Vision and MS

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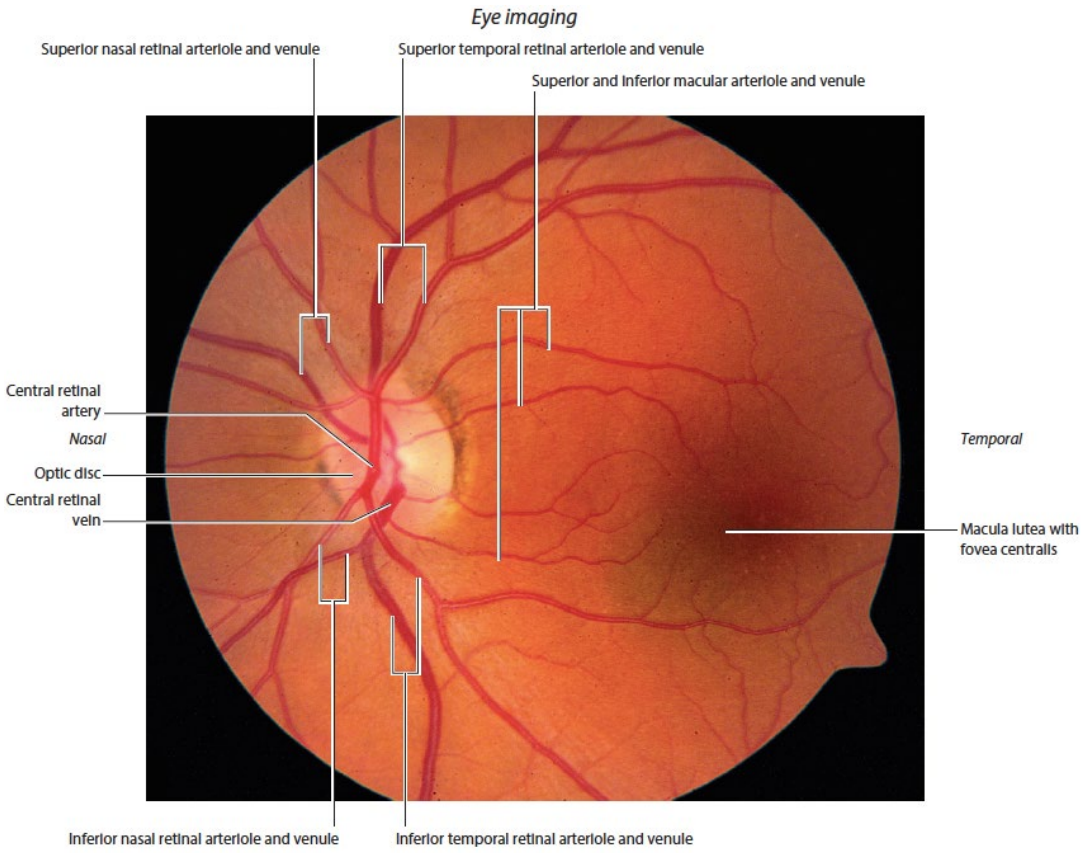
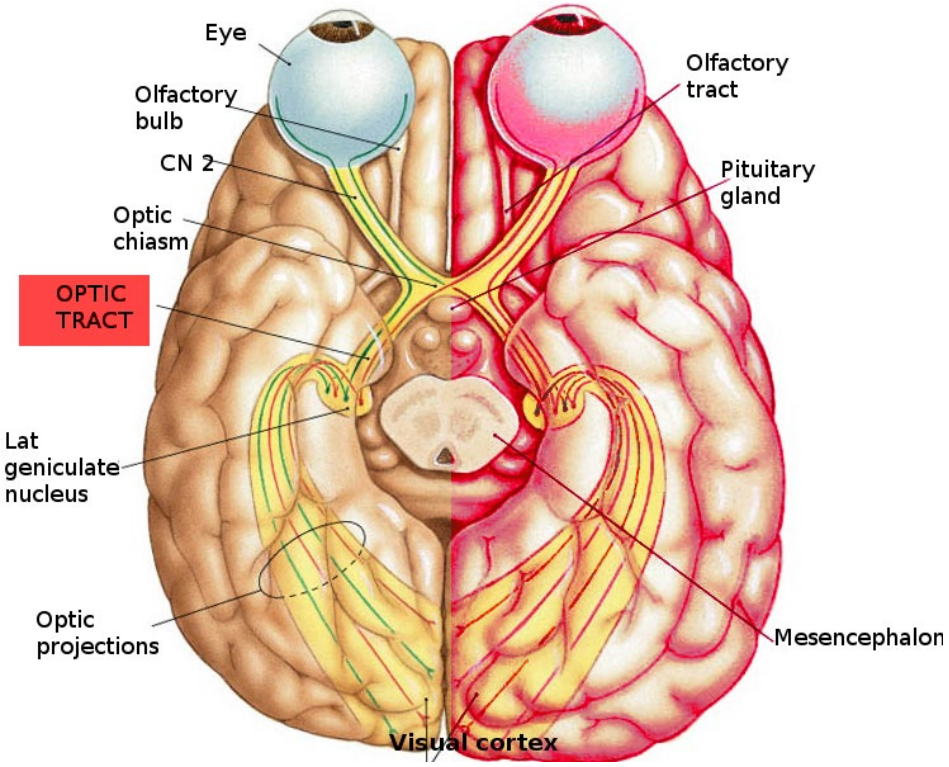
Full Disclosure of Presenter Financial Interests or Relationships

I declare that I or my immediate family do not have a financial interest or other relationship with any manufacturer/s of a commercial product/s which may be discussed at the conference

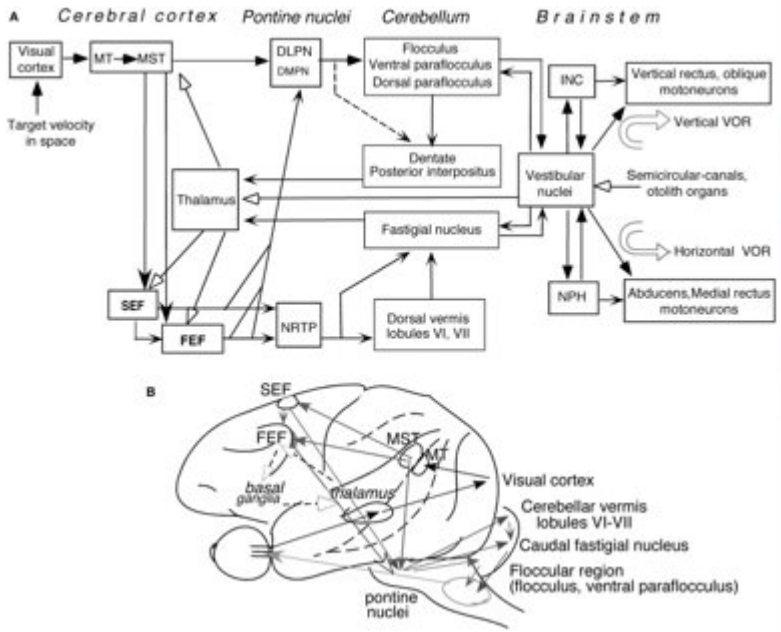
Afferent Visual System

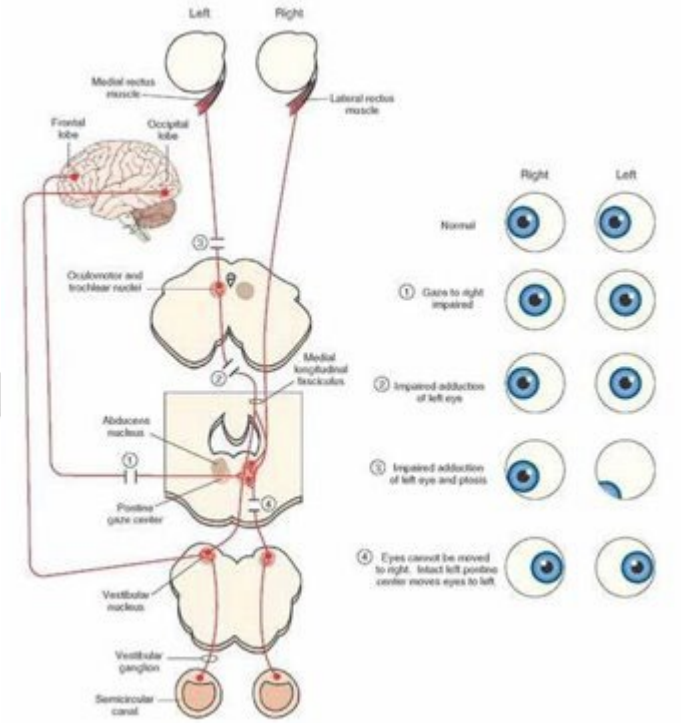


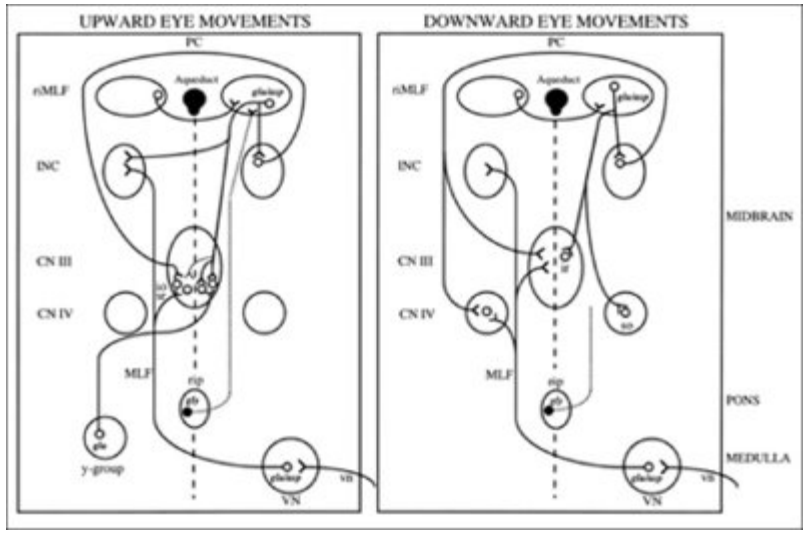


The Back of the Eye is the Front of the Brain

Ocular Motor(Efferent) System







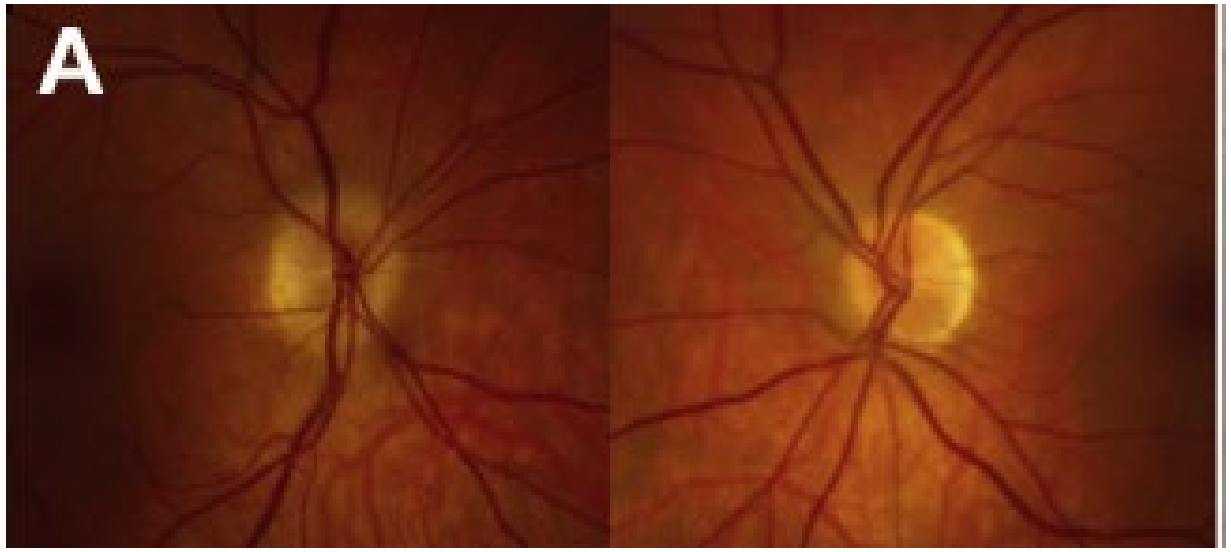
Optic Neuritis

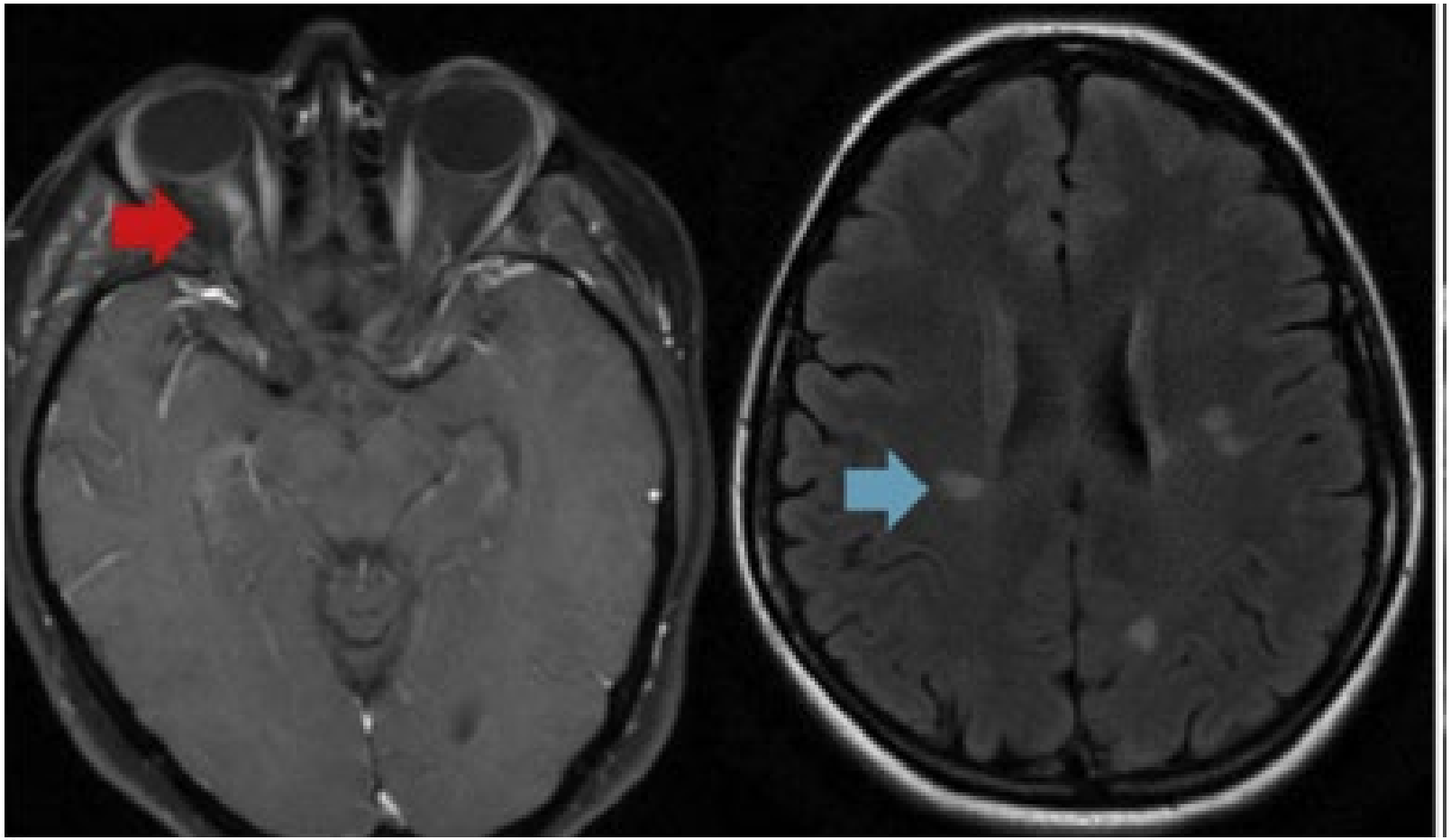
- Optic neuritis(ON) is a term to describe **any inflammation** of optic nerve
- Infectious:
  - Virus: HIV, VZV, EBV,
  - Bacteria: TB, sinus infection, **Bartonella**
  - Spirochetal: Syphilis, Lyme
- Non-infectious
  - Systemic autoimmune disorders: SLE, Sjogren, P-ANCA, sarcoidosis
  - CNS autoimmune/inflammatory disorders: **MS**, NMOSD, MOGAD

-Walsh &Hoyt Clinical Neuro-ophthalmology 6th ed, 2004

Case 1: “I can’t see”

- 22 YO, Caucasian female
- Presented with acute vision loss right eye for 3 days
- “Grey-out” with blurriness, as if looking through “smudged sunglasses lens”
- Eye pain, worse on eye movement
- VA : **20/100 OD**; 20/20 OS, right RAPD(+)





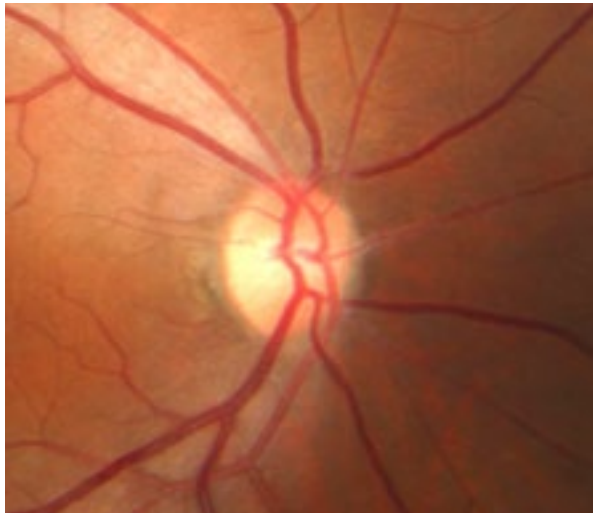
- Diagnosis: MS related optic neuritis
- Treatment : IVMP 1g daily x3 days; Refer to MS Clinic

MS Related Optic Neuritis

- Acute idiopathic demyelinating optic neuritis
- Most common type
- Typical clinical features:
  - Unilateral
  - Female in 20-30s
  - Painful
  - Mild to moderate decreased visual acuity(better than 20/200)
  - Usually normal optic disc(retro-bulbar) or mild optic disc edema

Case 1(cont)

- One month later, seen at MS clinic for follow up
- Full recovery of vision except mild color vision deficit
- **Exam:**
  - VA: 20/20 OU
  - Optic disc mild pallor, OD
  - No other focal neurological deficit
- **Plan**
  - Discharge from MS service?
  - Follow up in 6-12 months?
  - Spinal cord MRIs?
  - Maybe spinal tap?
  - Start DMT?



MS-ON and Multiple sclerosis

- MSON can be the first clinical event in 20-30% of MS patients
- 75% of MS patients has optic neuritis at some point of the disease course
- The overall odds of developing MS within 15 years after having a MSON attack is 50%
- Presence of brain lesion on MRI consistent with demyelination predicts higher risk of developing MS
- Disease modifying therapies(DMT) should be started as soon as possible to decrease the risk of developing MS

Abnormal brain MRI Indicates Higher risk of MS Conversion

ORIGINAL CONTRIBUTION

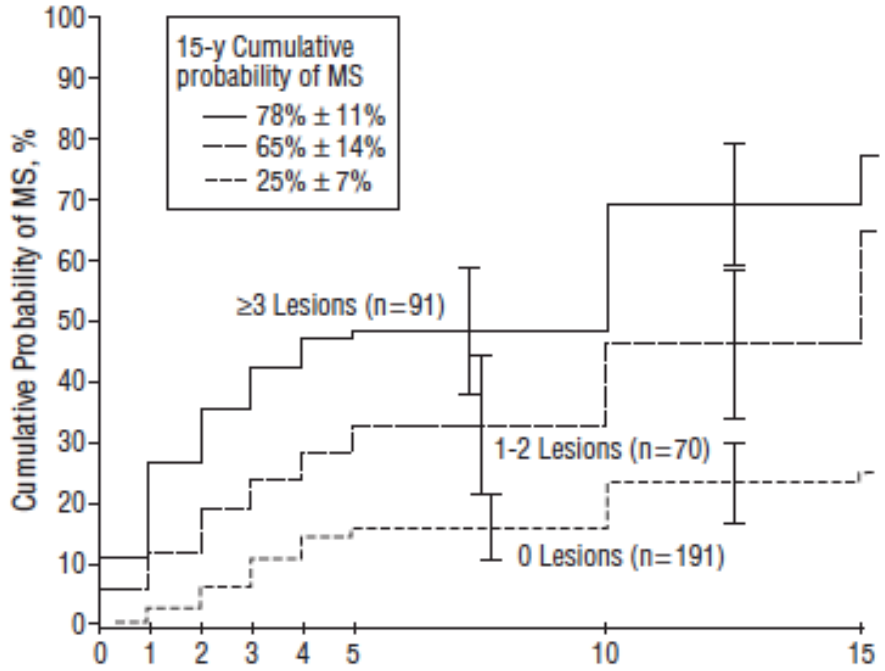
Multiple Sclerosis Risk After Optic Neuritis

Final Optic Neuritis Treatment Trial Follow-up

The Optic Neuritis Study Group

Conclusions: The presence of brain MRI abnormalities at the time of an optic neuritis attack is a strong predictor of the 15-year risk of MS. In the absence of MRI-detected lesions, male sex, optic disc swelling, and atypical clinical features of optic neuritis are associated with a low likelihood of developing MS. This natural history information is important when considering prophylactic treatment for MS at the time of a first acute onset of optic neuritis.

Arch Neurol. 2008;65(6):727-732



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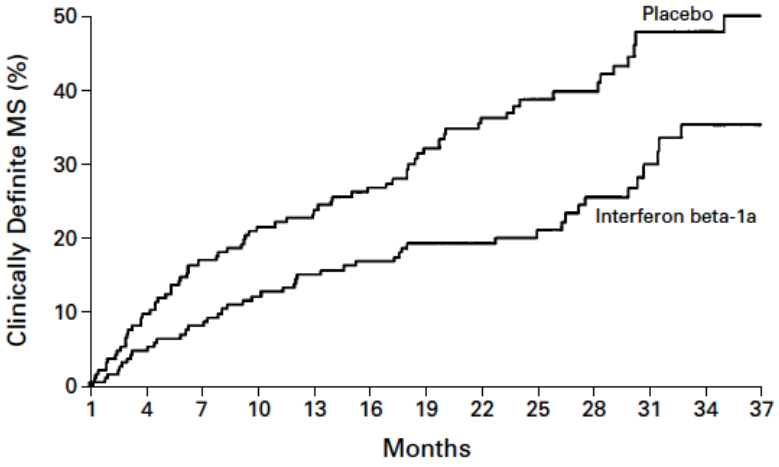
INTRAMUSCULAR INTERFERON BETA-1a THERAPY INITIATED DURING A FIRST DEMYELINATING EVENT IN MULTIPLE SCLEROSIS

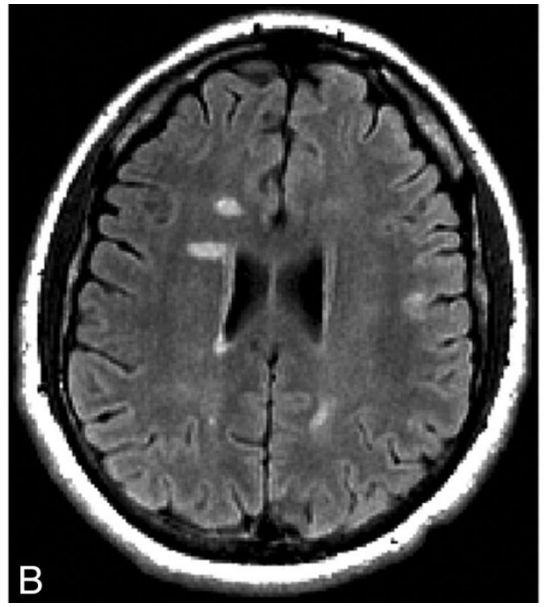
LAWRENCE D. JACOBS, M.D., ROY W. BECK, M.D., PH.D., JACK H. SIMON, M.D., PH.D., R. PHILLIP KINKEL, M.D., CAROL M. BROWNSCHEIDLE, PH.D., THOMAS J. MURRAY, M.D., NANCY A. SIMONIAN, M.D., PETER J. SLASOR, SC.D., ALFRED W. SANDROCK, M.D., PH.D., AND THE CHAMPS STUDY GROUP*

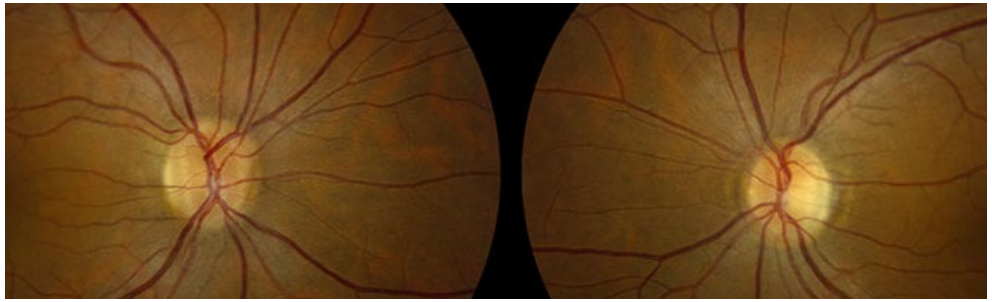
Conclusions Initiating treatment with interferon beta-1a at the time of a first demyelinating event is beneficial for patients with brain lesions on MRI that indicate a high risk of clinically definite multiple sclerosis. (N Engl J Med 2000;343:898-904.)



Case 2: Do I have MS?

- 50 YO woman with PMHx of **chronic headache**
- Brain MRI: “extensive white matter lesions concerning for MS”—”white spots”
- **Radiological isolated syndrome(RIS)**
- **What else do we need to diagnose MS?**
  - Clinical syndromes typical for MS:
    - **Hx of MS-ON**
      - Monocular, painful, blurry vision lasting for >24hrs
    - Brainstem syndrome
    - Cerebellar syndrome
    - Transverse myelitis
    - Cerebral syndrome





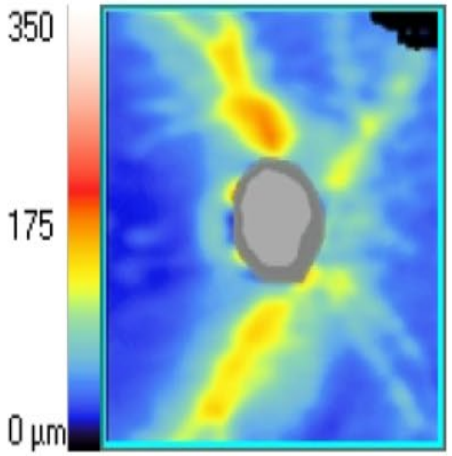
Optical coherence tomography(OCT)

Asymmetric RNFL Identify unilateral optic neuritis

Technician: Operator, Cirrus Signal Strength: 9/10 9/10

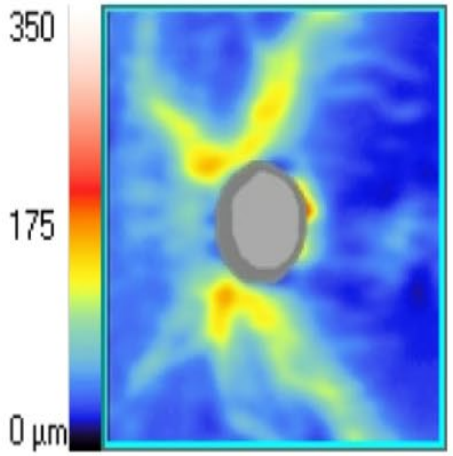
ONH and RNFL OU Analysis:Optic Disc Cube 200x200 OD OS

RNFL Thickness Map



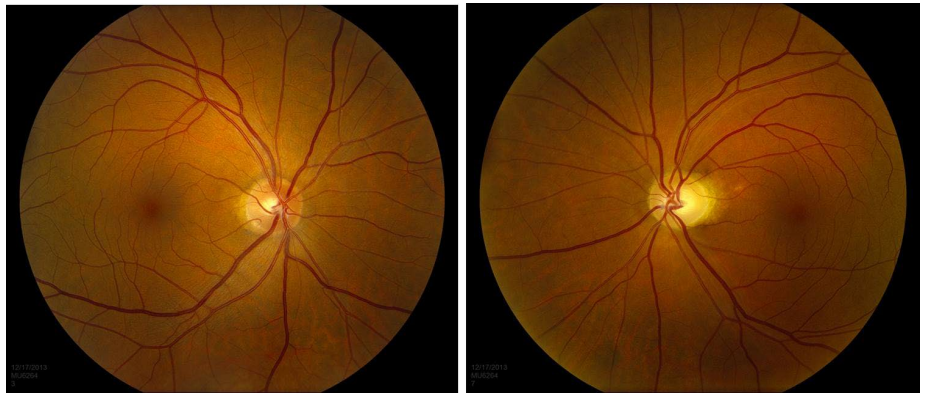
	OD	OS
Average RNFL Thickness	77 µm	69 µm
RNFL Symmetry	71%	
Rim Area	0.98 mm²	0.91 mm²
Disc Area	2.26 mm²	2.18 mm²
Average C/D Ratio	0.75	0.76
Vertical C/D Ratio	0.78	0.79
Cup Volume	0.421 mm³	0.534 mm³

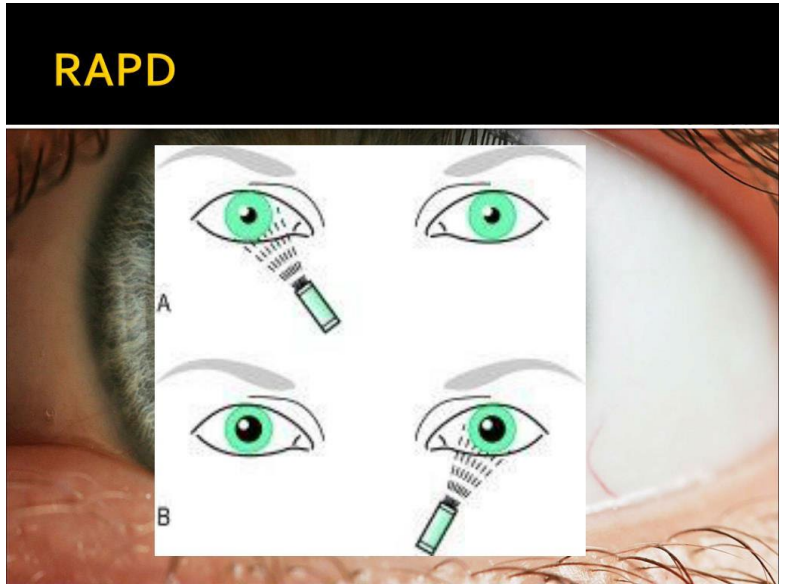
RNFL Thickness Map



Case 3: Am I having a relapse?

- 35 YO,F, recently diagnosed with RRMS:
  - Initially clinical presentation of **left MS-ON** in 12/2020
  - MRI brain and SC lesions with typical morphology of MS meeting DIS
  - Unique oligoclonal band in CSF
  - On dimethyl fumarate(Tecfidera)
- **Intermittent blurry vision left eye for** 2 weeks without eye pain.
- Exam: BCVA: 20/20 OU; Mild left optic nerve pallor; Subtle RAPD OS





Uhthoff phenomenon(MS heat intolerance)

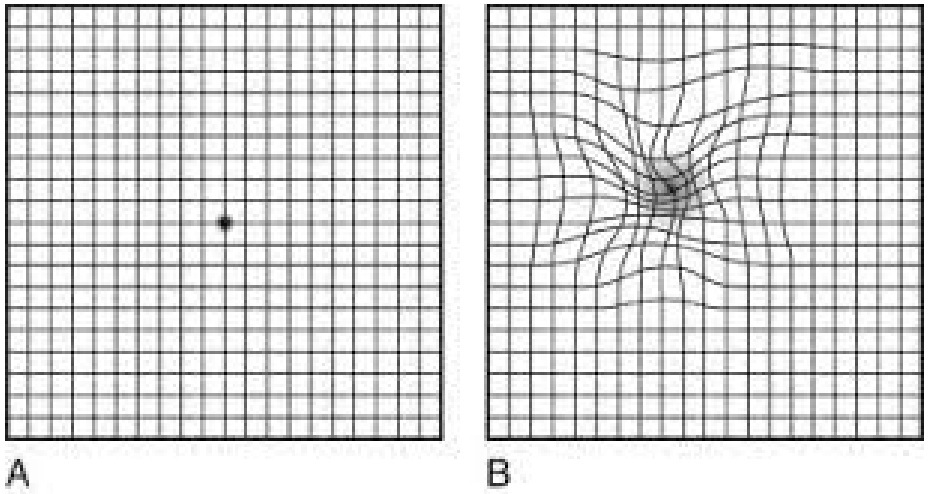
- Blurry vision in heat
- Stereotype, reversible, lasting less than 24 hours.
- Associated with one of the external factors
  - Heat(outdoor in summer, hot shower/tub, strenuous exercise)
  - Systemic infection(UTI)
  - Stress
- Doesn’t mean a relapse/breakthrough disease.
- May not justify change of DMTs

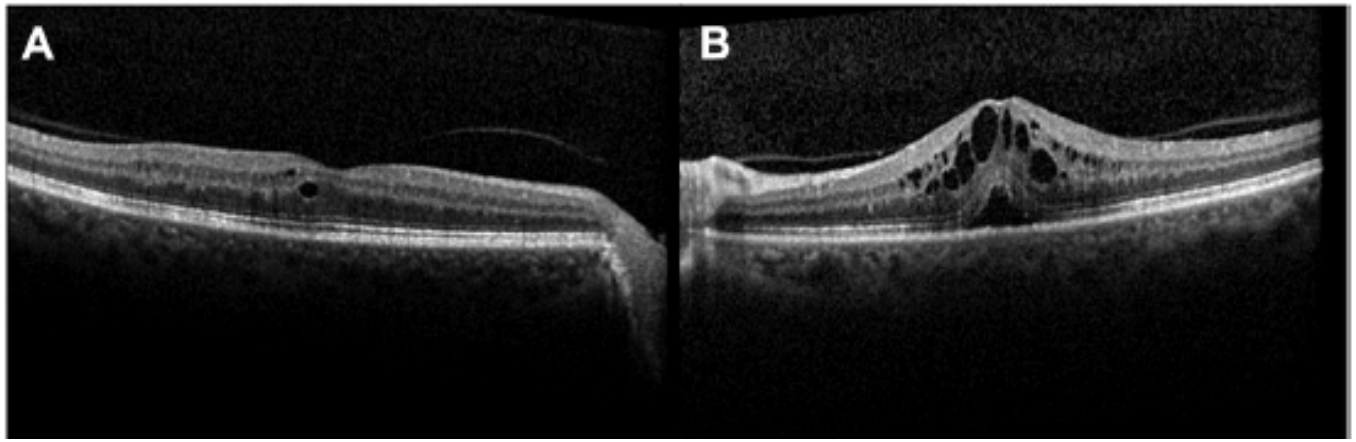
Case 4: “Am I having a relapse?”

- 62 YO Female
- PMHx of MS with optic neuritis and glaucoma
- Initially on Tecfidera come to OSU to establish care
- **EXAM(initial visit)**:
  - BCVA **20/20 OD, 20/25 OS**
  - Mild optic disc pallor OS
  - large cup OD, No RAPD
- **A few months later:** Present with blurry vision both eyes
- Exam: BCVA **20/40 OD; 20/80 OS**

Case 4: “Am I having a relapse?”

- Amsler Grid: “**wiggly lines”** on the left eye
- More History taking: recent switch of DMT from Dimyethal Fumarate(DMF) to **Fingolimod**
- **OCT:** Cystoid change at macular area OS





Cystoid Macular Edema Associated with Fingolimod

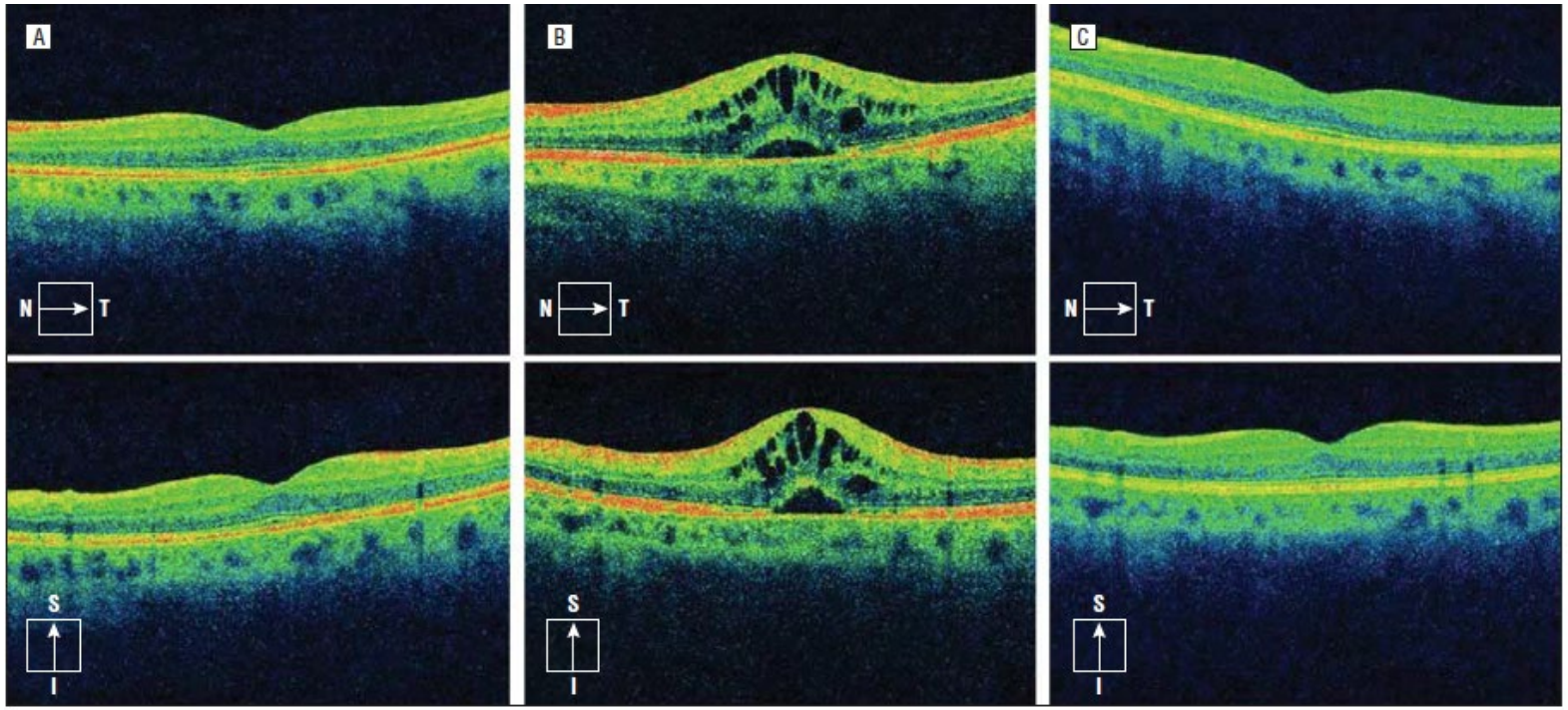


Figure 1. Case 1. Spectral-domain optical coherence tomographic images of the left eye 1 week prior to starting fingolimod (A), 4 weeks after starting fingolimod (B), and 8 weeks after starting fingolimod, after 4 weeks of topical nepafenac and difluprednate (C). I indicates inferior; N, nasal; S, superior; and T, temporal.

“I lost my peripheral vision”

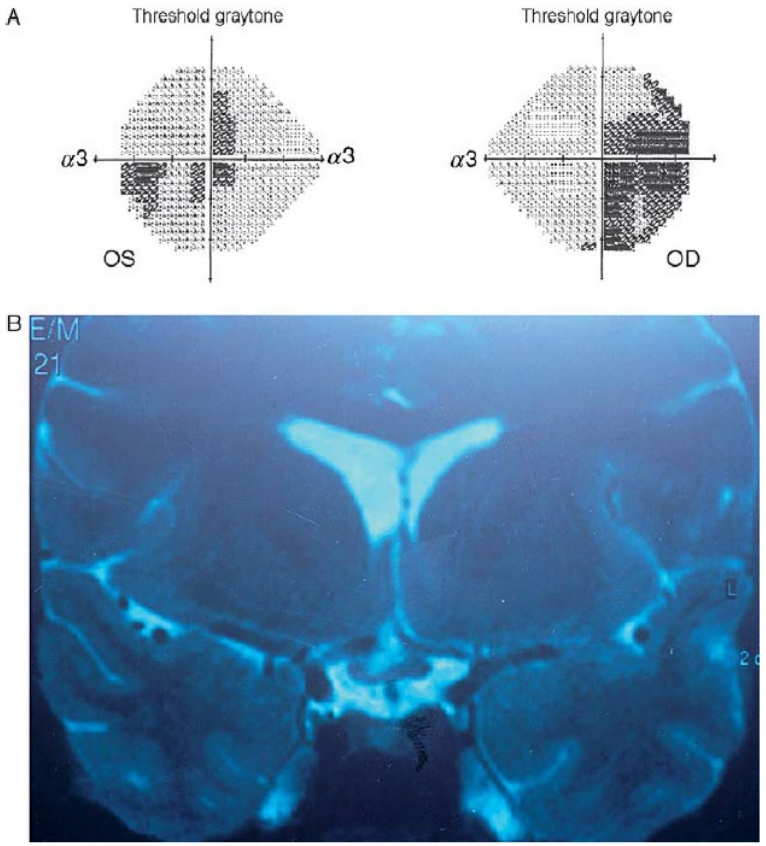


FIG. 4. Junctional scotoma secondary to chiasmal demyelination in MS. (A). Junctional scotoma defined by temporal field loss in the right eye (OD) and central field loss in the left eye (OS). (B). Coronal T2-weighted MRI image demonstrating demyelination of the body of the optic chiasm.

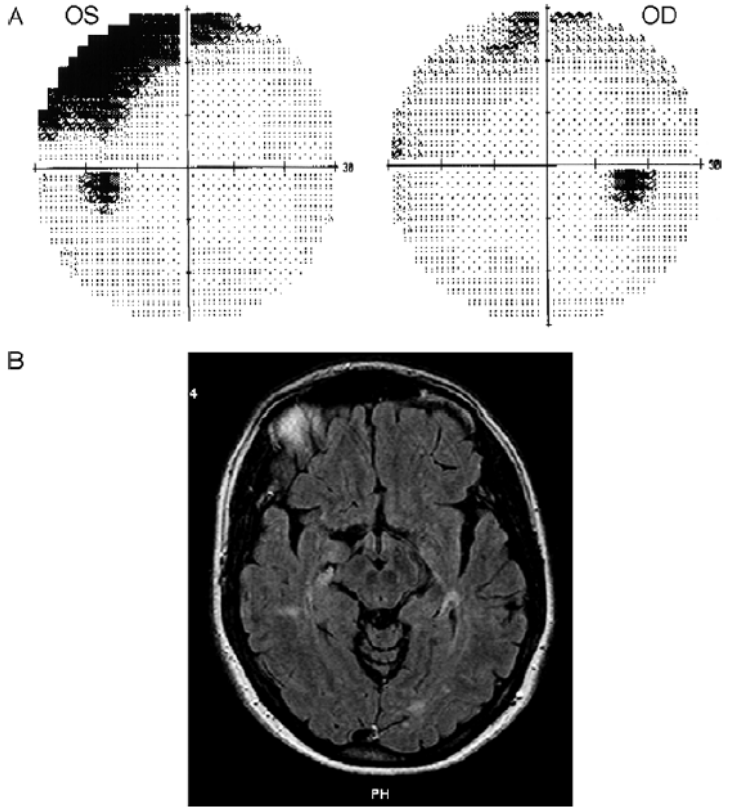
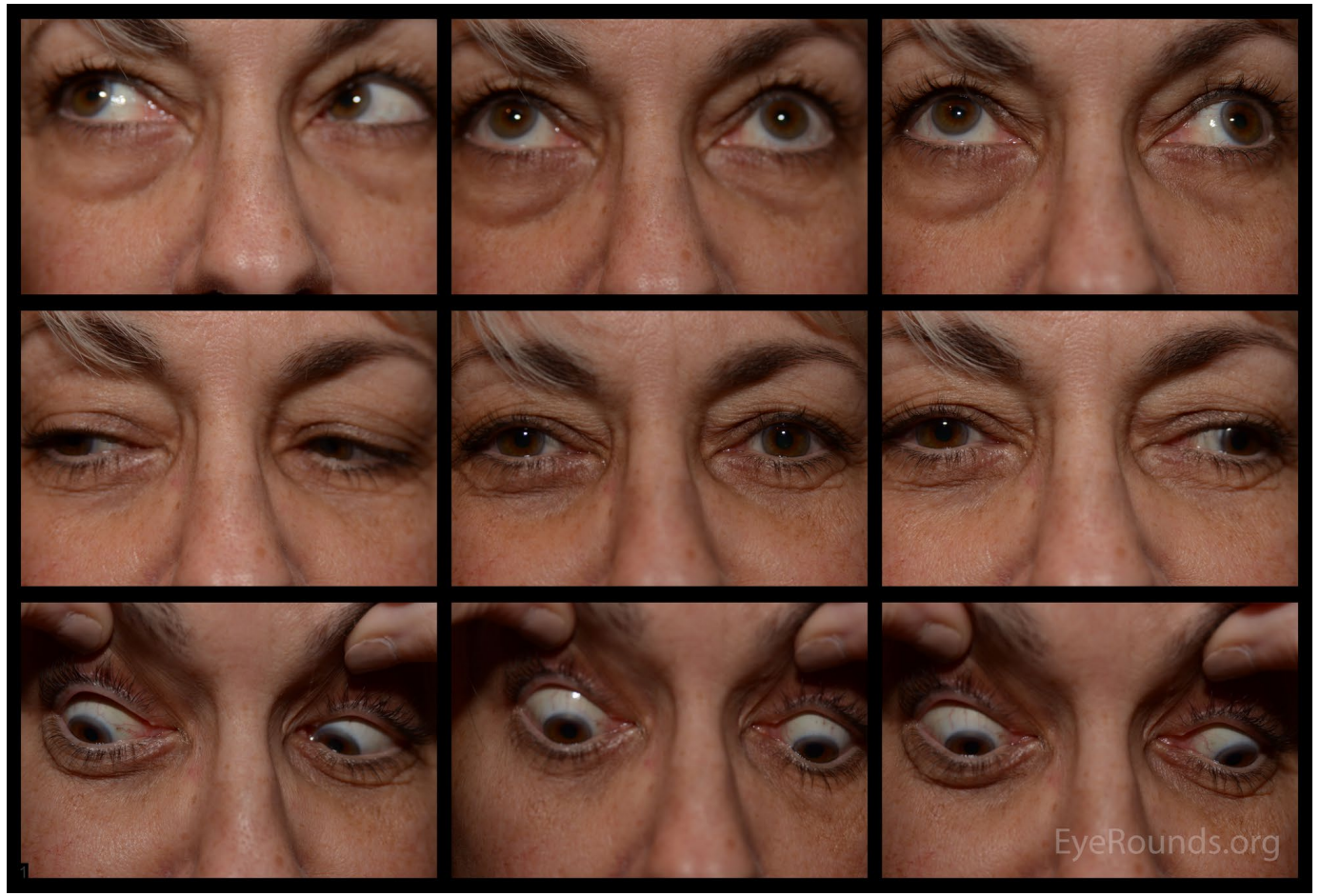


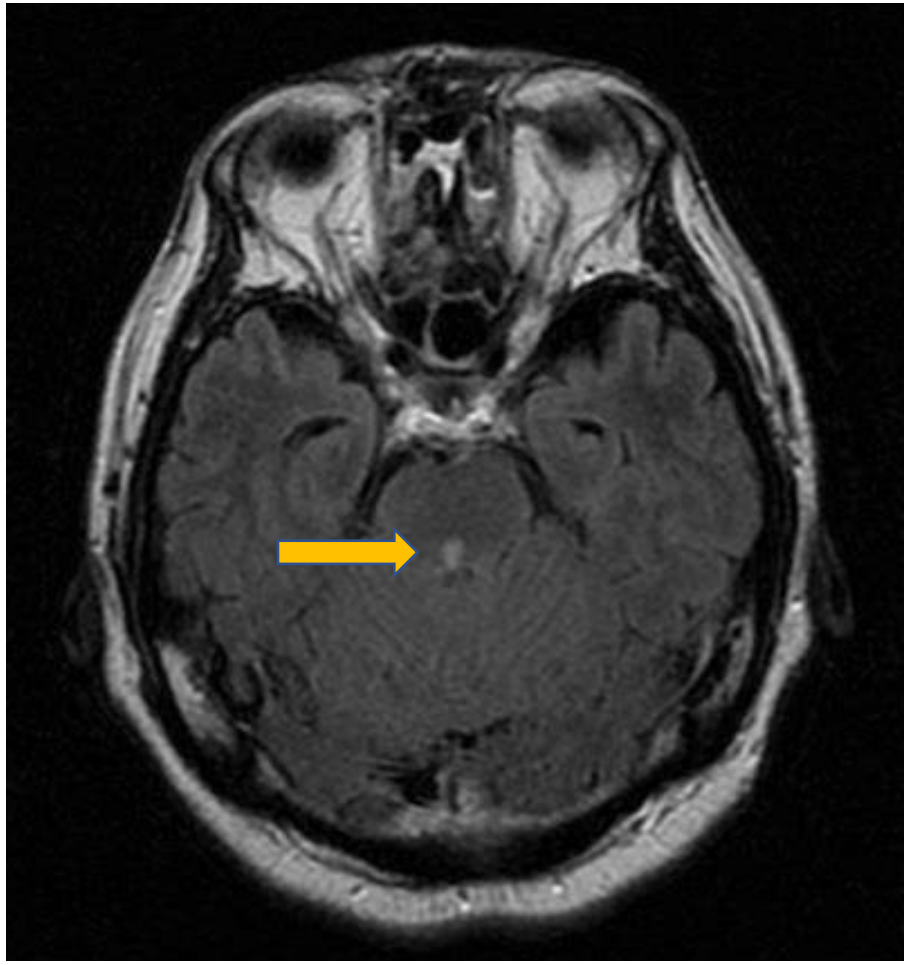
FIG. 5. Incongruous homonymous field loss in MS. (A). Automated threshold perimetry demonstrates an incongruous left homonymous field loss. (B). FLAIR imaging demonstrates demyelination involving the right anterior optic radiations.

Eye Movement and MS



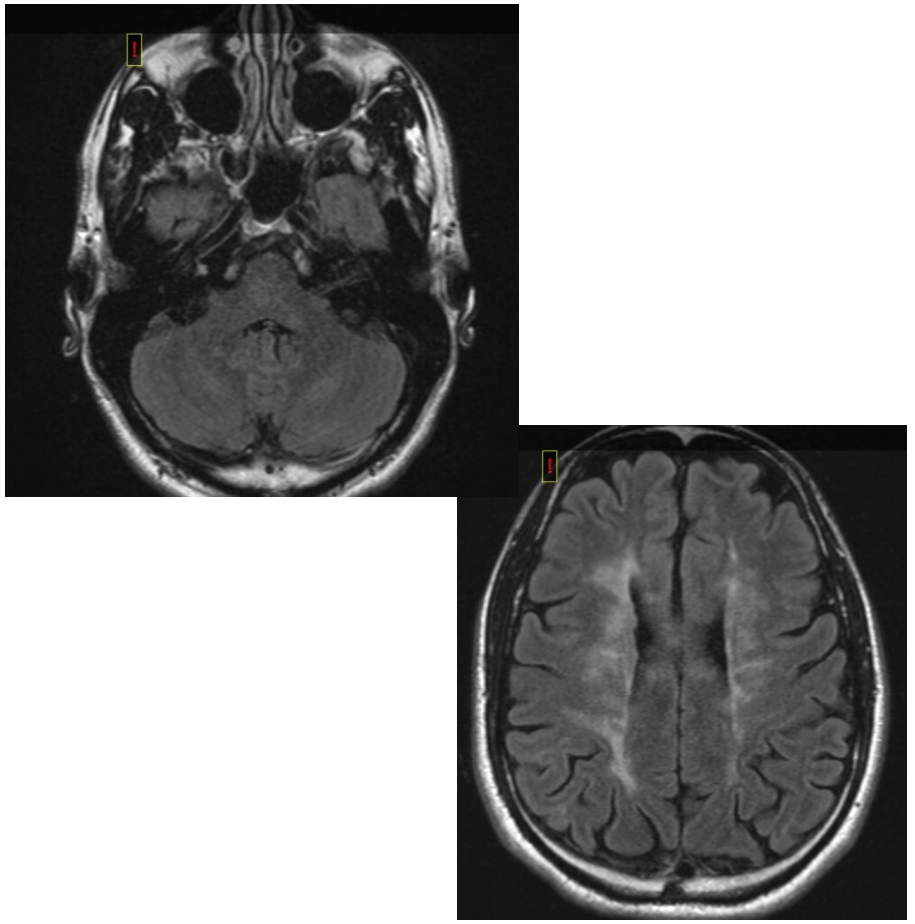
“I See double”

- Supranuclear lesions
  - Cerebral hemisphere
  - Pons(PPRF/MLF): horizontal diplopia, **INO**
  - Midbrain(riMLF): **vertical diplopia**
  - Skew deviation(MLF): vestibular--Supranuclear-III/IV
- Nuclear lesions:
  - 3rd: **bilateral** ptosis and upgaze impairment
  - 4th: unilateral, contralateral palsy
  - 6th: ipsilateral, horizontal palsy
- Internuclear lesions(MLF): INO



“My Eyes are shaking”

- 32 YO, Male was referred to MS clinic concerning for MS
- “My vision is blurry affecting my driving”
- “People see my eyes shaking”
- MRI brain: MS lesions
- CSF: oligoclonal band(+)
- Diagnosis: PPMS with acquired pendular nystagmus(APN)
    - Horizontal, vertical or elliptical



TAKE HOME MESSAGE

- Vision changes can be the first sign of MS
  - Optic neuritis: painful sudden onset blurry vision of one eye
  - Visual field defect: loss of peripheral vision
  - Double vision: bi-ocular
  - Nystagmus: Acquired pendular Nystagmus
- Not all the blurry vision in MS patient are sign of relapse
  - Uhthoff phenomenon (visual heat intolerance)
  - Drug side effect(FAME)
- OCT is a newer, non-invasive and relatively cheaper tool to help with diagnosis and monitor of MS
- Call your MS provider and/or see a neuro-ophthalmologist

THANK YOU