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

greater 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 ancestry
   abnormal accumulation of a certain glycolipid (GM2) 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**
recurring 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 is 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