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!
Visual Field Defects

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?
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?

OS

OD

How far in degrees from fixation is the blind spot?
Visual Field Defects

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

Anatomic locations for lesions producing VF defects
Visual Field Defects

Retina

next location

Anatomic locations for lesions producing VF defects
Visual Field Defects

Retina

Optic nerve

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

Optic nerve

Optic chiasm

Retrochiasmal

Clinically obvious dz
Clinically subtle dz
Visual Field Defects

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.
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?
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…
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?
Visual Field Defects

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Clinically obvious dz (eg…RP)
Clinically subtle dz (eg…CAR)

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.
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?*
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
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 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
Visual Field Defects

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

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

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

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

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

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

- 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

Optic nerve

Optic chiasm

Retrochiasmal

Clinically obvious dz
Clinically subtle dz

Depressions
Scotomas

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
- Optic chiasm
- Retrochiasmal

three specific depressions
Visual Field Defects

Retina
  - Clinically obvious dz
  - Clinically subtle dz

Optic nerve
  - Clinically obvious dz
  - Clinically subtle dz
  - Depressions
    - Nasal step
    - Altitudinal
    - Temporal wedge
  - Scotomas

Optic chiasm

Retrochiasmal
Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

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

Optic chiasm

Retrochiasmal
Visual Field Defects

Retina
- Clinically obvious dz
- Clinically subtle dz

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

Optic chiasm
- Superior altitudinal
- Inferior altitudinal

Retrochiasmal
Visual Field Defects

- Retina
  - Clinically obvious dz
  - Clinically subtle dz
  - Depressions
    - Nasal step
    - Altitudinal
    - Temporal wedge
  - Scotomas

- Optic nerve

- Optic chiasm

- 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
Central
Ceco-central

Optic chiasm

Superior arcuate

Inferior arcuate

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

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

Retina

Optic nerve

Optic chiasm

Retrochiasmal

Scotomas

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

Arcuate
Central
Ceco-central

(Take note: Bilateral ceco-central 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:
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**
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
  - #3?

- Optic chiasm
- Retrochiasmal
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:
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:

- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

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

Clindically obvious dz

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

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

Papillomacular bundle
Arcuate fibers
Nasal radiating fibers

Optic nerve head

Retrochiasmal

Optic chiasm

Retina
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

Retrochiasmal
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.

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?

Optic nerve head
- Clinically obvious dz
- Papillomacular bundle
  - Arcuate fibers
  - Nasal radiating fibers

Optic chiasm

Retrochiasmal

Nasal step
Altitudinal
Temporal wedge

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

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?

Optic nerve head:
- Papillomacular bundle
  - Arcuate fibers
  - Nasal radiating fibers
- Clinically obvious dz
- Clinically subtle dz

Optic chiasm:
- Nasal step
- Altitudinal
- Temporal wedge

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?**

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

**Optic nerve head**

**Optic chiasm**

**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.

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.
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:**

What 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:
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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.
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:
-- 

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.

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

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-- Tobacco

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?
Visual Field Defects

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

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.

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-- Ethanol
-- Tobacco

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

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.
## Visual Field Defects

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

### 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 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:
--
--

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.

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:
--
--

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:
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--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.
**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 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.

**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 B₁₂
--Folate
--Thiamine

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

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?

- **Clinically obvious dz**
  - Nasal step
  - Altitudinal
  - Temporal wedge

- **Clinically subtle dz**
  - Arcuate
  - Central
  - Ceco-central

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

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 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.

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.
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

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

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

Optic nerve head

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

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
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?

Optic nerve head

Papillomacular bundle
Arcuate fibers
Nasal radiating fibers

Optic chiasm

Retrochiasmal

Clinically obvious dz

Clinically subtle dz

R

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

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?

- Clinically obvious dz
- Clinically subtle dz

Optic nerve

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

Retrochiasmal

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
  - Papillomacular bundle
  - Arcuate fibers
    - Nasal radiating fibers

- Optic chiasm
  - 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?

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

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.
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.

- **Arcuate fibers**
  - Nasal radiating fibers

What is this ‘horizontal demarcation line’ called? The horizontal raphe.

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

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

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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
- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Optic chiasm

Retrochiasmal

Nasal step
- Altitudinal
- Temporal wedge

Arcuate
- Central
- Ceco-central

Clinically obvious dz

Clinically subtle dz

Visual Field Defects
Visual Field Defects

Clinically obvious dz
Clinically subtle dz

Optic nerve
head

Optic chiasm

Retrochiasmal

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

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Arcuate fibers
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Nasal radiating fibers

Nasal step
Altitudinal
Temporal wedge

Arcuate
Central
Ceco-central

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
- Temporal wedge
- Altitudinal
- Central
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Two conditions should come to mind:

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  - Arcuate fibers
  - Nasal radiating fibers

Optic chiasm

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Optic nerve head
- Clinically obvious dz
- Clinically subtle dz
- Nasal radiating fibers
- Arcuate fibers
- Papillomacular bundle

Retrochiasmal

Optic chiasm

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

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

- Optic nerve head
  - Clinically obvious dz
  - Nasal step
    - Altitudinal
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  - Nasal radiating fibers
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**Optic chiasm**

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There are a number of ways, but the most straightforward would be to inspect the ONH, which will be...
Visual Field Defects

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

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- Papillomacular bundle
- Arcuate fibers
- Nasal radiating fibers

Optic chiasm
- Nasal step
- Altitudinal
- Temporal wedge
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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

Retrochiasmal

four very specific types of chiasmal 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
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?

- **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
  - LCN
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  - 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

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  - Nasal step
  - Altitudinal
  - Temporal wedge
  - Arcuate

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

- **Retrochiasmal**
  - Optic tract
  - LGN
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Retina
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Retrochiasmal
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(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)
- With few exceptions, will not cross the vertical meridian

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

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?

With few exceptions, will not cross the vertical meridian

With few exceptions, must be homonymous hemianopia-like
In basic terms, what is the difference between chiasmal lesions resulting in a bitemporal VF defect vs those producing a 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?

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.
Fibers originating in the nasal retinas cross at the chiasm.

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

**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 **temporal** retinas are responsible for the **nasal** visual fields.
In basic terms, what is the difference between chiasmal lesions resulting in a bi-temporal VF defect vs those producing a bi-nasal defect?

Bitemporal hemianopia: *Central* aspect of chiasm

Binasal hemianopia: *Lateral* portions of chiasm

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

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.

**Nasal VF**  **Nasal VF**

**Optic Chiasm**

Binasal hemianopia: *Lateral* portions of chiasm

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?

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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.

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

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

The *temporal* retinas are responsible for the *nasal* visual fields.
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. Optic fibers originating in the temporal retinas do not cross at the chiasm.

Bitemporal hemianopia: Central aspect of chiasm

Nasal VF

Binasal hemianopia: Lateral portions of 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)

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

Here’s why:
In basic terms, what is the difference between chiasmal lesions resulting in a bi-temporal VF defect vs those producing a bi-nasal 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.

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

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).

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 temporal retinas do not cross at the chiasm.
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

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

**Retina**

**Optic nerve**

**Optic chiasm**

**Retrochiasmal**

Bitemporal hemianopia
- Binasal hemianopia
- Junctional common
- Junctional rare

Optic tract
- LGN
- Optic radiations
- Occipital cortex

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Is it usually congruous or incongruous? Incongruous

Optic nerve defects:
- Bitemporal hemianopia
  - Binasal hemianopia
  - Junctional common
  - Junctional rare

Visual Field Defects
- Retina
  - Clinically obvious dz
  - Clinically subtle dz
- Optic nerve
  - Depressed
  - Scotomas
- Optic chiasm
  - Bitemporal hemianopia
  - Optic tract
  - LGN
  - Optic radiations
  - Occipital cortex
- Retrochiasmal
  - Arcuate
  - Central
  - Ceco-central
  - Nasal step
  - Altitudinal
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Visual Field Defects

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Optic Field Defects

Retrochiasmal

Optic tract
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Visual Field Defects

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- 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 visual field.

Is it usually congruous or incongruous?

Bitemporal hemianopia
- Binasal hemianopia
- Junctional common
- Junctional rare

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

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 visual field.

Is it usually congruous or incongruous?
- Incongruous

Bitemporal hemianopia
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- Junctional common
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Optic tract
- LGN
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Visual Field Defects

What is the classic cause of a chiasmal binasal hemianopia?

Bilateral carotid disease

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

Glaucoma
What is the classic cause of a chiasmal binasal hemianopia? Bilateral carotid atherosclerotic dz compressing the outer chiasm bilaterally.
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
- Junctional common

Retrochiasmal

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

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?
Glaucoma
What does the term junctional refer to anatomically?

The junctional refers to the area where the optic nerve and the chiasm meet.
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

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

- Optic chiasm
  - Bitemporal hemianopia
  - Binasal hemianopia
  - Junctional common
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- 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
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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
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?*
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

1. **Retina**
   - Clinically obvious dz
   - Clinically subtle dz

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

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

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

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

- **With few exceptions**
  - Must be homonymous hemianopia-like

**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?

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°) 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.

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Visual Field Defects

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Let’s address one of these exceptions now.
Diagram of the nasal VF (60 degrees) and temporal VF (90-100 degrees). The temporal 60-90° region is the temporal crescent.
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Visual Field Defects

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

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
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 binasal VF cuts.

A

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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.

*temporal field is involved--if anything, glaucoma is far more likely to cause binasal VF cuts.*
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**Fuchs coloboma** (aka *tilted disc syndrome*) is associated with bitemporal loss that respects the vertical midline. *Chiasmal lesion* is associated with bitemporal loss that does not respect the midline. *Toxic/hereditary/nutritional optic neuropathy* is associated with bitemporal loss that does not respect the midline.

Toxic/hereditary/nutritional optic neuropathy is associated with bilateral cecocentral VF loss, which can mimic bitemporal loss.

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**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.

**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. This implies that the VF deficits could be resolved if the proper refractive correction was employed. Does it? Indeed it does, and this cinches the diagnosis. This implies also that the bitemporal VF loss shouldn't respect the vertical midline. Does it? No (except by pure dumb luck).
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—indeed, glaucoma is far more likely to cause binasal VF cuts.

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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