



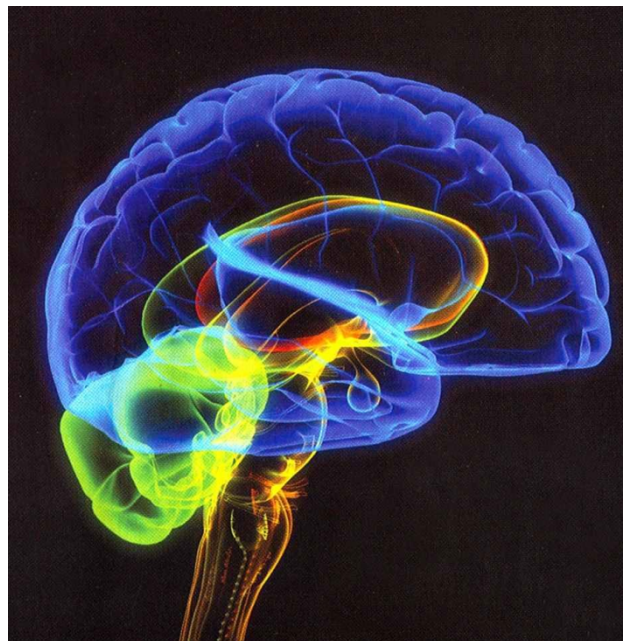
UNIVERSITY OF
NEW ENGLAND

Center for Excellence
in the Neurosciences

CEN Outreach

Neurological Disorders

Migraine,
Multiple Sclerosis,
Alzheimer's Disease



Migraine

- Migraine is the most common neurological disorder in the developed world
- Almost 1 in 5 Americans will have some form of migraine this year.
- 4% of Americans have headaches more than 4 hours, at least 15 days per month.
- Headache disorders lead to more than \$31B in economic costs in the US annually [1]

Clinical symptoms include:

- Typically last 4-72h. Throbbing headache, sensitivity to light and noise, visual disturbances (aura), nausea and vomiting.
- Two common forms of migraine i) migraine with aura, ii) migraine without aura.
- Phases of migraine. i) Prodrome, ii) Aura, iii) Headache, iv) Postdrome.



What causes Migraine: The cause of migraine unknown, but are many “migraine triggers”

- Insufficient foods, specific foods,
- Emotional triggers,
- Environmental triggers.



Treatment for Migraine:

- Non-pharmacological-identify and avoid trigger factors, meditation, relaxation techniques, psychotherapy
- Pharmacological- **Triptans** (sumatriptan) are serotonin/5HT receptor agonists, ergot alkaloids.



Resources:

- <http://www.allianceforheadacheadvocacy.org>
- <http://www.migraineresearchfoundation.org>

Multiple Sclerosis

- Multiple sclerosis is an autoimmune disorder. It is often a disabling disease that interrupts the flow of information within the brain and between the brain and body.
- 400,000 in the United States and 2.1 million people worldwide have MS.
- Often diagnosed between the ages 20-50.
- Affects 3x more females than males.

Clinical symptoms include: Varies from person to person.

- Abnormal fatigue, severe vision problems (double vision, blurriness),
- Loss of balance, loss of dexterity and muscle co-ordination or tremors making walking and daily tasks problematic.
- Slurred speech and memory issues.

What causes Multiple sclerosis:

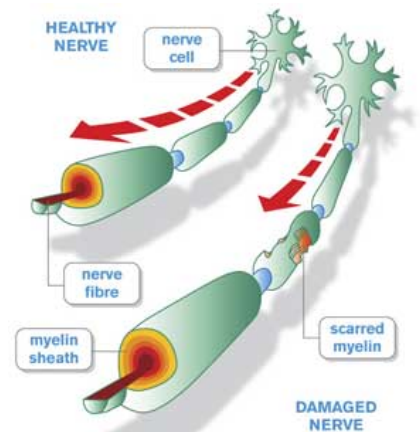
- Inflammation of the CNS is the primary cause of MS symptoms. The cause of the inflammation is unknown.
- Inflammation causes breakdown of **myelin** (demyelination) that forms a protective coat around brain and spinal cord nerve fibers.
- Lost myelin is replaced by scars of hardened “**sclerotic**” tissue.
- Some nerve fibers are lost and this occurs in **multiple** places in the CNS.

Treatment for Multiple sclerosis:

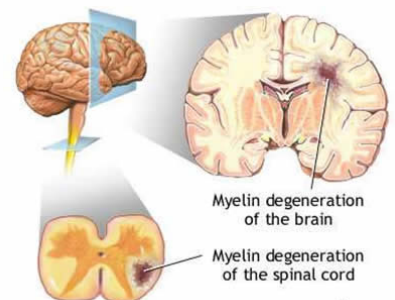
Research is looking for a cure for multiple sclerosis. Disease modifying drugs such as natalizumab can slow down the course of multiple sclerosis.

Resources:

- <http://www.msassociation.org>
- <http://www.nationalmssociety.org>



www.psych.ndsu.nodak.edu



ADAM.

Activity: Needle threading to show loss of dexterity in multiple sclerosis.

List of supplies:

- 2 pairs of gloves (differing thickness)
- Cotton thread
- Sewing needles.

Task:

Ask for three volunteers. Get two to wear the gloves. Task to thread the needle as quick as possible.

Expected outcome:

The volunteer with no gloves, representing a person with normal fine motor control, should be able to thread the needle very quickly. The other two wearing gloves will take longer to thread the needle and may even struggle to pick up the needle. This represents loss of fine motor control/dexterity seen in multiple sclerosis.

Alzheimer's Disease

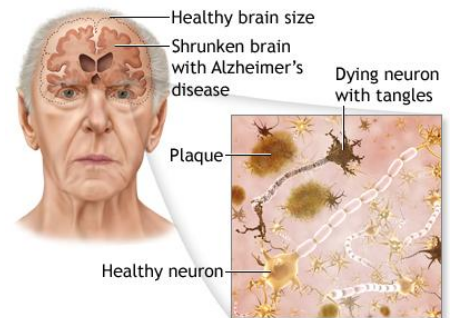
- Alzheimer's Disease (AD) is the most common form of dementia.
- In the United States 5 million Americans are estimated to be affected by AD and this figure is predicted to increase to 14.3 million by 2050
- It costs the United States at least \$100 billion per year making AD the 3rd most costly disease after heart disease and cancer.

Clinical symptoms include:

- Early stages show lapses of memory.

As disease progresses symptoms include:

- Confusion and forgetful of peoples names, places and recent events
- Mood changes, with feelings of sadness or anger, fear and frustration of memory loss. Also anxiety, suspicion or agitation, delusions or hallucinations.



What causes Alzheimer's Disease:

At present unknown. Three hypotheses have been proposed;

- “Cholinergic hypothesis”. Reduced synthesis of a neurotransmitter- **acetylcholine**. Medications to treat the acetylcholine deficiency only treat the disease symptoms and have not halted or reversed progression.
- “Tau hypothesis”. Abnormalities in a naturally occurring protein found in the brain –**tau**- protein may initiate the disease.
- “Amyloid hypothesis” Accumulation of a protein β -amyloid within the brain may be toxic to neurons.

Treatment for Alzheimer's Disease:

Research is looking for a cure for Alzheimer's disease. Drug treatments can temporarily alleviate symptoms or slow progression in some patients.

Resources:

- <http://www.alz.org>
- <http://www.nia.nih.gov/alzheimers>

Activity 1: “Telephone” to show disruption of normal synaptic transmission in Alzheimer’ s disease.

Task:

- a) Arrange students in a large circle. Whisper a message to the first student such as “I like neuroscience” Pass this message around the circle and then ask the last student to repeat the message that reached them.
- b) If two faculty members are present, ask them to join the circle half way round and to garble the message “I strike neurons”.

Expected outcome:

- a) Message often differs from the original.
- b) A non-sense message often causes confusing with the students in the latter part of the circle with many asking for a repeat of the message from their neighbors. This is a good illustration of disrupted neurotransmission in Alzheimer’ s disease.

Activity 2: Word recall to illustrate loss of short term memory in Alzheimer's disease.

Supplies: list of 20 random words greater than five letters each.

pillar	accident	cocktail	scarf	rehearsal
invention	composer	clippers	wardrobe	Skylight
rubbish	tunnel	sailor	volcano	theater
joint	space	chime	leech	reason

Pens and paper of each.

Task: Split the students in to 2-3 depending on numbers so about 5-6 in each group. Ask both groups to study the words and memorize for 60 seconds. Take the sheet of words away. Ask one group to concentrate on the words. With the other group distract by talking and asking them questions and getting each one to think of a question to ask. This should last about 120 seconds. Alternatively, get each member to count backwards from 100 in steps of three (i.e. 100, 97, 94, 91...). At the end of this time ask the students to write down as many words as they can remember.

Expected outcome: The group that was allowed to concentrate on the words should be able to remember nearly all, whereas the others that were distracted should show a markedly reduced recall.