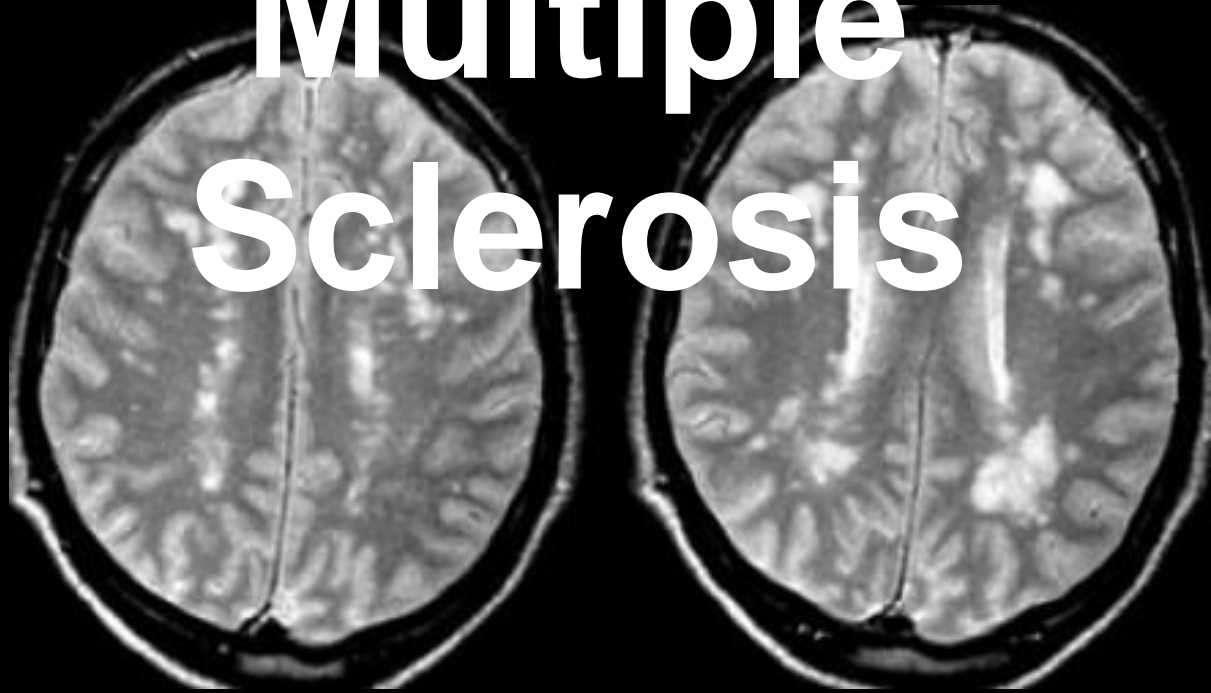


# Multiple Sclerosis



Corinne Bohling & Lexie Williams  
Grand Rounds Presentation  
MS STEP UP

# Introduction

- Chronic, progressive, neurodegenerative disease of CNS
- Immune-mediated
  - Body attacks myelin → demyelination forms scar tissue (sclerosis)

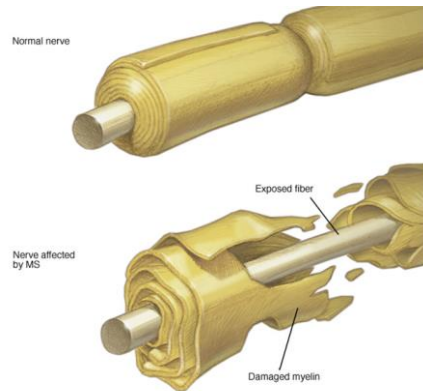


Image 2.

MS AFFECTS  
THE CENTRAL  
NERVOUS  
SYSTEM

THE  
C.N.S.

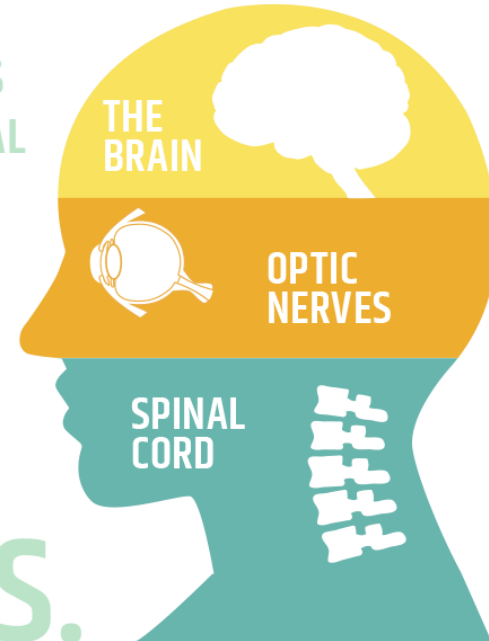


Image 1.

# Epidemiology

- >400,000 in US
- >2.5 million in the world
- ~3:1 Female:Male
- Age at diagnosis: 20-50
  - Most commonly mid-20's to early 30's
- Can occur in children and older adults; Occurs in most ethnic groups
  - More common in Caucasians
  - African-Americans more severe relapses, more aggressive disease course
  - Hispanic Americans diagnosed at younger age

# Epidemiology

- Unknown cause
  - Environmental:
    - Geographic: Further from equator
    - Vitamin D
    - Smoking
  - Genetics
    - First degree relative: 2.5-5% increase in risk
    - Identical Twin: 25% increase in risk
  - Infectious agents
    - Epstein-Barr virus

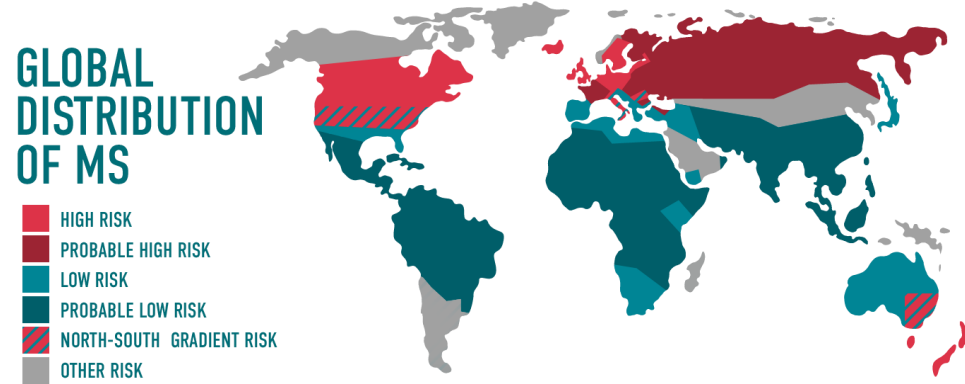
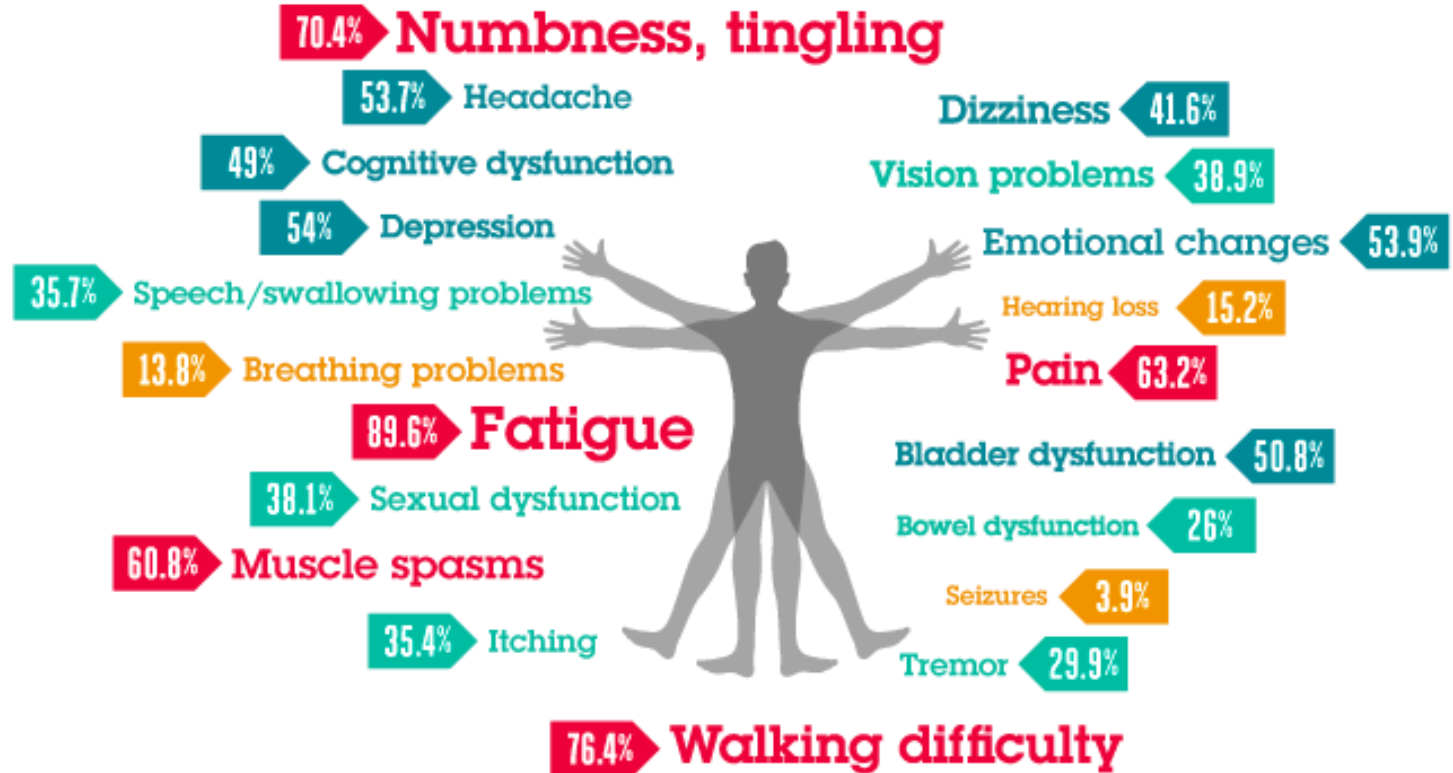


Image 3.

# Symptoms of MS



# Exacerbations

- Also known as a relapse, flare-up, attack
- Can last days to weeks or months
- Must last longer than 24 hours
  - Shorter than 24 hours=Uthoff's Phenomenon
- Separated by >30 days from previous relapse

**WARNING!!!**  
www.chronic-illness.org

Things **NOT** to say to someone with a disabling chronic condition:

- ...but you don't look sick
- ...everybody gets tired
- ...you're just having a bad day
- ...it must be nice not having to go to work
- ...I wish I had time to take a nap
- ...if you'd get out more
- ...you're just getting older
- ...if you'd get more exercise
- ...it can't be that bad
- ...it's all in your head
- ...you're just depressed
- ...there are people worse off than you
- ...you'll just have to tough it out
- ...you just need a more positive attitude
- ...this, too, shall pass

(I wouldn't wish what I have on anyone, but unless you get it, you just don't get it.)

# EDSS-Expanded Disability Status Scale

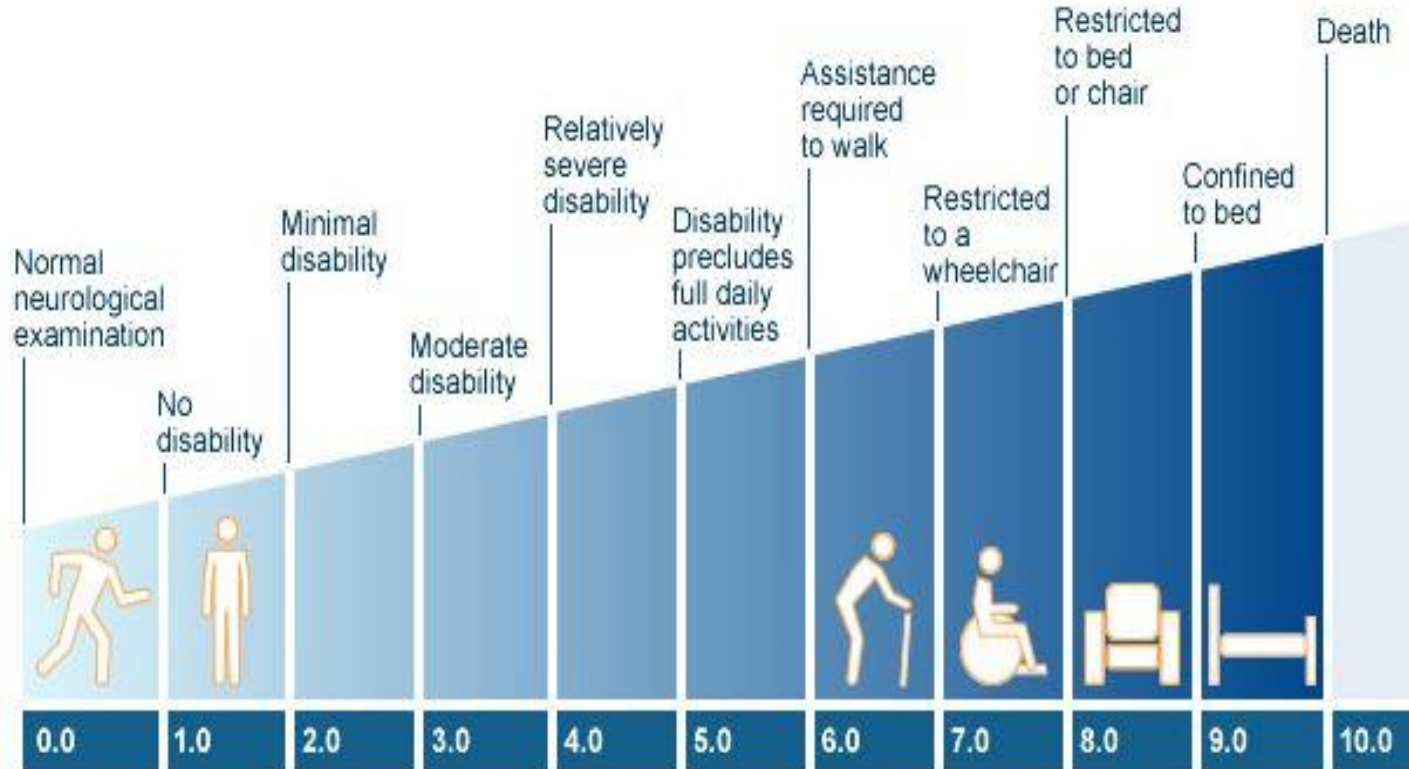
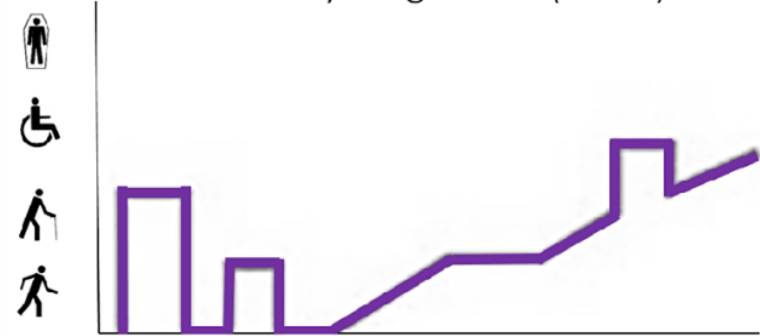


Image 6.

Relapsing-Remitting (RRMS)



Secondary Progressive (SPMS)



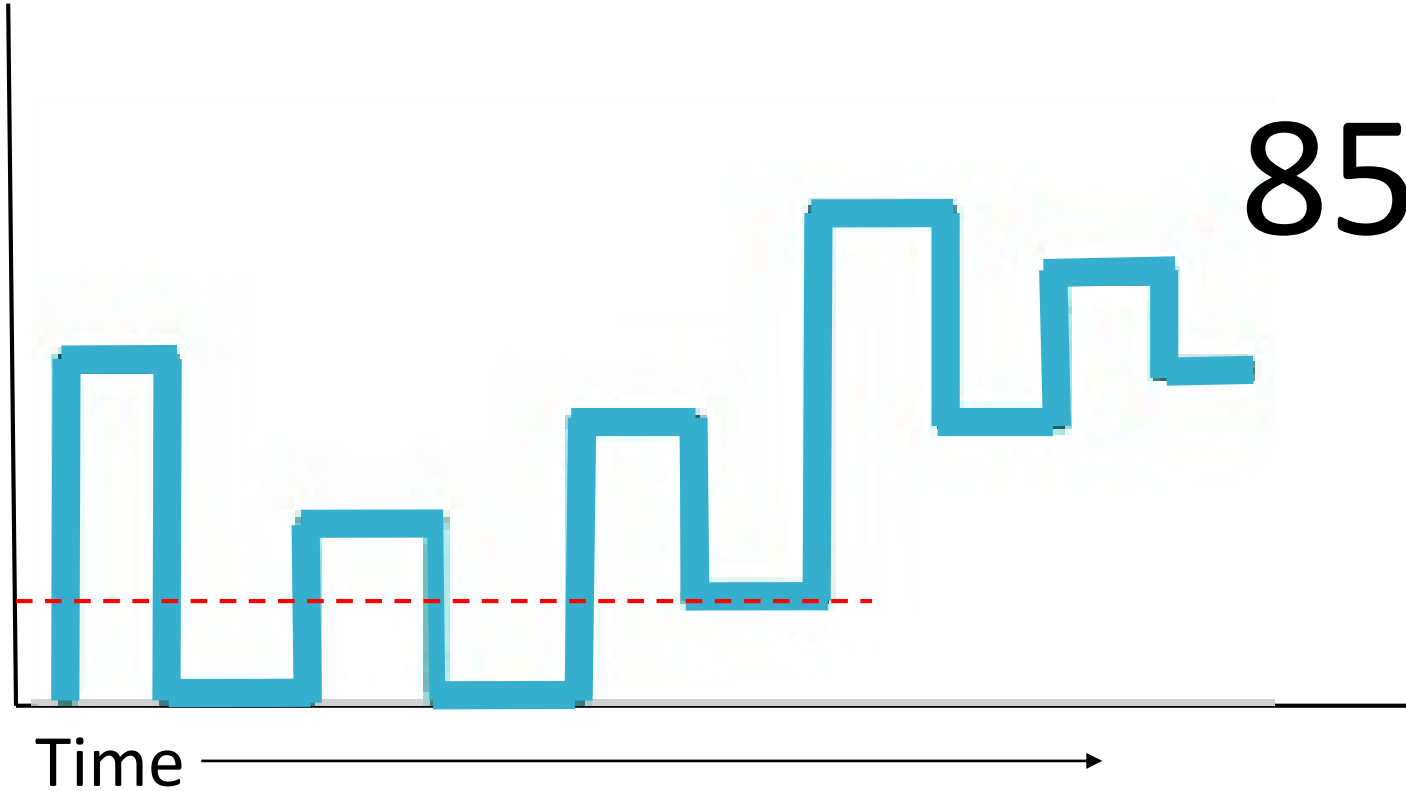
Primary Progressive (PPMS)



Progressive Relapsing (PRMS)

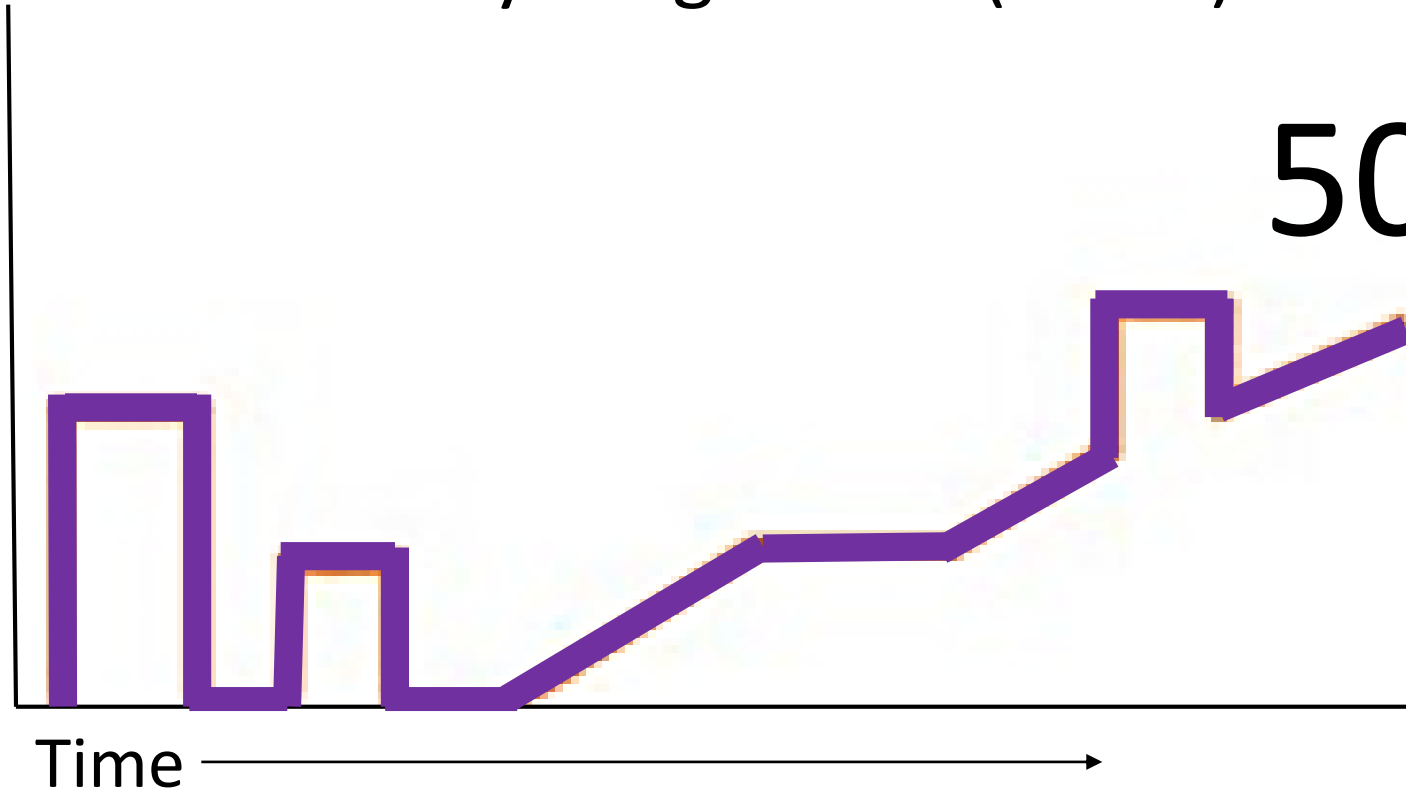


# Relapsing-Remitting (RRMS)



85%

# Secondary Progressive (SPMS)



# Primary Progressive (PPMS)



10%

# Progressive Relapsing (PRMS)

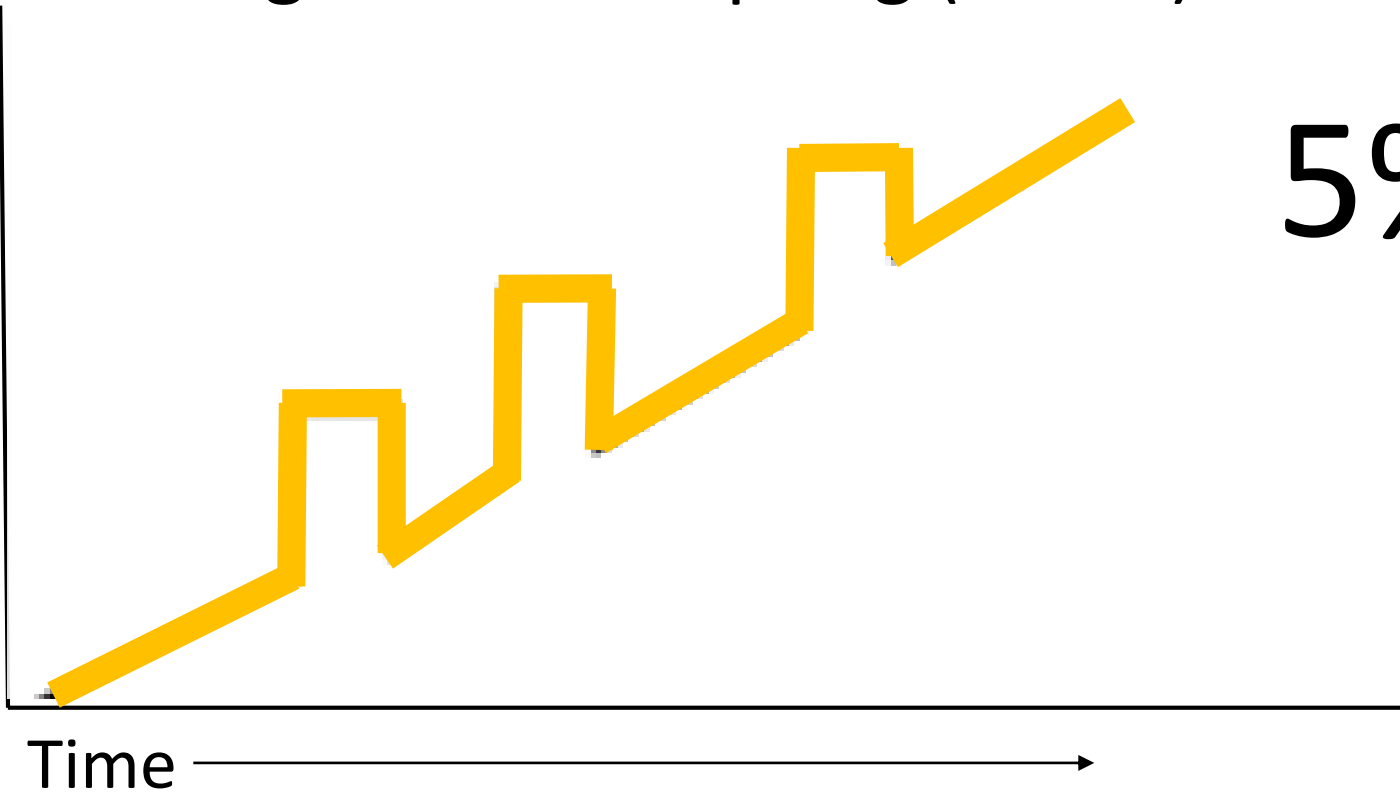
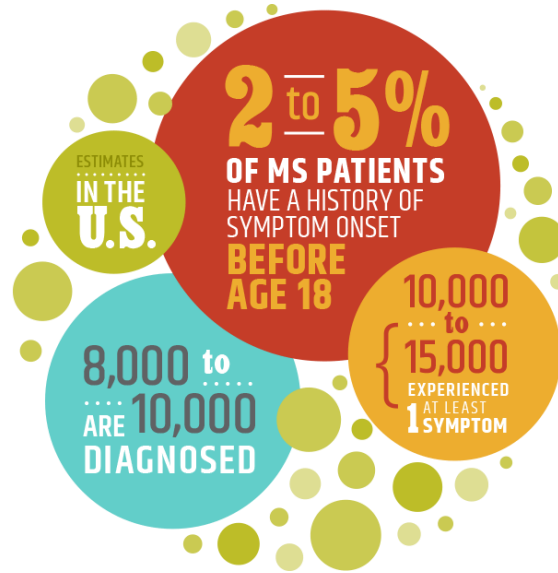


Image 7.

# Pediatric MS



**SYMPTOMS  
A-TYPICAL  
OF ADULT MS**

BEGINS AT AN  
EARLIER AGE

LONGER PERIOD  
OF TIME FOR  
DISABILITIES TO  
ACCUMULATE

MORE  
FREQUENT  
RELAPSES

SLOWER  
RATE OF  
PROGRESSION

SEIZURES

MOST  
COMMONLY  
RRMS

# Medication

- Treating Relapses
  - Corticosteroids
- Slowing Down MS
  - Disease Modifying Therapies
- Managing Symptoms
  - Pain, bowel & bladder, spasticity, etc

# Treating Attacks

**MOST COMMON TREATMENT:**

**CORTICOSTEROIDS**

3-5 day course of high-dose, intravenous

Reduces inflammation & ends relapses quicker

May be followed with a slow taper of oral prednisone.

No long-term benefit.

**OTHER MEDICATION OPTIONS:**

**SOLU MEDROL**  
HIGH-DOSE INTRAVENOUS  
(Methylprednisolone)

**DECADRON**  
HIGH-DOSE INTRAVENOUS  
(Dexamethasone)

**DELTAZONE**  
HIGH-DOSE ORALLY  
(Dexamethasone)

**IVIG**  
INTRAVENOUS  
Intravenously Administered Immunoglobulin  
(for those allergic to or intolerant of steroids)

**H.P. ACTHAR GEL**

ACTH is an option for those who are unable to cope with the side effects of high-dose corticosteroids, have been treated unsuccessfully with corticosteroids, do not have access to intravenous therapy, or have trouble receiving medication intravenously.

Image 9.

# Disease Modifying Therapies (DMTS)

- Reduce frequency and severity of exacerbations
- Reduce MRI lesions
- Reduce progression of disability
  
- Recommendations
  - Early & ongoing
  - Manage side effects
  - Assess responsiveness to treatment



Image 10.

\*Do not make people feel better short term (side effects can be challenging)

# Injection DMT

- Interferon
  - Avonex
  - Betaseron
  - Extavia
  - Rebif
  - Plegridy
- Copazone
- Glatopa



# Oral DMT

- Aubagio
- Gilenya
- Tecfidera



# Infusion DMT

- Lemtrada
- Novantrone
- Tysabri





Image 12.

## BLADDER DYSFUNCTION

- **BOTOX** (onabotulinumtoxin A)
- **DDAVP Nasal Spray** (desmopressin)
- **DETROL** (tolterodine)
- **DITROPAN** (oxybutynin)
- **ENABLEX** (darifenacin)
- **FLOMAX** (tamsulosin)
- **HYTRIN** (terazosin)
- **MINIPRESS** (prazosin)
- **MYRBETRIQ** (mirabegron)
- **OXYTROL** (oxybutynin) patch
- **PROBANTHINE** (propantheline)
- **SANCTURA** (trospium chloride)
- **TOFRANIL** (imipramine)
- **TOVIAZ**
- **VESICARE** (solifenacin succinate)

## BOWEL DYSFUNCTION

- **COLACE** (docusate)
- **DULCOLAX** (bisacodyl)
- **ENEMEEZ** (docusate stool softener laxative)
- **FLEET ENEMA**
- **METAMUCIL** (psyllium hydrophilic mucilloid)
- **MIRALAX**
- **PHILLIPS MILK OF MAGNESIA** (magnesium hydroxide)
- **SANI-SUPPOSITORY** (glycerin)

## DEPRESSION

- **CYMBALTA** (duloxetine hydrochloride)
- **CELEXA**
- **EFFEXOR** (venlafaxine)
- **ELAVIL**
- **LEXAPRO**
- **PARNELER**
- **PAXIL** (paroxetine)
- **PRISTIQ**
- **PROZAC** (fluoxetine)
- **SAVELLA**
- **WELLBUTRIN** (bupropion)
- **ZOLOFT** (sertraline)

## PAIN

- **CYMBALTA**
- **DEPAKOTE**
- **ELAVIL** (amitriptyline)
- **GABITRIL**
- **KEPPRA**
- **LYRICA**
- **NEURONTIN** (gabapentin)
- **PAMELOR** (nortriptyline)
- **TEGRETOL** (carbamazepine)
- **TOPAMAX**
- **TRILEPTAL**
- **ZONEGRAN**

## DIZZINESS & VERTIGO

- **ANTIVERT** (meclizine)
- **VALIUM**

## ITCHING

- **ATARAX** (hydroxyzine)
- **NEURONTIN**

## SEXUAL PROBLEMS

- **CIALIS** (tadalafil)
- **LEVITRA** (vardenafil)
- **PAPAVERINE**
- **MUSE** (alprostadil)
- **PROSTIN VR** (alprostadil)
- **VIAGRA** (sildenafil)

## WALKING DISTURBANCES

- **AMPYRA** (dalfampridine)

# MANAGING SYMPTOMS

## NON-SPECIFIC SYMPTOMS

- **REHABILITATION**
- **COUNSELING**
- **EXERCISE**

## FATIGUE

- **4-AP**
- **ADDERALL**
- **AMANTADINE**
- **CONCERTA**
- **NUVIGIL**
- **PROVIGIL** (modafinil)
- **RITALIN**
- **WELLBUTRIN**

## TREMORS

- **KLONOPIN**
- **LANIAZID** (lisoniazid)
- **INDERAL**
- **MYSOLINE**

## SPASTICITY

- **DANTRium** (dantrolene)
- **FLEXERIL**
- **GABLOFEN** (baclofen [intrathecal])
- **KLONOPIN** (clonazepam)
- **LIORISAL** (baclofen)
- **SOMA**
- **VALIUM** (diazepam)
- **ZANAFLEX** (tizanidine)

# Complementary & Alternative Medicine

- Food and Diet
- Exercise
- Stress Management
- Acupuncture
- Massage
- Marijuana (Cannabis)
- Dietary Supplements (Vit D)



Image 14.

# Interdisciplinary Team

- Patient & Care Partners
- Neurologist
- MS Nurse
- Rehabilitation specialist
  - Physical Therapy , Occupational Therapy, Speech/language pathologist
- Mental Health Specialist
  - Psychiatrist, Psychologist, neuropsychologist
- Nutritionist/Dietitian
- Urologist
- Primary care physician
- Orthotist
- Social Worker
- Pharmacist
- PM&R





Image 16.

## Meet Stacy

- 37 y.o. African-American Female
- Dec. 2007: dx with Relapsing-Remitting MS
  - Sudden onset of severe vertigo and syncope
- April 2014: Exacerbation with R-sided weakness
- Jan. 2015: MRI of brain consistent with MS
  - >9 lesions, atrophy to both optic nerves
  - No enhancing lesions
- March 2015: swallowing and balance difficulties
  - Referred to PT to address balance

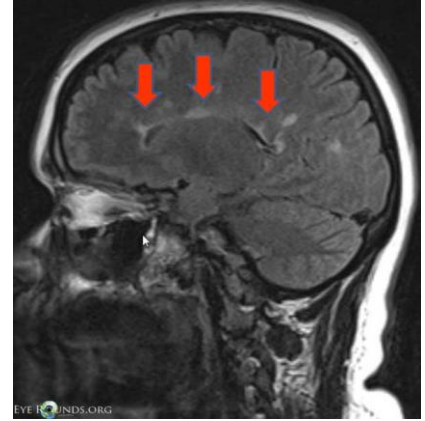


Image 17.

# Initial Evaluation: Subjective

- Stopped work 1 yr ago due to difficulties with cognition and memory
- Lives alone in 2<sup>nd</sup> story apt, recently staying with mother
- Independent with ADLs / IADLs
- Intermittent 7/10 pain: pressure in shoulders and thighs
- Occasional dizziness with migraines
- LOB daily, last “fall” 3 months ago



Image 18.

# Initial Evaluation: Objective

- ROM: Grossly WNL, pt “stiff” in shoulders
- MMT: 4/5 L triceps
- Alignment: B excessive pronation, pes planus, genu valgum
- Balance:
  - ↓ L single-limb stance, > 20s on R with cheating
  - LOB when rising up from sitting, walking
- Gait:
  - ↓ B arm swing, trunk rotation, step length, gait speed
  - Narrow BOS



Image 19.

# Initial Evaluation: Objective

- Dynamic Gait Index (DGI): 18/24
  - Difficulty walking with head turns, avoiding obstacles, etc.
- Vision: Convergence difficult within 6", L eye > R eye
- Sensory Organization Testing (SOT):
  - Somatosensory and Vestibular WNL
  - Visual system deficits
- MS Impact Scale (MSIS-29):
  - 96 composite score (moderate)
  - 86 on psych subscale (norm for adults with MS is 45.5)



*Image 20.*

# Initial Evaluation: Assessment

- Safety with community ambulation / ADLs
  - Visual system deficits
  - Gait
  - Alignment
  - Sit↔Stand Strategy
  - Strength?
  - Education for fall prevention
- Psych concerns



Image 21.

# Initial Evaluation

- Plan:
  - HEP: LE stretching, 30-min cycling with **intervals**
  - SPC until balance improves
  - Standing balance with shifting gaze, 30 sec. BID
  - Referral for eval for potential orthotics
  - Contact referring PA regarding psych concerns

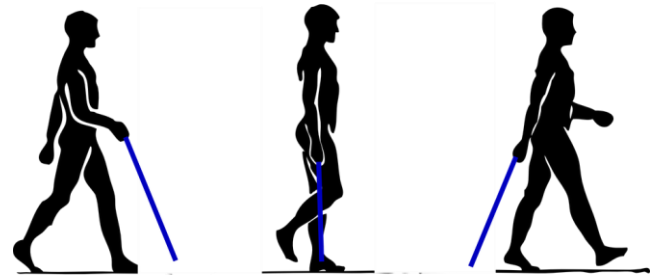


Image 22.

# Visits #3-#5

- Possible signs of exacerbation
  - Cramping in L calf, difficulty raising L UE, Numbness/tingling in face
  - Incident of forgetting where she was/why/how to call for help
  - Doesn't want to tell her PA, is afraid of infusions
- Discussed importance of communicating with neurologist
- Discussed psychological concerns and referral to psychologist



Image 23.

# Visits #3-#5

- Added calf stretching to address cramping
- Gait training (increase arm swing, etc.)
- Standing hip ABD exercises
- Progressed visual system exercises
  - Standing balance/walking with visual/surface challenges
  - Brock string exercises for convergence
- Education: hydration, intervals, importance of referrals and HEP



*Image 24.*

# Visits #6-#9

- Assistive device Training
  - Ordered foldable SPC
  - Available when needed
  - Proper use to ↓ energy expenditure, avoid injury, ↓ risk of falls
- Multisensory balance training
  - Obstacle course
    - Various surfaces, various heights, carrying items of various weight
- Posture Training
  - Core Strengthening
  - AAROM Exercises



Image 25.

# Progression Towards Discharge

- Transition to NC HOT summer
  - Avoiding activities after morning hours
  - Severe fatigue when outside
- Increase complaint of fatigue
  - Trouble completing day to day activities
  - Mental foginess
  - Lack of motivation to complete exercises
  - Missed appointments



*Image 26.*

# Temperature Sensitivities

- Heat temporarily worsens symptoms.
- $\frac{1}{4}$  -  $\frac{1}{2}$  of a degree is all it takes!
- Heat slows the conduction of nerve signals.
- Uhthoff's sign = pseudoexacerbation

**Ideas on ways to help keep patient's cool?**

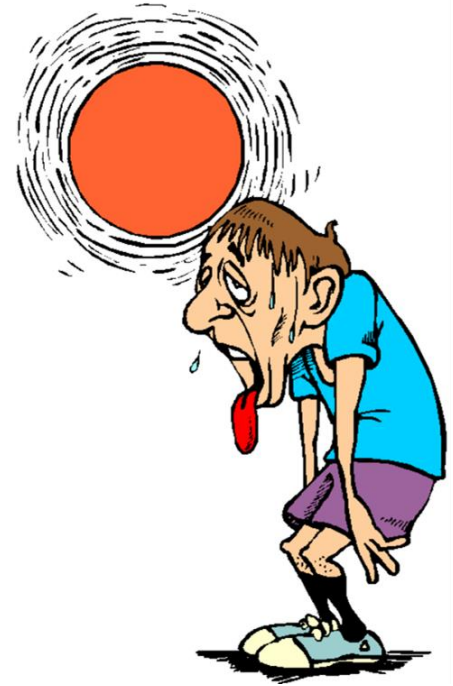


Image 28.

# Cool Products



Image 29.



Image 30.



Image 31.



Image 32.



Image 33.



Image 34.

# Cool Products



*Figure 35.*

# Self-Efficacy

- Treatment plan challenging, yet attainable
  - Celebrate successes!
- Joined new gym
  - Encouraged in order to maintain progress made in PT
  - Personal trainer unaware of the benefits of interval training
- Educating patient to educate herself
  - Teach back method
  - Identification of community resources



Image 38.

# Discharge Visit #10

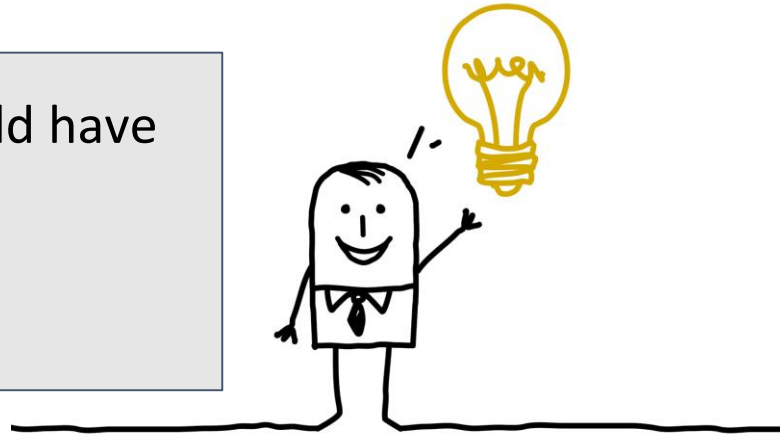
- DGI
  - 23/24 (MDC=4.19)
- SOT
  - Reached age predicted norms
  - Improved composite score 69→ 81
  - Continued use of ankle dominant correction strategy
- Others?
  - ABC, Modified Fatigue Impact Scale

# Reassessment

- Patient scheduled for 3-month f/u
- Cancelled via online scheduler with no reschedule

Any other information you would have like to have seen?

**Questions?**



# Resources



**National  
Multiple Sclerosis  
Society**

National MS Society

[www.nationalmssociety.org](http://www.nationalmssociety.org)

# Acknowledgements

- National Multiple Sclerosis Society-Greater Carolinas Chapter
- Diane Meyer
- Dr. Prue Plummer
- Past MS STEP UP Scholars

Heather Eustis, Joe Miller



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