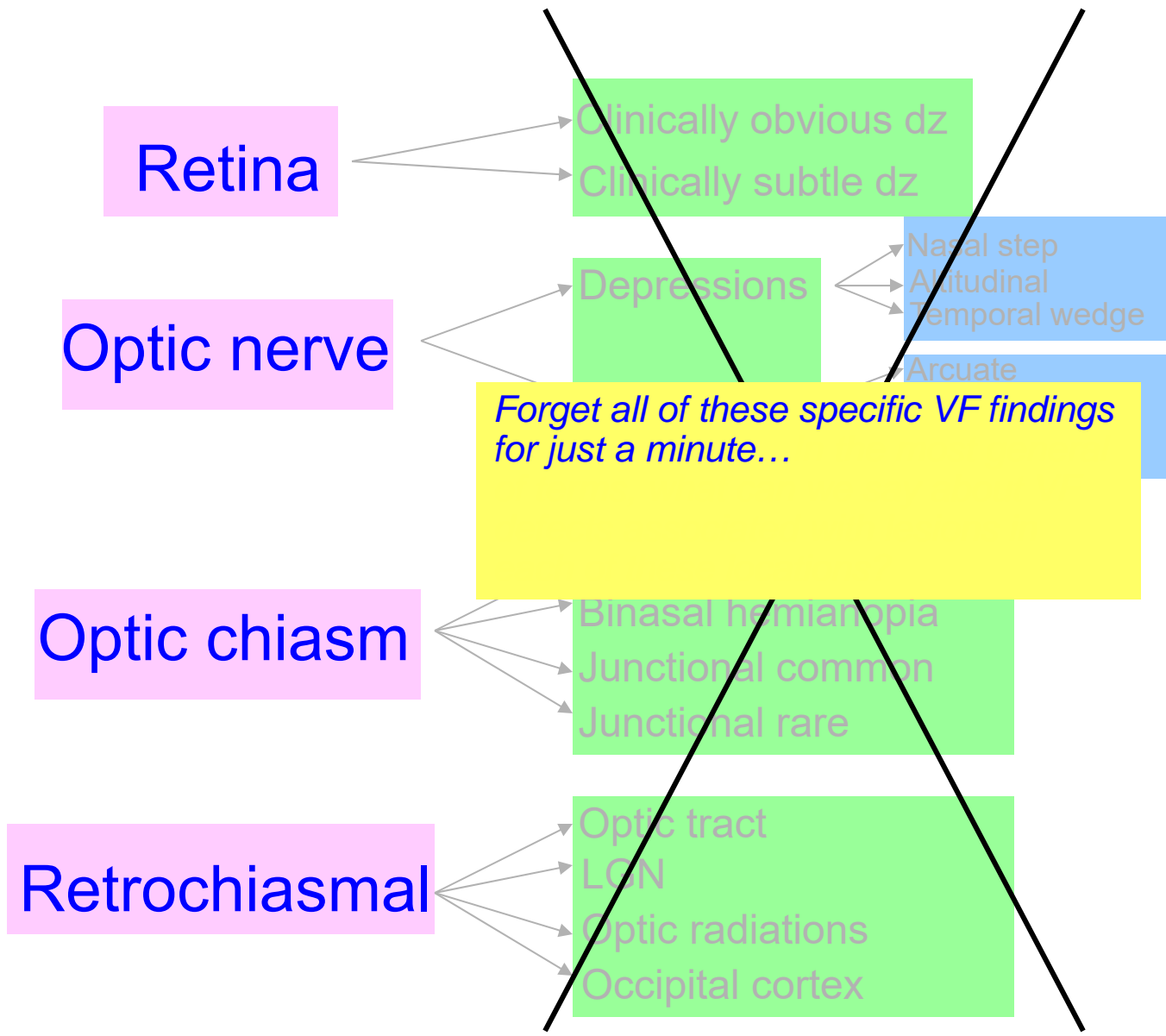


Visual Field Defects



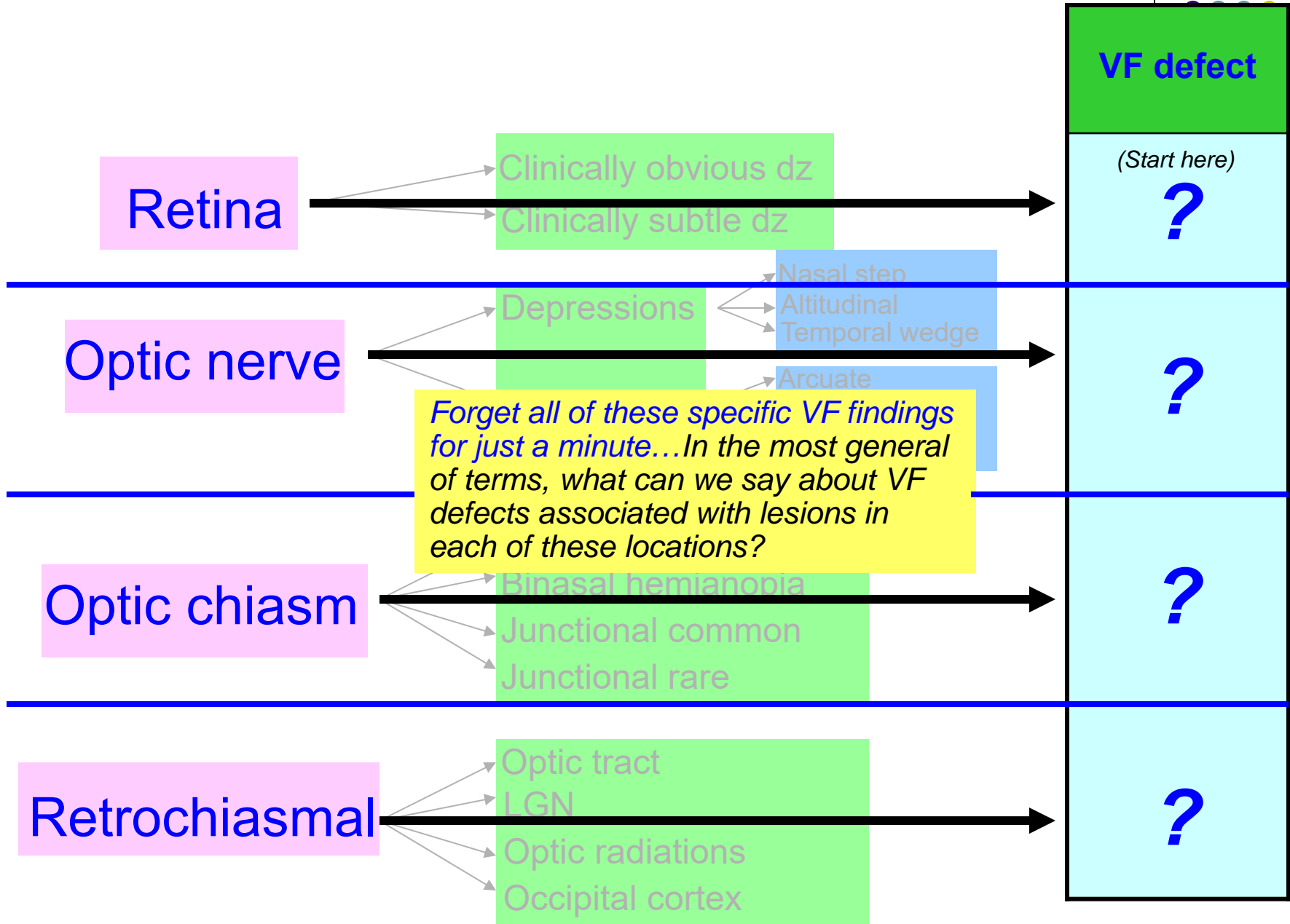


Visual Field Defects



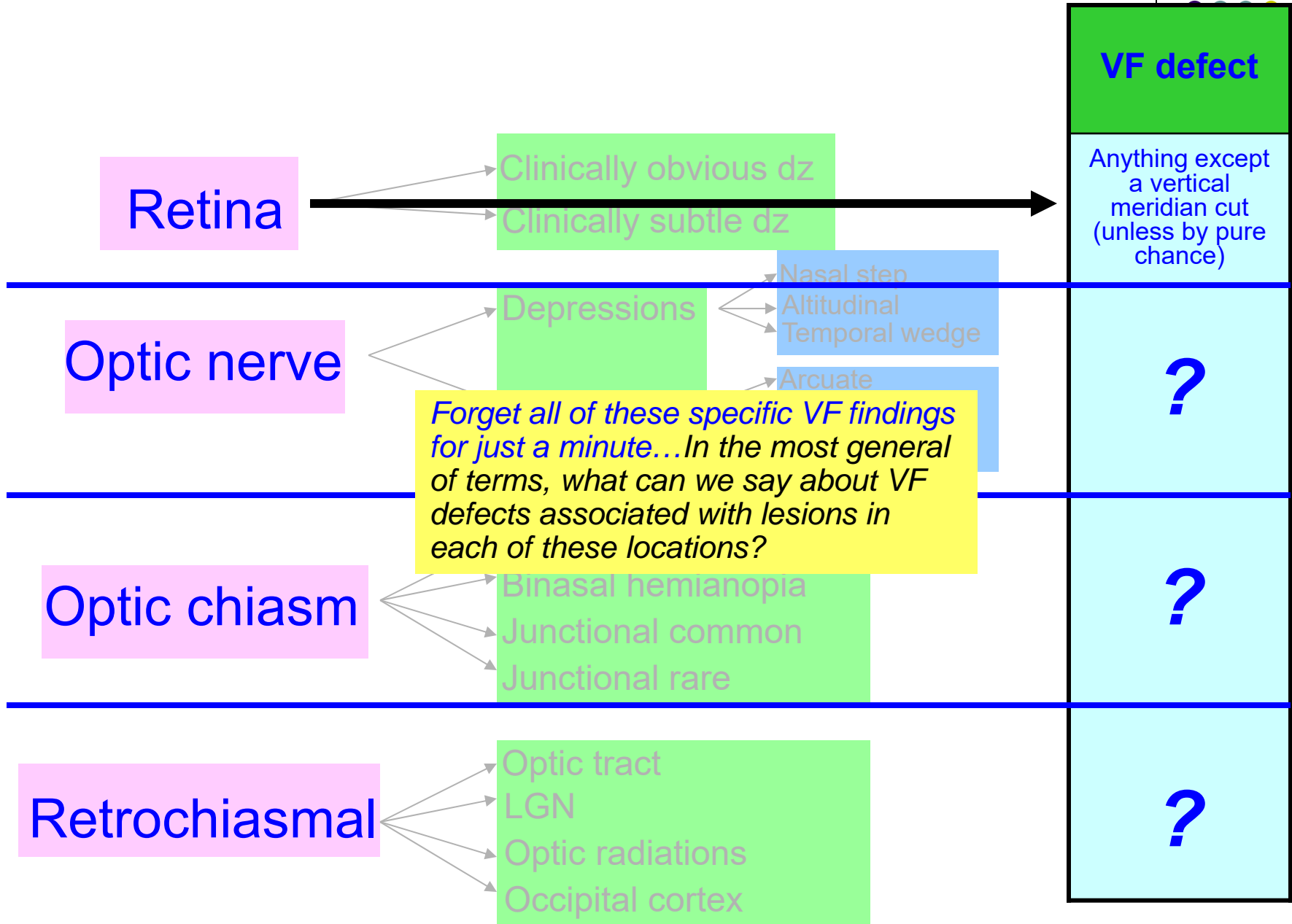


Visual Field Defects



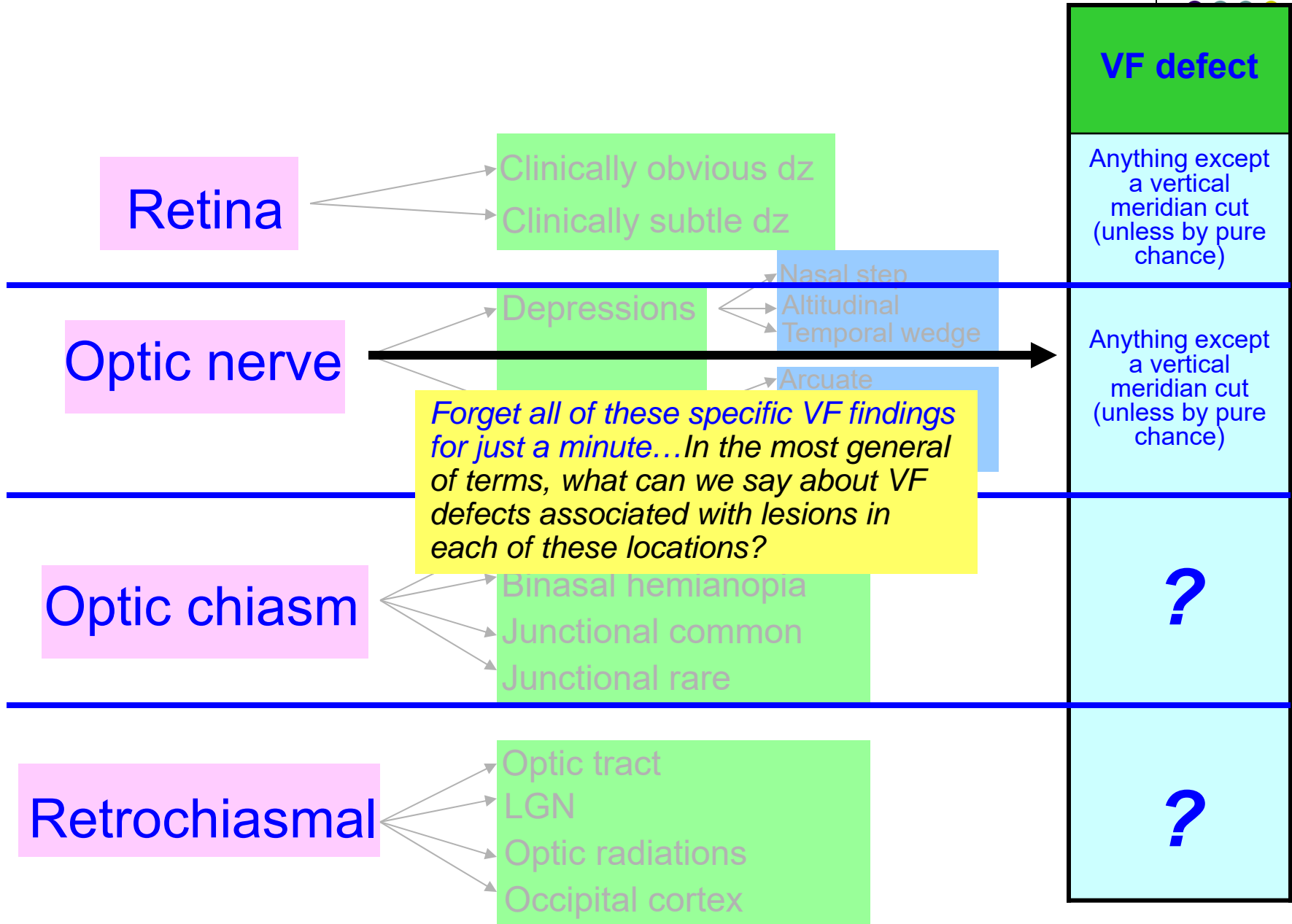


Visual Field Defects



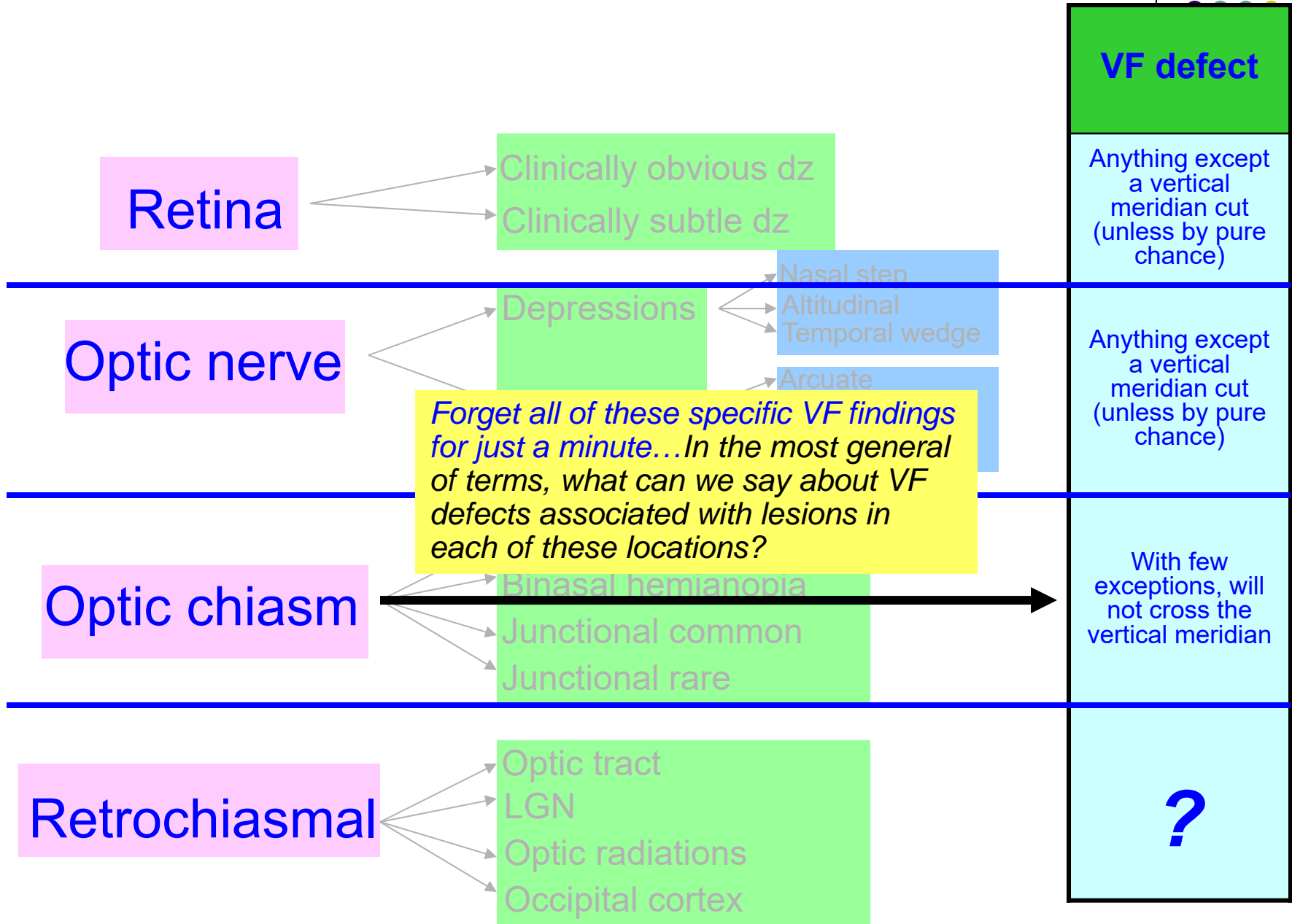


Visual Field Defects



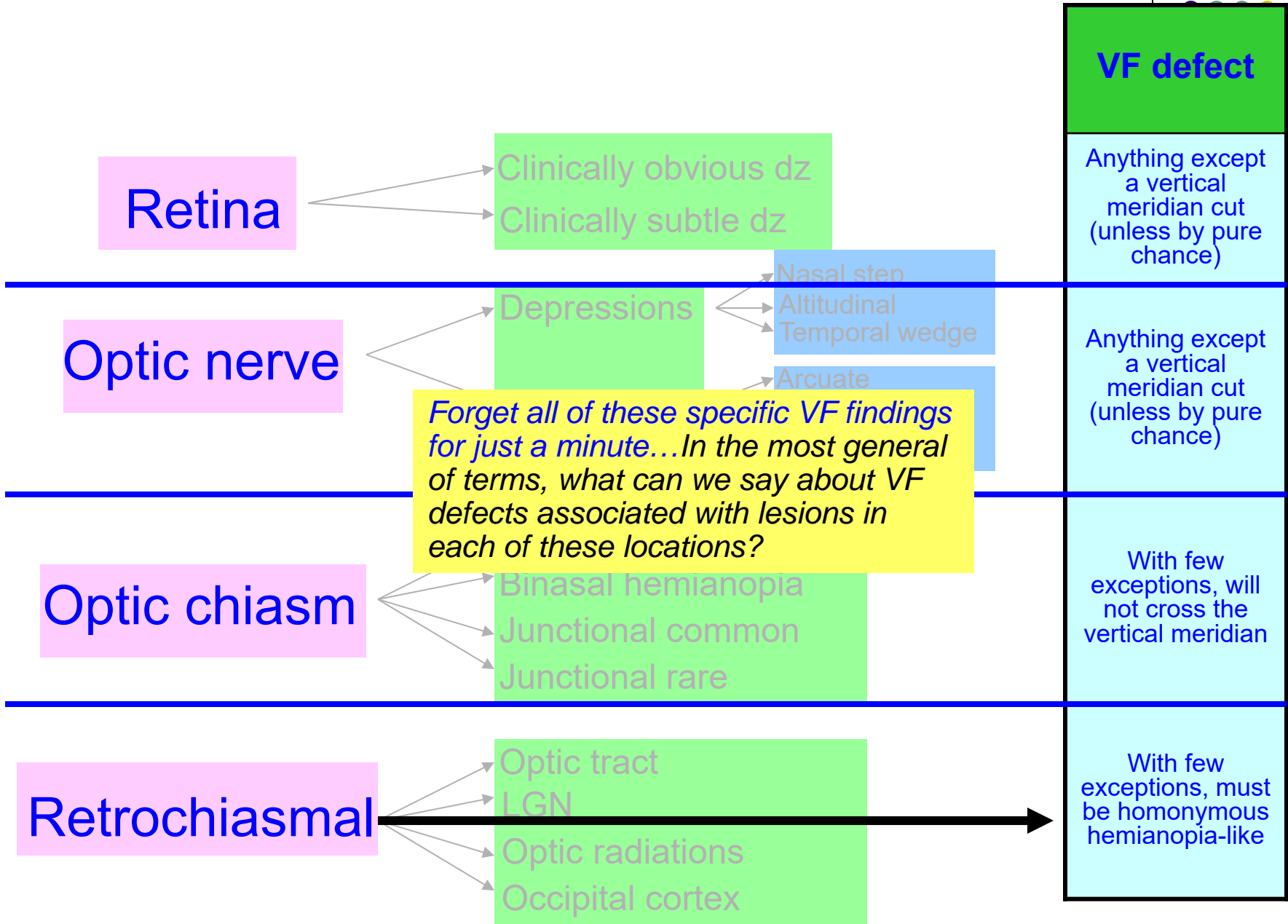


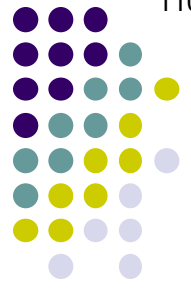
Visual Field Defects



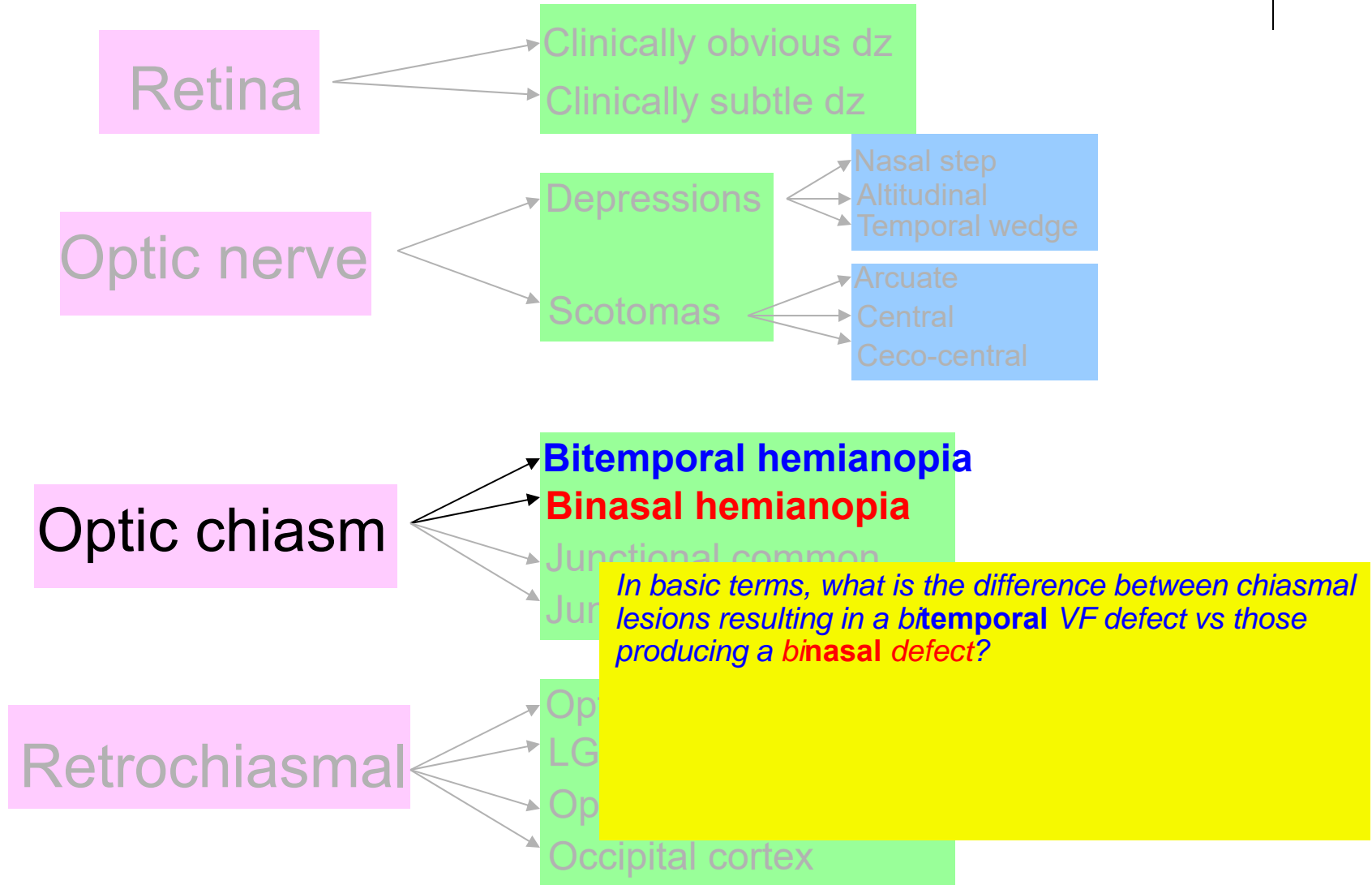


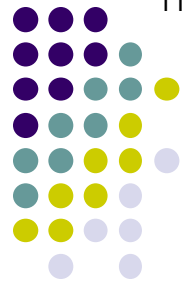
Visual Field Defects



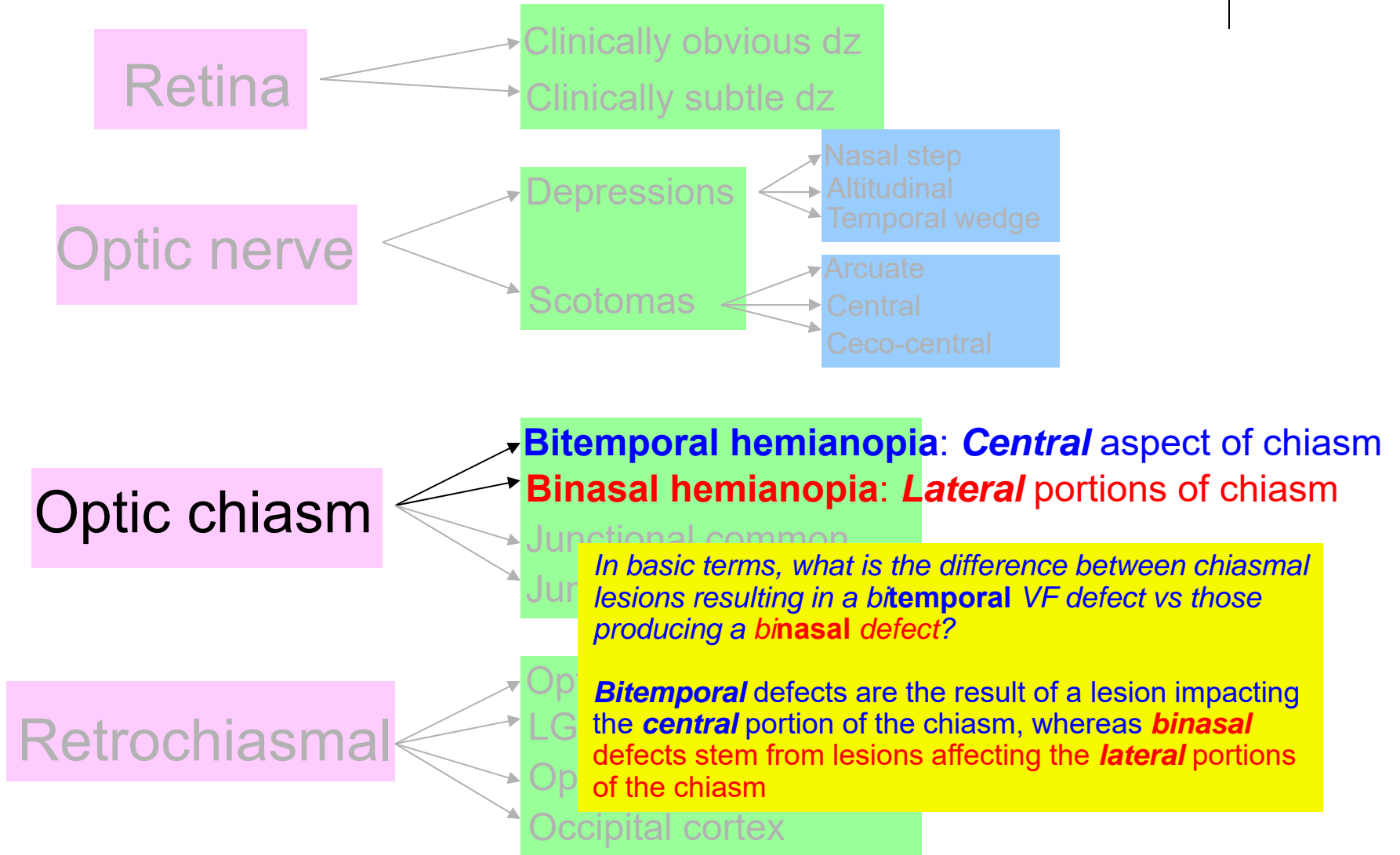


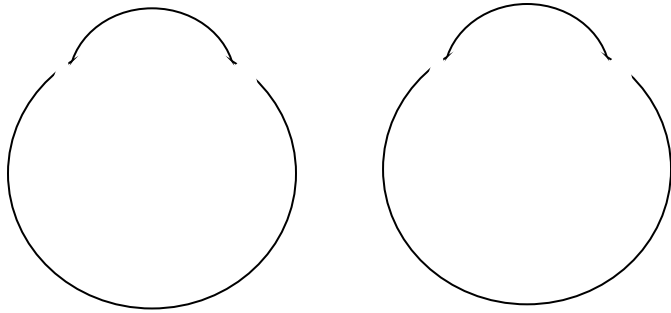
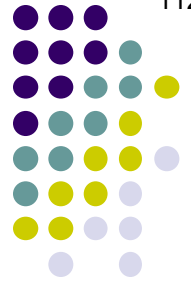
Visual Field Defects





Visual Field Defects





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?*

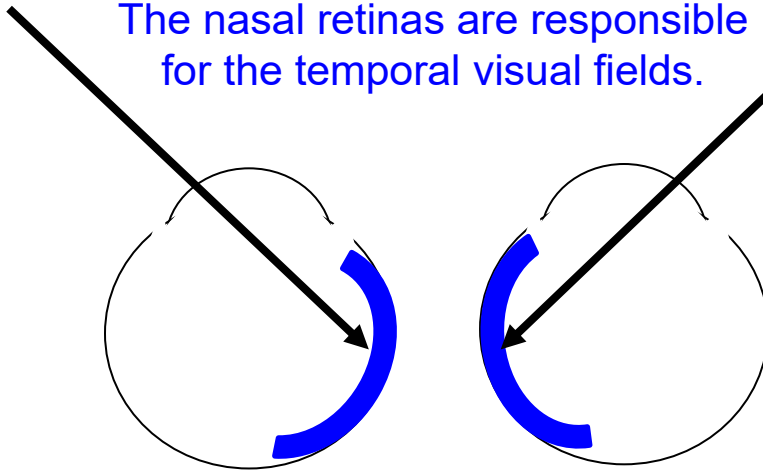
Bitemporal defects are the result of a lesion impacting the ***central*** portion of the chiasm, whereas ***binasal*** defects stem from lesions affecting the ***lateral*** portions of the chiasm



Temporal VF

The nasal retinas are responsible
for the temporal visual fields.

Temporal VF



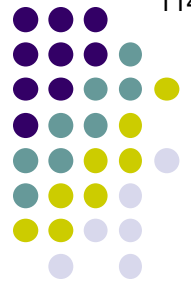
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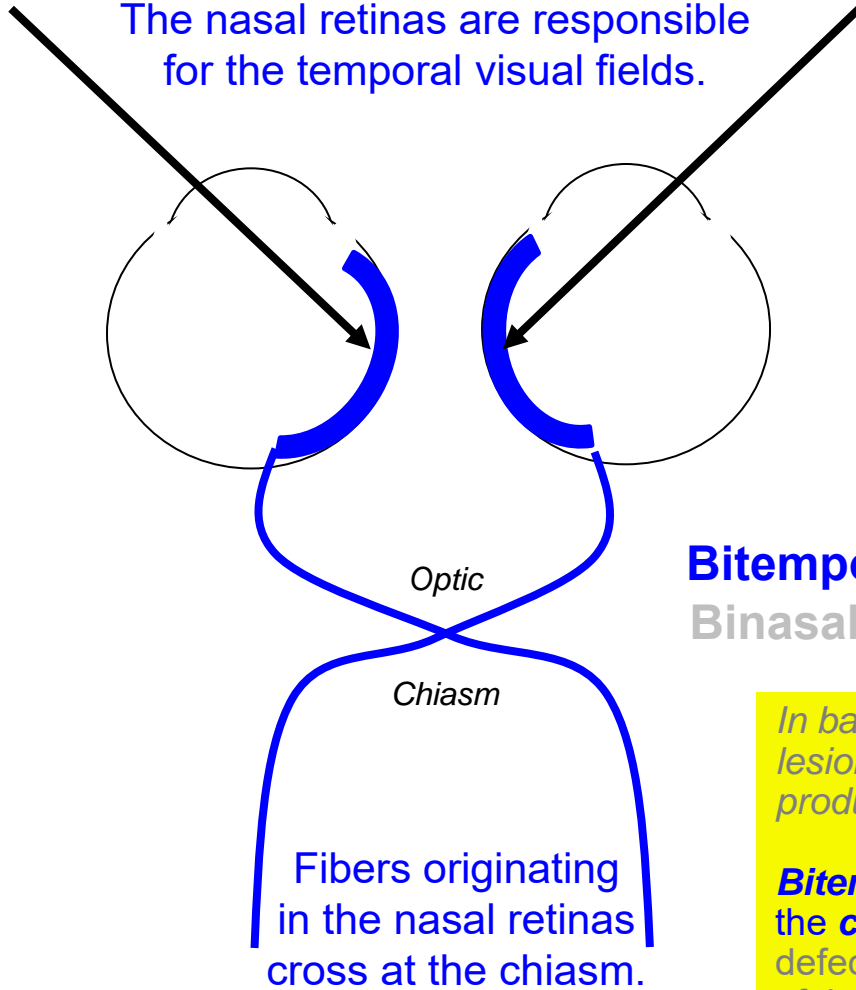
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Temporal VF

Temporal VF

The nasal retinas are responsible for the temporal visual fields.



Here's why:

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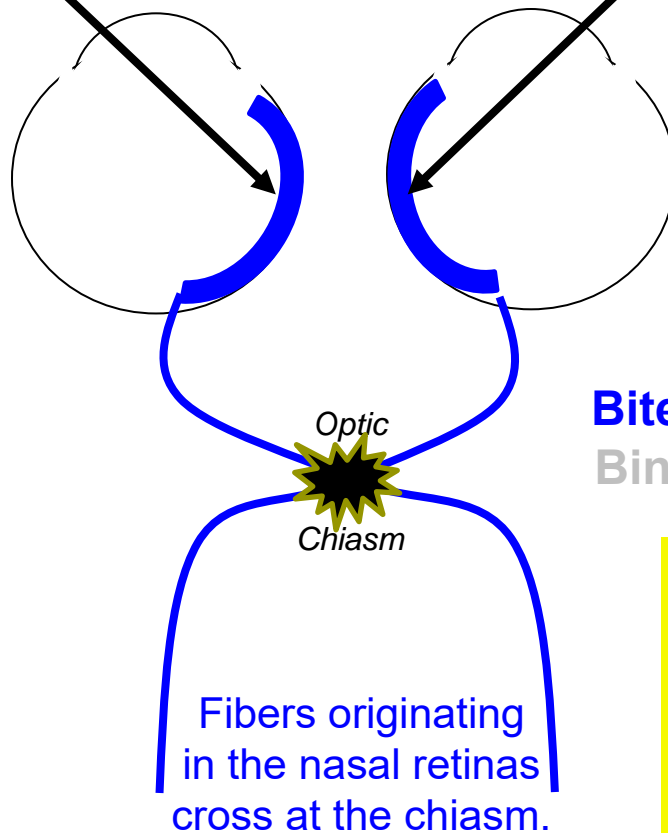
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Temporal VF

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Temporal VF



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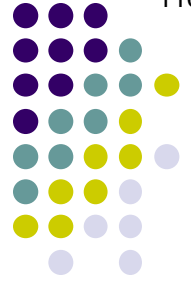
So a lesion of the central chiasm will bag these fibers, and thus tend to cause bitemporal defects

Bitemporal hemianopia: *Central* aspect of chiasm

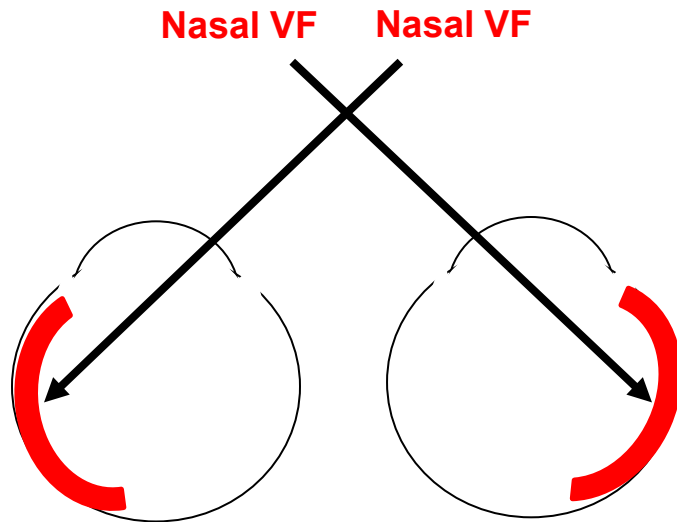
Binasal hemianopia: *Lateral* portions of chiasm

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



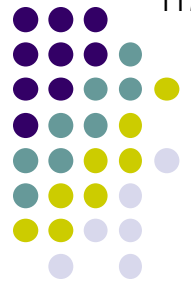
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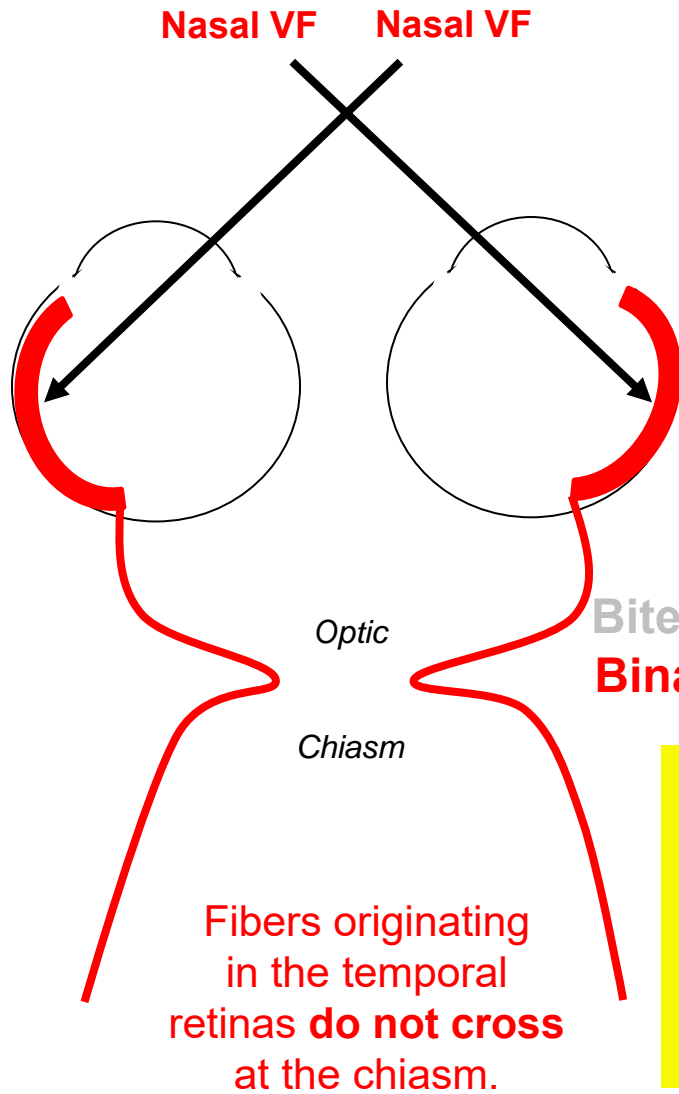
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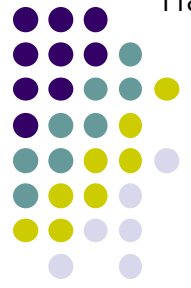
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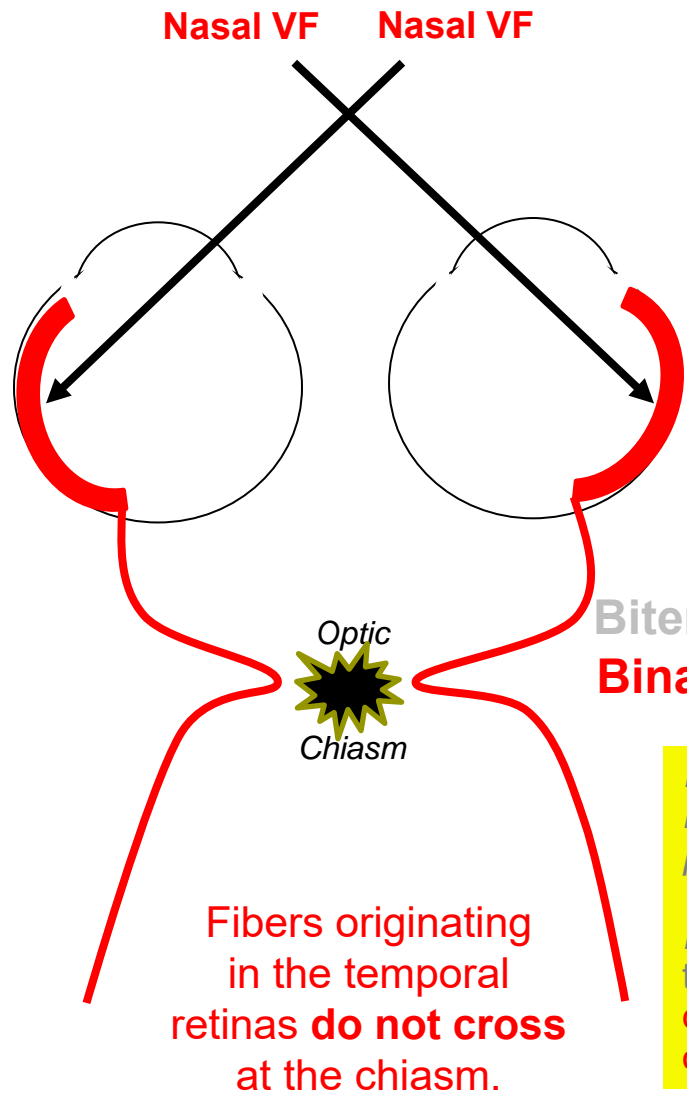
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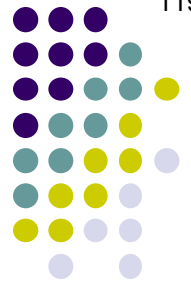
Here's why:

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

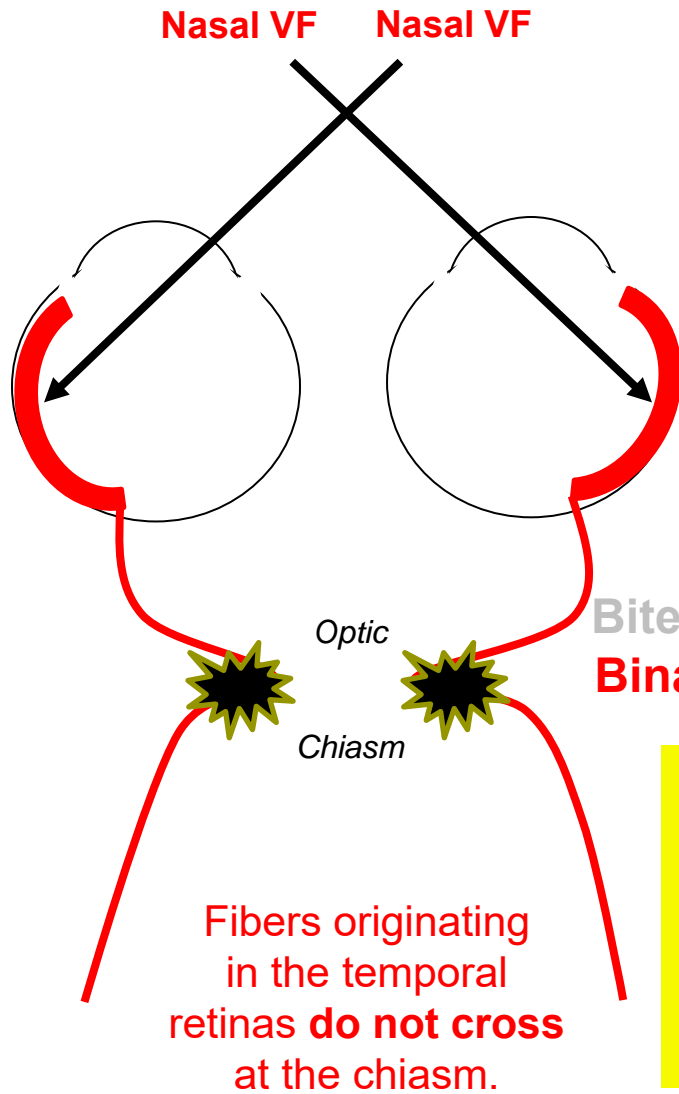
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The *temporal* retinas are responsible for the *nasal* visual fields.



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)

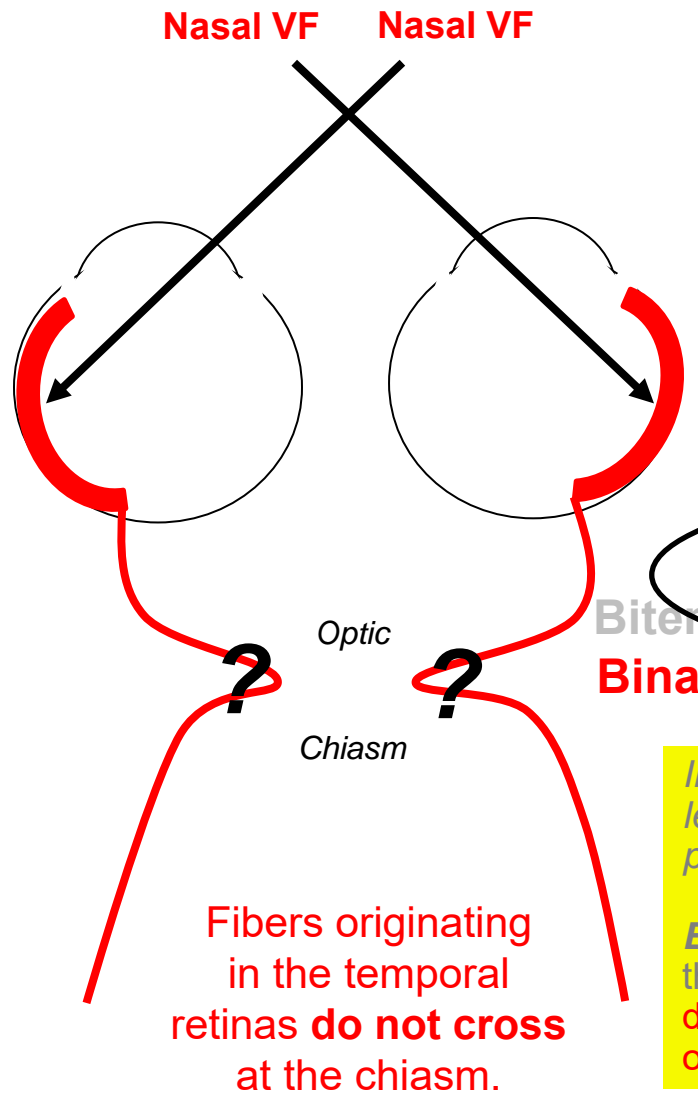
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What structures are located at the lateral aspects of the chiasm?

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**)

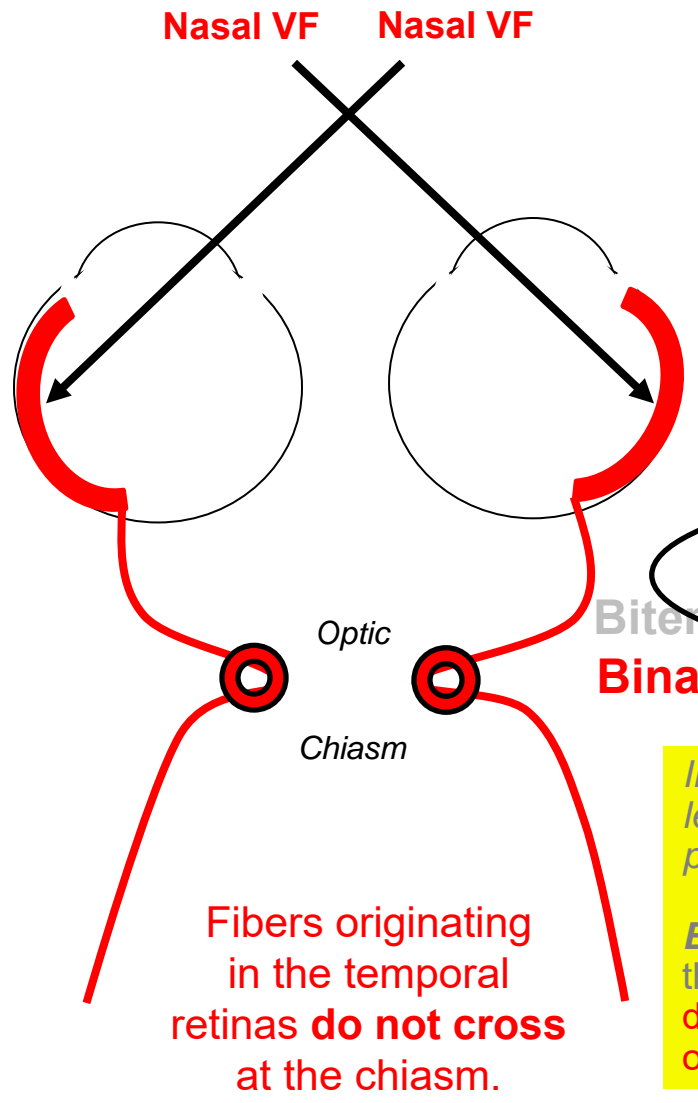
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What structures are located at the lateral aspects of the chiasm?
The internal carotid arteries

Here's why:

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Binasal hemianopia: Lateral portions of chiasm

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Visual Field Defects

Retina

Clin
Clin

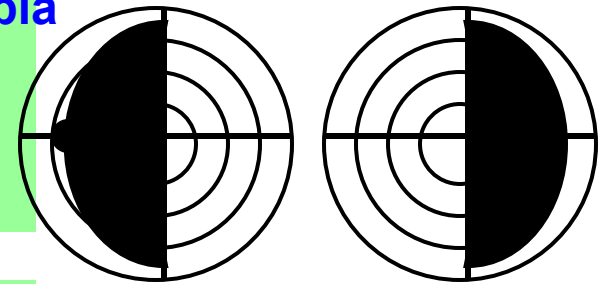
Optic nerve

Dep
Sco

What is the classic cause of a bitemporal hemianopia?

Optic chiasm

Bitemporal hemianopia
Binasal hemianopia
Junctional common
Junctional rare



Retrochiasmal

Optic tract
LGN
Optic radiations
Occipital cortex



Visual Field Defects

Retina

Clin
Clin

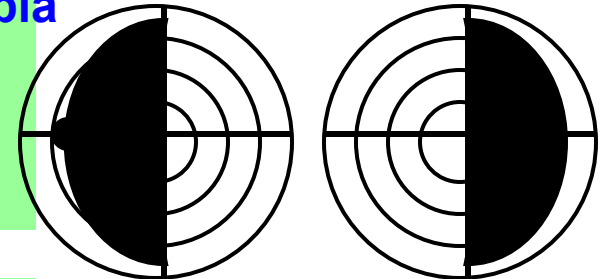
Optic nerve

Dep
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Occipital cortex



Visual Field Defects

Retina

Clin
Clin

Optic nerve

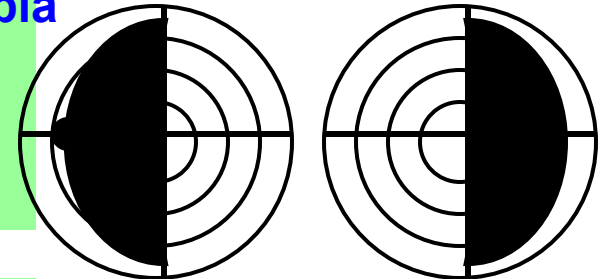
Dep
Sco

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

Is the hemianopia usually inferior, superior or complete?

Optic chiasm

Bitemporal hemianopia
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Retrochiasmal

Optic tract
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Visual Field Defects

Retina

Clin
Clin

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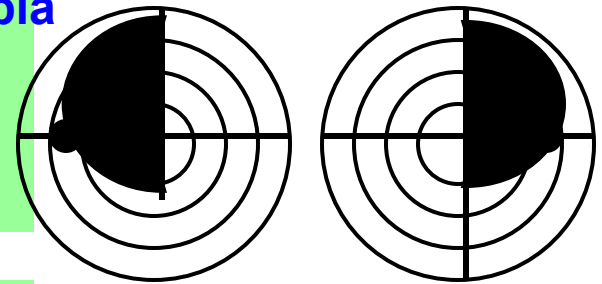
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Superior

Optic nerve

Dep
Sco

Optic chiasm

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Retrochiasmal

Optic tract
LGN
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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?
Superior*

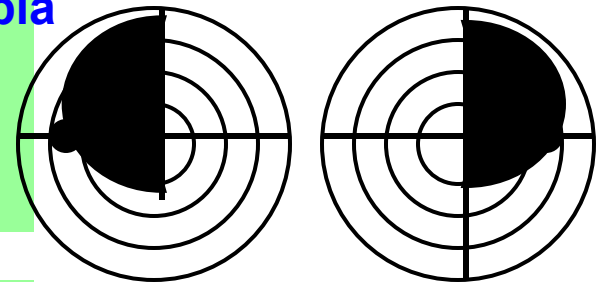
Optic nerve

Dep
Sci

Why usually superior?

Optic chiasm

Bitemporal hemianopia
Binasal hemianopia
Junctional common
Junctional rare

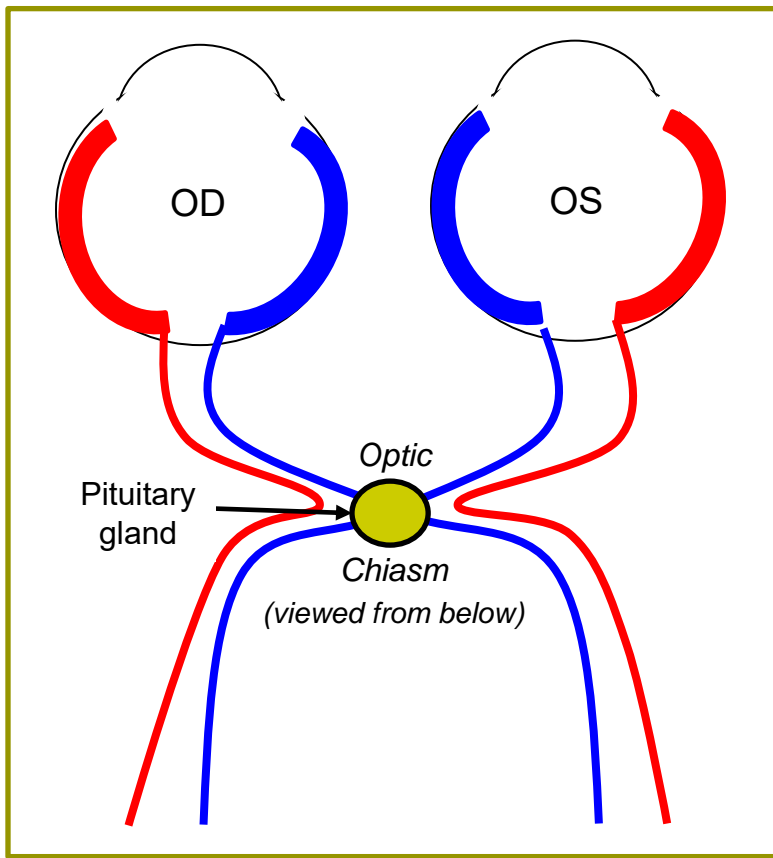


Retrochiasmal

Optic tract
LGN
Optic radiations
Occipital cortex



Visual Field Defects



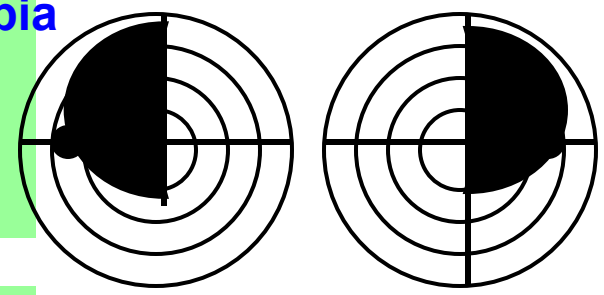
What is the classic cause of a bitemporal hemianopia?
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Is the hemianopia usually inferior, superior or complete?
 Superior

Why usually superior?
 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

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Clin
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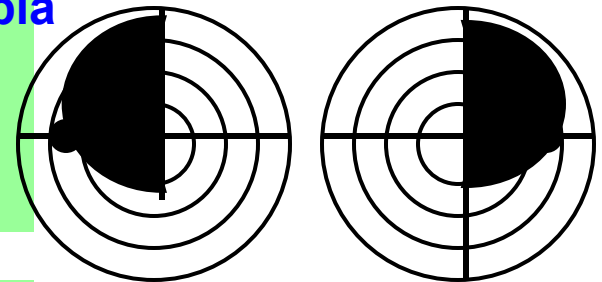
Dep
Sci

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

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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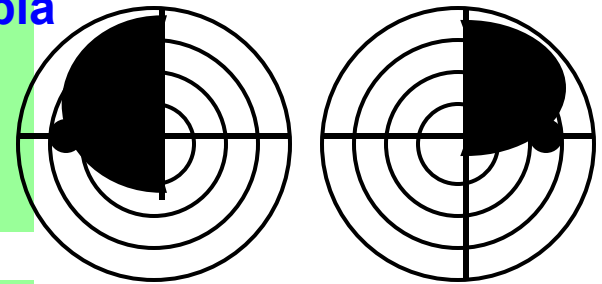
Dep
Sci

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Is it usually congruous or incongruous?
Incongruous

Optic chiasm

Bitemporal hemianopia
Binasal hemianopia
Junctional common
Junctional rare

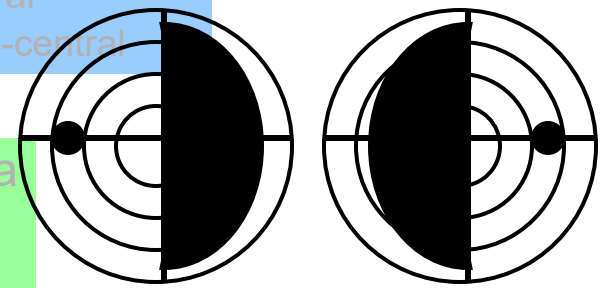
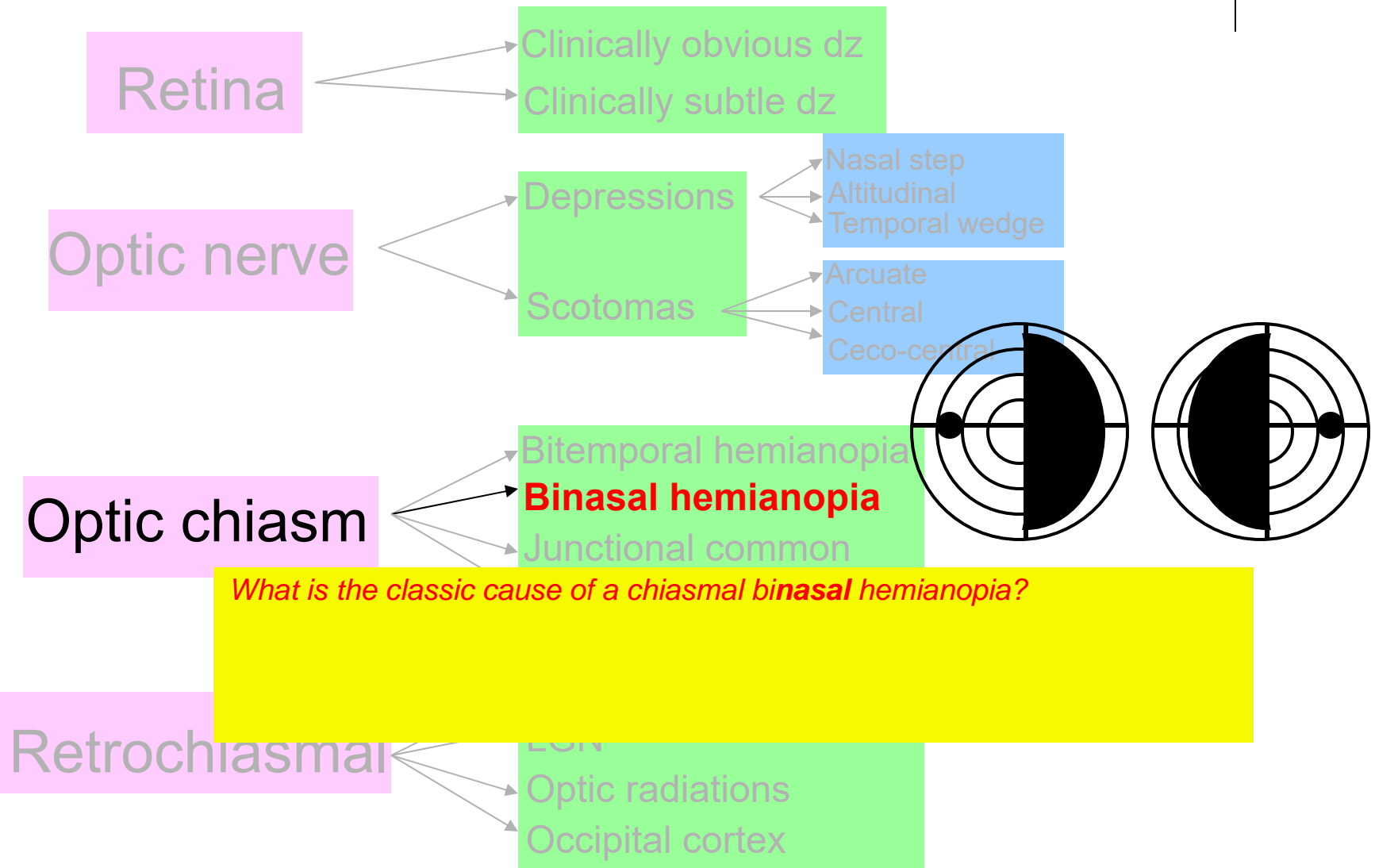


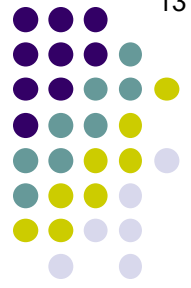
Retrochiasmal

Optic tract
LGN
Optic radiations
Occipital cortex

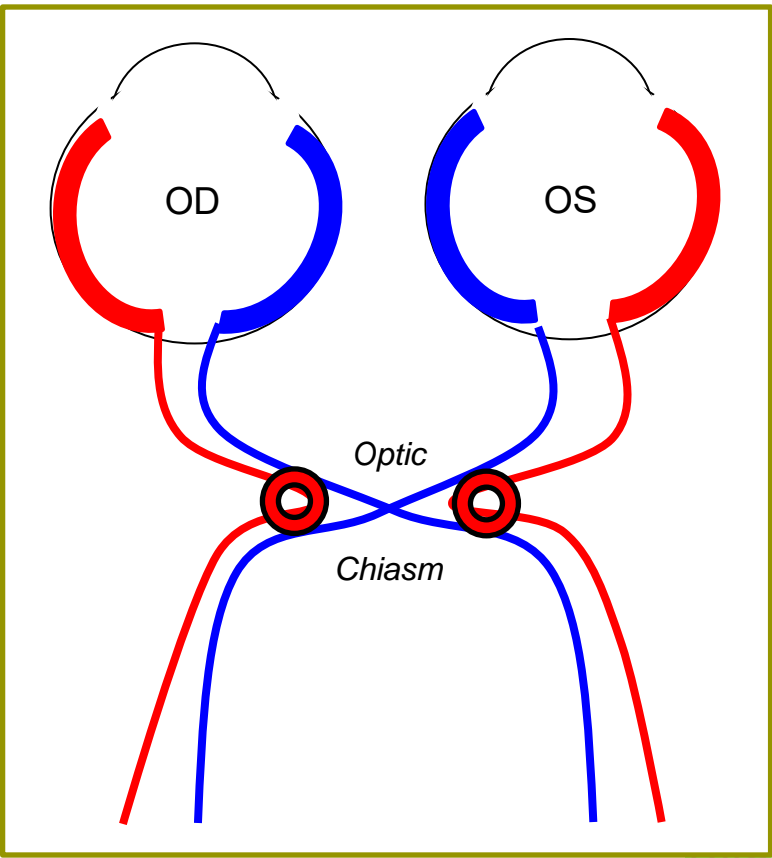


Visual Field Defects



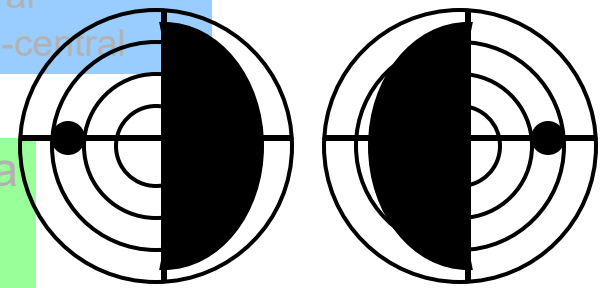


ffects



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

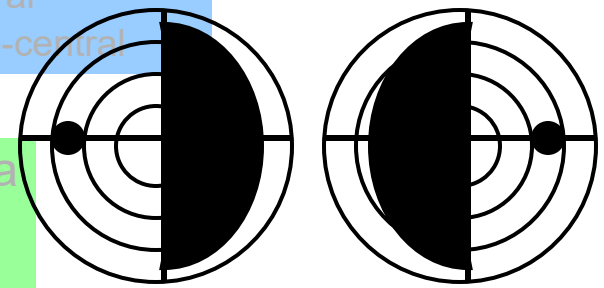
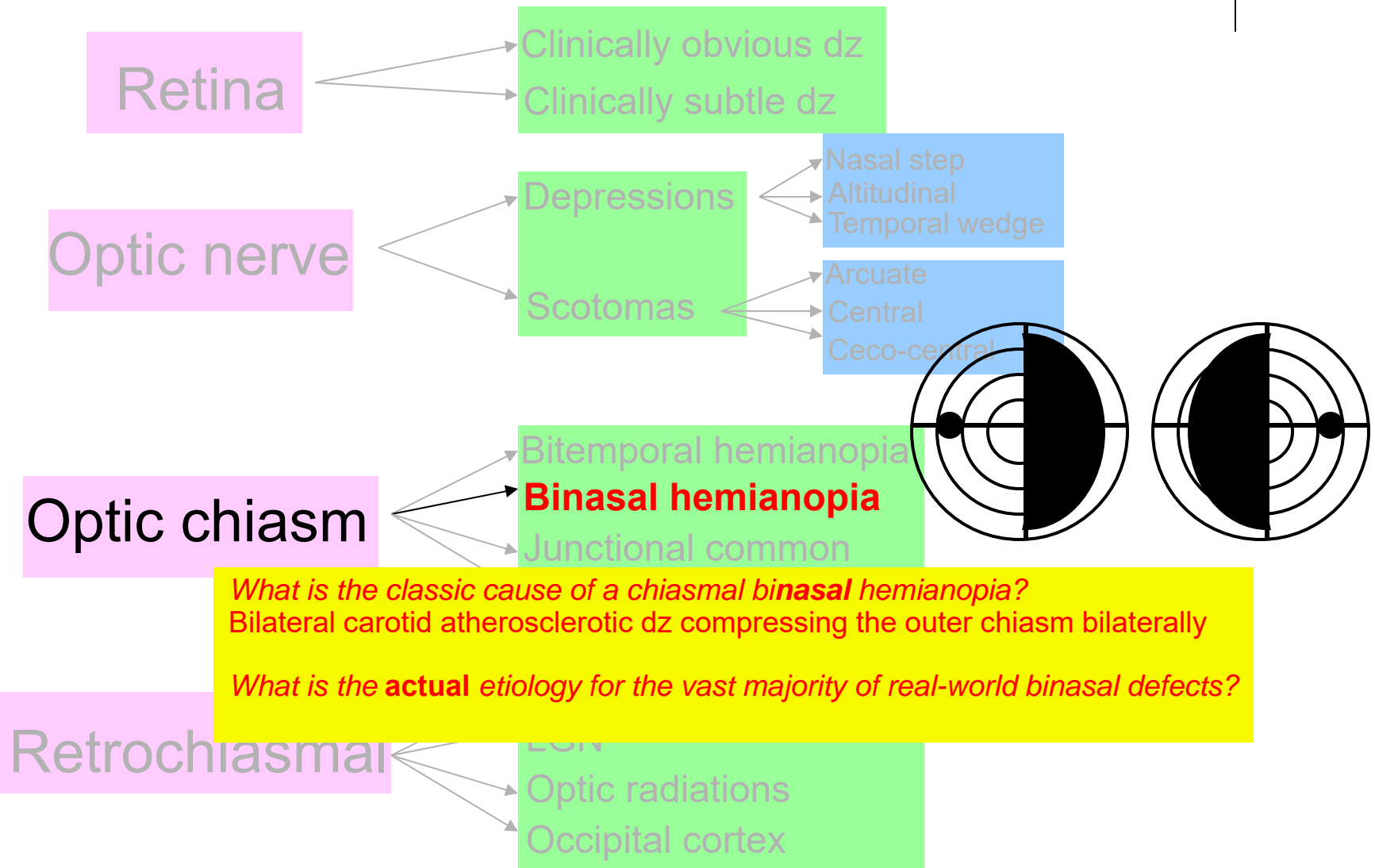
What is the classic cause of a chiasmal binasal hemianopia?
Bilateral carotid atherosclerotic dz compressing the outer chiasm bilaterally

Retrochiasmal

- Optic radiations
- Occipital cortex

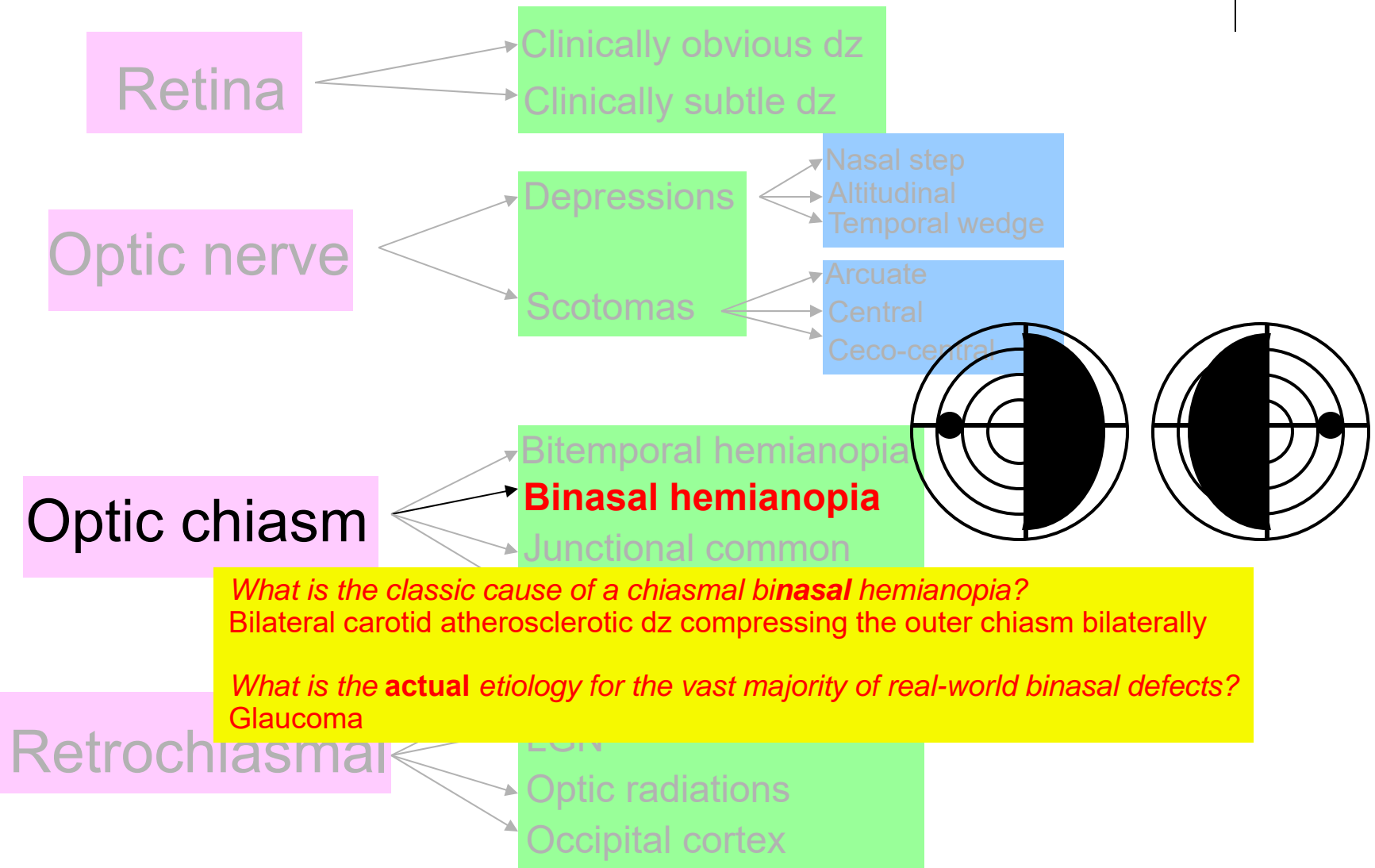


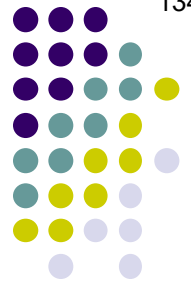
Visual Field Defects



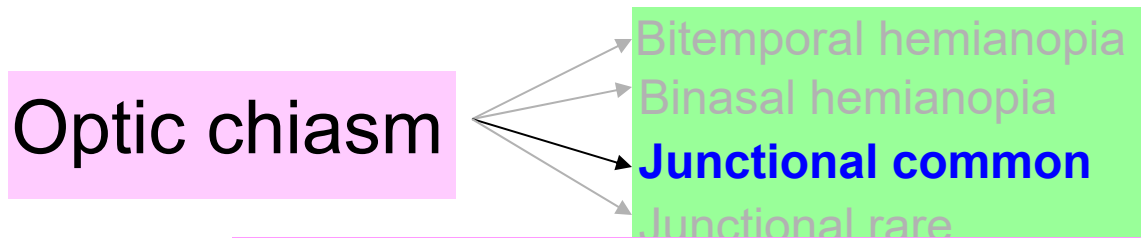
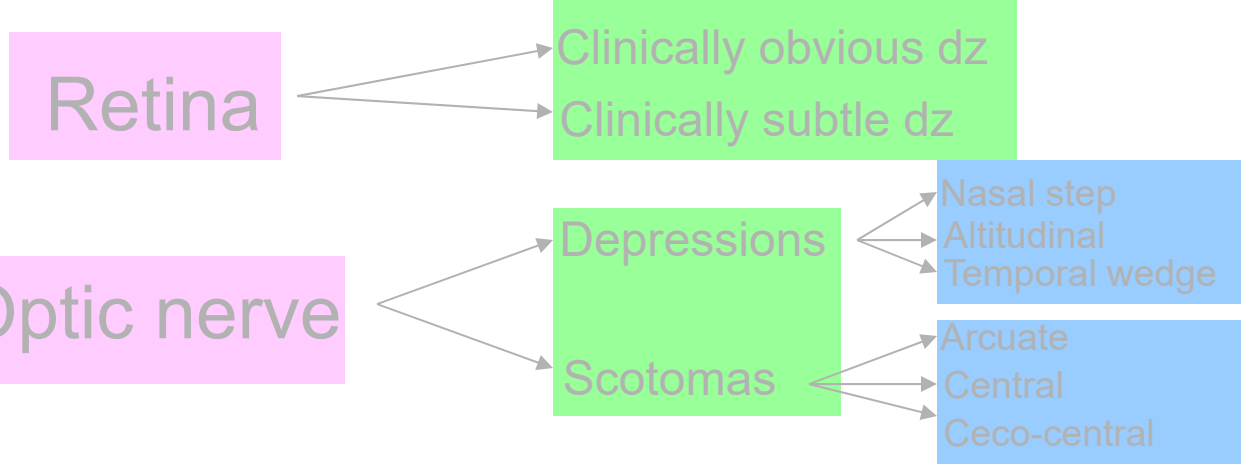


Visual Field Defects

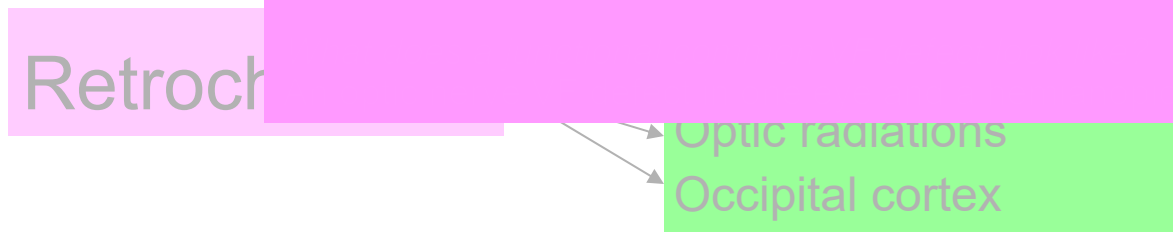


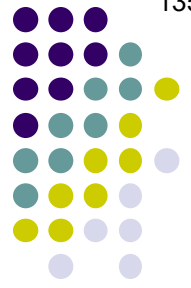


Visual Field Defects



What does the term junctional refer to anatomically?





Visual Field Defects

Retina

- Clinically obvious dz
- Clinically subtle dz

Optic nerve

- Depressions
- Scotomas

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

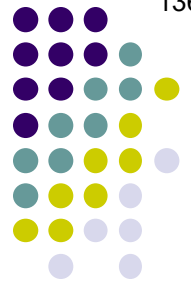
Optic chiasm

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

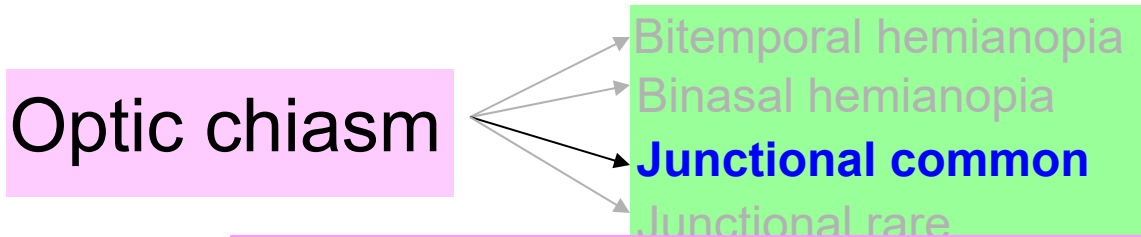
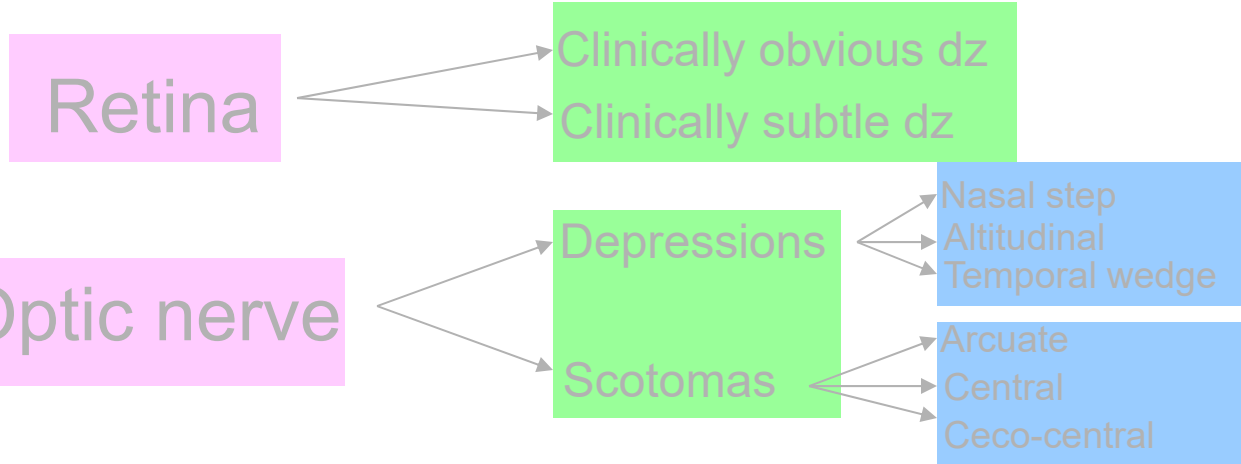
What does the term junctional refer to anatomically?
 The junction between the optic nerve and the chiasm

Retrochiasm

- Optic radiations
- Occipital cortex



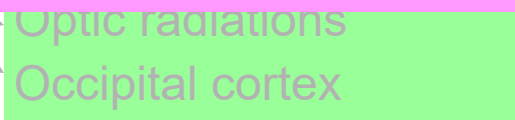
Visual Field Defects



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?

Retrochiasmatic





Visual Field Defects

Retina

Clinically obvious dz
Clinically subtle dz

Optic nerve

Depressions

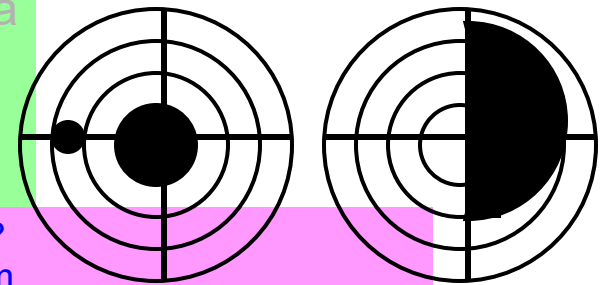
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Altitudinal
Temporal wedge

Scotomas

Arcuate
Central
Ceco-central

Optic chiasm

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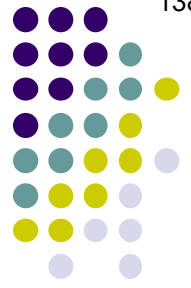
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Retrochiasm

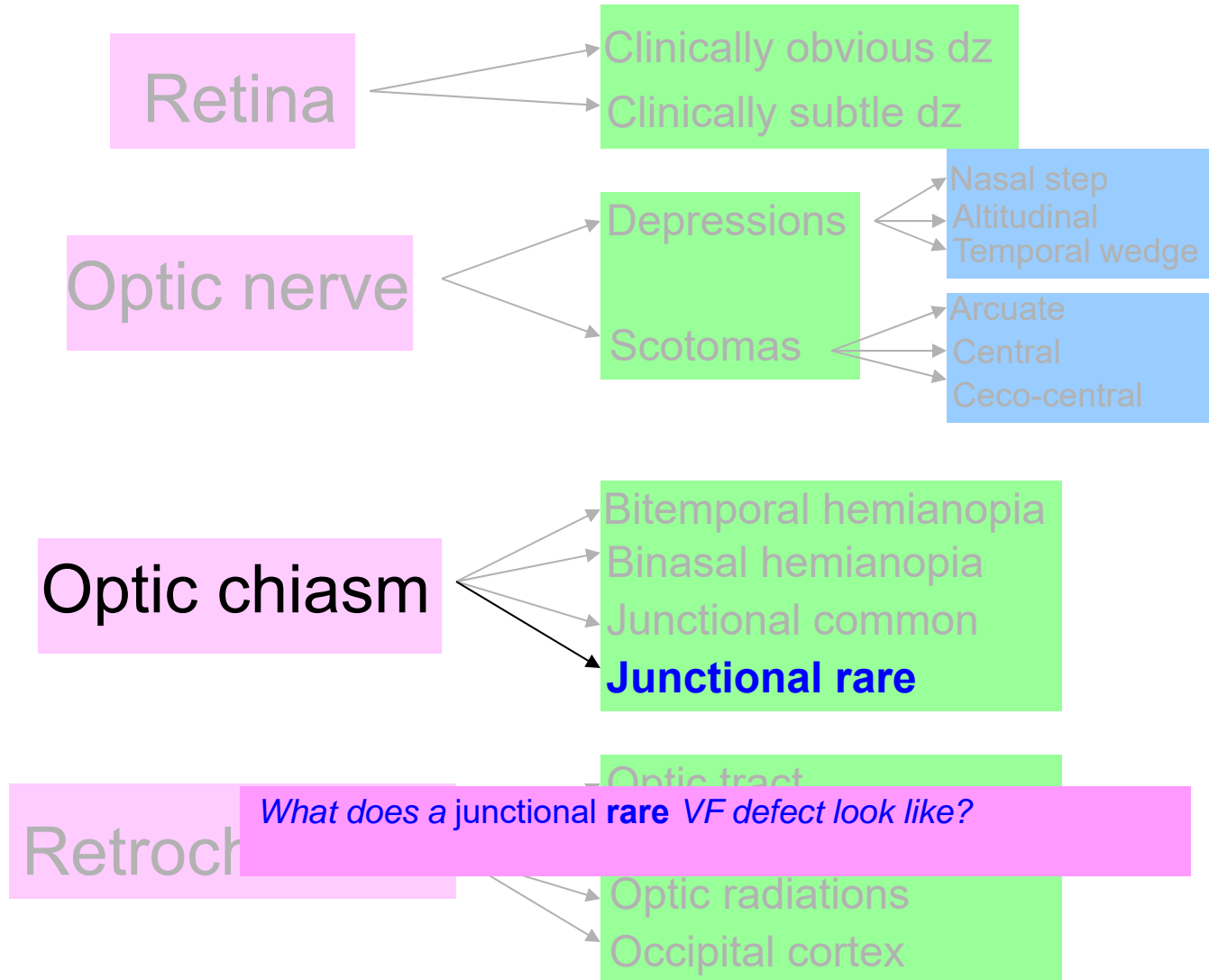
What does a junctional common VF defect look like?
An optic nerve VF defect in one eye and a hemianopic-like defect in the other

Optic radiations
Occipital cortex

i.e., it respects the vertical meridian



Visual Field Defects





Visual Field Defects

Retina

- Clinically obvious dz
- Clinically subtle dz

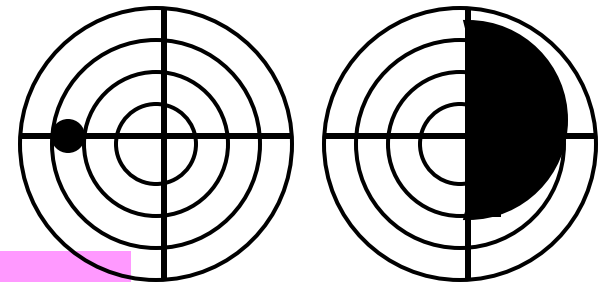
Optic nerve

- Depressions
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- Central
- Ceco-central

Optic chiasm

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



Retrochiasm

*What does a junctional rare VF defect look like?
A hemianopic-like defect in one eye, but no lesion in the other*

- Optic tract
- Optic radiations
- Occipital cortex

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



A

- Which of the following is **not** associated with bitemporal visual-field loss?
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- **Glaucoma.** True bitemporal VF loss respects the vertical midline, and is associated almost exclusively with *lesions compressing the chiasm*, specifically the mid-chiasm. Other causes of bitemporal loss do not respect the midline (except by happenstance). *Sectoral RP* is symmetric bilaterally, and thus can affect the temporal VF bilaterally. *Fuchs coloboma* (aka *tilted disc syndrome*) is associated with bitemporal loss that resolves with proper astigmatic correction. *Toxic/hereditary/nutritional optic neuropathy* is associated with bilateral cecocentral VF loss, which can mimic bitemporal loss. Glaucoma almost always affects the nasal VF long before the temporal field is involved--if anything, glaucoma is far more likely to cause bi**nasal** VF cuts.



Q

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Why is the ONH tilted?

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Why is the ONH tilted?

Abnormal closure of the embryonic optic fissure at the optic-nerve/globe junction results in an oblique (read: tilted) orientation of the ONH. The abnormal closure also creates a modest staphyloma in the inferonasal region of the globe.

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Which of the following is *not* associated with bitemporal visual-field loss?

Why on earth do these pts get a VF defect?

It's actually pretty simple.

Recall that these eyes have inferonasal staphylomas. This results in an extra-long 'axial length' for the photoreceptors overlying the staphyloma. Because of this extra axial length, the correction used during the performance of a visual-field test—a correction determined on the basis of the (non-staphylomatous) fovea—is not myopic enough for the staphylomatous inferonasal region. As a result, the uncorrected refractive error in this region produces a *refractive scotoma* in the superotemporal visual field.

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This implies that the VF deficits could be resolved if the proper refractive correction was employed. Does it?

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Does it?

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This implies also that the bitemporal VF loss shouldn't respect the vertical midline. Does it?

No (except by pure dumb luck)

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