UNDERSTANDING MULTIPLE SCLEROSIS
CINDY ANDERSON MSN, APRN, ACNP, ANP, CNRN
FEBRUARY 2017

DEFINITION
CHRONIC, UNPREDICTABLE, PROGRESSIVE AND DISABLING AUTOIMMUNE DISEASE WITH SIGNIFICANT NEURODEGENERATIVE AND INFLAMMATORY COMPONENTS.

ANATOMY

[Diagram of Oligodendrocyte]
Statistics

Affects ½ million people in the US

Most common serious neurological disorder in young adults
SURVIVAL RATES

1970-38 YEARS
2016-50+ YEARS WITH CURRENT DISEASE MODIFYING THERAPIES

RISK FACTORS

MUTATION IN THE HUMAN LEUKOCYTE ANTIGEN (HLA)
GENDER 3 TIMES MORE COMMON IN WOMEN
LOWER LEVELS OF VITAMIN D
20-45 YEARS OF AGE

FACTORS ASSOCIATED WITH MS RISK

GENETIC FACTORS- MUTATION IN THE HUMAN LEUKOCYTE ANTIGEN (HLA)
GENDER- 3 TIMES MORE COMMON IN WOMEN
VITAMIN D- LOWER LEVELS OF VITAMIN D
AGE- USUALLY APPEARS BETWEEN 20-45
Types of MS

Relapsing-remitting MS (RRMS) - most common type. Most commonly begins with a new attack followed by partial or complete recovery. May not experience another attack for weeks, months or years.

Primary Progressive MS (PPMS) - patients experience a steady worsening of symptoms.

Secondary-progressive MS (SPMS) - patient diagnosed with RRMS for a time and then begins a steady worsening of symptoms without remissions.

Progressive-relapsing MS - rare form of MS steady worsening of symptoms with occasional exacerbations. Rate of disease progression varies from each patient.

50 YEAR OLD DIAGNOSED IN 2002
T2 IMAGE (RRMS)
SAME LADY- NO TREATMENT GADOLINIUM IMAGE

SECONDARY PROGRESSIVE MS Dawson's fingers (WHEELCHAIR BOUND)

CORD INVOLVEMENT 48YR OLD WITH SECONDARY PROGRESSIVE MS
SEVERE FORM OF MS FACTORS

- Age >40
- Initial symptoms that affect motor control, posture, gait, balance or urinary control
- Initial symptoms affecting multiple regions of the body
- Frequent attacks in the first 2 years
- Short interval between the first two attacks
- Incomplete remission
- Rapid progression to moderate disability
- Develops progressive MS shortly after onset

78 YEAR OLD NO TREATMENT-MASSIVE ATROPHY AND DEMENTIA

SYMPTOMS

- Fatigue
- Pain
- Loss of function or feelings in the legs
- Loss of balance and coordination
- Slurring of speech
- Loss of bowel/bladder control
- Sexual dysfunction
- Loss of cognitive functioning
- Emotional changes
OPTIC NEURITIS

MOST COMMON SINGLE PRESENTING SYMPTOM!!!!!!!!!!

UNILATERAL VISION LOSS
PAIN ON MOVEMENT
DECREASED COLOR VISION

IV SOLUMEDROL ASAP

OTHER CAUSES OF OPTIC NEURITIS

INFECTIONS:
- LYME DISEASE
- CAT SCRATCH FEVER
- SYPHILIS
- MEASLES, MUMPS
- HERPES

DISEASES:
- SARCOIDOSIS
- LUPUS

MEDICATIONS: QUININE AND SOME ANTIBIOTICS
CEREBELLAR SYMPTOMS

- Limb and Gait Ataxia
- Dysarthria (Scanning Speech)
- Tremors
- Dysmetria

MOST DISABLING SYMPTOMS

INTERNUCLEAR OPHTALMOPLEGIA (INO)
Disturbance of the medial longitudinal fasciculus in the brainstem.

Double vision

INO
FACTOR THAT DETERMINE HIGHER RISK FOR SEVERE MS

AGE > 40
INITIAL SYMPTOMS THAT AFFECT MOTOR CONTROL, POSTURE, GAIT, BALANCE OR URINARY CONTROL
INITIAL SYMPTOMS THAT AFFECT MULTIPLE REGIONS OF THE BODY
FREQUENT ATTACKS IN THE FIRST 2 YEARS
SHORT INTERVAL BETWEEN THE FIRST 2 ATTACKS
INCOMPLETE REMISSIONS
RAPID PROGRESSION TO MODERATE DISABILITY

DIAGNOSIS

MCDONALD CRITERIA 2010

PRINCIPAL OF DISSEMINATION IN SPACE (DIS)
2 OR MORE LESIONS IN CNS (CLINICAL AND OR MRI)

PRINCIPAL OF DISSEMINATION IN TIME (DIT)
2 ATTACKS SEPARATED BY 30 DAYS (CLINICAL AND OR MRI)

PRINCIPAL OF NO BETTER EXPLANATION
NO BETTER EXPLANATION (CLINICAL & MRI STRONGLY INDICATIVE)

42 YEAR OLD FROM NY NOT ON ANY MEDS
CSF DIAGNOSIS

OLIGOCLONAL BANDS AND/OR INCREASED IgG INDEX

ALSO CHECK:
- CELL COUNT AND DIFFERENTIAL
- TOTAL PROTEIN
- GLUCOSE
- OLIGOCLONAL BANDS EVALUATION
- IgG INDEX AND SYNTHESIS RATE

BLOOD TEST

- ESR
- ANA
- TSH
- VITAMIN B12
- COPPER
- ANTI-NEUTROPHIL CYTOPLASMIC ANTIBODIES
- RF
- SSA/SSB (Sjogren's Antigens)
- ANTIPHOSPHOLIPID ANTIBODIES

DISEASE MODIFYING THERAPIES

ARE THOUGHT TO IMPACT THE IMMUNE AND NERVOUS SYSTEM THROUGH THESE PROCESSES:

- PRODUCTION AND PROLIFERATION OF LYMPHOCYTES
- MIGRATION OF LYMPHOCYTES
- FUNCTION OF LYMPHOCYTES
- DEPLETION OF LYMPHOCYTES
- NEUROPROTECTION
Progression modifying treatments (RRMS)

**Beta interferon**
- Flu-like symptoms, injection site reaction
- Monitor liver functions
- CAUTION: MAY WORSEN DEPRESSION

- **Avonex** - beta 1A
  - CAN WORSEN DEPRESSION

- **Beta serum** - beta 1B

- **Rebif** - beta 1A

- **Plegridy** - long acting beta 1A

**Copolymer 1**
- **Glatiramer acetate (Copaxone)**
  - Subcut 3X a wk
  - Skin irritation
  - CAN CAUSE ASTHMA
- SAFEST IN PREGNANCY

**Oral agents**
- **Dimethyl fumarate (Tecfidera)**
  - Flushing, diarrhea, nausea, decreased WBC

- **Fingolimod (Gilenya)**
  - Headache, HIGH BP, blurred vision
  - Monitor heart rate for 6 hr
  - Drops lymphocytes

- **Teriflunomide (Aubagio)**
  - Liver damage, hair loss
  - Category X pregnancy

**Progression modifying treatments (cont)**

**IV agents**
- **Natalizumab (Tysabri)** - positive JC virus
- **Alemtuzumab (Lemtrada)** - yearly infusions
- **Mitoxantrone**
- **Zinbryta (Daclizumab)**

- **Natalizumab (Tysabri)**
  - Positive JC virus
  - Anaphylaxis
  - Progressive multifocal leukoencephalopathy

- **Alemtuzumab (Lemtrada)**
  - Yearly infusions
  - Have to check monthly labs forever

- **Mitoxantrone**
  - Heart failure and leukemia
  - Used only in severe cases

- **Zinbryta (Daclizumab)**
  - 150mg sub q month
  - D/C

- **Severe fatal liver injury**
- **Monitor LFT's for 6 months after d/c**

**Routine blood test with MS treatment**

- **CBC**
- **Renal and LFT's**
- **JC virus antibody status**
- **Vitamin D**
SYMPTOMATIC TREATMENT TO FOLLOW

RED FLAGS

YOUNG PERSON

- optic neuritis
- Abrupt sensory level INO
- Cerebellar signs
- Trigeminal neuralgia

Drug | ACTION | DOSE
--- | --- | ---
Amantadine (Symmetrel) | potentiates CNS dopaminergic response | 100mg bid
Armodafinil (Nuvigil) | inhibits dopamine reuptake | 150-250mg daily
Modafinil (Provigil) | inhibits dopamine reuptake | 200mg q am
Methylphenidate (Ritalin) (concerta) schedule II | blocks reuptake and increase release of norepinephrine and dopamine | 5-15mg po bid, tid
dextroamphetamine (Adderall) schedule II - same as Ritalin | 5-60mg po qid-tid

Treatment of fatigue
SPASTICITY SYMPTOMS TREATMENT

PHYSICAL THERAPY FOR STRETCHING EXERCISES

Baclofen- 10-140 mg per day
Diazepam/ clonazepam- adverse CNS effect
Dantrolene- bad for liver
Neurontin- 300-3600mg per day – side effect: sedation
Zanaflex- less weakness 2-32mg per day- more sedation
IM botox in spastic muscles
Intrathecal baclofen pump

Cognitive Problems

NOT EARLY ON

CHECK FOR: UTI,
SIDE EFFECTS FROM MEDICATIONS
HYPOTHYROIDISM
LOW B12
POORLY CONTROLLED DIABETES
POOR SLEEP
ANXIETY AND/or DEPRESSION

COGNITIVE/MOOD PROBLEMS

20-50% OF MS PATIENTS HAVE COGNITIVE PROBLEMS (VISUAL MEMORY AND ATTENTION)

DEPRESSION AND ANXIETY - SECONDARY SYMPTOMS
CREASED INCIDENCE OF Bipolar disease
CAN HAVE PAIN FROM SPINAL CORD LESIONS

Total body pain or total body weakness not typical of MS
COGNITIVE IMPAIRMENT

WORD FINDING DIFFICULTY
INABILITY OR REDUCED ABILITY TO WORK
TROUBLE REMEMBER DAILY ROUTINES
DIFFICULTY MAKING DECISIONS
DIFFICULTY KEEPING UP WITH TASKS OR CONVERSATION

MONITORING BRAIN ATROPHY VIA MRI IS IMPORTANT INDICATOR OF COGNITIVE FUNCTIONING
40-70% SUFFER COGNITIVE IMPAIRMENT

DIFFICULTY WALKING

<table>
<thead>
<tr>
<th>Multiple Sclerosis (MS) Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty Walking</td>
</tr>
</tbody>
</table>

Antidepressants ( Ampyra) Impramine (Erythromycin) 5 mg, 12 mg 1 to 3 times/day. To improve walking in patients with MS. Physical therapy, orthotic equipment, and walking aids also may be of benefit.

BLADDER PROBLEMS

- FAILURE TO STORE
  - SCHEDULED VOIDING
  - LIMIT FLUID INTAKE IN THE EVENING
  - ANTICHOLINERGIC MEDICATIONS: OXYBUTYNIN
  - ELIMINATE DIURETICS: CAFFEINE
  - BOTOX BLADDER INJECTIONS

- FAILURE TO EMPTY
  - LARGE FLACCID BLADDER AND INABILITY FOR THE SPHINCTER TO RELAX
  - URGENCY, FREQUENCY, NOCTURIA, INCONTINENCE, INCOMPLETE EMPTYING
  - FREQUENT UTI'S
  - ALPHA BLOCKERS
**BOWEL PROBLEMS**

**CONSTIPATION**
- Most common bowel problem
- Results from: Neuronal bowel immobility
- Restricted fluid intake

**TREATMENT**
- 8-10 cups fluid per day
- Increase dietary fiber to 15 g
- Stool softeners - Colace
- Bulk formers - Metamucil, Per-Diem, Citracel, Fibercon
- Rectal suppositories/rectal stimulation

---

**SEXUAL DYSFUNCTION**

Erectile dysfunction common in men with MS

- Viagra, Cialis, Levitra
- Penile prosthesis

---

**EXPERIMENTAL AGENTS**

- LAQUINIMOD
- CLADRIBINE
- OCRELIZUMAB (ANTI-CD 20 ANTIBODY)
- Skin patch - Myelin peptide
STEM CELL RESEARCH

ASTIMS STUDY-ITALY
DONE FOR SEVERE MS REFRACTORY TO THE MEDICATIONS
PHASE II TRIAL- 4 YEARS- FEWER T2 LESIONS ON MRI COMPARED TO MITOXANTRONE
PHASE III TRIAL PENDING

NO DIFFERENCE IN PROGRESSION OF DISABILITY BETWEEN THE 2 GROUPS

Alternative therapies

Any chronic disease for which there is not an effective treatment tends to have a lot of alternative approaches:

- Spa therapy
- Herbal preparations
- Stimulants
- Minerals
- Detoxification
- Rest therapies
- Hyperbaric oxygen

March is Multiple Sclerosis Awareness Month
With Awareness, There is Hope. Spread the Word.
GiftsForAwareness.com