Neurological Disorders
Part 2

Parkinson’s Disease
- Difficulty moving
- Tremor in resting body parts
- Frozen facial expressions
- Stooped posture
- Loss of balance, frequent falls
- Autonomic disturbances
- Dementia in later stages
- Premature death

Structural Brain Problems
- Degeneration of substantia nigra (midbrain)
- Damage to the basal ganglia

Chemical Brain Problems
- Dopamine levels are 40% of normal
  - Proposed treatment: L-DOPA
    - Precursor to Dopamine
    - Leads to an increase in the amount of dopaminergic activity throughout the body
    - Benefit: increases in dopamine levels in the basal ganglia lead to a decrease in the PD symptoms
    - Cost: BAD side effects
      - Increases in dopamine levels throughout the body lead to issues with the liver and other organs
      - ONLY treats the symptoms, not the cause

More Chemicals
- Levels of noradrenaline, serotonin, and acetylcholine have also been found to be lower in Parkinson’s patients

Genetics of Parkinson’s Disease
- Strongly linked for early-onset PD
  - Alpha-synuclein protein is tweaked
    - One Guanine is changed to Adenine
Environmental theories?
- PD was caused by a drug that was marketed as heroin
  - MPTP
    - Destroyed the substantia nigra
- PD is more common in certain parts of the world
  - Guam, Part of Japan, New Guinea
- PD is less common in smokers and caffeine drinkers
- Possibly linked to free radicals
  - Damaging chemicals and have lost an electron

Treatment
- Stem cells
  - Can create new dopamine producing cells in the substantia nigra in rats
  - Also recently found in primates (although the recovery was not as large)
- Deep Brain Stimulation
  - Electrodes are implanted that deliver continuous stimulation to certain areas
  - May block the disabling motor messages
- With proper therapy, life expectancy is now similar to people without PD now

Huntington’s Disease
- Produces involuntary, jerky movements, depression, hallucination and delusions.

Structural Problems
- Generalized shrinkage of the brain (up to 20%)
- Striatum degeneration (ie basal ganglia)
  - Up to 95% of cells degenerated at the time of death

Chemical Problems
- Lower levels of GABA and Acetylcholine
- Higher dopamine levels
  - Possibly due to the loss of GABA
    - Remember they are inhibitory
- Possibly too much glutamate
  - When injected into the striatum, glutamate produced HD like symptoms
  - Possibly due to Calcium levels increasing

Genetics of HD
- Heritable condition
- Autosomal dominance
  - Parents with HD pass it on 50% of the time
  - The disease does not develop until middle age
- Antibiotics and fetal tissue transplants and maintaining activity may provide treatment in the future.