Before you begin: This is a big topic, and big topics beget big slide-sets. There’s natural breaks in a couple of spots (@slides 152- and 355-ish); I placed break time! slides to mark them.
There’s no single correct way to divide up the optic neuropathies. That said, there’s a compelling argument that you should think of them in terms of these two subgroups. What are they?
There's no single correct way to divide up the optic neuropathies. That said, there's a compelling argument that you should think of them in terms of these two subgroups. What are they?
What is the common name for an optic neuropathy 2ndry to an inflammatory process?

**Optic Neuropathy**

- Inflammatory
- Noninflammatory
What is the common name for an optic neuropathy 2ndry to an inflammatory process?

Optic neuritis
Again, no single correct answer (and several viable options). But there’s a compelling argument that you should think of them as belonging to one of two subgroups. What are they?
Again, no single correct answer (and several viable options). But there’s a compelling argument that you should think of them as belonging to one of two subgroups. What are they?
What does it mean to say an optic neuritis is typical?

It means the underlying disease process involves demyelination.
Typical Optic Neuritis

Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Noninflammatory

What does it mean to say an optic neuritis is typical?
It means the underlying dz process involves demyelination
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Noninflammatory

**Typical Optic Neuritis**

What does it mean to say an optic neuritis is typical?
It means the underlying dz process involves demyelination.

Note: In common clinical parlance, the term *typical* is reserved for demyelination that is either idiopathic or related to MS.
What does it mean to say an optic neuritis is typical?
It means the underlying disease process involves demyelination.
Optic Neuropathy

Optic neuritis

Typical (demyelinating) - Demographically speaking, who is the typical typical optic neuritis patient? A woman between 15 and 45

Noninflammatory

What does it mean to say an optic neuritis is typical? It means the underlying dz process involves demyelination.
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Noninflammatory

What does it mean to say an optic neuritis is typical?
It means the underlying dz process involves demyelination

Demographically speaking, who is the typical typical optic neuritis patient?
A woman between 15 and 45 (average age #)
What does it mean to say an optic neuritis is typical?
It means the underlying dz process involves demyelination

Demographically speaking, who is the typical typical optic neuritis patient?
A woman between 15 and 45 (average age 32)
What does it mean to say an optic neuritis is typical?

It means the underlying disease process involves demyelination.

Demographically speaking, who is the typical typical optic neuritis patient?

A woman between 15 and 45 (average age 32).

What proportion of typical optic neuritis pts are women?

Almost 80%!
What does it mean to say an optic neuritis is typical?
It means the underlying disease process involves demyelination.

Demographically speaking, who is the typical typical optic neuritis patient?
A woman between 15 and 45 (average age 32)

What proportion of typical optic neuritis pts are women?
Almost 80%!
Typical Optic Neuritis

As the title implies, we will have much more to say about typical optic neuritis later in the set.

Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Noninflammatory

What does it mean to say an optic neuritis is typical?

It means the underlying disease process involves demyelination.

Demographically speaking, who is the typical typical optic neuritis patient?

A woman between 15 and 45 (average age 32)

Almost 80% of typical optic neuritis patients are women!

No question—proceed when ready
Optic Neuropathy

Optic neuritis

- Typical
  (demyelinating)
- Atypical
  ?
  ?

Noninflammatory

No single correct answer, yada yada yada.
What are these two groups?
Optic Neuropathy

- Optic neuritis
  - Typical (demyelinating)
  - Atypical
    - Infectious
    - Immune

No single correct answer, yada yada yada.
What are these two groups?
Name 3 infectious causes of atypical ON:
1) 
2) 
3) 
(There are many others, of course)
Optic Neuropathy

- Optic neuritis
  - Typical (demyelinating)
  - Atypical
    - Infectious
      - Syphilis
      - Bartonella
      - Lyme
    - Immune

*Name 3 infectious causes of atypical ON:
1) Syphilis
2) Bartonella
3) Lyme*

(There are many others, of course)
Optic Neuropathy

Optic neuritis

- Typical
  - (demyelinating)

- Atypical
  - Infectious
  - Immune

Name 3 immune-related causes of atypical ON:
1) 
2) 
3) 

(There are many others, of course)
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Infectious

Immune

Name 3 immune-related causes of atypical ON:
1) Sarcoid
2) SLE or some other vasculitic process
3) Granulomatosis with polyangiitis

(There are many others, of course)
Optic Neuropathy

Optic neuritis

Typical
(demyelinating)

Atypical

Infectious

Immune

Name 3 immune-related causes of atypical ON:
1) Sarcoid
2) SLE or some other vasculitic process
3) Granulomatosis with polyangiitis (formerly known as Wegener's)

(There are many others, of course)
Optic Neuropathy

Typical Optic Neuritis

Optic neuritis

Noninflammatory

Atypical

Typical (demyelinating)

Infectious

Immune

Name 3 immune-related causes of atypical ON:
1) Sarcoid
2) SLE or some other vasculitic process
3) Granulomatosis with polyangiitis (formerly known as Wegener’s)

(There are many others, of course)
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Infectious

Immune

Typical Optic Neuritis

Why don’t we call it Wegener’s?

(Formerly known as Wegener’s)

(There are many others, of course)

Name 3 immune-related causes:
1) Sarcoid
2) SLE or some other vasculitic process
3) Granulomatosis with polyangiitis

(There are many others, of course)
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Infectious

Immune

Typical Optic Neuritis

Name 3 immune-related causes of atypical ON:

1) Sarcoid
2) SLE or some other vasculitic process
3) Granulomatosis with polyangiitis (formerly known as Wegener’s)

(There are many others, of course)

Why don’t we call it Wegener’s?
Because Dr Wegener was a Nazi, and is suspected to have committed war crimes.
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Infectious

Immune

Noninflammatory

Typical Optic Neuritis
Optic Neuropathy

Optic neuritis

Typical Optic Neuritis

Noninflammatory
- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

Atypical

Infectious

Immune

Typical (demyelinating)
What is far-and-away the most common type of optic neuropathy?

Hint…
Optic Neuropathy

Optic neuritis

- Typical (demyelinating)
- Atypical
  - Infectious
  - Immune

Noninflammatory

- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

*What is far-and-away the most common type of optic neuropathy?*

*Hint…It’s not listed on this slide!*

*Hint…*
What is far-and-away the most common type of optic neuropathy?

Hint…It’s not listed on this slide!

Hint…It’s so common, it gets its own ophthalmic subspecialty!

It’s… Glaucoma
What is far-and-away the most common type of optic neuropathy?

*Hint*...It’s not listed on this slide!

*Hint*...It’s so common, it gets its own ophthalmic subspecialty!

It’s...**Glaucoma** (don’t forget—glaucoma is an optic neuropathy!)
What exam finding is the sine qua non of unilateral or asymmetric bilateral optic neuropathy?
What exam finding is the sine qua non of unilateral or asymmetric bilateral optic neuropathy? A relative afferent pupillary defect (RAPD)
Typical Optic Neuritis

Optic Neuritis

- Optic neuritis
  - Typical (demyelinating)
  - Atypical
    - Infectious
    - Immune

Noninflammatory

- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

What exam finding is the sine qua non of unilateral or asymmetric bilateral optic neuropathy? **A relative afferent pupillary defect (RAPD)**

What should you do if a presumptive unilateral/asymmetric bilateral ON pt doesn't have an RAPD?
What exam finding is the sine qua non of unilateral or asymmetric bilateral optic neuropathy?

A relative afferent pupillary defect (RAPD)

What should you do if a presumptive unilateral/asymmetric bilateral ON pt doesn't have an RAPD?

You should question the diagnosis
What functional abnormalities are likely to be found in a pt with an optic neuropathy?

-- Decreased
-- Abnormal
-- Impaired

Typical Optic Neuritis

Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Infectious

Immune

Noninflammatory

--- Ischemic
--- Compressive
--- Toxic/nutritional
--- Congenital/hereditary
--- Traumatic

--- Decreased
--- Abnormal
--- Impaired

--- two words
--- two different words
--- two different words
What functional abnormalities are likely to be found in a pt with an optic neuropathy?
--Decreased central acuity
--Abnormal visual fields
--Impaired color vision
Optic Neuropathy

- Optic neuritis
  - Noninflammatory
  - Typical (demyelinating)
  - Ischemic
  - Compressive
  - Toxic/nutritional
  - Congenital/hereditary
  - Traumatic
- Atypical

What functional abnormalities are likely to be found in a pt with an optic neuropathy?
- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

What is the typical pattern of vision loss in typical optic neuritis?
- Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later
- VA can be anywhere from 20/20 to NLP; however, most cases are in the 20/40 – 20/200 range
- Long-term VA prognosis: Very good—about 90% will be 20/40 or better at one year
**Optic Neuropathy**

- Optic neuritis
  - Noninflammatory
  - Typical (demyelinating)
  - Ischemic
  - Compressive
  - Toxic/nutritional
  - Congenital/hereditary
  - Traumatic

- Atypical
  - Infectious
  - Immune

---

**What functional abnormalities are likely to be found in a pt with an optic neuropathy?**

- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

---

**What is the typical pattern of vision loss in typical optic neuritis?**

- Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later

**How profound is the vision loss?**

- VA can be anywhere from 20/20 to NLP; however, most cases are in the 20/40 – 20/200 range

**What is the long-term VA prognosis?**

- Very good—about 90% will be 20/40 or better at one year
Optic Neuropathy

- Typical (demyelinating)
- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic
- Atypical

What functional abnormalities are likely to be found in a pt with an optic neuropathy?

- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

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What is the long-term VA prognosis?

Very good—about 90% will be 20/40 or better at one year.
Optic Neuropathy

What is the typical pattern of vision loss in typical optic neuritis? Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a day, week or two later.

What functional abnormalities are likely to be found in a pt with an optic neuropathy?

- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

Typical Optic Neuritis
Typical Optic Neuritis

Optic Neuropathy

What is the typical pattern of vision loss in typical optic neuritis? Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later.

What functional abnormalities are likely to be found in a pt with an optic neuropathy?

--Decreased central acuity
--Abnormal visual fields
--Impaired color vision

Typical (demyelinating)
Optic Neuropathy

What functional abnormalities are likely to be found in a pt with an optic neuropathy?
-- Decreased central acuity
-- Abnormal visual fields
-- Impaired color vision

What is the typical pattern of vision loss in typical optic neuritis?
Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later.

This pattern of vision loss and recovery over time in typical optic neuritis bears repeating for emphasis.

No question—proceed when ready
**Typical Optic Neuritis**

Vision in typical optic neuritis

She will c/o rapid unilateral VA loss that occurs over several days.

**What is the typical pattern of vision loss in typical optic neuritis?**

Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later.

This pattern of vision loss and recovery over time in typical optic neuritis bears repeating for emphasis.

**What functional abnormalities are likely to be found in a pt with an optic neuropathy?**

--Decreased central acuity
--Abnormal visual fields
--Impaired color vision

No question—proceed when ready
What is the typical pattern of vision loss in typical optic neuritis?
Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later.

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What functional abnormalities are likely to be found in a pt with an optic neuropathy?
-- Decreased central acuity
-- Abnormal visual fields
-- Impaired color vision

No question—proceed when ready
Typical Optic Neuritis

What is the typical pattern of vision loss in typical optic neuritis?
Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later.

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What functional abnormalities are likely to be found in a pt with an optic neuropathy?
- Decreased central acuity
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This pattern of vision loss and recovery over time in typical optic neuritis bears repeating for emphasis.

What functional abnormalities are likely to be found in a pt with an optic neuropathy?

- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

No question—proceed when ready
Typical Optic Neuritis

Optic Neuropathy

What is the typical pattern of vision loss in typical optic neuritis?
Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later.

How profound is the vision loss?
VA can be anywhere from 20/20 to NLP; however, most cases are in the 20/40 – 20/200 range.

What functional abnormalities are likely to be found in a pt with an optic neuropathy?
- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

Very good—about 90% will be 20/40 or better at one year.
Optic Neuropathy

- **Typical Optic Neuritis**
  - Optic neuritis: Noninflammatory (demyelinating)
  - Ischemic
  - Compressive
  - Toxic/nutritional
  - Congenital/hereditary
  - Traumatic

**What functional abnormalities are likely to be found in a pt with an optic neuropathy?**

- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

**What is the typical pattern of vision loss in typical optic neuritis?**

Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later.

**How profound is the vision loss?**

VA can be anywhere from 20/20 to NLP; however, most cases are in the 20/40 – 20/200 range.

**What is the long-term VA prognosis?**

Very good—about 90% will be 20/40 or better at one year.
Optic Neuropathy

- Optic neuritis Noninflammatory
  - Typical (demyelinating)
  - Ischemic
  - Compressive
  - Toxic/nutritional
  - Congenital/hereditary
  - Traumatic
- Atypical
  - Infectious Immune

What functional abnormalities are likely to be found in a pt with an optic neuropathy?
- Decreased central acuity
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- Impaired color vision

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Optic Neuropathy

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- Decreased central acuity
- Abnormal visual fields
- Impaired color vision
Typical Optic Neuritis

Optic Neuropathy

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Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later.

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Very good—about % will be 20/40 or better at one year.

What functional abnormalities are likely to be found in a pt with an optic neuropathy?
--Decreased central acuity
--Abnormal visual fields
--Impaired color vision
Typical Optic Neuritis

Optic Neuropathy

- What is the typical pattern of vision loss in typical optic neuritis?
  Unilateral vision loss which develops and nadirs over a few days, with spontaneous recovery beginning a week or two later.

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What functional abnormalities are likely to be found in a pt with an optic neuropathy?
- Decreased central acuity
- Abnormal visual fields
- Impaired color vision
What functional abnormalities are likely to be found in a pt with an optic neuropathy?
--Decreased central acuity
--Abnormal visual fields
--Impaired color vision

What pattern(s) of VF loss occur in typical optic neuritis?
What functional abnormalities are likely to be found in a pt with an optic neuropathy?

- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

What pattern(s) of VF loss occur in typical optic neuritis?

It can be anything, but is most commonly a...
What functional abnormalities are likely to be found in a pt with an optic neuropathy?
-- Decreased central acuity
-- Abnormal visual fields
-- Impaired color vision

What pattern(s) of VF loss occur in typical optic neuritis?
It can be anything, but is most commonly a central scotoma
Central scotoma in typical optic neuritis
What functional abnormalities are likely to be found in a pt with an optic neuropathy?

- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

**Dyschromatopsia in typical optic neuritis: Is it red-green, or blue-yellow?**
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Infectious

Immune

Noninflammatory

- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

What functional abnormalities are likely to be found in a pt with an optic neuropathy?

- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

Dyschromatopsia in typical optic neuritis: Is it red-green, or blue-yellow?

Red-green
Optic Neuropathy

Optic neuritis

**Typical**
- (demyelinating)

**Atypical**
- Infectious
- Immune

Noninflammatory
- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

What functional abnormalities are likely to be found in a pt with an optic neuropathy?
-- Decreased central acuity
-- Abnormal visual fields
-- Impaired color vision

Dyschromatopsia in typical optic neuritis: Is it red-green, or blue-yellow?
Red-green

How common is it?
What functional abnormalities are likely to be found in a pt with an optic neuropathy?

- Decreased central acuity
- Abnormal visual fields
- Impaired color vision

Dyschromatopsia in typical optic neuritis: Is it red-green, or blue-yellow?

Red-green

How common is it?
Per the Neuro book, it is “nearly universal”
What is the usual appearance of the ONH in typical optic neuritis?
What is the usual appearance of the ONH in typical optic neuritis? Pretty unremarkable—only $\text{\%}$ of cases present with disc edema.
What is the usual appearance of the ONH in typical optic neuritis?
Pretty unremarkable—only 1/3 of cases present with disc edema
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

What is the usual appearance of the ONH in typical optic neuritis? Pretty unremarkable—only 1/3 of cases present with disc edema.

When edema is present, is it usually mild, or florid (ie, severe with associated hemorrhages)?
What is the usual appearance of the ONH in typical optic neuritis? Pretty unremarkable—only 1/3 of cases present with disc edema.

When edema is present, is it usually mild, or florid (ie, severe with associated hemorrhages)?
Mild
Optic Neuropathy

- Optic neuritis
  - Typical (demyelinating)
  - Atypical

Typical Optic Neuritis

Is typical optic neuritis associated with ocular pain?

- Noninflammatory
  - Ischemic
  - Compressive
  - Toxic/nutritional
  - Congenital/hereditary
  - Traumatic

- Infectious
- Immune
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Noninflammatory
- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary

Is typical optic neuritis associated with ocular pain?
Yes—over % will complain of pain
Optic Neuropathy

Optic neuritis

Typical (demyelinating)
Atypical

Noninflammatory
- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary
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- Immune

Typical Optic Neuritis

Is typical optic neuritis associated with ocular pain?
Yes—over 90% will complain of pain

Yes—over 90% will complain of pain
Is typical optic neuritis associated with ocular pain? 
Yes—over 90% will complain of pain **provoked by** two words.
Is typical optic neuritis associated with ocular pain? Yes—over 90% will complain of pain provoked by eye movements.
Is typical optic neuritis associated with ocular pain? 
Yes—over 90% will complain of pain provoked by eye movements

Does the onset of pain typically precede, follow, or coincide with the loss of vision?
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Noninflammatory
- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

Is typical optic neuritis associated with ocular pain?
Yes—over 90% will complain of pain provoked by eye movements

Does the onset of pain typically precede, follow, or coincide with the loss of vision?
While it doesn’t have to, it often precedes it
If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done?

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MRI brain and orbits, with contrast. That’s it.
If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done? MRI brain and orbits, with contrast. That’s it.

What is the purpose of the MRI?
If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done? MRI brain and orbits, with contrast. That’s it.

What is the purpose of the MRI?
To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS).
If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done? MRI brain and orbits, with contrast. That’s it.

What is the purpose of the MRI?
To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS)
Typical Optic Neuritis

Optic Neuropathy

Optic neuritis

Typical (classical presentation)

Atypical

Noninflammatory

- Ischemic
- Compressive

Traumatic

Toxic/nutritional

Congenital/hereditary

Infectious Immune

Ischemic

Compressive

Traumatic

Toxic/nutritional

Congenital/hereditary

Infectious Immune

What was the name of the study that followed typical optic neuritis pts over many years, and (among other things) assessed their risk of developing MS?

To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS)
If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done?

MRI brain and orbits, with contrast. That's it.

What is the purpose of the MRI?

To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS).

What was the name of the study that followed typical optic neuritis pts over many years, and (among other things) assessed their risk of developing MS?

The Optic Neuritis Treatment Trial (ONTT)

Per the ONTT, what proportion of typical optic neuritis pts develop MS by 15 years if...

- if there were no white matter changes on MRI: 1/4
- if even one white matter change was present: 3/4
Typical Optic Neuritis

Optic Neuropathy

Optic neuritis

Noninflammatory
- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary

Atypical

Typical (demyelinating)

If a typical patient presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done?

MRI brain and orbits, with contrast. That's it.

What is the purpose of the MRI?
To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS).

What was the name of the study that followed typical optic neuritis patients over many years, and (among other things) assessed their risk of developing MS?
The Optic Neuritis Treatment Trial (ONTT)

Is the ONTT one of those trials I'm expected to know by name?
Yes it is

Per the ONTT, what proportion of typical optic neuritis patients develop MS by 15 years if...
- there were no white matter changes on MRI: 1/4
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Typical Optic Neuritis

What was the name of the study that followed typical optic neuritis pts over many years, and (among other things) assessed their risk of developing MS?

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Yes it is

To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS)
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Per the ONTT, what proportion of typical optic neuritis pts develop MS by 15 years if…

…there were no white matter changes on MRI:

1/4

…if even one white matter change was present:

3/4
**Typical Optic Neuritis**

If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done?

MRI brain and orbits, with contrast. That's it.

What is the purpose of the MRI?

To look for white-matter changes, the presence of which increases the likelihood of developing **multiple sclerosis (MS)**.

What was the name of the study that followed typical optic neuritis pts over many years, and (among other things) assessed their risk of developing MS? The Optic Neuritis Treatment Trial (ONTT)

*Per the ONTT, what proportion of typical optic neuritis pts develop MS by 15 years if…*. 

…there were **no** white matter changes on MRI: 1/4
If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done? MRI brain and orbits, with contrast. That’s it.

What is the purpose of the MRI? To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS).

What was the name of the study that followed typical optic neuritis pts over many years, and (among other things) assessed their risk of developing MS? The Optic Neuritis Treatment Trial (ONTT).

Per the ONTT, what proportion of typical optic neuritis pts develop MS by 15 years if…
…there were **no** white matter changes on MRI: 1/4
…if even **one** white matter change was present:
Typical Optic Neuritis

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To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS).
Optic Neuropathy

Optic neuritis

Typical (demyelinating)

Atypical

Noninflammatory
- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

Typical Optic Neuritis

If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done?

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Per the ONTT, what proportion of typical optic neuritis pts develop MS by 15 years if...

- there were no white matter changes on MRI:
  - 1/4

- if even one white matter change was present:
  - 3/4

Why is knowing the likelihood of developing MS important?

Because it influences decision-making vis a vis whether to initiate tx that can forestall MS onset (and may improve dz course)
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Per the ONTT, what proportion of typical optic neuritis pts develop MS by 15 years if... there were no white-matter changes on MRI: 1/4. Even with just one white-matter change: 3/4.

Why is knowing the likelihood of developing MS important? Because it influences decision-making vis a vis whether to initiate tx that can forestall MS onset (and may improve dz course).
Typical Optic Neuritis

Optic Neuropathy

- Typical
- Atypical
  - Infectious
  - Immune
  - Ischemic
  - Compressive
  - Toxic/nutritional
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**We will have much more to say about MS later in the set**

What was the name of the study that followed typical optic neuritis pts over many years, and (among other things) assessed their risk of developing MS?
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Because it influences decision-making vis a vis whether to initiate tx that can forestall MS onset (and may improve dz course)

To look into what white-matter changes, the proportion of white matter changes increases the likelihood of developing multiple sclerosis (MS)
The ONTT evaluated what sort of drug as tx for typical optic neuritis?

### Typical Optic Neuritis

Steroids

- **IV methylprednisolone.** 250 mg qid x 3 days (then pred 1 mg/kg/d x 11d, then tapered off)
- **PO prednisone.** 1 mg/kg/d x 14 days, then tapered off.

With respect to vision, to what extent did steroids provide a long-term benefit?

None. The final VA outcome of the Steroid group was no different than that of the control group.

Did steroids have any positive effects on vision?

The IV group regained their final (best) vision a week or two faster than the control group—although to reiterate for emphasis, their final VA was not better than that of the controls. (The PO steroid group did not enjoy even this modest benefit.)

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IV steroids delayed the onset of MS in pts who had 2+ white-matter lesions at presentation. But as was the case with VA, eventually this outcome difference between the IV steroid and control groups disappeared—by 3 years post-event, there was no difference in the rate of MS development between these groups.

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Indeed they did—the PO pred group had an increased risk of recurrence of optic neuritis. So PO pred @1 mg/kg/d doesn’t help, and may harm, optic neuritis pts.
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IV steroids delayed the onset of MS in pts who had 2+ white-matter lesions at presentation. But as was the case with VA, eventually this outcome difference between the IV steroid and control groups disappeared—by 3 years post-event, there was no difference in the rate of MS development between controls and steroid groups.

Did steroids have any negative effects?
Indeed they did—the PO pred group had an increased risk of recurrence of optic neuritis.

Does this mean PO pred is contraindicated in typical optic neuritis?
No, subsequent studies found that megadose PO steroids hasten VA recovery without increasing the risk of recurrence

‘Megadose’? How much pred are we talking about here?
A gram a day (same as the IV dose of methylprednisolone in the ONTT)

So PO pred @1 mg/kg/d doesn’t help—and seems to harm—optic neuritis pts.
If a typical pt presents with what seems to be a typical case of typical optic neuritis, what tests if any should be done?

As a review: Who is the typical typical optic neuritis pt?

What is the purpose of the MRI?
To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS)
If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done?

What is the purpose of the MRI?
To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS)

As a review: Who is the typical typical optic neuritis pt?

Female
Young adult

Typical (demyelinating)
### Typical Optic Neuritis

**Female**  
**Young adult**

**VA loss**  
**Nadirs over**  
**Recovery starts**  
**Pain with**  
**Disc edema**

- **Laterality**
- **Amount of time**

**Optic Neuropathy**

- **Optic Neuritis**
  - Noninflammatory
    - Ischemic
    - Compressive
    - Toxic/nutritional
    - Congenital/hereditary

**Atypical**

**Typical** (demyelinating)

- If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done?  
  - MRI brain and orbits, with contrast. That’s it.  

**What is the purpose of the MRI?**
  - To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS)

**As a review: Who is the typical typical optic neuritis pt?**

- **Typical case**
  - Female
  - Young adult
  - VA loss
  - Nadirs over several days
  - Recovery starts within 1 month
  - Pain with eye movement
  - Disc edema absent or mild

**How does a case of typical optic neuritis typically present?**
Optic Neuropathy

Noninflammatory
- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary

Optic Neuritis

Atypical

Infectious

Immune

Ischemic

Compressive

Toxic/nutritional

Congenital/hereditary

Optic Neuritis

Female
Young adult
VA loss unilateral
Nadirs over several days
Recovery starts <1 month
Pain with eye movement
Disc edema absent or mild

If a typical pt presents with what seems to be a typical case of typical optic neuritis, what sort of workup should be done? MRI brain and orbits, with contrast. That's it.

What is the purpose of the MRI?
To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS)

As a review: Who is the typical optic neuritis pt?

How does a case of typical optic neuritis typically present?
If the pt deviates from the typical pattern…

Typical Optic Neuritis

MRI brain and orbits, with contrast. That's it.

What is the purpose of the MRI?
To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS)

No question—proceed when ready
Typical Optic Neuritis

If the pt or the presentation deviates from the typical pattern...

Typical (demyelinating) Optic Neuritis
- Female
- Young adult
- VA loss unilateral
- Nadirs over several days
- Recovery starts <1 month
- Pain with eye movement
- Disc edema absent or mild

Atypical Optic Neuritis
- Male
- Older
- VA loss bilateral
- Progressive VA loss
- No recovery after a month
- Lack of pain
- Disc edema severe/florid

Optic Neuropathy
- Infectious
- Immune
- Ischemic
- Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

If a pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.
No question—proceed when ready

As a review: Who is the typical typical optic neuritis pt?
What is the purpose of the MRI?
To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS)

How does a case of typical optic neuritis typically present?
**Typical Optic Neuritis**

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis.

**Typical (demyelinating)?**

- Female
- Young adult
- VA loss unilateral
- Nadirs over several days
- Recovery starts <1 month
- Pain with eye movement
- Disc edema absent or mild

**Atypical**

- Male
- Older
- VA loss bilateral
- Progressive VA loss
- No recovery after a month
- Lack of pain
- Disc edema severe/florid

If a *typical pt* presents with what seems to be a *typical case* of typical optic neuritis, what sort of workup should be done? Does contrast help?

**As a review: Who is the typical typical optic neuritis pt?**

**How does a case of typical optic neuritis typically present?**

What is the purpose of the MRI?
To look for white-matter changes, the presence of which increases the likelihood of developing multiple sclerosis (MS)

No question—proceed when ready
Typical Optic Neuritis

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

Optic neuritis

Typical (demyelinating but)

Not idiopathic or MS-related

Atypical

Infectious

Immune

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

No question—proceed when ready
If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies

Typical Optic Neuritis

Neuropathy

Optic neuritis

Atypical

Typical (demyelinating) but

Not idiopathic or MS-related

Infectious

Immune

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

(Cont)

What etiologies?
?
?
?
?
?
Optic Neuritis

Optic neuritis

Typical (demyelinating not idiopathic or MS-related)

Atypical

Infectious

Immune

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

What etiologies?
Syphilis
Bartonella
Lyme testing (if endemic)
Sarcoid
SLE

(Cont)
Granulomatosis w/ polyangiitis
LHON
Meningeal process
NMO(SD)
MOGAD

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

Neuropathy
If the pt or the presentation deviates from the typical pattern…
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

Typical Optic Neuritis

What etiologies? What studies?
Syphilis: ?
Bartonella
Lyme testing (if endemic)
Sarcoid
SLE

(Cont)
Granulomatosis w/ polyangiitis
LHON
Meningeal process
NMO(SD)
MOGAD
Optic Neuropathy

Optic neuritis

Typical (demyelinating) but not idiopathic or MS-related

Atypical

Infectious

Immune

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies

What etiologies? What studies?
Syphilis: Serum and CSF RPR/TPPA
Bartonella
Lyme testing (if endemic)
Sarcoid
SLE

(Cont)
Granulomatosis w/ polyangiitis
LHON
Meningeal process
NMO(SD)
MOGAD
Optic Neuropathy

**Typical Optic Neuritis**

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

**Optic neuritis**

- **Typical** (demyelinating)
  - Not idiopathic or MS-related
  - Infectious
  - Immune

- **Atypical**
  - Toxic/nutritional
  - Congenital/hereditary
  - Traumatic

**What etiologies? What studies?**

- **Syphilis:** Serum and CSF RPR/TPPA
- **Bartonella:** ?
- Lyme testing (if endemic)
- Sarcoid
- SLE

(Cont)

- Granulomatosis w/ polyangiitis
- LHON
- Meningeal process
- NMO(SD)
- MOGAD
If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

Typical Optic Neuritis

Optic neuritis

- Male
- Older
- VA loss bilateral
- Progressive VA loss
- No recovery after a month
- Lack of pain
- Disc edema severe/florid

Not idiopathic or MS-related

Infectious

Immune

Atypical

Typical (demyelinating but not idiopathic or MS-related)

What etiologies? What studies?

- Syphilis: Serum and CSF RPR/TPPA
- Bartonella: IgM titers
- Lyme testing (if endemic)
- Sarcoid
- SLE

(Cont)

- Granulomatosis w/ polyangiitis
- LHON
- Meningeal process
- NMO(SD)
- MOGAD

Compressive
- Traumatic
- Toxic/nutritional
- Congenital/hereditary
If the pt or the presentation deviates from the typical pattern... You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

What etiologies? What studies?
Syphilis: Serum and CSF RPR/TPPA
Bartonella: IgM titers
Lyme testing (if endemic): ?
Sarcoid
SLE

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

Compressive
- Toxic/nutritional
- Congenital/hereditary
- Traumatic

Typical
(demyelinating but not idiopathic or MS-related)

Atypical

Infectious

Immune

(Cont)
Granulomatosis w/polymangiitis
LHON
Meningeal process
NMO(SD)
MOGAD
Optic Neuropathy

Noninflammatory

Infectious Immune

Ischemic Compressive Toxic/nutritional Congenital/hereditary Traumatic

Typical Optic Neuritis

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies

Typical (demyelinating but not idiopathic or MS-related)

Atypical

Infectious Immune

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

What etiologies? What studies?
Syphilis: Serum and CSF RPR/TPPA
Bartonella: IgM titers
Lyme testing (if endemic): Serum/CSF ELISA
Sarcoid
SLE

(Cont)
Granulomatosis w/ polyangiitis
LHON
Meningeal process
NMO(SD)
MOGAD
Optic Neuropathy

Optic neuritis

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

Typical Optic Neuritis

What etiologies? What studies?
Syphilis: Serum and CSF RPR/TPPA
Bartonella: IgM titers
Lyme testing (if endemic): Serum/CSF ELISA
Sarcoid: ?
SLE

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

Immune

Infectious

Not idiopathic or MS-related

Traumatic

Toxic/nutritional

Congenital/hereditary

Granulomatosis w/ polyanangiitis
LHON
Meningeal process
NMO(SD)
MOGAD

(Cont)
If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

**Typical Optic Neuritis**

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

**What etiologies? What studies?**
- Syphilis: Serum and CSF RPR/TPPA
- Bartonella: IgM titers
- Lyme testing (if endemic): Serum/CSF ELISA
- Sarcoid: Chest XR or CT; +/- Gallium/PET
- SLE
- Granulomatosis w/ polyangiitis
- LHON
- Meningeal process
- NMO(SD)
- MOGAD
Typical Optic Neuritis

If the pt or the presentation deviates from the typical pattern... You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

Neuropathy

Optic neuritis

- Typical (demyelinating but not idiopathic or MS-related)
- Atypical
  - Infectious
  - Immune

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

(Cont)
Granulomatosis w/ polyangiitis
LHON
Meningeal process
NMO(SD)
MOGAD

What etiologies? What studies?
Syphilis: Serum and CSF RPR/TPPA
Bartonella: IgM titers
Lyme testing (if endemic): Serum/CSF ELISA
Sarcoid: Chest XR or CT; +/- Gallium/PET
SLE: ?
If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

Typical Optic Neuritis

What etiologies? What studies?

- Syphilis: Serum and CSF RPR/TPPA
- Bartonella: IgM titers
- Lyme testing (if endemic): Serum/CSF ELISA
- Sarcoid: Chest XR or CT; +/- Gallium/PET
- SLE: ESR, ANA, Anti-DNA

(Cont)
- Granulomatosis w/ polyangiitis
- LHON
- Meningeal process
- NMO(SD)
- MOGAD

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Typical Optic Neuritis

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies

Optic neuritis

- Typical (demyelinating) but not idiopathic or MS-related
- Infectious
- Immune

What etiologies? What studies?
- Syphilis: Serum and CSF RPR/TPPA
- Bartonella: IgM titers
- Lyme testing (if endemic): Serum/CSF ELISA
- Sarcoid: Chest XR or CT; +/- Gallium/PET
- SLE: ESR, ANA, Anti-DNA

(Cont)
- Granulomatosis w/ polyangiitis: ?
- LHON
- Meningeal process
- NMO(SD)
- MOGAD

Neuropathy

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

- Compressive
  - Toxic/nutritional
  - Congenital/hereditary
  - Traumatic
**Typical Optic Neuritis**

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

---

### Typical Optic Neuritis

- Male
- Older
- VA loss bilateral
- Progressive VA loss
- No recovery after a month
- Lack of pain
- Disc edema severe/florid

### Atypical Optic Neuritis

- Toxic/nutritional
- Congenital/hereditary
- Traumatic

---

**What etiologies? What studies?**

- **Syphilis**: Serum and CSF RPR/TPPA
- **Bartonella**: IgM titers
- **Lyme testing (if endemic)**: Serum/CSF ELISA
- **Sarcoid**: Chest XR or CT; +/- Gallium/PET
- **SLE**: ESR, ANA, Anti-DNA

*(Cont)*

- **Granulomatosis w/ polyangiitis**: ANCA
- **LHON**
- **Meningeal process**
- **NMO(SD)**
- **MOGAD**
Typical Optic Neuritis

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies

Optic neuritis

Typical (demyelinating but not idiopathic or MS-related)

Atypical

Infectious

Immune

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

What etiologies? What studies?
Syphilis: Serum and CSF RPR/TPPA
Bartonella: IgM titers
Lyme testing (if endemic): Serum/CSF ELISA
Sarcoid: Chest XR or CT; +/- Gallium/PET
SLE: ESR, ANA, Anti-DNA

(Cont)
Granulomatosis w/ polyangiitis: ANCA
LHON: ?
Meningeal process
NMO(SD)
MOGAD
**Optic Neuropathy**

**Optic neuritis**

- **Typical (demyelinating)**
  - Not idiopathic or MS-related
  - Infectious
  - Immune

- **Atypical**
  - Toxic/nutritional
  - Congenital/hereditary
  - Traumatic

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

**Typical Optic Neuritis**

- Male
- Older
- VA loss bilateral
- Progressive VA loss
- No recovery after a month
- Lack of pain
- Disc edema severe/florid

**What etiologies? What studies?**

- Syphilis: Serum and CSF RPR/TPPA
- Bartonella: IgM titers
- Lyme testing (if endemic): Serum/CSF ELISA
- Sarcoid: Chest XR or CT; +/- Gallium/PET
- SLE: ESR, ANA, Anti-DNA

(Cont)

- Granulomatosis w/ polyangiitis: ANCA
- LHON: Genetic testing
- Meningeal process
- NMO(SD)
- MOGAD
Optic Neuropathy

Typical Optic Neuritis

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies

Typical (demyelinating but not idiopathic or MS-related)

Atypical

Immune

Infectious

Neuropathy

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

Compressive
– Toxic/nutritional
– Congenital/hereditary
– Traumatic

Meningeal process: ?

What etiologies? What studies?
Syphilis: Serum and CSF RPR/TPPA
Bartonella: IgM titers
Lyme testing (if endemic): Serum/CSF ELISA
Sarcoid: Chest XR or CT; +/- Gallium/PET
SLE: ESR, ANA, Anti-DNA

(Cont)
Granulomatosis w/ polyangiitis: ANCA
LNHO: Genetic testing
Meningeal process: ?
NMO(SD)
MOGAD
Optic Neuropathy

Optic neuritis

- Typical (demyelinating but not idiopathic or MS-related)
  - Infectious
  - Immune

- Atypical
  - Ischemic
  - Compressive
  - Toxic/nutritional
  - Congenital/hereditary
  - Traumatic

If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

What etiologies? What studies?
- Syphilis: Serum and CSF RPR/TPPA
- Bartonella: IgM titers
- Lyme testing (if endemic): Serum/CSF ELISA
- Sarcoid: Chest XR or CT; +/- Gallium/PET
- SLE: ESR, ANA, Anti-DNA

(Cont)
- Granulomatosis w/ polyangiitis: ANCA
- LHON: Genetic testing
- Meningeal process: LP with cytology
- NMO(SD)
- MOGAD
Optic Neuropathy

Typical Optic Neuritis

If the pt or the presentation deviates from the typical pattern… You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

Optic neuritis

- Typical
  - Male
  - Older
  - VA loss bilateral
  - Progressive VA loss
  - No recovery after a month
  - Lack of pain
  - Disc edema severe/florid

- Atypical
  - Infectious
  - Immune
  - Not idiopathic or MS-related

What etiologies? What studies?

Syphilis: Serum and CSF RPR/TPPA
Bartonella: IgM titers
Lyme testing (if endemic): Serum/CSF ELISA
Sarcoid: Chest XR or CT; +/- Gallium/PET
SLE: ESR, ANA, Anti-DNA

(Cont)
Granulomatosis w/ polyangiitis: ANCA
LHON: Genetic testing
Meningeal process: LP with cytology
NMO(SD): ?
MOGAD
Typical Optic Neuritis

If the pt or the presentation deviates from the typical pattern... You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies

Neuropathy

Optic neuritis

Typical (demyelinating but not idiopathic or MS-related)

Atypical

Infectious

Immune

Male
Older
VA loss bilateral
Progressive VA loss
No recovery after a month
Lack of pain
Disc edema severe/florid

What etiologies? What studies?

Syphilis: Serum and CSF RPR/TPPA
Bartonella: IgM titers
Lyme testing (if endemic): Serum/CSF ELISA
Sarcoid: Chest XR or CT; +/- Gallium/PET
SLE: ESR, ANA, Anti-DNA

Granulomatosis w/ polyangiitis: ANCA
LHON: Genetic testing
Meningeal process: LP with cytology
NMO(SD): Serum AQP4-IgG, spinal MRI
MOGAD

(Cont)
If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

**Typical Optic Neuritis**

- Male
- Older
- VA loss bilateral
- Progressive VA loss
- No recovery after a month
- Lack of pain
- Disc edema severe/florid

**Atypical**

- Toxic/nutritional
- Congenital/hereditary
- Traumatic

**Optic neuritis**

- **Typical** (demyelinating but not idiopathic or MS-related)
  - Infectious
  - Immune

**What etiologies? What studies?**

- Syphilis: Serum and CSF RPR/TPPA
- Bartonella: IgM titers
- Lyme testing (if endemic): Serum/CSF ELISA
- Sarcoid: Chest XR or CT; +/- Gallium/PET
- SLE: ESR, ANA, Anti-DNA

(Cont)

- Granulomatosis w/ polyangiitis: ANCA
- LHON: Genetic testing
- Meningeal process: LP with cytology
- NMO(SD): Serum AQP4-IgG, spinal MRI
- MOGAD: ?
If the pt or the presentation deviates from the typical pattern...
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

**Typical Optic Neuritis**

**Neuropathy**

**Optic neuritis**

- **Typical (demyelinating)**
  - Not idiopathic or MS-related

- **Atypical**
  - Infectious
  - Immune

**What etiologies? What studies?**
- Syphilis: Serum and CSF RPR/TPPA
- Bartonella: IgM titers
- Lyme testing (if endemic): Serum/CSF ELISA
- Sarcoid: Chest XR or CT; +/- Gallium/PET
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(Cont)
- Granulomatosis w/ polyangiitis: ANCA
- LHON: Genetic testing
- Meningeal process: LP with cytology
- NMO(SD): Serum AQP4-IgG, spinal MRI
- MOGAD: Serum MOG-IgG
If the pt or the presentation deviates from the typical pattern…
You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

- Male
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- VA loss bilateral
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- Ischemic
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What etiologies? What studies?
- Syphilis: Serum and CSF RPR/TPPA
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- Lyme testing (if endemic): Serum/CSF ELISA
- Sarcoid: Chest XR or CT; +/- Gallium/PET
- SLE: ESR, ANA, Anti-DNA
- Granulomatosis w/ polyangiitis: ANCA
- LHON: Genetic testing
- Meningeal process: LP with cytology
- NMO(SD): Serum AQP4-IgG, spinal MRI
- MOGAD: Serum MOG-IgG

We will address these conditions in considerable detail later in the set.
If the pt or the presentation deviates from the typical pattern… You should question the dx of typical (demyelinating) optic neuritis, and institute a workup for infectious/autoimmune etiologies.

*Typical Optic Neuritis*

**Optic neuritis**
- Male
- Older
- VA loss bilateral
- Progressive VA loss
- No recovery after a month
- Lack of pain
- Disc edema severe/florid

**But first let’s take a minute to drill down on MS**

Typical (demyelinating *but*

- Not idiopathic or MS-related

- Infectious
- Immune

What etiologies? What studies?
- Syphilis: Serum and CSF RPR/TPPA
- Bartonella: IgM titers
- Lyme testing (if endemic): Serum/CSF ELISA

We will address these conditions in considerable detail later in the set.

(Cont)
- Granulomatosis w/ polyangiitis: ANCA
- LHON: Genetic testing
- Meningeal process: LP with cytology

NMO(SD): Serum AQP4-IgG, spinal MRI
MOGAD: Serum MOG-IgG
Typical Optic Neuritis

50 Ways to Take a Break

(This is a good point in the set to take a break)
Typical Optic Neuritis

CDMS: Basics

What does CDMS stand for in this context?
What does CDMS stand for in this context?
Clinically-definite multiple sclerosis
What does CDMS stand for in this context?
Clinically-definite multiple sclerosis

In a nutshell, what is MS?
What does CDMS stand for in this context?
Clinically-definite multiple sclerosis

In a nutshell, what is MS?
An inflammatory neurodegenerative disorder of the CNS that produces progressive disability over time
CDMS: Basics

What does CDMS stand for in this context?
Clinically-definite multiple sclerosis

In a nutshell, what is MS?
An inflammatory neurodegenerative disorder of the CNS that produces progressive disability over time

Is there a gender predilection?
What does CDMS stand for in this context?
Clinically-definite multiple sclerosis

In a nutshell, what is MS?
An inflammatory neurodegenerative disorder of the CNS that produces progressive disability over time

Is there a gender predilection?
Yes, it is more common in M vs F
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CDMS: Basics

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CDMS: *Basics*

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**CDMS: Basics**

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Yes, it is more common in young adults (age 25-40)

*Is there a racial predilection?*
Yes, it is more common in Whites

*There is a geographic predilection—what is it?*
It is more prevalent among people who live closer to the equator.
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Yes, it is more common in Whites

There is a geographic predilection—what is it?
It is more prevalent among people who live farther from the equator
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There is a geographic predilection—what is it?
It is more prevalent among people who live farther from the equator

What is the classic two-word description of the typical clinical course in MS?
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It is more prevalent among people who live farther from the equator

What is the classic two-word description of the typical clinical course in MS?
‘Relapsing-remitting’
Typical Optic Neuritis

CDMS: Manifestations

- Nonocular
- Ocular

Are ocular manifestations common in MS?
Are ocular manifestations common in MS?
Indeed they are—optic neuritis occurs in \% of MS cases.
CDMS: *Manifestations*

- Nonocular
- Ocular

**Typical Optic Neuritis**

*Are ocular manifestations common in MS?*
Indeed they are—optic neuritis occurs in 75% of MS cases
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CDMS: Manifestations

Nonocular

Ocular
- Optic neuritis S/S
- ?
- ?
- ?

Are ocular manifestations common in MS?
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Three non-neuritis ocular manifestations are often encountered as well—what are they?
Are ocular manifestations common in MS? Indeed they are—optic neuritis occurs in 75% of MS cases (and is the presenting symptom in 25%).

Three non-neuritis ocular manifestations are often encountered as well—what are they?
**Typical Optic Neuritis**

**CDMS: Manifestations**

- **Nonocular**
- **Ocular**
  - Optic neuritis S/S
  - Nystagmus/oscillations
  - Diplopia
  - Uveitis

*In a nutshell, what is a nystagmus and/or oscillation?*
**Typical Optic Neuritis**

**CDMS: Manifestations**

- **Nonocular**

  *In a nutshell, what is a nystagmus and/or oscillation?*
  Both are involuntary eye-movement patterns that involve displacement of gaze off of its intended target, followed by a refixation movement

- **Ocular**
  - Optic neuritis S/S
  - **Nystagmus/oscillations**
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In a nutshell, what is a nystagmus and/or oscillation?
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What is the difference between a nystagmus and an oscillation?
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What is the difference between a nystagmus and an oscillation? In a nystagmus, the velocity of the displacement movement is by definition slow, whereas in an oscillation it’s by definition fast.
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What is the difference between a nystagmus and an oscillation?
In a nystagmus, the velocity of the displacement movement is by definition slow, whereas in an oscillation it’s by definition fast.

But I thought jerk nystagmus was fast, and pendular nystagmus was slow. What’s the deal?
In a nutshell, what is a nystagmus and/or oscillation?
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In a nystagmus, the velocity of the displacement movement is by definition slow, whereas in an oscillation it's by definition fast.

But I thought jerk nystagmus was fast, and pendular nystagmus was slow. What’s the deal?
You thought correct—jerk is fast, pendular slow. But these terms refer to the speed of the refixation movement—the initial displacement is slow in both.
**CDMS: Manifestations**

**Nonocular**

*In a nutshell, what is a nystagmus and/or oscillation?*
Both are involuntary eye-movement patterns that involve displacement of gaze off of its intended target, followed by a refixation movement

*What is the difference between a nystagmus and an oscillation?*
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*Is nystagmus/oscillations a common, or rare occurrence in MS?*

**Ocular**

- Optic neuritis S/S
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Common (especially nystagmus)
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Is nystagmus/oscillations a common, or rare occurrence in MS?
Common (especially nystagmus).

Is there a particular direction (i.e., horizontal, vertical, rotary) in which the nystagmus tends to manifest?
Typical Optic Neuritis

CDMS: Manifestations

Nonocular

Ocular

### Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia
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**In a nutshell, what is a nystagmus and/or oscillation?**
Both are involuntary eye-movement patterns that involve displacement of gaze off of its intended target, followed by a refixation movement.

**What is the difference between a nystagmus and an oscillation?**
In a nystagmus, the velocity of the displacement movement is by definition slow, whereas in an oscillation it’s by definition fast.

**Is nystagmus/oscillations a common, or rare occurrence in MS?**
Common (especially nystagmus)

**Is there a particular direction (ie, horizontal, vertical, rotary) in which the nystagmus tends to manifest?**
No—it can be any direction (and either jerk or pendular)
Is diplopia a common manifestation of MS?

CDMS: Manifestations

Typical Optic Neuritis

Nonocular

Ocular

- Optic neuritis S/S
- Nystagmus/oscillations
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Is diplopia a common manifestation of MS? Indeed it is

CDMS: Manifestations

Typical Optic Neuritis

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CDMS: Manifestations

Typical Optic Neuritis

Nonocular

Is diplopia a common manifestation of MS? Indeed it is

Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)?

Ocular

- Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia
- Uveitis
Is diplopia a common manifestation of MS? Indeed it is.

Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)? 3, 4 and 6.

CDMS: Manifestations

Nonocular

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Typical Optic Neuritis

- Optic neuritis S/S
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CDMS: Manifestations

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Ocular

- Optic neuritis S/S
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Step-back II: The EOM control pathway has four levels or subsections. What are they?

--?
--?
--?
--?
CDMS: **Manifestations**

Nonocular

- **Is diplopia a common manifestation of MS?**
  - Indeed it is

Taking a step back: **Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)?**
  - 3, 4 and 6

Step-back II: **The EOM control pathway has four levels or subsections. What are they?**
  - The *Supranuclear* pathways
  - The *Internuclear* pathway
  - The *Nuclear* level: The CN3, 4 and 6 nuclei themselves
  - The *Infranuclear* pathway

Ocular

- Optic neuritis S/S
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Step-back II: The EOM control pathway has four levels or subsections. What are they?
--- The Supranuclear pathways
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Broadly speaking, what constitutes the supranuclear pathways?
Is diplopia a common manifestation of MS? Indeed it is.

Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)?
3, 4 and 6

Step-back II: The EOM control pathway has four levels or subsections. What are they?
-- The Supranuclear pathways
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Broadly speaking, what constitutes the supranuclear pathways?
Inputs to the nuclei from centers in the cortex, cerebellum, vestibular system, etc. These locations are ‘supra’ in that they carry signals to the nuclei.
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**CDMS: Manifestations**

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**Ocular**

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**Step-back II: The EOM control pathway has four levels or subsections. What are they?**

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**The Supranuclear pathways**

- The Internuclear pathway

**Broadly speaking, what constitutes the supranuclear pathways?**

Inputs to the nuclei from centers in the cortex, cerebellum, vestibular system, etc. These locations are ‘supra’ in that they carry signals to the nuclei. Examples of supranuclear dysfunction include Parinaud syndrome, PSP, and convergence or divergence excess/insufficiency.
CDMS: Manifestations

Nonocular

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Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)? 3, 4 and 6.

Ocular

- Optic neuritis S/S
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What does PSP stand for in this context?
Is diplopia a common manifestation of MS? Indeed it is.

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-- The Supranuclear pathways
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What does PSP stand for in this context? Progressive supranuclear palsy.
Is diplopia a common manifestation of MS? Indeed it is.

Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)? 3, 4 and 6.

Step-back II: The EOM control pathway has four levels or subsections. What are they?

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It should be noted that, generally speaking, diplopia is vs isn't a feature of supranuclear pathway lesions.
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Typical Optic Neuritis

CDMS: Manifestations

Nonocular

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--The Supranuclear pathways

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Typical Optic Neuritis

Ocular

Optic neuritis S/S

Nystagmus/oscillations

Diplopia

Uveitis

It should be noted that, generally speaking, diplopia isn’t a feature of supranuclear pathway lesions. This is because most supranuclear-pathway lesions affect three words.

Is diplopia a common manifestation of MS? Indeed it is

Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)? 3, 4 and 6

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It should be noted that, generally speaking, diplopia isn’t a feature of supranuclear pathway lesions. This is because most supranuclear-pathway lesions affect both eyes symmetrically.

Examples of supranuclear dysfunction include Parinaud syndrome, PSP, and convergence or divergence excess/insufficiency.
Is diplopia a common manifestation of MS?
Indeed it is

Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)? 3, 4 and 6

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- The **Internuclear** pathway
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Broadly speaking, what constitutes the **supranuclear pathways**?
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Examples of supranuclear dysfunction include Parinaud syndrome, PSP, and convergence or divergence excess/insufficiency.

It should be noted that, generally speaking, diplopia isn’t a feature of supranuclear pathway lesions. This is because most supranuclear-pathway lesions affect both eyes symmetrically. Notable exceptions are lesions of the convergence and divergence control mechanisms.
Is diplopia a common manifestation of MS? Indeed it is.

Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)? 3, 4 and 6.

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--The **Supranuclear** pathways
--The **Internuclear** pathway
--The **Nuclear** level: The CN3, 4 and 6 nuclei themselves
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**Which two cranial nerve nuclei share an internuclear connection of well-established clinical importance?**

- Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia
- Uveitis
Is diplopia a common manifestation of MS? Indeed it is.

Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)?

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Which two cranial nerve nuclei share an internuclear connection of well-established clinical importance?

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- The supranuclear pathways
- The internuclear pathway
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- The infranuclear pathway

Which two cranial nerve nuclei share an internuclear connection of well-established clinical importance? 3 and 6.

What is the name of the internuclear connection shared by these two nuclei? The medial longitudinal fasciculus (MLF).

Damage to the MLF results in what clinical condition? An internuclear ophthalmoplegia (INO).
CDMS: Manifestations

Nonocular

Is diplopia a common manifestation of MS? Indeed it is

Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)? 3, 4 and 6

Step-back II: The EOM control pathway
-- The Supranuclear pathways
-- The Internuclear pathway
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-- The Infranuclear pathway

Ocular

Optic neuritis S/S
Nystagmus/oscillations

Diplopia
Uveitis

Which two cranial nerve nuclei share an internuclear connection of well-established clinical importance?
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What is the name of the internuclear connection shared by these two nuclei?
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Indeed it is.

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3, 4 and 6

Step-back II: The EOM control pathways
--The Supranuclear pathways
--The Internuclear pathway
--The Nuclear level: The CN3, CN4 and CN6 nuclei
--The Infranuclear pathway

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Damage to the MLF results in what clinical condition?
An internuclear ophthalmoplegia (INO).

**In a nutshell, how does a unilateral INO manifest?**
Upon attempted lateral gaze, the adducting eye adducts slowly (or not at all), while the abducting eye abducts fully, but displays an end-point nystagmus. Additionally, the eye on the abducting side may be exotropic in primary gaze.

How does a bilateral INO manifest?
With the same motility difficulties, but on attempted lateral gaze in either direction. Both eyes are often exotropic in primary, resulting in a WEBINO (acronym for *w* all-e *b* ilateral INO).

If you see a young person with a WEBINO, think MS first.
**CDMS: Manifestations**

**Nonocular**

*Is diplopia a common manifestation of MS? Indeed it is*

**Ocular**

- Optic neuritis S/S
- Nystagmus/oscillations
- **Diplopia**

**Typical Optic Neuritis**

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**Step-back II: The EOM control pathway**

- The **Supranuclear** pathways
- The **Internuclear pathway**
- The **Nuclear level**: The CN3, 4 and 6 nuclei themselves
- The **Infranuclear pathway**

**Which two cranial nerve nuclei share an internuclear connection of well-established clinical importance?**

3 and 6

**What is the name of the internuclear connection shared by these two nuclei?**

The medial longitudinal fasciculus (MLF)

**Damage to the MLF results in what clinical condition?**

An *internuclear ophthalmoplegia (INO)*

**If you see a young person with a WEBINO, think MS first.**
Is diplopia a common manifestation of MS?
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Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)? 3, 4 and 6

Step-back II: The EOM control pathway has four levels or subsections.

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Optic neuritis S/S
Nystagmus/oscillations
Diplopia

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What are the two cranial nerve nuclei that share an internuclear connection of well-established clinical importance?
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Damage to the MLF results in what clinical condition?
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Upon attempted lateral gaze, the adducting eye adducts slowly (or not at all), while the abducting eye abducts fully, but displays an end-point nystagmus. Additionally, the eye on the abducting side may be exotropic in primary gaze.

How does a bilateral INO manifest?

With the same motility difficulties, but on attempted lateral gaze in either direction. Both eyes are often exotropic in primary, resulting in a WEBINO (acronym for "walled bilateral INO").
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With the same motility difficulties, but on attempted lateral gaze in either direction. Both eyes are often exotropic in primary, resulting in a WEBINO (acronym for wall-eyed bilateral INO).
Typical Optic Neuritis

Right gaze  Primary  Left gaze
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Damage to the MLF results in what clinical condition?
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Typical Optic Neuritis

CDMS: Manifestations

What constitutes the infranuclear pathway?

The infranuclear pathway includes everything after the nuclei: the axons as they run through the brainstem to enter the subarachnoid space; the 'cranial nerve' portion as it passes through the subarachnoid space into the cavernous sinus and then the orbit to the neuromuscular junction; the junction itself; and finally the EOMs themselves.

Note that the only portion of the infranuclear pathway that is located within the CNS is the fascicular portion, i.e., the axon bundle that has left the CN nucleus, but is still within the substance of the brainstem. (It is only after these fibers have entered the subarachnoid space that they are formally designated a 'nerve'.)

The cranial-nerve nuclei and their fascicles are located within the brainstem. Given this, it shouldn't come as a surprise that, generally speaking, lesions of the nuclei and/or fascicles do not present with isolated EOM abnormalities; i.e., the ophthalmoparesis is almost always accompanied by nonocular signs and symptoms of CNS damage—that is, a stroke-like presentation.
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The Nuclear level: The CN3, 4 and 6 nuclei themselves

The Infranuclear pathway
Typical Optic Neuritis

CDMS: Manifestations

What constitutes the infranuclear pathway?
Everything after the nuclei: **the axons as they run through the brainstem to enter the subarachnoid space** the ‘cranial nerve’ portion as it passes through the subarachnoid space into the cavernous sinus and then the orbit to the neuromuscular junction; the junction itself; and finally the EOMs themselves. Note that the only portion of the infranuclear pathway that is located within the CNS is the **portion**, ie, the axon bundle that has left the CN nucleus, but is still within the substance of the brainstem.

--The Infranuclear pathway

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CDMS: Manifestations

Typical Optic Neuritis

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-- The Infranuclear pathway
Typical Optic Neuritis

Aqueduct

3rd nerve nucleus

Red nucleus

Cerebral peduncle

Third nerve fascicle

Cranial nerve fascicle
CDMS: Manifestations

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The Supranuclear pathways

The Internuclear pathway

The Nuclear level: The CN3, 4 and 6 nuclei themselves

--The Infranuclear pathway
Typical Optic Neuritis

CDMS: Manifestations

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The cranial-nerve nuclei and their fascicles are located within the brainstem. Given this, it shouldn’t come as a surprise that, generally speaking, lesions of the nuclei and/or fascicles do not present with isolated EOM abnormalities; ie, the ophthalmoparesis is almost always accompanied by nonocular signs and symptoms of CNS damage—that is, a stroke-like presentation.

---The Infranuclear pathway---
CDMS: \textit{Manifestations}

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--- The \textit{Infranuclear pathway}
**Typical Optic Neuritis**

**CDMS: Manifestations**

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**The Infranuclear pathway**
CDMS: Manifestations

Typical Optic Neuritis

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---The Infranuclear pathway

What term is used to describe conditions presenting with motility dysfunction secondary to fascicle damage + non-ocular CNS findings? Fascicular syndrome

Four fascicular syndromes involve the CN3 fascicle—what are they?

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--?

--?

Two fascicular syndromes involve the CN6 fascicle—what are they?

-- Millard-Gubler syndrome

-- Foville syndrome
CDMS: Manifestations

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The Nuclear level: The CN3, 4 and 6 nuclei themselves

--- The Infranuclear pathway

Typical Optic Neuritis

What term is used to describe conditions presenting with motility dysfunction secondary to fascicle damage + non-ocular CNS findings?

Fascicular syndrome

Four fascicular syndromes involve the CN3 fascicle—what are they?
--Weber syndrome
--Benedikt syndrome
--Claude syndrome
--Nothnagel syndrome

Two fascicular syndromes involve the CN6 fascicle—what are they?
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What constitutes the infranuclear pathway? Everything after the nuclei: the axons as they run through the subarachnoid space; the ‘cranial nerve’ portion as it passes through the subarachnoid space into the cavernous sinus and then the orbit to the neuromuscular junction; the junction itself; and finally the extraocular muscles. Note that the only portion of the infranuclear pathway that is located within the CNS is the **fascicular portion**, i.e., the axon bundle that has left the CN nucleus, but is still within the substance of the brainstem. (It is only after these fibers have entered the subarachnoid space that they are formally designated a ‘nerve’.) The cranial-nerve nuclei and their fascicles are located within the brainstem. Given this, it shouldn’t come as a surprise that, generally speaking, lesions of the nuclei and/or fascicles do not present with isolated EOM abnormalities, i.e., the ophthalmoparesis is almost always accompanied by **nonocular** signs and symptoms of CNS damage—that is, a stroke-like presentation.

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**The Infranuclear pathway**

**Typical Optic Neuritis**

CDMS: Manifestations

**Nonocular**

Optic neuritis S/S

Nystagmus/oscillations

Diplopia

Uveitis

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Is diplopia a common manifestation of MS? Indeed it is

Taking a step back: Which three cranial nerves are responsible for controlling eye position (and thus are implicated in diplopia)? 3, 4 and 6

Step-back II: The EOM control pathway has four levels or subsections. What are they?

--The **Supranuclear** pathways

--The **Internuclear** pathway

--The **Nuclear** level: The CN3, 4 and 6 nuclei themselves

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**What term is used to describe conditions presenting with motility dysfunction 2ndry to fascicle damage + non-ocular CNS findings?**

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--- The Infranuclear pathway

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CDMS: Manifestations

Nonocular

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At last: Which of these portions of the EOM control pathway can be affected in MS?
CDMS: Manifestations

Nonocular

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At last: Which of these portions of the EOM control pathway can be affected in MS?
Recall that MS was defined as a neurodegenerative disorder of the CNS. The last portion of the EOM pathway that is located within the CNS is the nerve fascicles.
Is diplopia a common manifestation of MS? Indeed it is.

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At last: Which of these portions of the EOM control pathway can be affected in MS? Recall that MS was defined as a neurodegenerative disorder of the CNS. The last portion of the EOM pathway that is located within the CNS is the nerve fascicles. Thus, MS damage can (and does) occur in the supranuclear, internuclear, and nuclear portions, as well as the fascicular section of the infranuclear portion.
CDMS: **Manifestations**

- **Nonocular**
- **Ocular**
  - Optic neuritis S/S
  - Nystagmus/oscillations
  - Diplopia
  - **Uveitis**

*MS conveys an increased risk of uveitis. How much?*
CDMS: Manifestations

Nonocular

Typical Optic Neuritis

Ocular

- Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia
- Uveitis

*MS conveys an increased risk of uveitis. How much? MS pts are # times more likely to experience uveitis than are non-MS individuals!*
CDMS: Manifestations

Nonocular

MS conveys an increased risk of uveitis. How much? MS pts are 10 times more likely to experience uveitis than are non-MS individuals!

Ocular

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Typical Optic Neuritis
**CDMS: Manifestations**

**Nonocular**

MS conveys an increased risk of uveitis. How much?
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What proportion of MS pts will develop uveitis at some point?

**Ocular**

- Optic neuritis S/S
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CDMS: Manifestations

Nonocular

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About 1/3

Ocular

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Typical Optic Neuritis
CDMS: Manifestations

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About 1/3

In those MS pts who develop it: Does it tend to precede, or follow, their MS diagnosis?

Ocular

- Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia
- Uveitis
**CDMS: Manifestations**

**Nonocular**

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*About 1/3*

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*To follow*

**Ocular**

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CDMS: Manifestations

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About 1/3

In those MS pts who develop it: Does it tend to precede, or follow, their MS diagnosis?
To follow, but: As many as % of MS pts will manifest uveitis up to prior to their eventual MS diagnosis!

Ocular

Optic neuritis S/S
Nystagmus/oscillations
Diplopia
Uveitis
CDMS: Manifestations

Nonocular

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In those MS pts who develop it: Does it tend to precede, or follow, their MS diagnosis?
To follow, but: As many as 25% of MS pts will manifest uveitis up to 10 years prior to their eventual MS diagnosis!

Ocular

Optic neuritis S/S
Nystagmus/oscillations
Diplopia
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MS has several HLA associations, one of which conveys a higher risk of developing uveitis. Which one?
**Typical Optic Neuritis**

**CDMS: Manifestations**

**Nonocular**

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To follow, **but**: As many as 25% of MS pts will manifest uveitis up to 10 years prior to their eventual MS diagnosis!

**MS has several HLA associations, one of which conveys a higher risk of developing uveitis. Which one?**

HLA-DR15

**Ocular**

- Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia
- Uveitis
CDMS: Manifestations

Nonocular

**MS conveys an increased risk of uveitis. How much?**
MS pts are 10 times more likely to experience uveitis than are non-MS individuals!

*Taking a step back: There are four types of uveitis, based on the location of the inflammation. What are they?*

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--Anterior
--Intermediate
--Posterior
--Panuveitis

Ocular

Optic neuritis S/S
Nystagmus/oscillations
Diplopia
Uveitis

Typical Optic Neuritis
CDMS: Manifestations

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Ocular

Optic neuritis S/S

Nystagmus/oscillations

Diplopia

Uveitis
**CDMS: Manifestations**

**Nonocular**

**Ocular**

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**Optic neuritis S/S**

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**Nystagmus/oscillations**

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CDMS: Transformations

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_Uveitis_

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**CDMS: Manifestations**

**Nonocular**

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--- Panuveitis: ?

**Ocular**

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- Nystagmus/oscillations
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**Typical Optic Neuritis**
**CDMS: Manifestations**

**Nonocular**

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CDMS: *Manifestations*

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**Ocular**

- Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia

**Uveitis**

*Which form is most likely to occur in MS?*
CDMS: *Manifestations*

**Nonocular**

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**Ocular**

--- Optic neuritis S/S
--- Nystagmus/oscillations
--- Diplopia

--- **Uveitis**

*Which form is most likely to occur in MS? Intermediate uveitis*
CDMS: Manifestations

Typical Optic Neuritis

**Is intermediate uveitis in MS a unilateral, or bilateral condition?**

Intermediate uveitis

**Which form is most likely to occur in MS?**

Intermediate uveitis

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Which form is most likely to occur in MS?

Intermediate uveitis
CDMS: Manifestations

Nonocular

Optic neuritis S/S
Nystagmus/oscillations
Diplopia
Uveitis

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--Panuveitis: All three locations are equally involved

Which form is most likely to occur in MS?
Intermediate uveitis

Is intermediate uveitis in MS a unilateral, or bilateral condition?
It is bilateral

MS is a risk factor for developing intermediate uveitis. Is the reverse true as well, ie, are individuals with intermediate uveitis at higher risk of developing MS?
Yes, about 15% of intermediate-uveitis pts will develop MS

Two specific manifestations (ie, signs) of intermediate uveitis are classically associated with MS— which ones?
--Vitritis, which tends to be mild
--Periphlebitis
**CDMS: Manifestations**

**Optic neuritis S/S**
- Nystagmus/oscillations
- Diplopia
- Uveitis

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**Which form is most likely to occur in MS?**
Intermediate uveitis

--- **Is intermediate uveitis in MS a unilateral, or bilateral condition?**
It is bilateral in almost all (>95%) cases
**CDMS: Manifestations**

**Typical Optic Neuritis**

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Which form is most likely to occur in MS?  
Intermediate uveitis
Typical Optic Neuritis

CDMS: Manifestations

Nonocular:
- Optic neuritis S/S
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Which form is most likely to occur in MS?
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**CDMS: Manifestations**

**Nonocular Manifestations**

- Optic neuritis S/S
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*Which form is most likely to occur in MS?*

Intermediate uveitis

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**Typical Optic Neuritis**

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**CDMS: Manifestations**

**Nonocular manifestations**
- Optic neuritis S/S
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**Ocular manifestations**
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**Typical Optic Neuritis**
CDMS: Manifestations

Nonocular S/S

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Which form is most likely to occur in MS? Intermediate uveitis
**CDMS: Manifestations**

**Nonocular**
- Optic neuritis S/S
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**Ocular**

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- Vitritis, which tends to be mild vs severe
- Periphlebitis

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Typical Optic Neuritis
**CDMS: Manifestations**

### Nonocular

- Optic neuritis S/S
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Speaking of dz severity: In general, does MS-associated intermediate uveitis tend to be milder, or more severe than the idiopathic version?

Milder
CDMS: **Manifestations**

**Nonocular S/S**
- Optic neuritis
- Nystagmus/oscillations
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**Ocular S/S**

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The Neuro book divvies the nonocular S/S of MS into five groups—what are they?
The Neuro book divvies the nonocular S/S of MS into five groups—what are they?
What motor symptoms are commonly encountered in MS?

Typical Optic Neuritis

CDMS: Manifestations

Nonocular

Motor

Cerebellar

Ocular

Optic neuritis S/S

Nystagmus/oscillations

Diplopia

Uveitis

What motor symptoms are commonly encountered in MS?
What motor symptoms are commonly encountered in MS? Weakness of the extremities or facial musculature can occur, as can hemi- or paraplegia.
What sensory symptoms commonly occur in MS?
What sensory symptoms commonly occur in MS?
Paresthesias of the face and/or body
What sensory symptoms commonly occur in MS?

Paresthesias of the face and/or body (classic presentation: paresthesia of the trunk described as ‘bandlike’).
What sensory symptoms commonly occur in MS?
Paresthesias of the face and/or body (classic presentation: paresthesia of the trunk described as ‘bandlike’)

CDMS: Manifestations

Nonocular

Motor

Cerebellar

Sensory

Mental

Ocular

Optic neuritis S/S

Nystagmus/oscillations

Diplopia

Uveitis
CDMS: Manifestations

Nonocular
- Motor
- Cerebellar
- Sensory
- Mental

Ocular
- Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia
- Uveitis

What sensory symptoms commonly occur in MS?
Paresthesias of the face and/or body (classic presentation: paresthesia of the trunk described as ‘bandlike’)

Speaking of sensory symptoms in MS: What is Lhermitte's sign? Shock-like sensations precipitated by a movement
What sensory symptoms commonly occur in MS? Paresthesias of the face and/or body (classic presentation: paresthesia of the trunk described as 'bandlike').

CDMS: Manifestations

Nonocular
- Motor
- Sensory
- Mental
- Cerebellar

Ocular
- Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia
- Uveitis

Typical Optic Neuritis

Which sphincter are we talking about here?
**CDMS: Manifestations**

- **Nonocular**
  - Motor
  - Cerebellar
  - Sensory
  - Mental

- **Ocular**
  - Optic neuritis S/S
  - Nystagmus/oscillations
  - Diplopia
  - Uveitis

---

*Which sphincter are we talking about here?*

*The bladder sphincter*
Which sphincter are we talking about here?
The bladder sphincter

What bladder sphincter-related symptoms occur in MS?
CDMS: Manifestations

Typical Optic Neuritis

Nonocular
- Motor
- Cerebellar
- Sensory
- Mental

Ocular
- Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia
- Uveitis

Which sphincter are we talking about here?
The bladder sphincter

What bladder sphincter-related symptoms occur in MS?
Incontinence, frequency, and/or urgency
What mental manifestations are commonly encountered in MS?
What mental *manifestations are commonly encountered in MS*? Primarily emotional issues: Lability; depression; irritability
CDMS: Manifestations

Nonocular
- Motor
- Sensory
- Sphincter

Ocular
- Optic neuritis S/S
- Nystagmus/oscillations
- Diplopia

Cerebellar

What sorts of cerebellar-related symptoms do MS pts experience?
CDMS: Manifestations

Nonocular

Motor

Sensory

Cerebellar

Optic neuritis S/S

Nystagmus/oscillations

Diplopia

Ocular

Sphincter

What sorts of cerebellar-related symptoms do MS pts experience?
Ataxia, dysarthria, and intentional tremor (among others)
Typical Optic Neuritis

CDMS: *Evaluation*

Labs  Imaging

*What lab test cinches a diagnosis of MS?*
Typical Optic Neuritis

CDMS: *Evaluation*

- Labs
- Imaging

*What lab test cinches a diagnosis of MS?*  
There ain’t none
Typical Optic Neuritis

CDMS: *Evaluation*

Labs  Imaging

*What lab test cinches a diagnosis of MS?*
There ain’t none

*What imaging finding is pathognomonic for MS?*
What lab test cinches a diagnosis of MS?
There ain’t none

What imaging finding is pathognomonic for MS?
Same as labs—no such thing exists
Typical Optic Neuritis

CDMS: Evaluation

- Labs
- Imaging

What lab test cinches a diagnosis of MS?
There ain't none

Remember, MS is a clinical diagnosis—labs and imaging are contributory, but of themselves cannot make it!

Same as labs—no such thing exists
Typical Optic Neuritis

CDMS: *Evaluation*

Labs

Imaging

OK, so what lab(s) are contributory vis a vis diagnosing MS?
OK, so what lab(s) are contributory vis a vis diagnosing MS?
The finding of two words in the a body fluid.
OK, so what lab(s) are contributory vis a vis diagnosing MS?
The finding of oligoclonal bands in the CSF
OK, so what lab(s) are contributory vis a vis diagnosing MS?
The finding of oligoclonal bands in the CSF

Which immunoglobulin form (IgA, IgE, IgG, etc) do the bands take?
OK, so what lab(s) are contributory vis a vis diagnosing MS?
The finding of oligoclonal bands in the CSF

Which immunoglobulin form (IgA, IgE, IgG, etc) do the bands take?
IgG
OK, so what lab(s) are contributory vis a vis diagnosing MS? The finding of oligoclonal bands in the CSF

Which immunoglobulin form (IgA, IgE, IgG, etc) do the bands take? IgG

What proportion of CDMS pts manifest these CSF bands?
OK, so what lab(s) are contributory vis a vis diagnosing MS? The finding of oligoclonal bands in the CSF.

Which immunoglobulin form (IgA, IgE, IgG, etc) do the bands take?
IgG

What proportion of CDMS pts manifest these CSF bands?
Over 90%
OK, so what lab(s) are contributory vis a vis diagnosing MS?
The finding of oligoclonal bands in the CSF

Which immunoglobulin form (IgA, IgE, IgG, etc) do the bands take?
IgG

What proportion of CDMS pts manifest these CSF bands?
Over 90%

Are similar bands found in the serum of CDMS pts?
OK, so what lab(s) are contributory vis a vis diagnosing MS? The finding of oligoclonal bands in the CSF

Which immunoglobulin form (IgA, IgE, IgG, etc) do the bands take?
IgG

What proportion of CDMS pts manifest these CSF bands?
Over 90%

Are similar bands found in the serum of CDMS pts?
No
Typical Optic Neuritis

CDMS: *Evaluation*

Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?
Typical Optic Neuritis

CDMS: Evaluation

Labs

Imaging

Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI? MRI
Typical Optic Neuritis

CDMS: Evaluation

Labs

Imaging

Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?

MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?
Typical Optic Neuritis

CDMS: Evaluation

Labs

Imaging

Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?
MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?
FLAIR
Typical Optic Neuritis

CDMS: Evaluation

Labs

Imaging

Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?

MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?

FLAIR

What does FLAIR stand for in this context?
Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?

MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?

FLAIR

What does FLAIR stand for in this context?
Fluid-attenuated inversion recovery
Typical Optic Neuritis

CDMS: Evaluation

Labs

Imaging

Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?
MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?
FLAIR

Do MS lesions enhance with gadolinium?
Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?
MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?
FLAIR

Do MS lesions enhance with gadolinium?
Yes
Typical Optic Neuritis

CDMS: Evaluation

Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI? MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it? FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS?
Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?
MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?
FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS?
uni- vs multifocal; white- vs gray matter lesions
Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?
MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?
FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS?
Multifocal white–matter lesions
Typical Optic Neuritis

Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?
MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?
FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS?
Multifocal white-matter lesions, usually ovoid in shape
Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI? MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it? FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS? Multifocal white–matter lesions, usually ovoid in shape
**Typical Optic Neuritis**

**CDMS: Evaluation**

**Imaging**

Labs

Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?

MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?

FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS?

Multifocal white-matter lesions, usually ovoid in shape and in location
Typical Optic Neuritis

Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?
MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?
FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS?
Multifocal white-matter lesions, usually ovoid in shape and periventricular in location
MRI of a patient with multiple sclerosis (MS) shows demyelinating plaques. 
A, T1-weighted, postgadolinium MRI scan demonstrates enhancing white matter lesions bilaterally, as well as “black holes” (arrows). 
B, T2-weighted MRI scan shows periventricular, multifocal, hyperintense white matter lesions consistent with demyelination. 
C, FLAIR scan confirms periventricular ovoid white matter lesions.
Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI? MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it? FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS?

**Multifocal white–matter lesions, usually ovoid in shape and periventricular in location**

What is the eponymous name for these ovoid lesions?
Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI? MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it? FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS?

Multifocal white–matter lesions, usually ovoid in shape and periventricular in location

What is the eponymous name for these ovoid lesions? Dawson’s fingers
Typical Optic Neuritis

MS: Dawson’s fingers
Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?
MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?
FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS?
Multifocal white-matter lesions, usually ovoid in shape and periventricular in location

What proportion of CDMS pts manifest these findings?
Which (if either) is the preferred imaging modality for detecting MS-associated abnormalities—CT, or MRI?
MRI

In addition to the usual series (T1; T2; w/w/o gadolinium), there is an image-type that is especially useful—what is it?
FLAIR

Other than optic-nerve changes, what imaging findings are typically encountered in MS?
Multifocal white–matter lesions, usually ovoid in shape and periventricular in location

What proportion of CDMS pts manifest these findings?
About 90%
Do steroids still have a role in managing MS?
Do steroids still have a role in managing MS?
Mos def—they are the go-to therapy for acute exacerbations
Do steroids still have a role in managing MS?
Mos def—they are the go-to therapy for acute exacerbations

Is the dose low, or high?
Do steroids still have a role in managing MS? Mos def—they are the go-to therapy for acute exacerbations

Is the dose low, or high?
High
CDMS: *Treatment*

**Typical Optic Neuritis**

**Steroids**

Do steroids still have a role in managing MS? Mos def—they are the go-to therapy for acute exacerbations

*Is the dose low, or high? Is the preferred route PO, IM, or IV? High.*
Do steroids still have a role in managing MS?
Mos def—they are the go-to therapy for acute exacerbations

Is the dose low, or high? Is the preferred route PO, IM, or IV?
High. IV.
What does DMT stand for in this context?
What does DMT stand for in this context? Disease-modifying therapy
What does DMT stand for in this context?
Disease-modifying therapy

There are three classes of DMTs—what are they?
--?
--?
--?
What does DMT stand for in this context? Disease-modifying therapy

There are three classes of DMTs—what are they?
--Interferons
--Monoclonal antibodies
--Immunomodulators
What does DMT stand for in this context?
Disease-modifying therapy

There are three classes of DMTs—what are they?
--- Interferons
--- Monoclonal antibodies
--- Immunosuppressants

One immunosuppressant is notorious for causing macular edema—
which one?
What does DMT stand for in this context?
Disease-modifying therapy

There are three classes of DMTs—what are they?
--Interferons
--Monoclonal antibodies
--Immunomodulators

One immunomodulator is notorious for causing macular edema—which one?
Fingolimod
What does DMT stand for in this context?
Disease-modifying therapy

There are three classes of DMTs—what are they?
--Interferons
--Monoclonal antibodies
--Immunomodulators

One immunomodulator is notorious for causing macular edema—which one?
Fingolimod

By what name is fingolimod-associated macular edema known?
What does DMT stand for in this context?
Disease-modifying therapy

There are three classes of DMTs—what are they?
--Interferons
--Monoclonal antibodies
--Immunomodulators

One immunomodulator is notorious for causing macular edema—
which one?
Fingolimod

By what name is fingolimod-associated macular edema known?
It is called ‘fingolimod-associated macular edema’ (FAME)
What does DMT stand for in this context?
Disease-modifying therapy

There are three classes of DMTs—what are they?
--Interferons
--Monoclonal antibodies
--Immunomodulators

One immunomodulator is notorious for causing macular edema—which one?
Fingolimod

By what name is fingolimod-associated macular edema known?
It is called ‘fingolimod-associated macular edema’ (FAME)

What is the tx for FAME?
**CDMS: Treatment**

What does DMT stand for in this context?
Disease-modifying therapy

There are three classes of DMTs—what are they?
--Interferons
--Monoclonal antibodies
--Immunomodulators

One immunomodulator is notorious for causing macular edema—which one?
Fingolimod

By what name is fingolimod-associated macular edema known?
It is called ‘fingolimod-associated macular edema’ (FAME)

What is the tx for FAME?
Cessation of the medication
What does DMT stand for in this context?
Disease-modifying therapy

There are three classes of DMTs—what are they?
--Interferons
--Monoclonal antibodies
--Immunomodulators

One immunomodulator is notorious for causing macular edema—which one?
Fingolimod

By what name is fingolimod-associated macular edema known?
It is called ‘fingolimod-associated macular edema’ (FAME)

What is the tx for FAME? Is it effective?
Cessation of the medication.
What does DMT stand for in this context?
Disease-modifying therapy

There are three classes of DMTs—what are they?
--Interferons
--Monoclonal antibodies
--Immunomodulators

One immunomodulator is notorious for causing macular edema—which one?
Fingolimod

By what name is fingolimod-associated macular edema known?
It is called ‘fingolimod-associated macular edema’ (FAME)

What is the tx for FAME? Is it effective?
Cessation of the medication. Yes.
Typical Optic Neuritis

50 Ways to Take a Break

(This is a good point in the set to take a break)
Optic neuritis

As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself:

No question—proceed when ready
Typical Optic Neuritis

Does this pt have ‘clinically isolated Optic neuritis’?

As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or…

aka clinically isolated syndrome (CIS)

No question—proceed when ready
Does this pt have ‘clinically isolated Optic neuritis’?

As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or...does she have MS?’

*aka* clinically isolated syndrome (CIS)

No question—proceed when ready
Does this pt have *clinically isolated* Optic neuritis’?

As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or…does she have MS?’

But the *Neuro* book places great emphasis on asking two additional questions: 1) ‘Does this pt have clinically isolated optic neuritis, or…’
As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or…does she have MS?"

But the *Neuro* book places great emphasis on asking two additional questions: 1) ‘Does this pt have clinically isolated optic neuritis, or…does she have

**NMO?**

**NMOSD?**

\[\text{Does she have NMO?}\]

\[\text{Does this pt have ‘clinically isolated Optic neuritis’?}\]
As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or…does she have MS?"

But the *Neuro* book places great emphasis on asking two additional questions:
1) ‘Does this pt have clinically isolated optic neuritis, or…does she have neuromyelitis optica (or neuromyelitis optica spectrum disorder)?"
Does this pt have ‘clinically isolated Optic neuritis’?

As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or…does she have MS?’

But the *Neuro* book places great emphasis on asking two additional questions:
1) ‘Does this pt have clinically isolated optic neuritis, or…does she have neuromyelitis optica (or neuromyelitis optica spectrum disorder)?

And:
2) ‘Does this pt have clinically isolated optic neuritis, or…does she have what MOGAD stands for?’
As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or...does she have MS?'

But the *Neuro* book places great emphasis on asking two additional questions:
1) ‘Does this pt have clinically isolated optic neuritis, or...does she have neuromyelitis optica (or neuromyelitis optica spectrum disorder)?’
**And:**
2) ‘Does this pt have clinically isolated optic neuritis, or...does she have myelin oligodendrocyte glycoprotein IgG-associated disorder?’
As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or…does she have MS?’

But the *Neuro* book places great emphasis on asking two additional questions:

1) ‘Does this pt have clinically isolated optic neuritis, or…does she have neuromyelitis optica (or neuromyelitis optica spectrum disorder)?

2) ‘Does this pt have clinically isolated optic neuritis, or…does she have myelin oligodendrocyte glycoprotein IgG-associated disorder?’

Why the emphasis on these two questions/conditions?
As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or…does she have MS?"

The Neuro book places great emphasis on asking two additional questions:

1) ‘Does this pt have clinically isolated optic neuritis, or…does she have neuromyelitis optica (or neuromyelitis optica spectrum disorder)?

2) ‘Does this pt have clinically isolated optic neuritis, or…does she have myelin oligodendrocyte glycoprotein IgG-associated disorder?"

Why the emphasis on these two questions/conditions?
For several reasons related to dz management:
--?
--?
As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or…does she have MS?"

the Neuro book places great emphasis on asking two additional questions:

1) ‘Does this pt have clinically isolated optic neuritis, or…does she have neuromyelitis optica (or neuromyelitis optica spectrum disorder)?'

2) ‘Does this pt have clinically isolated optic neuritis, or…does she have myelin oligodendrocyte glycoprotein IgG-associated disorder (MOGAD)?'

Why the emphasis on these two questions/conditions?

For several reasons related to dz management:

--Differences in pathophysiology means tx for NMO(SD), MOG and MS differ; and

--?
Typical Optic Neuritis

As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or...does she have MS?"

But the *Neuro* book places great emphasis on asking two additional questions:

1) ‘Does this pt have clinically isolated optic neuritis, or...does she have neuromyelitis optica (or neuromyelitis optica spectrum disorder)?

And:

2) ‘Does this pt have clinically isolated optic neuritis, or...does she have myelin oligodendrocyte glycoprotein IgG-associated disorder?"

Why the emphasis on these two questions/conditions?
For several reasons related to dz management:
--Differences in pathophysiology means tx for NMO(SD), MOG and MS differ; and
--Some MS txs are ineffective in one—and worse, are deleterious in the other.
As we have seen, when assessing a typical optic neuritis pt it is vital to ask oneself: ‘Does this pt have clinically isolated optic neuritis, or…does she have MS? Does she have NMO? Does she have MOGAD? Why the emphasis on these two questions/conditions? For several reasons related to dz management:

1) Differences in pathophysiology means tx for NMO(SD), MOG and MS differ; and
2) Some MS txs are ineffective in MOG—and worse, are deleterious in NMO(SD)
By what eponymous name is NMO also known?
Typical Optic Neuritis

By what eponymous name is NMO also known?
Devic’s dz
By what eponymous name is NMO also known?
Devic’s dz

NMO involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
By what eponymous name is NMO also known?
Devic’s dz

NMO involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
Longitudinally extensive transverse myelitis
By what eponymous name is NMO also known? Devic’s dz

NMO involves two separate and specific inflammatory processes. One is optic neuritis. What is the other? Longitudinally extensive transverse myelitis aka Devic’s dz

What is transverse myelitis? Inflammation of the spinal cord

How does transverse myelitis present clinically? As a symmetric para- or quadriparesis, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally? They usually occur within weeks to months of each other, but can be separated by several years

How does transverse myelitis manifest on MRI? As a hyperintense signal on T2 imaging
What is transverse myelitis?
Inflammation of the spinal cord

What is the other?
Longitudinally extensive

transverse myelitis
What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
Typical Optic Neuritis

By what eponymous name is NMO also known?
Devic's dz

What is the other?
Longitudinally extensive transverse myelitis aka Devic's dz

What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
As a symmetric para- or quadriparesis, often with sensory loss
By what eponymous name is NMO also known? Devic’s dz

NMO involves two separate and specific inflammatory processes. One is optic neuritis. What is the other? Longitudinally extensive transverse myelitis aka Devic’s dz

What is transverse myelitis? Inflammation of the spinal cord

How does transverse myelitis present clinically? As a symmetric para- or quadriparesis, often with sensory loss

But MS can also present with paresis + sensory loss. How is this any different?

What is the other? Transverse myelitis
Typical Optic Neuritis

What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
As a symmetric para- or quadriparesis, often with sensory loss

But MS can also present with paresis + sensory loss. How is this any different? The difference is the symmetry. Whereas NMO presents with bilaterally symmetric motor and/or sensory loss, symmetric deficits are distinctly uncommon in MS.

What is the other?
Longitudinally extensive transverse myelitis

By what eponymous name is NMO also known?
Devic's dz

NMO involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
Longitudinally extensive transverse myelitis aka Devic's dz

What is transverse myelitis?
Inflammation of the spinal cord
What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
As a symmetric para- or quadriplegia, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally?

What is the other?
Longitudinally extensive transverse myelitis (aka Devic’s disease)
What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
As a symmetric para- or quadripareisis, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally?
They usually occur within unit of time to unit of time of each other

What is the other?
Longitudinally extensive
What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
As a symmetric para- or quadriplegia, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally?
They usually occur within weeks to months of each other
NMOSD

NMO aka Devic's dz

What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
As a symmetric para- or quadriparesis, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally?
They usually occur within weeks to months of each other, but can be separated by several years.

Typical Optic Neuritis

Longitudinally extensive transverse myelitis

What is the other?
Longitudinally extensive transverse myelitis

unit of time
What is transverse myelitis? 
Inflammation of the spinal cord

How does transverse myelitis present clinically? 
As a symmetric para- or quadriparesis, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally? 
They usually occur within weeks to months of each other, but can be separated by several years

What is the other? 
Longitudinally extensive transverse myelitis

Typical Optic Neuritis

NMOSD

MS

NMO

aka Devic’s dz

MOGAD

Devic’s dz

Optic neuritis

+ transverse myelitis

What is the other? 
Longitudinally extensive transverse myelitis
What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
As a symmetric para- or quadriparesis, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally?
They usually occur within weeks to months of each other, **but can be separated by several years**

How does transverse myelitis manifest on MRI?

**Transverse myelitis**
What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
As a symmetric para- or quadriplegia, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally?
They usually occur within weeks to months of each other, but can be separated by several years

How does transverse myelitis manifest on MRI?
As a hyperintense signal on T2 imaging
Sagittal T2-weighted MRI of the spinal cord in a patient with NMOSD depicting a hyperintense lesion
What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
As a symmetric para- or quadriparesis, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally?
They usually occur within weeks to months of each other, but can be separated by several years

How does transverse myelitis manifest on MRI?
As a hyperintense signal on T2 imaging

What is the other?
Longitudinally extensive transverse myelitis

How extensive (ie, long) are these lesions?
What is transverse myelitis?
Inflammation of the spinal cord

How does transverse myelitis present clinically?
As a symmetric para- or quadriparesis, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally?
They usually occur within weeks to months of each other, but can be separated by several years

How does transverse myelitis manifest on MRI?
As a hyperintense signal on T2 imaging

What is the other?
Longitudinally extensive transverse myelitis

How extensive (ie, long) are these lesions?
2-3 vertebral segments or so
Sagittal T2-weighted MRI of the spinal cord in a patient with NMOSD depicting a hyperintense lesion over more than 3 vertebral segments
What is transverse myelitis?

So, the spinal cord lesions in NMO are longitudinally extensive…Perchance, is the same true of the optic nerve lesions in NMO?

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What is transverse myelitis?

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- Indeed it is! Further, in addition to longer, the optic nerve lesions in NMO tend to be more posterior than those found in typical optic neuritis.

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How extensive (ie, long) are these lesions? 2-3 vertebral segments or so
MRI findings in NMOSD-associated optic neuritis: Enhancement is **bilateral**, **extensive**, and **posterior**.

MRI findings in MS-associated optic neuritis: Enhancement is **unilateral**, **short**, and **anterior**.
By what eponymous name is NMO also known?

Devic’s dz

NMO involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?

Longitudinally extensive transverse myelitis aka Devic’s dz

What is transverse myelitis?

Inflammation of the spinal cord

How does transverse myelitis present clinically?

As a symmetric para- or quadriparesis, often with sensory loss

How are the optic neuritis and transverse myelitis episodes related temporally?

They usually occur within weeks to months of each other, but can be separated by several years

How does transverse myelitis manifest on MRI?

As a hyperintense signal on T2 imaging

How extensive (ie, long) are these lesions?

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How posterior are we talking about here?

They can extend to the optic chiasm (which is almost unheard of in typical optic neuritis)

What does chiasmal involvement portend vis a vis exam findings in NMO?

It raises the possibility that bitemporal and/or homonymous hemianopic VF defects might be found
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Thirteen-year-old girl presenting with bilateral visual loss due to NMO-associated optic neuritis. Axial FLAIR brain imaging showed optic chiasm involvement (white arrow).
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Typical Optic Neuritis

NMOSD

MS

NMO

aka Devic’s dz

MOGAD

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Speaking of VA loss in NMO(SD)—does it tend to be on the mild-to-moderate side a la typical optic neuritis?

No it tends to be worse

Does it exhibit spontaneous recovery a la typical optic neuritis?

It does not

Is long-term visual prognosis good a la typical optic neuritis?

It is not—in fact, it is common for at least one eye to end up with VA < 20/200

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NMOSD → NMO → MS → MOGAD

What is transverse myelitis?

So, the spinal cord lesion in NMO(SD) is... transverse myelitis aka Devic’s dz

Indeed it is! Faster pathology than those found in MS

How posterior are the NMO(SD) spinal cord lesions?

They can extend more posterior...to the optic chiasm...which is almost unheard of in typical optic neuritis

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They usually occur within 2 weeks to 6 months of each other, but can be separated by several years.

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NMO
aka Devic's dz
+ transverse myelitis

Optic neuritis

NMO is an antibody-mediated autoimmune condition. What is the target of the antibodies?
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What does this protein do?
NMO is an antibody-mediated autoimmune condition. **What is the target of the antibodies?** The protein aquaporin-4 (AQP4)

**What does this protein do?**
It is the main water channel protein in CNS cell type cells
**NMO is an antibody-mediated autoimmune condition. What is the target of the antibodies?**

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In the present context, what do astrocytes do?
Typical Optic Neuritis

**NMO**
aka *Devic’s dz*

+ *transverse myelitis*

**Optic neuritis**

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The protein *aquaporin-4* (AQP4)

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They maintain oligodendrocyte viability—so, astrocyte loss → oligodendrocyte loss
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What do oligodendrocytes do? They provide myelin in the CNS—oligodendrocyte loss = demyelination
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**Typical Optic Neuritis**

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Is lab testing available to detect antibodies against AQP4?
Yes, and they form part of the diagnostic criteria for NMO.

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NMOSD involves three separate and specific inflammatory processes. Two are optic neuritis and longitudinally extensive transverse myelitis. What is the third?
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Area postrema syndrome

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What is the area postrema?
A portion of the posterior medulla
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What is the area postrema?
A portion of the posterior medulla

How does area postrema syndrome present clinically?
With intractable episodes of one or both of the following:
--?
--?
NMOSD involves three separate and specific inflammatory processes. Two are optic neuritis and longitudinally extensive transverse myelitis. What is the third?

Area postrema syndrome

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A portion of the posterior medulla

How does area postrema syndrome present clinically?
With intractable episodes of one or both of the following:
--Hiccups
--Nausea/vomiting
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How does area postrema syndrome present clinically?
With intractable hiccups and/or nausea/vomiting:

- How long do hiccups have to last to be considered 'intractable'?
At least 30 days or so
Like NMO, does NMOSD involve antibodies against the AQP4 protein?

Indeed it does

Also as with NMO, is Ab positivity a diagnostic criteria for NMOSD?

Indeed it is

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The AQP4 water channel membrane protein is found mainly in three locations—what are they?
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--The area postrema
--The spinal cord
--The optic nerve
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Indeed it is

The AQP4 water channel membrane protein is found mainly in:

-- Area postrema
-- Spinal cord
-- Optic nerve

(In retrospect, this should not be surprising)

Is NMOSD a common cause of demyelinating disorder?
Not in North America, but it accounts for about half the cases in Asia and the West Indies.
**NMOSD**

Is NMOSD a common cause of demyelinating dz?
Not in North America

**Optic neuritis**

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Like NMO, does NMOSD involve antibodies against the AQP4 protein?
Indeed it does

The AQP4 water channel membrane protein is found mainly in three locations—what are they?
- Area postrema
- Spinal cord
- Optic nerve

(In retrospect, this should not be surprising)

Also as with NMO, is Ab positivity a diagnostic criteria for NMOSD?
Indeed it is

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NMOSD involves three separate and specific inflammatory processes. Two are optic neuritis and longitudinally extensive transverse myelitis. What is the third?

Area postrema syndrome

What is the area postrema?
A portion of the posterior medulla

How does area postrema syndrome present clinically?
With intractable episodes of one or both of the following:

--Hiccups
--Nausea/vomiting

How long do hiccups have to last to be considered ‘intractable’?
At least 30 days or so

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--The area postrema
--The spinal cord
--The optic nerve
(In retrospect, this should not be surprising)

Is NMOSD a common cause of demyelinating dz?
Not in North America, but it accounts for about half the cases in

Asia and the West Indies
**NMOSD**

Is NMOSD a common cause of demyelinating dz? Not in North America, but it accounts for about half the cases in Asia.

**NMO**

aka Devic's dz

+ transverse myelitis

**Optic neuritis**

NMOSD involves three separate and specific inflammatory processes. Two are optic neuritis and longitudinally extensive transverse myelitis. What is the third? Area postrema syndrome

What is the area postrema? A portion of the posterior medulla

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What is the area postrema?
A portion of the posterior medulla.

How does area postrema syndrome present clinically?
With intractable episodes of one or both of the following:

- Hiccups
- Nausea/vomiting

How long do hiccups have to last to be considered 'intractable'?
At least 30 days or so.

Like NMO, does NMOSD involve antibodies against the AQP4 protein?
Indeed it does.

The AQP4 water channel membrane protein is found mainly in the area postrema, spinal cord, optic nerve, and area postrema syndrome.

(In retrospect, this should not be surprising.)

Also as with NMO, is Ab positivity a diagnostic criteria for NMOSD?
Indeed it is.

The AQP4 water channel membrane protein is found mainly in three locations—what are they?

- Area postrema
- Spinal cord
- Optic nerve

**+ area postrema syndrome**

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**NMOSD**

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**NMOSD**

- **Optic neuritis**
- **Longitudinally extensive transverse myelitis**
- **Area postrema syndrome**

**What is the area postrema?**

A portion of the posterior medulla.

**How does area postrema syndrome present clinically?**

With intractable episodes of one or both of the following:

- Hiccups
- Nausea/vomiting

**How long do hiccups have to last to be considered 'intractable'?** At least 30 days or so.

**Like NMO, does NMOSD involve antibodies against the AQP4 protein?** Indeed it does.

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- Spinal cord
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**Is NMOSD a common cause of demyelinating dz?**

Not in North America, but it accounts for about half the cases in Asia and the West Indies.

**Ab positivity as a diagnostic criteria for NMOSD?**

Indeed it is.

The AQP4 water channel membrane protein is found mainly in:

- Area postrema
- Spinal cord
- Optic nerve

(In retrospect, this should not be surprising)
How are NMO and NMOSD treated?
How are NMO and NMOSD treated?
Acute exacerbations are treated with steroids aka Devic’s dz
How are NMO and NMOSD treated?
Acute exacerbations are treated with steroids
**NMOSD**

- + area postrema syndrome

**NMO**

aka Devic’s dz

- + transverse myelitis

How are NMO and NMOSD treated?

Acute exacerbations are treated with steroids—dose, and duration
How are NMO and NMOSD treated? 
Acute exacerbations are treated with steroids—1 g/d for 3-5 days
How are NMO and NMOSD treated?
Acute exacerbations are treated with steroids—1 g/d for 3-5 days. If ineffective, and/or abbreviations should be considered.
How are NMO and NMOSD treated?
Acute exacerbations are treated with steroids—1 g/d for 3-5 days. If ineffective, plasma exchange and/or IVIG should be considered.
*Typical Optic Neuritis*

**NMOSD**
- + area postrema syndrome

**NMO**
- aka Devic's dz
- + transverse myelitis

**MS**

**MOGAD**

**Optic neuritis**

*How are NMO and NMOSD treated?*
Acute exacerbations are treated with steroids—1 g/d for 3-5 days. If ineffective, plasma exchange and/or IVIG should be considered.

*What class of medicine has been shown to reduce the risk of recurrence?*
How are NMO and NMOSD treated?
Acute exacerbations are treated with steroids—1 g/d for 3-5 days. If ineffective, plasma exchange and/or IVIG should be considered.

What class of medicine has been shown to reduce the risk of recurrence? Immunosuppressives
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Acute exacerbations are treated with steroids—1 g/d for 3-5 days. If ineffective, plasma exchange and/or IVIG should be considered.

What class of medicine has been shown to reduce the risk of recurrence? Immunosuppressives

What happens if an NMO(SD) pt is misdiagnosed as having MS and is started on DMT?
Typical Optic Neuritis

NMOSD

+ area postrema syndrome

NMO
aka Devic's dz

+ transverse myelitis

Optic neuritis

MS

MOGAD

How are NMO and NMOSD treated?
Acute exacerbations are treated with steroids—1 g/d for 3-5 days. If ineffective, plasma exchange and/or IVIG should be considered.

What class of medicine has been shown to reduce the risk of recurrence?
Immunosuppressives

What happens if an NMO(SD) pt is misdiagnosed as having MS and is started on DMT?
These meds will increase the risk of recurrence
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
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NMOSD

+ area postrema syndrome

MOSD

+ optic neuritis

Typical Optic Neuritis

MS

What is the other?

Acute disseminated encephalomyelitis (ADEM)

In a nutshell, what is ADEM?

Acute disseminated encephalomyelitis (ADEM) aka Devic’s dz

Is it more common in children, or adults?

Children

Is there a gender predilection?

Yes, it is more common in males

There is a geographic predilection—what is it?

It is more prevalent among people who live farther from the equator
Typical Optic Neuritis

NMOSD + area postrema syndrome

MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other? Acute disseminated encephalomyelitis (ADEM)

In a nutshell, what is ADEM? An acute autoimmune demyelinating condition affecting the brain and/or spinal cord

Is it more common in children, or adults? Children

Is there a gender predilection? Yes, it is more common in males

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Typical Optic Neuritis

NMOSD

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MS

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Children

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MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
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NMOSD

+ area postrema syndrome

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In a nutshell, what is ADEM?
An acute autoimmune demyelinating condition affecting the brain and/or spinal cord

Is it more common in children, or adults? Children

Is there a gender predilection? Yes, it is more common in men (M) than women (F).
In a nutshell, what is ADEM?
An acute autoimmune demyelinating condition affecting the brain and/or spinal cord.

Is it more common in children, or adults?
Children

Is there a gender predilection?
Yes, it is more common in males.
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
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In a nutshell, what is ADEM?
An acute autoimmune demyelinating condition affecting the brain and/or spinal cord

Is it more common in children, or adults?
Children

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Yes, it is more common in males

There is a geographic predilection—what is it?

It is more prevalent among people who live farther from the equator.
What is the other?
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Children.

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Yes, it is more common in males.

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Like MS
Typical Optic Neuritis

NMOSD + area postrema syndrome

MS

In a nutshell, what is ADEM?
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Is it more common in children, or adults?
Children

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Not like MS

MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
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Typical Optic Neuritis

MS

+ area postrema syndrome

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Is it more common in children, or adults?
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There is a geographic predilection—what is it?
It is more prevalent among people who live farther from the equator

What is the other?
Acute disseminated encephalomyelitis (ADEM)

How does it present clinically?
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An acute autoimmune demyelinating condition affecting the brain and/or spinal cord

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There is a geographic predilection—what is it?
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How does it present clinically?
With multifocal neurologic deficits in concert with encephalopathic signs/symptoms
In a nutshell, what is ADEM?
An acute autoimmune demyelinating condition affecting the brain and/or spinal cord

Is it more common in children, or adults?
Children

Is there a gender predilection?
Yes, it is more common in males

There is a geographic predilection—what is it?
It is more prevalent among people who live farther from the equator

How does it present clinically?
With multifocal neurologic deficits

What are the more common neurologic deficits?
--?
--?
NMOSD
+ area postrema syndrome
+ optic neuritis

**Typical Optic Neuritis**

**MOG** involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?

Acute disseminated encephalomyelitis (ADEM)

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How does it present clinically?
With multifocal neurologic deficits

What are the more common neurologic deficits?
--Extremity weakness
--Ataxia

Is it more common in children, or adults?
Children

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Yes, it is more common in males

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What are the S/S of encephalopathy?
Encephalopathic signs/symptoms
In a nutshell, what is ADEM?
An acute autoimmune demyelinating condition affecting the brain and/or spinal cord

Is it more common in children, or adults?
Children

Is there a gender predilection?
Yes, it is more common in males

There is a geographic predilection—what is it?
It is more prevalent among people who live farther from the equator

What are the S/S of encephalopathy?
Stupor (or even frank coma); irritability; confusion

encephalopathic signs/symptoms
**Typical Optic Neuritis**

**NMOSD**

+ area postrema syndrome

**MS**

**In a nutshell, what is ADEM?**
An acute autoimmune demyelinating condition affecting the brain and/or spinal cord

**Is it more common in children, or adults?**
Children

**Is there a gender predilection?**
Yes, it is more common in males

**There is a geographic predilection—what is it?**
It is more prevalent among people who live farther from the equator

**MOG** vs. **ADEM**

What is the other?
Acute disseminated encephalomyelitis (ADEM)

**How does it present clinically?**
With multifocal neurologic deficits in concert with encephalopathic signs/symptoms

**How does it present radiologically?**
What is the other?
Acute disseminated encephalomyelitis (ADEM)

In a nutshell, what is ADEM?
An acute autoimmune demyelinating condition affecting the brain and/or spinal cord

Is it more common in children, or adults?
Children

Is there a gender predilection?
Yes, it is more common in males

There is a geographic predilection—what is it?
It is more prevalent among people who live farther from the equator

How does it present clinically?
With multifocal neurologic deficits in concert with encephalopathic signs/symptoms

How does it present radiologically?
With large, bilateral, diffuse lesions involving both gray and white matter structures including the brainstem
(A) ADEM. Axial FLAIR showing bilateral, globular, hyperintense lesions in cortical gray matter (among other locations)
(A) **ADEM.** Axial FLAIR showing bilateral, globular, hyperintense lesions in cortical gray matter (among other locations). (B) For comparison, FLAIR showing Dawson’s fingers typical of MS
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other? Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG?
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG?
Optic neuritis
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What is the most common presenting sign of MOG? Optic neuritis

The ONH in MOG-associated optic neuritis—is it normal-to-mildly edematous, as is typical in typical optic neuritis?
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG?
Optic neuritis

The ONH in MOG-associated optic neuritis—is it normal-to-mildly edematous, as is typical in typical optic neuritis?
No, it tends to be much worse
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG?
Optic neuritis

How does MOG present radiologically?
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other? Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG? Optic neuritis

How does MOG present radiologically? Unlike the lesions of MS, MOG presents with gray-matter lesions.
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG?
Optic neuritis

How does MOG present radiologically?
Unlike the periventricular white-matter lesions of MS, MOG presents with gray-matter lesions
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other? Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG? Optic neuritis

How does MOG present radiologically? Unlike the periventricular white-matter lesions of MS, MOG presents with gray-matter lesions, as well as diffuse lesions involving the
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
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What is the most common presenting sign of MOG?
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How does MOG present radiologically?
Unlike the periventricular white-matter lesions of MS, MOG presents with gray-matter lesions, as well as diffuse lesions involving the brainstem
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?
Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG?
Optic neuritis

How does MOG present radiologically?
Unlike the periventricular white-matter lesions of MS, MOG presents with gray-matter lesions, as well as diffuse lesions involving the brainstem. However, it has no pathognomonic radiographic features, and often cannot be differentiated from ADEM.
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?

Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG?

Optic neuritis

How does MOG present radiologically?

Unlike the periventricular white-matter lesions of MS, MOG presents with gray-matter lesions, as well as diffuse lesions involving the brainstem.

Regarding VA loss in MOG—does it tend to be on the mild-to-moderate side a la typical optic neuritis, or severe as in NMO(SD)?

Severe

Does it exhibit spontaneous recovery a la typical optic neuritis, or nah like NMO(SD)?

Indeed it does

How about long-term visual prognosis: good, or nah?

Good
MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other?

Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG?

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How does MOG present radiologically?

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Spontaneous recovery is the rule

Good
Typical Optic Neuritis

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How about long-term visual prognosis: good, or nah?

Good
Typical Optic Neuritis

NMOSD

+ area postrema syndrome

MS

NMO

aka Devic's dz

MOGAD

MOG involves two separate and specific inflammatory processes. One is optic neuritis. What is the other? Acute disseminated encephalomyelitis (ADEM)

What is the most common presenting sign of MOG? Optic neuritis

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Regarding VA loss in MOG—does it tend to be on the mild-to-moderate side a la typical optic neuritis, or severe as in NMO(SD)? Severe

Does it exhibit spontaneous recovery a la typical optic neuritis, or nah like NMO(SD)? Spontaneous recovery is the rule

How about long-term visual prognosis: good, or nah? Good
MOG is an antibody-mediated autoimmune condition. What is the target of the antibodies?
MOG is an antibody-mediated autoimmune condition. What is the target of the antibodies? It’s all there in the name—a glycoprotein on myelin oligodendrocytes.
MOG is an antibody-mediated autoimmune condition. What is the target of the antibodies? It’s all there in the name—a glycoprotein on myelin oligodendrocytes

What does this protein do?
MOG is an antibody-mediated autoimmune condition. What is the target of the antibodies? It’s all there in the name—a glycoprotein on myelin oligodendrocytes.

What does this protein do?
At the time of this writing, this has yet to be elucidated. But whatever the protein does, it is mission-critical to maintaining oligodendrocyte viability.
MOG is an antibody-mediated autoimmune condition. What is the target of the antibodies? It’s all there in the name—a glycoprotein on myelin oligodendrocytes.

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Lab testing is available to detect these antibodies? Yes, and they form part of the diagnostic criteria for MOG.
MOG is an antibody-mediated autoimmune condition. What is the target of the antibodies? It’s all there in the name—a glycoprotein on myelin oligodendrocytes. What does this protein do? At the time of this writing, this has yet to be elucidated. But whatever the protein does, it is mission-critical to maintaining oligodendrocyte viability, because like NMO (and typical optic neuritis), MOG is a demyelinating dz.

Is lab testing available to detect these antibodies? Yes, and they form part of the diagnostic criteria for MOG.
To recap: The following findings push you away from typical optic neuritis/MS and toward MOG or NMO(SD), but do not help differentiate between the two:

--?
--?
--?
--?
--?
--?
--?
To recap: The following findings push you away from typical optic neuritis/MS and toward MOG or NMO(SD), but do not help differentiate between the two:

- Bilateral presentation
- Laterality
To recap: The following findings push you away from typical optic neuritis/MS and toward MOG or NMO(SD), but do not help differentiate between the two:

--Bilateral presentation
--?
To recap: The following findings push you away from typical optic neuritis/MS and toward MOG or NMO(SD), but do not help differentiate between the two:

--Bilateral presentation
--Severe vision loss
To recap: The following findings push you away from typical optic neuritis/MS and toward MOG or NMO(SD), but do not help differentiate between the two:
--Bilateral presentation
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--?
To recap: The following findings push you away from typical optic neuritis/MS and toward MOG or NMO(SD), but do not help differentiate between the two:
--Bilateral presentation
--Severe vision loss
--Chronicity episodes
--?
To recap: The following findings push you **away** from typical optic neuritis/MS and **toward** MOG or NMO(SD), but do not help differentiate between the two:

--- Bilateral presentation
--- Severe vision loss
--- Recurrent episodes
--?
--?
--?
To recap: The following findings push you away from typical optic neuritis/MS and toward MOG or NMO(SD), but do not help differentiate between the two:
--Bilateral presentation
--Severe vision loss
--Recurrent episodes
--Two words ON enhancement
--?
To recap: The following findings push you **away** from typical optic neuritis/MS and **toward** MOG or NMO(SD), but do not help differentiate between the two:

-- Bilateral presentation
-- Severe vision loss
-- Recurrent episodes
-- Longitudinally extensive ON enhancement
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NMOSD

Typical Optic Neuritis

NMO aka Devic’s dz

These findings push you away from MOG and towards NMO(SD):
--MRI brain unremarkable
--No spontaneous VA recovery
--No pain with eye movements
--Hx transverse myelitis
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- MRI brain unremarkable
- No spontaneous VA recovery
- No pain with eye movements
- Hx transverse myelitis
- Hx area postrema syndrome
- Poor visual outcome

Warning: Don’t misinterpret the meaning of this list! If a listed characteristic is present, it greatly increases the likelihood of NMO(SD) over the other two entities. But if the characteristic is not present, this shouldn’t be taken to exclude NMO(SD).

--A lack of oligoclonal bands in the CSF

No question—proceed when ready
Typical Optic Neuritis

NMOSD

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MOG

Optic Neuritis

These findings push you away from MOG and towards NMO(SD):
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--A lack of oligoclonal bands in the CSF
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--A lack of oligoclonal bands in the CSF

No question—proceed when ready
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--MRI brain with gray-matter changes
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MOGAD

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(Warning: Soapbox speech ahead)
Can typical optic neuritis present bilaterally? \textbf{Yes}. Can it be chronic? \textbf{Yes}. But you (speaking to errbody who isn’t a fellowship-trained neuro-oph) shouldn’t make that call, because such cases are zebras, if not unicorns.
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Can typical optic neuritis present bilaterally? Yes. Can it be chronic? Yes. But you (speaking to errbody who isn’t a fellowship-trained neuro-oph) shouldn’t make that call, because such cases are zebras, if not unicorns. So don’t select ‘bilateral typical optic neuritis’ or ‘chronic typical optic neuritis’ as answers on the OKAP or WQEs, don’t utter those words when taking the Boards, and most importantly, don’t write them on a pt’s chart until and unless Neuro-Oph has written them first.