Here is a representation of the VF for each eye. Which is OD, and which OS?
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!
Measured in degrees from fixation, how far does the normal VF extend superiorly, inferiorly, nasally and temporally?
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

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

most anterior location

Anatomic locations for lesions producing VF defects
Visual Field Defects

Retina

Anatomic locations for lesions producing VF defects
Visual Field Defects

- Retina
- Optic nerve

Anatomic locations for lesions producing VF defects

next location
Visual Field Defects

- Retina
- Optic nerve
- Optic chiasm

Anatomic locations for lesions producing VF defects

General term for all locations posterior to the previous one
Visual Field Defects

- Retina
- Optic nerve
- Optic chiasm
- Retrochiasmal

Anatomic locations for lesions producing VF defects
Visual Field Defects

- Retina
- Optic nerve
- Optic chiasm
- Retrochiasmal

Two very general categories of retinal dz
Visual Field Defects

- Retina
  - Clinically obvious dz
  - Clinically subtle dz

- Optic nerve

- Optic chiasma

- Retrochiasmal
Visual Field Defects

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Clinically obvious dz
Clinically subtle dz

What is meant by clinically obvious vs clinically subtle retinal dz?
Visual Field Defects

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.
Visual Field Defects

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?
Visual Field Defects

Retina

Clinically obvious dz (eg...RP)
Clinically subtle dz

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
**Visual Field Defects**

- **Retina**
  - Clinically obvious dz (eg…RP)
  - Clinically subtle dz (eg…?)

  *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 nerve**
- **Optic chiasm**
- **Retrochiasmal**
Visual Field Defects

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
Visual Field Defects

Let's take a brief aside to cover optic nerve fundamentals before we address optic nerve VF defects.
The optic nerves are composed of what?
Visual Field Defects

*The optic nerves are composed of what?*

The axons of retinal ganglion cells
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)
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?
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

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

‘Most’? Where will the others synapse, and what are they responsible for?
The hypothalamus, where they are involved in modulating circadian responses
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

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

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

‘Most’? Where will the others synapse, and what are they responsible for?
The hypothalamus, where they are involved in modulating circadian responses
Visual Field Defects

Retina

Clinically obvious dz
Clinically subtle dz

Optic nerve

two general categories of ON VF defects

Optic chiasm

Retrochiasmal
Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

Optic nerve
- Depressions
- Scotomas

Optic chiasm

Retrochiasmal
Visual Field Defects

- Retina
  - Clinically obvious dz
  - Clinically subtle dz
- Optic nerve
  - Depressions
  - Scotomas
- 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.
Visual Field Defects

- Retina
  - Clinically obvious dz
  - Clinically subtle dz
- Optic nerve
  - Depressions
  - Scotomas
  - three specific depressions
- Optic chiasm
- Retrochiasmal
Visual Field Defects

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Clinically obvious dz
Clinically subtle dz

Depressions

Scotomas

Nasal step
Altitudinal
Temporal wedge
Visual Field Defects

Retina

- Clinically obvious dz
- Clinically subtle dz

Optic nerve

- Depressions
- Scotomas
  - Nasal step
  - Altitudinal
  - Temporal wedge

Optic chiasm

Retrochiasmal

Nasal step

Superior nasal step

Inferior nasal step
Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

Optic nerve
- Depressions
- Scotomas
  - Nasal step
  - Altitudinal
  - Temporal wedge

Optic chiasm

Retrochiasmal
Visual Field Defects

- Retina
  - Clinically obvious dz
  - Clinically subtle dz
- Optic nerve
  - Depressions
  - Scotomas
- Optic chiasm
  - Nasal step
  - Altitudinal
  - Temporal wedge
- Retrochiasmal
Visual Field Defects

- Retina
  - Clinically obvious dz
  - Clinically subtle dz
- Optic nerve
  - Depressions
    - Nasal step
    - Altitudinal
    - Temporal wedge
  - Scotomas
    - three specific scotomas
- Optic chiasm
- Retrochiasmal
Visual Field Defects

- Retina
  - Clinically obvious dz
  - Clinically subtle dz

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

- Optic chiasm

- Retrochiasmal
Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

Optic nerve
- Depressions
  - Nasal step
  - Altitudinal
  - Temporal wedge
- Scotomas
  - Arcuate
    - Superior arcuate
    - Inferior arcuate
  - Central
  - Ceco-central

Optic chiasm

Retrochiasmal
Visual Field Defects

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Clinically obvious dz

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

Scotomas

Central

Ceco-central

Arcuate

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.
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.
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.
Visual Field Defects

What's the difference between a central and a cecocentral scotoma?
A central scotoma involves only fixation, whereas…
a cecocentral scotoma involves fixation and extends all the way to the blind spot

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

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

*The basic topography of the RNFL looks a lot like a fish!*
Visual Field Defects

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

- Clinically obvious dz
- Clinically subtle dz

- Papillomacular bundle
  - Arcuate fibers
  - Nasal radiating fibers

- Nasal step
- Altitudinal
- Temporal wedge

- Arcuate
- Central
- Ceco-central

Optic nerve
  - Head

Optic chiasm

Retrochiasmal
Visual Field Defects

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

Optic nerve head

Papillomacular bundle
  - Arcuate fibers
  - Nasal radiating fibers

Optic chiasm

Retrochiasmal

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central
Visual Field Defects

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

- Clinically obvious dz
- Clinically subtle dz

Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

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.

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

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

Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge
Arcuate
Central
Ceco-central

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

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Visual Field Defects

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

Optic nerve head
- Papillomacular bundle
  - Arcuate fibers
  - Nasal radiating fibers

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

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

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

Optic nerve head
- Papillomacular bundle
  - Arcuate fibers
  - Nasal radiating fibers

Retina

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

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:*
  - ...
  - ...

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.

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

With damage to each group?

Toxins that shouldn’t be ingested at all:
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:
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:
--
--

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

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

Why do conditions affecting metabolism preferentially affect the P-M bundle VF defect is present?

Toxic/metabolic

Conditions involving compromised cellular metabolism. Think 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**

*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:*
--
--

**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.

**Which of these VF defects are associated with damage to each group?**
- Nasal step
- Altitudinal
- Temporal wedge
- Arcuate
- Central
- Ceco-central

**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

**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:**
--
--
Visual Field Defects

Toxins that shouldn’t be ingested at all:
-- Methanol
-- Ethylene glycol
-- Lead (in children)
-- (many others)

Toxins that shouldn’t be ingested in large quantities for prolonged periods:
-- Ethanol
-- Tobacco

Toxins you were told to ingest by a doc:
--

Nutrients that weren’t ingested in sufficient quantity:
--

Inherited mitochondrial diseases:
--

Which VF defects are associated with damage to each group?

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

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.

Conditions involving compromised cellular metabolism: Think toxic/metabolic, nutritional deficiencies, inherited mitochondrial dz, etc
Visual Field Defects

Toxins that shouldn’t be ingested at all:
-- Methanol
-- Ethylene glycol
-- Lead (in children)
-- (many others)

Toxins that shouldn’t be ingested in large quantities for prolonged periods:
-- Ethanol
-- Tobacco

Toxins you were told to ingest by a doc:
--

--

--

-- (many others)

Nutrients that weren’t ingested in sufficient quantity:
--

--

--

Inherited mitochondrial diseases:
--

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

Toxins that shouldn’t be ingested in large quantities for prolonged periods:
--Ethanol
--Tobacco

Toxins you were told to ingest by a doc:
--Amiodarone
--Ethambutol
--Isoniazid
--Linezolid
--(many others)

Nutrients that weren’t ingested in sufficient quantity:
--
--
--

Inherited mitochondrial diseases:
--
--

Visual Field Defects

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.

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.
Visual Field Defects

**Toxins that shouldn’t be ingested at all:**
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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:**
--
--
--

**Inherited mitochondrial diseases:**
--
--
--

**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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--Ethylene glycol
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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:
--

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.

Which of these VF defects are associated with damage to each group?
Nasal step
Altitudinal
Temporal wedge
Arcuate
Central
Ceco-central

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.
Visual Field Defects

Toxins that shouldn’t be ingested at all:
-- Methanol
-- Ethylene glycol
-- Lead (in children)
-- (many others)

Toxins that shouldn’t be ingested in large quantities for prolonged periods:
-- Ethanol
-- Tobacco

Toxins you were told to ingest by a doc:
-- Amiodarone
-- Ethambutol
-- Isoniazid
-- Linezolid
-- (many others)

Nutrients that weren’t ingested in sufficient quantity:
-- Vitamin $B_{12}$
-- Folate
-- Thiamine

Inherited mitochondrial diseases:
--
--

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.

Conditions involving compromised cellular metabolism. Think toxic/metabolic, nutritional deficiencies, etc.

Inherited mitochondrial dz

Which VF defects are associated with damage to each group?
- Nasal step
- Altitudinal
- Temporal wedge
- Arcuate
- Central
- Ceco-central

Toxins that shouldn’t be ingested at all:
-- Methanol
-- Ethylene glycol
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-- Tobacco

Toxins you were told to ingest by a doc:
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-- Ethambutol
-- Isoniazid
-- Linezolid
-- (many others)

Nutrients that weren’t ingested in sufficient quantity:
-- Vitamin $B_{12}$
-- Folate
-- Thiamine

Inherited mitochondrial diseases:
--
--

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

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

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.

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.

Inherited mitochondrial diseases:
- Leber's hereditary optic neuropathy
- Nutrients that weren't ingested in sufficient quantity:
  - Thiamine
  - Folate
  - Vitamin B12

Toxins you were told to ingest by a doc:
- Amiodarone
- Ethambutol
- Isoniazid
- Linezolid
- (many others)

Toxins that shouldn't be ingested in large quantities for prolonged periods:
- Ethanol
- Tobacco
- Ethylene glycol
- Methanol
- Lead (in children)
- (many others)

Toxins that shouldn't be ingested at all:
- Methanol
- Ethylene glycol
- Lead (in children)
- (many others)

Nutrients that weren't ingested in sufficient quantity:
- Vitamin B12
- Folate
- Thiamine
- (many others)

Inherited mitochondrial diseases:
- Leber's hereditary optic neuropathy
- Autosomal dominant optic atrophy

- P-M bundle VF defect is present?

With damage to each group?

Retina

Optic nerve

Optic head

Optic chiasm

Retrochiasmal

Papillomacular bundle

Nasal radiating fibers

Clinically obvious dz

Clinically subtle dz
Visual Field Defects

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

- Clinically obvious dz
- Clinically subtle dz

Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Optic nerve head

Nasal step
Altitudinal
Temporal wedge
Arcuate
Central
Ceco-central

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

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.

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

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Visual Field Defects

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

Optic chiasm

- Nasal step
- Altitudinal
- Temporal wedge

Retrochiasmal

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

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.

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

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

Clinically obvious dz
Clinically subtle dz

Papillomacular bundle
Arcuate fibers
Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

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

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

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

Value
Color vision

*Which makes sense—after all, a central VF defect is present.
Visual Field Defects

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

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

Optic chiasm

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

Retrochiasmal
Which of these VF defects are associated with damage to each group?
Visual Field Defects

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

- Optic nerve head
  - Arcuate fibers
    - Papillomacular bundle
  - Nasal radiating fibers

- Optic chiasm
  - Clinically obvious dz
  - Clinically subtle dz

- Retrochiasmal

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
Visual Field Defects

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

Optic nerve head
- Arcuate fibers
  - Nasal radiating fibers
- Papillomacular bundle

Clinically obvious dz

Nasal step
- Altitudinal
- Temporal wedge

Arcuate
- Central
- Ceco-central

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

Glaucoma
Visual Field Defects

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

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

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

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

- Optic nerve head
  - Arcuate fibers
    - Papillomacular bundle
  - Nasal radiating fibers

- Optic chiasm

Retrochiasmal

Clinically obvious dz

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

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?

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.
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.

What is this ‘horizontal demarcation line’ called?

The horizontal raphe.
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?

The horizontal raphe
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.

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

Unlike P-M defects, arcuate fiber bundle defects do not cross (ie, they ‘respect’) the horizontal midline. The arcuate fibers arc around the P-M bundle, and meet along a horizontal demarcation line.
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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.

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**Optic nerve head**

- **Arcuate fibers**
  - Nasal radiating fibers

**Optic chiasm**

- **Temporal wedge**
  - **Arcuate**
    - Central
    - Ceco-central

**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 (i.e., 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.

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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
Visual Field Defects

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

- Optic nerve head
- Optic chiasm
- Retrochiasmal

Clinically obvious dz

Papillomacular bundle
Arcuate fibers
Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central
Visual Field Defects

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

- Clinically obvious dz
- Clinically subtle dz

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- Nasal radiating fibers

Optic nerve head

- Optic chiasm
- Retrochiasmal

Nasal step
Altitudinal
Temporal wedge
Arcuate
Central
Ceco-central
Visual Field Defects

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- Nasal radiating fibers

Optic chiasm

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

Clinically obvious dz

Clinically subtle dz

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

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

How can you differentiate between these two conditions?

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

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

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

If a pt presents with an altitudinal VF defect, what condition should you consider first?
Two conditions should come to mind:

- Glaucoma
- NAION

How can you differentiate between these two conditions?
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Visual Field Defects

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Papillomacular bundle
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Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

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Visual Field Defects

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

Optic nerve
- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Clinically obvious dz

Clinically subtle dz

Optic chiasm

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Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central
Visual Field Defects

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- Nasal radiating fibers

Clinically obvious dz

Clinically subtle dz

Nasal step
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- Temporal wedge

Arcuate
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- Ceco-central

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- Arcuate fibers
- Nasal radiating fibers

Optic chiasm
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- Altitudinal
- Temporal wedge
- Arcuate
- Central
- Ceco-central

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--If the pt has glaucoma, it likely represents advanced glaucomatous optic neuropathy

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

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

If a pt presents with an altitudinal VF defect, what condition should you consider first?
Two conditions should come to mind:
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Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

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

Optic chiasm
- four very specific types of chiasmal VF defects

Retrochiasmal
Visual Field Defects

Retina

Clinically obvious dz
Clinically subtle dz

Optic nerve

Depressions

Nasal step
Altitudinal
Temporal wedge

Scotomas

Arcuate
Central
Ceco-central

Optic chiasm

Bitemporal hemianopia
Binasal hemianopia
Junctional common
Junctional rare

Retrochiasmal
Visual Field Defects

- Retina
  - Clinically obvious dz
  - Clinically subtle dz

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

- Optic chiasm
  - Bitemporal hemianopia
  - Binasal hemianopia
  - Junctional common
  - Junctional rare

- Retrochiasmal
  - four fairly specific retrochiasmal anatomic locations associated with VF defects
Visual Field Defects

- Retina
  - Clinically obvious dz
  - Clinically subtle dz
- Optic nerve
  - Depressions
    - Nasal step
    - Altitudinal
    - Temporal wedge
  - Scotomas
    - Arcuate
    - Central
    - Ceco-central
- Optic chiasm
  - Bitemporal hemianopia
  - Binasal hemianopia
  - Junctional common
  - Junctional rare
- Retrochiasmal
  - Optic tract
  - LGN
  - Optic radiations
  - Occipital cortex
Forget all of these specific VF findings for just a minute… In the most general of terms, what can we say about VF defects associated with lesions in each of these locations?
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Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

Optic nerve
- Depressions
- Nasal step
- Altitudinal
- Temporal wedge
- Arcuate

Optic chiasm
- Binasal hemianopia
- Junctional common
- Junctional rare

Retrochiasmal
- Optic tract
- LGN
- Optic radiations
- Occipital cortex

VF defect
- Anything except a vertical meridian cut (unless by pure chance)

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Visual Field Defects

- Retina
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  - Arcuate
  - Bitemporal hemianopia
  - Binasal hemianopia
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  - Junctional rare

- Optic chiasm
  - Binasal hemianopia
  - Junctional common
  - Junctional rare

- Retrochiasmal
  - Optic tract
  - LGN
  - Optic radiations
  - Occipital cortex

**For all these specific VF findings, forget just a minute...**
In the most general of terms, what can we say about VF defects associated with lesions in each of these locations?

**VF defect**
- Anything except a vertical meridian cut (unless by pure chance)

**Oddity**
- Anything except a vertical meridian cut (unless by pure chance)
Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

Optic nerve
- Depressions
  - Nasal step
  - Altitudinal
  - Temporal wedge
  - Arcuate

Optic chiasm
- Binasal hemianopia
- Junctional common
- Junctional rare

Retrochiasmal
- Optic tract
- LGN
- Optic radiations
- Occipital cortex

VF defect
- Anything except a vertical meridian cut (unless by pure chance)

Forget all of these specific VF findings for just a minute... In the most general of terms, what can we say about VF defects associated with lesions in each of these locations?

(Next)
Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

Optic nerve
- Depressions
  - Nasal step
  - Altitudinal
  - Temporal wedge
  - Arcuate

Optic chiasm
- Binasal hemianopia
- Junctional common
- Junctional rare

Retrochiasmal
- Optic tract
- LGN
- Optic radiations
- Occipital cortex

VF defect
- Anything except a vertical meridian cut (unless by pure chance)

Forget all of these specific VF findings for just a minute…In the most general of terms, what can we say about VF defects associated with lesions in each of these locations? With few exceptions, will not cross the vertical meridian?

?
Visual Field Defects

**Retina**
- Clinically obvious dz
- Clinically subtle dz

**Optic nerve**
- Depressions
  - Nasal step
  - Altitudinal
  - Temporal wedge
  - Arcuate

**Optic chiasm**
- Binasal hemianopia
- Junctional common
- Junctional rare

**Retrochiasmal**
- Optic tract
- LGN
- Optic radiations
- Occipital cortex

Forget all of these specific VF findings for just a minute...In the most general of terms, what can we say about VF defects associated with lesions in each of these locations?

With few exceptions, must be homonymous hemianopia-like

With few exceptions, will not cross the vertical meridian

Anything except a vertical meridian cut (unless by pure chance)

Anything except a vertical meridian cut (unless by pure chance)

(Next)
Visual Field Defects

- **Retina**
  - Clinically obvious dz
  - Clinically subtle dz

- **Optic nerve**
  - Depressions
  - Nasal step
  - Altitudinal
  - Temporal wedge
  - Arcuate

- **Optic chiasm**
  - Binasal hemianopia
  - Junctional common
  - Junctional rare

- **Retrochiasmal**
  - Optic tract
  - LGN
  - Optic radiations
  - Occipital cortex

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**VF defect**

- Anything except a vertical meridian cut (unless by pure chance)

- Forget all of these specific VF findings for just a minute...In the most general of terms, what can we say about VF defects associated with lesions in each of these locations?

- With few exceptions, will not cross the vertical meridian

- With few exceptions, must be homonymous hemianopia-like
Visual Field Defects

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

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

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

Fibers originating in the nasal retinas cross at the chiasm.

**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?*

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Fibers originating in the nasal retinas cross at the chiasm.

**Optic Chiasm**

Fibers originating in the nasal retinas cross at the chiasm.

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

**Here's why:**

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

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

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Bitemporal hemianopnia: Central aspect of chiasm
Binasal hemianopnia: Lateral portions of chiasm

The temporal retinas are responsible for the nasal visual fields.

Here's why:
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.

The temporal retinas are responsible for the nasal visual fields.

Here’s why:

Fibers originating in the temporal retinas do not cross at the 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.

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

Fibers originating in the temporal retinas **do not cross** at the chiasm.

**Here’s why:**

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

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

Fibers originating in the temporal retinas **do not cross** at 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).

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.

The temporal retinas are responsible for the nasal visual fields.

Fibers originating in the temporal retinas do not cross at the chiasm.

Bitemporal hemianopia: Central aspect of chiasm

Binasal hemianopia: Lateral portions of chiasm

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

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)

Here's why:
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.

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

**Nasal VF**

**Nasal VF**

**Optic**

**Chiasm**

Fibers originating in the temporal retinas **do not cross** at the chiasm.

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

**The internal carotid arteries**

Bitemporal hemianopia: **Central** aspect of chiasm

Binasal hemianopia: **Lateral** portions of 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).
Visual Field Defects

What is the classic cause of a bitemporal hemianopia?

Pituitary adenoma

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 VF.

Incongruous
Visual Field Defects

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

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

Bitemporal hemianopia
- Binasal hemianopia
- Junctional common
- Junctional rare

Optic tract
- LGN
- Optic radiations
- Occipital cortex

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Depression

Scotoma

Clinically obvious dz

Clinically subtle dz

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

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Pituitary adenoma

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

Retina

Optic nerve

Optic chiasm

Retrochiasmal

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

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 VF.

Is it usually congruous or incongruous?
Incongruous
Visual Field Defects

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- Incongruous

Bitemporal hemianopia
- Binasal hemianopia
- Junctional common
- Junctional rare

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Scotomas

Clinically obvious dz

Clinically subtle dz

Depressions

Optic tract

LGN

Optic radiations

Occipital cortex

Arcuate

Central

Ceco-central

Nasal step

Altitudinal

Temporal wedge

Depression
Visual Field Defects

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

**Temporal hemianopia**

- Nasal hemianopia
  - Junctional common
  - Junctional rare

**Visual Field Defects**

- OD OS
- Optic tract
- LGN
- Optic radiations
- Occipital cortex

- Retrochiasmal
What is the classic cause of a bitemporal hemianopia?
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Is it usually congruous or incongruous?

Bitemporal hemianopia
Binasal hemianopia
Junctional common
Junctional rare

Optic tract
LGN
Optic radiations
Occipital cortex
**What is the classic cause of a bitemporal hemianopia?**
Pituitary adenoma

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

**Is it usually congruous or incongruous?**
Incongruous

---

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

- Optic tract
- LGN
- Optic radiations
- Occipital cortex
What is the classic cause of a chiasmal binasal hemianopia?
What is the classic cause of a chiasmal binasal hemianopia?

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

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

Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

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

Optic chiasm
- Bitemporal hemianopia
- Binasal hemianopia
- Junctional common

Retrochiasmal
- LGN
- Optic radiations
- Occipital cortex
Visual Field Defects

- Retina
  - Clinically obvious dz
  - Clinically subtle dz
- Optic nerve
  - Depressions
    - Nasal step
    - Altitudinal
    - Temporal wedge
  - Scotomas
    - Arcuate
    - Central
    - Ceco-central
- Optic chiasm
  - Bitemporal hemianopia
  - Binasal hemianopia
    - Junctional common
- Retrochiasmal
  - Optic radiations
  - Occipital cortex

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

What is the actual etiology for the vast majority of real-world b**inasal** defects?
Glaucoma
Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

Optic nerve
- Bitemporal hemianopia
- Binasal hemianopia
- Scotomas
- Depressions
- Nasal step
- Altitudinal
- Temporal wedge
- Arcuate
- Central
- Ceco-central

Optic chiasm
- Bitemporal hemianopia
- Binasal hemianopia
- Junctional common
- Junctional rare

Retrochiasmal
- Optic radiations
- Occipital cortex

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

- **Retrochiasmal**
  - Optic radiations
  - Occipital cortex

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

Retrochiasmal
- Optic radiations
- Occipital cortex

**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?**
Visual Field Defects

- **Retina**
  - Clinically obvious dz
  - Clinically subtle dz
- **Optic nerve**
  - Depressions
    - Nasal step
    - Altitudinal
    - Temporal wedge
  - Scotomas
    - Arcuate
    - Central
    - Ceco-central
- **Optic chiasm**
  - 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
  - What does a junctional common VF defect look like? An optic nerve VF defect in one eye and a hemianopic-like defect in the other i.e., it respects the vertical meridian

- **Retrochiasmal**
  - Optic radiations
  - Occipital cortex

The junction between the optic nerve and the chiasm.
What does a junctional rare VF defect look like?

- Optic nerve
- Retina
- Optic chiasm
- Optic tract
  - Optic radiations
  - Occipital cortex
- Clinically obvious dz
- Clinically subtle dz
- Depressions
- Scotomas
- Bitemporal hemianopia
- Binasal hemianopia
- Junctional common
  - Junctional rare
- Nasal step
- Altitudinal
- Temporal wedge
- Arcuate
- Central
- Ceco-central

What does a junctional rare VF defect look like?
Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

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

Optic chiasm
- Bitemporal hemianopia
- Binasal hemianopia
- Junctional common
  - Junctional rare

Retrochiasmal
- Optic tract
- Optic radiations
- Occipital cortex

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

- **Retina**
  - Clinically obvious dz
  - Clinically subtle dz

- **Optic nerve**
  - De oppressions
    - Nasal step
    - Altitudinal
    - Temporal wedge
    - Arcuate

- **Optic chiasm**
  - Binasal hemianopia
  - Junctional common
  - Junctional rare

- **Retrochiasmal**
  - LGN
  - Optic radiations
  - Occipital cortex

Forget all of these specific VF findings for just a minute... in the most general of terms, what can we say about VF defects associated with lesions in each of these locations?

With few exceptions, will not cross the vertical meridian.

Anything except a vertical meridian cut (unless by pure chance)

Let’s address one of these exceptions now

With few exceptions, must be homonymous hemianopia-like
VF defect

Visual Field Defects

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

With few exceptions, will not cross the vertical meridian

VF defect

With few exceptions, must be homonymous hemianopia-like

VF defect

Let’s address one of these exceptions now

VF defect

Junctional common

Junctional rare

VF defect

Retrochiasmal

VF defect

LGN

Optic radiations

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VF defect

Central

Ceco-central

Nasal step

Altitudinal

Temporal wedge

Depressions

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Let’s address one of these exceptions now
Visual Field Defects

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Let’s address one of these exceptions now
An elderly vasculopath presents c/o things ‘sneaking up on her from the left.’ You check her CVFs—they’re fine. You get a 24-2—WNL OU. You send her on her way with reassurances that everything’s fine. Two weeks later she’s on your schedule again with the same complaint. Just to be sure you repeat the VF, but with the rarely-used 30-2 protocol—again, WNL. Reassure, discharge. Back the next week. Sigh. This visit, for the first time in your career, you order the never-used 60-2 protocol—again, nothing. YOU’RE FINE, YOU CRAZY OLD BAT! you yell at her. (Not really.) To placate her, you refer her to a neuro-oph, who… Sends you a consult note detailing both her VF loss and the location of the CNS changes (dx: ischemic CVA) that produced it. What did you miss?

Let’s address one of these exceptions now
Visual Field Defects

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You missed a classic case of loss of the temporal crescent. The temporal visual field of the eye ipsilateral to the field in question extends much farther (~100°) than does the contribution from the fellow eye (~60°). Thus, there is a roughly 40° crescent in the ipsilateral eye that has no corresponding contribution from the fellow eye—it is hemianopia-like, it is not homonymous. No commercially-available automated VF analyzer is capable of detecting a temporal crescent; the only technology that can is Goldmann perimetry. Lesions of the anterior occipital cortex are responsible for this finding.

Let’s address one of these exceptions now two words
An elderly vasculopathy presents c/o things ‘sneaking up on her from the left.’ You check her CVFs—they’re fine. You get a 24-2—WNL OU. You send her on her way with reassurances that everything’s fine. Two weeks later she’s on your schedule again with the same complaint. Just to be sure you repeat the VF, but with the rarely-used 30-2 protocol—again, WNL. Reassure, discharge. Back the next week. Sigh. This visit, for the first time in your career, you order the never-used 60-2 protocol—again, nothing. YOU’RE FINE, YOU CRAZY OLD BAT! you yell at her. (Not really.) To placate her, you refer her to a neuro-oph, who… Sends you a consult note detailing both her VF loss and the location of the CNS changes (dx: ischemic CVA) that produced it. What did you miss? You missed a classic case of loss of the temporal crescent. The temporal visual field of the eye ipsilateral to the field in question extends much farther (~ 100°) that does the contribution from the fellow eye (~ 60°). Thus, there is a roughly 40° crescent in the ipsilateral eye that has no corresponding contribution from the fellow eye—it is hemianopia-like, it is not homonymous. No commercially-available automated VF analyzer is capable of detecting a temporal crescent; the only technology that can is Goldmann perimetry. Lesions of the anterior occipital cortex are responsible for this finding. Let’s address one of these exceptions now.
An elderly vasculopath presents c/o things ‘sneaking up on her from the left.’ You check her CVFs—they’re fine. You get a 24-2—WNL OU. You send her on her way with reassurances that everything’s fine. Two weeks later she’s on your schedule again with the same complaint. Just to be sure you repeat the VF, but with the rarely-used 30-2 protocol—again, WNL. Reassure, discharge. Back the next week. Sigh. This visit, for the first time in your career, you order the never-used 60-2 protocol—again, nothing. YOU’RE FINE, YOU CRAZY OLD BAT! you yell at her. (Not really.) To placate her, you refer her to a neuro-oph, who… Sends you a consult note detailing both her VF loss and the location of the CNS changes (dx: ischemic CVA) that produced it. What did you miss?

You missed a classic case of loss of the temporal crescent. The temporal visual field of the eye ipsilateral to the field in question extends much farther (~100°) than does the contribution from the fellow eye (~60°). Thus, there is a roughly 40° crescent in the ipsilateral eye that has no corresponding contribution from the fellow eye—it is hemianopia-like, it is not homonymous. No commercially-available automated VF analyzer is capable of detecting a temporal crescent; the only technology that can is Goldmann perimetry. Lesions of the anterior occipital cortex are responsible for this finding.
Visual Field Defects

An elderly vasculopath presents c/o things ‘sneaking up on her from the left.’ You check her CVFs—they’re fine. You get a 24-2—WNL OU. You send her on her way with reassurances that everything’s fine. Two weeks later she’s on your schedule again with the same complaint. Just to be sure you repeat the VF, but with the rarely-used 30-2 protocol—again, WNL. Reassure, discharge. Back the next week. Sigh. This visit, for the first time in your career, you order the never-used 60-2 protocol—again, nothing. YOU'RE FINE, YOU CRAZY OLD BAT! you yell at her. (Not really.) To placate her, you refer her to a neuro-oph, who… Sends you a consult note detailing both her VF loss and the location of the CNS changes (dx: ischemic CVA) that produced it. What did you miss? You missed a classic case of loss of the temporal crescent. The temporal visual field of the eye ipsilateral to the field in question extends much farther (~ 100°) than does the contribution from the fellow eye (~ 60°).
An elderly vasculopath presents c/o things ‘sneaking up on her from the left.’ You check her CVFs—they’re fine. You get a 24-2—WNL OU. You send her on her way with reassurances that everything’s fine. Two weeks later she’s on your schedule again with the same complaint. Just to be sure you repeat the VF, but with the rarely-used 30-2 protocol—again, WNL. Reassure, discharge. Back the next week. Sigh. This visit, for the first time in your career, you order the never-used 60-2 protocol—again, nothing. YOU’RE FINE, YOU CRAZY OLD BAT! you yell at her. (Not really.) To placate her, you refer her to a neuro-oph, who… Sends you a consult note detailing both her VF loss and the location of the CNS changes (dx: ischemic CVA) that produced it. What did you miss?
You missed a classic case of loss of the temporal crescent. The temporal visual field of the eye ipsilateral to the field in question extends much farther (~ 100°) than does the contribution from the fellow eye (~ 60°). Thus, there is a roughly 40° crescent in the ipsilateral eye that has no corresponding contribution from the fellow eye—it is hemianopia-like, but not homonymous.
Diagram of the nasal VF (60 degrees) and temporal VF (90-100 degrees). The temporal 60-90° region is the temporal crescent.
Visual Field Defects

An elderly vasculopath presents c/o things ‘sneaking up on her from the left.’ You check her CVFs—they’re fine. You get a 24-2—WNL OU. You send her on her way with reassurances that everything’s fine. Two weeks later she’s on your schedule again with the same complaint. Just to be sure you repeat the VF, but with the rarely-used 30-2 protocol—again, WNL. Reassure, discharge. Back the next week. Sigh. This visit, for the first time in your career, you order the never-used 60-2 protocol—again, nothing. YOU’RE FINE, YOU CRAZY OLD BAT! you yell at her. (Not really.) To placate her, you refer her to a neuro-oph, who… Sends you a consult note detailing both her VF loss and the location of the CNS changes (dx: ischemic CVA) that produced it. What did you miss? You missed a classic case of loss of the temporal crescent. The temporal visual field of the eye ipsilateral to the field in question extends much farther (~ 100°) than does the contribution from the fellow eye (~ 60°). Thus, there is a roughly 40° crescent in the ipsilateral eye that has no corresponding contribution from the fellow eye—it is hemianopia-like, but not homonymous. No commercially-available automated VF analyzer is capable of detecting a temporal crescent; the only technology that can is Goldmann perimetry. Let’s address one of these exceptions now.
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Images showcasing the location of a lesion producing Temporal Crescent Syndrome
Which of the following is *not* associated with bitemporal visual-field loss?

- Sectoral RP
- Glaucoma
- Fuchs coloboma
- Chiasmal lesion
- Toxic/hereditary/nutritional optic neuropathy
Q/A

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Tilted disc: Superior bitemporal VF defects
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How on earth does a tilted disc produce a bitemporal VF defect, and how can the defect be resolved via refraction? It’s actually pretty straightforward. The area including and adjacent to the inferior pole of a tilted disc is staphylomatous. This means the ‘axial length’ of the photoreceptors within this region is greater than that of the rest of the posterior pole. Because of this extra axial length, the correction used during VF testing (which is based on the refraction of the non-staphylomatous fovea) is not myopic enough for the inferior peripapillary region.

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