Subcortical Dementias

- Parkinson’s disease (PD)
- Huntington’s disease (HD)
- Progressive Supranuclear Palsy (PSP)
- Creutzfeldt-Jakob disease (CJD)
- Diffuse Lewy Body Disease (DLBD)*
- DLBD is a mixed dementia

Lecture Outline

1. Overview of Subcortical Structures
2. Parkinson’s Disease
3. Huntington’s Disease
4. Creutzfeldt-Jakob Disease
Overview of Subcortical Structures: Basal Ganglia

Parkinson’s Disease

PD occurs as a result of degeneration of the pigmented dopamine containing neurons of the pars compacta of the substantia nigra.

Parkinson’s Disease: Epidemiology

- Over 1 million Americans (relatively common)
- 60,000 new cases annually
- Incidence increases with age
- Insidious onset and chronic progression
- Idiopathic
  - Genetics
  - Environmental toxins
  - Sporadic
- 1.5 to 2 times more likely to occur in males
Parkinson’s Disease: Dopamine Depletion

Less dopamine = less movement

When dopamine (shown in red) production is stopped, the neuron can no longer transmit signals to the next neuron.

Parkinson’s Disease: Motor Symptoms

Positive Symptoms

- Resting tremor (pill rolling)
- Rigidity (cogwheeling)
- Stooped posture
- Impaired righting reflex/poor balance

Positive Symptoms images: http://www.youtube.com/watch?v=O1BRA7k1fYo
CNN Janet Reno: http://www.youtube.com/watch?v=sMl_vHzhX2I

Resting tremor: http://www.youtube.com/watch?v=O1BRA7k1fYo
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**Parkinson’s Disease: Motor Symptoms**

- **Negative Symptoms**
  - Bradykinesia
  - Hypokinesia
  - Gait disturbance
  - Slow
  - Festinating
  - Freezing
  - Masked facies
  - Slowed speech
  - Decreased voice amplitude
  - Ocular disturbances
  - Decreased blink rate
  - Decreased light accommodation
  - Slowed saccades

**Parkinson’s Disease: Cognitive Symptoms**

- Bradyphrenia = slowed thinking
- Visual-spatial
  - Benton*
  - Clock drawing*
- Executive dysfunctioning
  - Verbal fluency reduced beyond slowing*
  - Changing ‘sets’
- Language/Speech
  - Hypophonia
- Memory
  - Problems encoding - poor strategies
  - Impaired retrieval
  - Recall is more impaired than recognition

**Benton Judgment of Line Orientation Test**

Benton, Hamsher, Varney & Spreen (1983)
Benton Judgment of Line Orientation Test

Clock Drawing

Copy the drawing
Draw the clock from memory

Parkinson’s Disease: Cognitive Symptoms

Benton, Hamsher, Varney & Spreen (1983)
Parkinson's Disease: Cognitive Symptoms

- Determine if demented
  - ~1/3 of PD patients develop dementia
  - More severe memory and language problems than "expected"
- Assess for depression (highly common)
- Baseline cognitive functioning prior to surgical treatments
- Document declines

Parkinson's Disease: Role of the Neuropsychologist

- Stages measured by Hoeyn-Yahr Scale
  - Stage 1: Unilateral involvement with little or no functional impairment
  - Stage 2: Bilateral or midline involvement with no impairment of balance
  - Stage 3: Impaired righting reflexes, unsteady while turning
  - Stage 4: Fully developed symptoms, markedly incapacitated, disabling rigidity and bradykinesia
  - Stage 5: Bed or wheelchair bound

Parkinson's Disease: Progression
Parkinson’s Disease: Treatments

Medications
• L-dopa = dopamine precursor
• Anticholinergics

Surgery
• Pallidotomy
• Thalotomy
• Deep brain stimulation

Huntington’s Disease: Treatments

HD is characterized by programmed neuronal death in the basal ganglia and is caused by an expanded trinucleotide repeat.

Huntington’s Disease: Famous People with HD

“I’ve got the 1st early signs and symptoms of a dizzy disease called Huntington’s Chorea, same disease Mama had which lets me stay dizzy in my head everyday without paying my barman one penny.” --Woody Guthrie
Huntington’s Disease: Epidemiology

- Most common **inherited** neurodegenerative disorder
- Prevalent in ~ 1 in 10,000
- Age of diagnosis
  - Average age 40 years old
  - Range ~20-40 years old
- Genetic testing can determine risk

Huntington’s Disease: Background

- **Autosomal dominant neurodegenerative disease**
- 50% risk for child with an HD parent

  HD allele from HD parent

  Non-HD allele from HD parent

  Non-HD allele from non-HD parent

  * child has HD allele

- **CAG repeat**
  - in the IT15 gene on Chromosome 4
Huntington’s Disease: Background

- Autosomal dominant neurodegenerative disease
- CAG repeat
- IT15 gene on Chromosome 4

>40 --> glutamate excitotoxicity

Subcortical neuronal death

1. Ventricles
2. Caudate
3. Putamen

BASAL GANGLIA AND HD DYSFUNCTION

Excitatory connection
Inhibitory connection

Huntington's Disease

Brain stem
Spinal cord

Striatum

Thalamus
Huntington’s Disease: Background

- **Autosomal dominant neurodegenerative disease**
- **CAG repeat**
  - Chromosome 4 on IT15 gene
  - Codes for Huntingtin protein
  - >35 → glutamate excitotoxicity
  - Subcortical neuronal death
- **Triad of dysfunction:**
  - Movement
  - Psychiatric
  - Cognitive

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### Huntington’s Disease: Cognitive Symptoms

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