Optometry
And
M.S.
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2.5 Million
Number of People
That May Actually Have
MS Worldwide

What MS
is NOT...
...INHERITED

200
Number of People
Diagnosed With MS
This Week

What MS
is NOT...
...CONTAGIOUS

20-50
Age Range At Which
Most People Are
Diagnosed

400,000
Number of People
In the USA That
Acknowledge Having
MS

What MS
is NOT...
...USUALLY FATAL
What MS is NOT...

...YET CURABLE

SKLEROΣ
MEANS “HARD”

Types of MS
Relapsing-Remitting
85%
Clearly defined flare-ups of acute worsening. Followed by partial or complete recovery periods

Types of MS
Primary-Progressive
10%
Nearly continuous worsening of the symptoms. There are variations of the progression with plateaus.

Types of MS
Secondary-Progressive
50%
Within 10 years of diagnosis
Starts with relapsing-remitting and then changes to a state of constant worsening.
Types of MS

**Progressive-Relapsing**

5%

Worsening constant with stages of dramatic relapses. Does not have downtime to symptoms.

Complete Medical History

Healthcare providers need an overall view of the individual's health picture, including symptoms and when they began.

Nervous System Functioning

Testing of reflexes, balance, coordination, and vision—as well as checking for areas of numbness.

Evoked Potential Tests

...which measure how quickly and accurately a person's nervous system responds to certain stimulation.

**DIAGNOSIS OF MS**

MRI

...which gives detailed view of the brain.
OCT ...measures ganglion nerve fiber layer

Spinal Tap ...which checks spinal fluid for signs of the disease
McDonald criteria

1 attack
2 or more objective clinical lesions

Dissemination in space, demonstrated by:
MRI

McDonald criteria

1 attack
1 objective clinical lesion

(monosymptomatic presentation)

Dissemination in space by demonstrated by:
MRI
or positive CSF and 2 or more
MRI lesions consistent with MS

McDonald criteria

2 or more attacks (relapses)
2 or more objective clinical lesions

Dissemination in space demonstrated by:

MRI or positive CSF and 2 or more MRI lesions consistent with MS

Insidious neurological progression suggestive of MS

Positive CSF and

Dissemination in space demonstrated by:
MRI evidence of 9 or more T2 brain lesions
or 2 or more spinal cord lesions
or 4-8 brain and 1 spinal cord lesion
or positive VEP with 4-8 MRI lesions
or positive VEP with <4 brain lesions plus 1 spinal cord lesion
and dissemination in time demonstrated by:
MRI
or continued progression for 1 year

Anatomy
That
Involves
Nervous
Innervetni
<table>
<thead>
<tr>
<th>Name</th>
<th>Serves</th>
<th>Signs and Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Olfactory</td>
<td>Sense of smell</td>
<td></td>
</tr>
<tr>
<td>II Optic</td>
<td>Vision (Retina)</td>
<td>Optic Neuritis</td>
</tr>
<tr>
<td>III Oculomotor</td>
<td>Eye movement and pupil dilation</td>
<td>Ptosis (drooping eye), loss of pupil constriction and lateral (side to side) diplopia</td>
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<tr>
<td>IV Trochlear</td>
<td>Downward and outward eye movement</td>
<td>Vertical diplopia</td>
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<tr>
<td>V Trigeminal</td>
<td>Facial sensation, tongue, teeth, chewing muscles</td>
<td>Trigeminal neuralgia (Facial pain)</td>
</tr>
<tr>
<td>VI Abducens</td>
<td>Outward movement of eye</td>
<td>Sixth nerve palsy, lateral (side to side) diplopia</td>
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<tr>
<td>VII Facial</td>
<td>Facial expression and sensation</td>
<td>Bell's Palsy, myokymia (Facial twitching)</td>
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<tr>
<td>VIII Vestibulocochlear</td>
<td>Hearing and sense of balance</td>
<td>Dizziness, vertigo, vomiting, deafness and tinnitus</td>
</tr>
<tr>
<td>IX Glossopharyneal</td>
<td>Movement and sensation of</td>
<td>Numbness and paralysis of the palate, and throat, difficulty swallowing and disturbance of sound</td>
</tr>
<tr>
<td>X Vagus</td>
<td>Throat, nasal passages, larynx, heart, lungs, stomach</td>
<td>Acid reflux, gagging, difficulty in swallowing or talking</td>
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<tr>
<td>XI Spinal/Accessory</td>
<td>Head and shoulder movement</td>
<td>Drooping of the shoulder and inability to rotate the head away from the affected side</td>
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<tr>
<td>XII Hypoglossal</td>
<td>Tongue movement</td>
<td>Speech problems, ipsilateral (single sided) movement of tongue and thick speech</td>
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</tbody>
</table>
Main Symptoms of MS

Seen in Optometric Offices

Monocular Visual Loss

Optic Neuritis

Of all patients with MS – 20% initially present with optic neuritis.

40% will present with optic neuritis during the course of the disease.

Loss of visual acuity may range from minimal to profound.

Vision loss may be a few days to several weeks.
Visual Field Loss

Afferent Pupillary Defect

Optic Neuritis Treatment Study
- 35% 20/40 or better vision
- 30% 20/50 – 20/200
- 35% 20/200 or worse
- 3% No Light Perception

Normal Optic Nerve

Flashing Lights

This MRI scan from a patient with acute optic neuritis. This MRI scan shows enhancement of involved area (optic nerve Gd rap arrow)

A spared area of contrast enhancement is seen in the contralateral optic (right lower arrow)
Optic Neuritis Treatment Study

| 74% | 20/60 or better by 8 weeks |
| 90% | 20/40 or better by 6 months |
| 100% | of patients 20/60 or worse had color vision problems |
| 50% | of patients with 20/20 vision had a change in color vision |

Steroids... or No Steroids... That Is The Question...

The probability of a recurrence of optic neuritis in either eye within 5 years is 28 percent. Visual recovery after a second episode in the same eye is generally very good.

Treatment with standard-dose oral prednisone alone did not improve the visual outcome and was associated with an increased rate of new attacks of optic neuritis.

Treatment with high-dose, intravenous corticosteroids followed by oral corticosteroids accelerated visual recovery but provided no long-term benefit to vision.

So... Waddaya Do?

So... Waddaya Do?

Treatment with the intravenous followed by oral corticosteroid regimen provided a short-term reduction in the rate of development of multiple sclerosis, particularly in patients with brain MRI changes consistent with demyelination. However, by 3 years of follow-up, this treatment effect had subsided.
Uhthoff Phenomenon

Loss of Color Vision

So... Waddaya Do?

How Is Color Vision Changed?
So…
Waddaya Do?

Nystagmus

So…
Waddaya Do?

Prisms

So…
Waddaya Do?

Double Vision
EXOTROPIA

So...

Waddaya Do?

ESOTROP
Prisms

Eye Movement Problems

So... Waddaya Do?
Prisms

Multifocals
Large Print
Larger Computer Monitor
Computer Lenses
Use Line Guide
Vision Therapy?
Books On Tape

So...
Waddaya Do?

Eyelid and Tear Problems

Pupillary Problems
So…
Waddaya Do?

TROUBLES
WITH
TREATMENT

STEROIDS
Glaucoma

DRUGS FOR SEXUAL DYSFUNCTION

ANTIDEPRESSANTS & PAIN MEDICATIONS

DRUGS THAT MODIFY THE DISEASE COURSE
<table>
<thead>
<tr>
<th><strong>Avonex® (Interferon beta-1a)</strong></th>
<th><strong>Betaseron® (Interferon beta-1b)</strong></th>
<th><strong>Copaxone® (Glatiramer acetate)</strong></th>
<th><strong>Extavia® (Interferon beta-1b)</strong></th>
<th><strong>Gilenya® (Filgotinib)</strong></th>
<th><strong>Rebif® (Interferon beta-1a)</strong></th>
<th><strong>Tysabri® (natalizumab)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use:</strong> Treatment of relapsing forms of MS, and to treat after an initial episode of inflammation.</td>
<td><strong>How administered:</strong> Intramuscular (into the muscle) injection</td>
<td><strong>How administered:</strong> Subcutaneous (under the skin) injection</td>
<td><strong>Frequency of use:</strong> Weekly</td>
<td><strong>Common side effects:</strong> Mild flu-like symptoms</td>
<td><strong>Frequency of use:</strong> Three times per week</td>
<td><strong>Common side effects:</strong> Infections, acute hypersensitivity reactions</td>
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<tr>
<td><strong>How administered:</strong> Intramuscular (into the muscle) injection</td>
<td><strong>Frequency of use:</strong> Weekly</td>
<td><strong>Common side effects:</strong> Possible reaction at the injection site</td>
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<td><strong>Novantrone (Mitoxantrone)</strong></td>
<td><strong>Use:</strong> Treatment of rapidly worsening relapsing-remitting MS and for progressive-relapsing or secondary-progressive forms of MS</td>
<td><strong>How administered:</strong> Intravenous (by vein)</td>
<td><strong>Frequency of use:</strong> Once every 3 months or four times a year. Maximum dose 8-12 doses</td>
<td><strong>Common side effects:</strong> Nausea, hair thinning, decreased white blood cell count</td>
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<td><strong>Tysabri® (natalizumab)</strong></td>
<td><strong>Use:</strong> Treatment of relapsing forms of MS</td>
<td><strong>How administered:</strong> By intravenous infusion</td>
<td><strong>Frequency of use:</strong> Once a month</td>
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<tr>
<td><strong>DRUGS THAT TREAT EXACERBATIONS</strong></td>
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<td><strong>STEROIDS AGAIN</strong></td>
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Thanks For Hanging Out With Me Today!

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Write down one thing you learned in this session. Take it back and share it with the clinic you work in!