Aging Central Nervous System

reaches peak development ~30

by age 75 average brain weighs slightly half its 30 yr weight
gyri are narrower
sulci are wider
cortex is thinner
more space between brain and meninges

neurons show signs of slower metabolism, accumulate neurofibrillary tangles and lipofuscin pigment

less efficient signal conduction and transmission

myelin sheath degenerates

fewer synapses

less NT produced, fewer receptor proteins

language skills and long term memory hold up better than motor coordination, intellectual function and short term memory

Effects of Aging on ANS

efficiency of ANS declines in old age, like rest of ns

target organs have fewer receptor proteins for NT and are less responsive

∓ dry eyes, poorer night vision, slower adapting to intensity, less efficient control of BP

Diseases of Nervous Tissue

1. Multiple Sclerosis

autoimmune disease possibly triggered by a virus in genetically susceptible individuals

oligodendrocytes and myelin sheaths of CNS deteriorate and are replaced by hardened scar tissue

occur esp between 20-40 yrs of age

nerve fibers are severed

& myelin sheaths in CNS are gradually destroyed

⇉ short circuits; loss of impulse conduction

affects mostly young adults

common symptoms:

- visual problems
- muscle weakness
- clumsiness
- eventual paralysis

2. Tay-Sachs Disease

hereditary disorder seen mainly in infants of Eastern European Jewish ancestory

abnormal accumulation of a certain glycolipid (GM_2)in myelin sheath

as it accumulates it disrupts conduction of signals

results in blindness, loss of coordination ,dementia

symptoms appear before 1 yr of age, death by 3 or 4

Disorders of the Central Nervous System

migraine headaches:

often debilitating and excruciating headaches

10-12% of US ⇉28M in US suffer;

~70% are women

92 M workdays lost/yr; $11 B/yr (AAS 97)

2 kinds:

Classic (with aura)

some or all of symptoms:

- seeing zigzagging lines
- tingling or numbness in face, arm, leg
- seeing blind spots and tunnel vision

Common (without aura)

pain on one or both sides of head

nausea

- sometimes vomiting
- sensitivity to light, smell or noise

throbbing, intense pain
may be due to:
a. fluctuations in levels of serotonin
imitrex increases serotonin levels to stop headache
b. excessive levels of dopamine
c. may be a genetic component

Tourette's Syndrome
recurrent involuntary muscle contractions = tics
eg. eyeblinking, nose twitching, facial grimacing, head shaking, shoulder shrugging
usually begins in childhood between ages of 2 – 15
worldwide, all races
may affect 1 in 2000, worldwide; US ~100,000 affected
may be due to chemical abnormality in basal ganglia
one type of tourette's in inherited

Alzheimers Disease
affect 11% in us over 65; 47% by 85
~half of all nursing home admissions
leading cause of death among elderly
AD may begin before 50 with very mild, undiagnosed symptoms
one of 1st symptoms is memory loss, esp of recent events
progresses with reduced attention span, disorientation, moody, confused, paranoid, combative or hallucinatory
may lose ability to read, write, talk, walk, and eat
death usually from pneumonia or other complications of confinement and immobility

Parkinsons Disease
progressive loss of motor function
begins in 50's or 60's
can be hereditary
due to degeneration of dopamine releasing neurons in substantia nigra (inhibitory neurons)
leads to hyperactivity of basal nuclei and involuntary muscle contractions
results in shaking hands, facial muscles become rigid, range of motion decreases
develops smaller steps, slow shuffling gait with forward bent posture and a tendency to fall forward
speech becomes slurred, handwriting illegible

Disorders of PNS

radial and sciatic nerves are especially vulnerable to injury

a. crutch palsy

b. wrist drop
fingers, hand and wrist are chronically flexed since extensor muscles supplied by radial nerve are paralyzed

c. sciatica
sharp pain that travels from gluteal region along posterior side of leg to ankle
90% of cases result from herniated discs or osteoarthritis of lower spine
also sitting on wallet, or edge of hard chair too long

Autonomic Imbalances

disorders generally reflect exaggerated or deficiencies in controlling smooth muscle activities

1. Raynaud's Disease
sever vasoconstriction

2. Hypertension
high BP
renal disease
stress
atherosclerosis

3. Mass Reflex
in some quadriplegics
massive activation of sympathetic system
no higher brain control of reflex responses