

# An Overview of Neurological Stuttering

by

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Motor Speech Disorders

Com Dis 624

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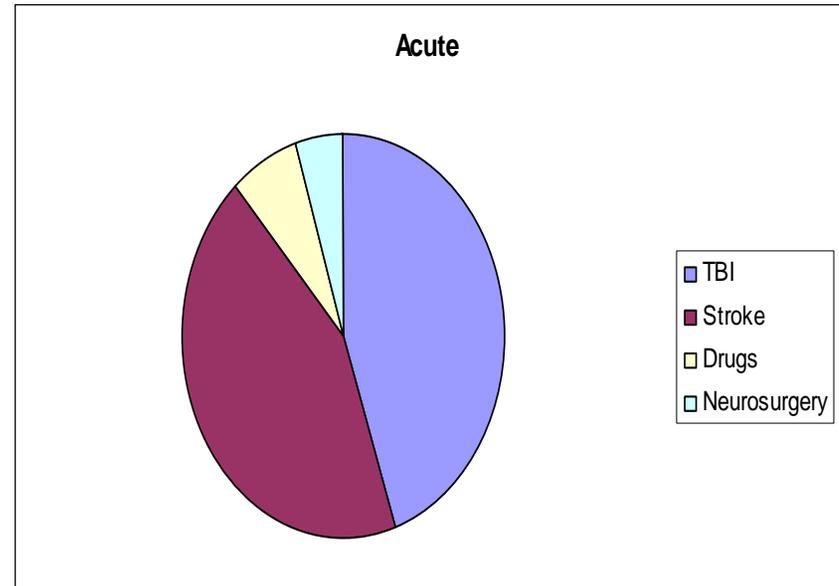
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# Introduction to neurogenic stuttering

- Motor speech disorder
- Primary symptom = dysfluent speech
- Differential is difficult because
  - symptoms can overlap with other MSD
  - it can co-exist with other MSD
  - there are other forms of stuttering (i.e. psychogenic and developmental)
- AKA acquired stuttering and cortical stuttering

# Etiologies

- Acute
  - TBI = 38%
  - Stroke = 37%
  - Drugs = 6%
  - Neurosurgery = 4%
- Degenerative
  - Parkinson's disease
  - Dementia
  - Seizure disorders
  - Brain tumors



(Duffy 2005)

# Site of lesion

- Studies have found left hemisphere lesion is most prevalent
  - 38% among all neurogenic stuttering cases (Duffy 2005)
  - Survey done by Theys et al. found that out of 29 neurogenic stuttering patients, 17 had lesions in left hemisphere
- As a result of left hemispheric damage the right hemisphere becomes overactive for language (Neumann 2003)



# More possible lesion sites

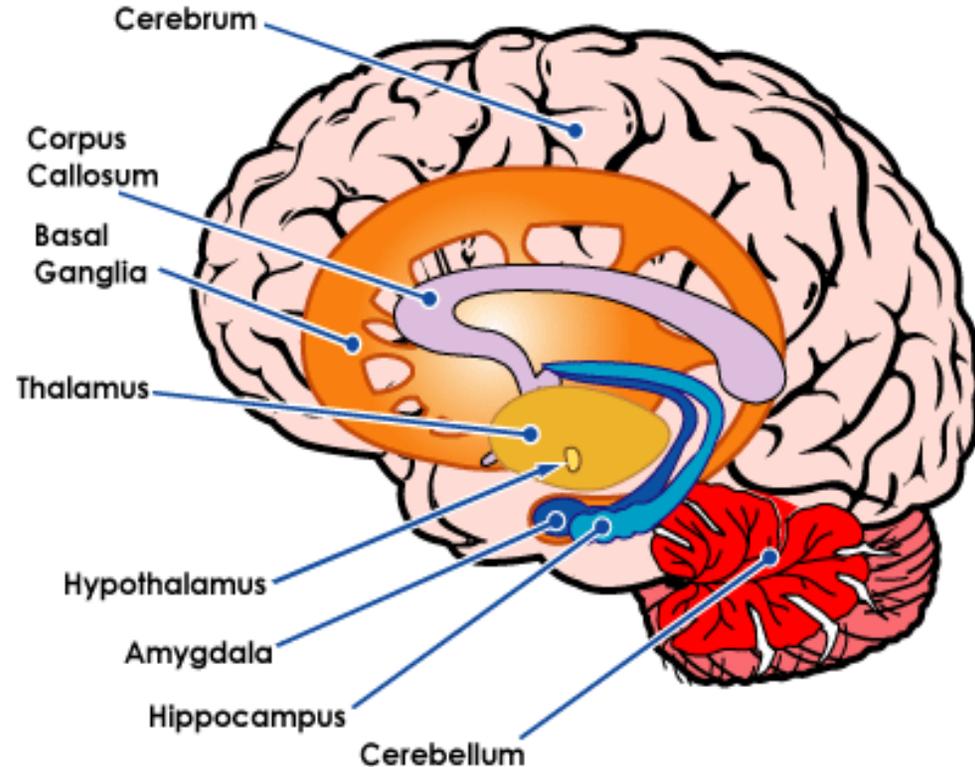
- Sub-cortical structures: basal ganglia

-Breakdown in BG causes an inability to sequence new speech patterns and automatic speech tasks (Smits-Bandstra & DeNil 2007)

-When acquired stuttering is associated with Parkinson's the lesion site is in the BG (Smits-Bandstra & DeNil 2007)

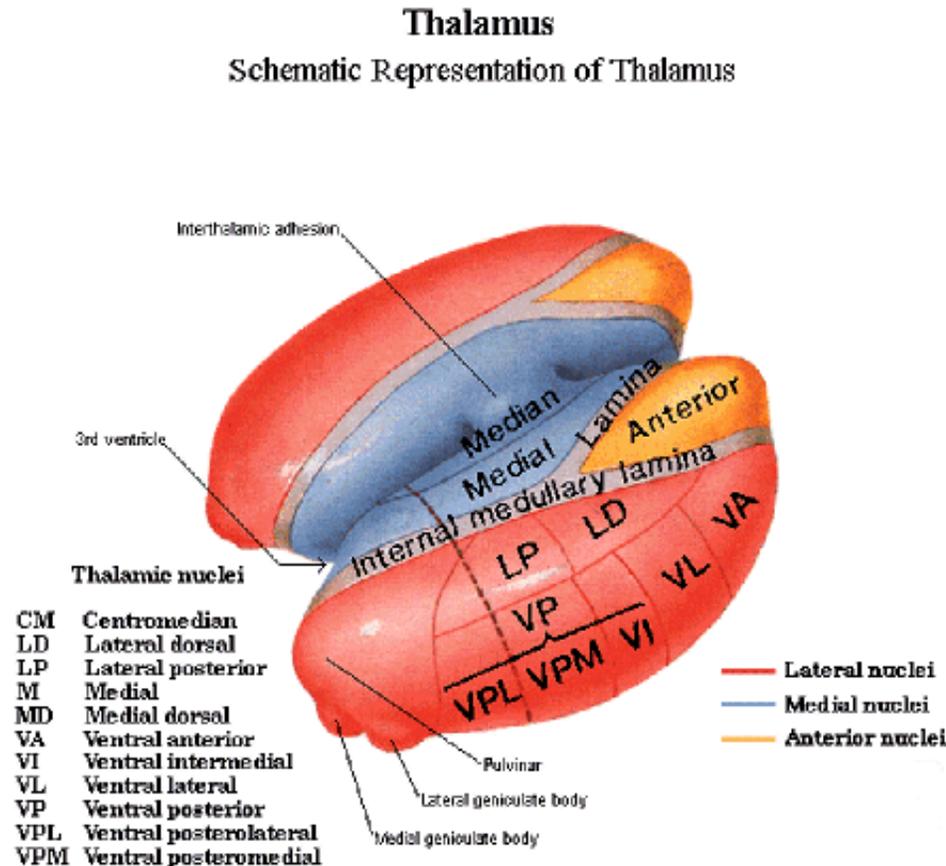
-Contrary to Duffy, sub-cortical neuronal breakdown is directly related to neurogenic stuttering (Giraud et al. 2007)

Basal Ganglia and Limbic System



# Sub-cortical structures: thalamus

- Pathways between cortex and thalamus = primary lesion site (Kent 2000)
- Characteristics of stuttering due to thalamus involvement versus “typical” characteristics of neurogenic stuttering suggests distinct clinical entity (Van Borsel 2003)



# Common characteristics

- Neurogenic
  - lack of secondary behaviors
  - lack of anxiety
  - lower amount of blocks
  - difficulty producing function and content words
  - difficulty with syllables in all word positions
- Developmental
  - secondary behaviors
  - anxiety
  - higher amount of blocks
  - difficult with content words
  - difficulty with word initial syllables

(Van Borsel 2001 & Theys 2008)

# Treatment

- Treat individual according to constellation of symptoms
- Most common techniques applied:
  - slowed and smooth rate of speech movements
  - soft voice onsets
  - continuous phonation
  - light articulatory contacts
  - voice control such as appropriate tone, loudness, resonance
  - appropriate breath support
  - relaxation techniques

# Prolonged Speech Patterns

- Patterns focus on phonatory mechanism
  - Patients lengthens sounds with slowed & controlled transitions
- Controversial Findings
  - After treatment, observed unnatural sounding speech (Ingham & Oslow 2001)
  - Effective at behavioral level; unclear effect on brain circuitry (Neumann 2004)

# Treatment implications

- Stuttering therapy increased activity in left motor strip
- The patients were able to produce speech more automatically and self-corrected
- Depended less on cognitive and linguistic skills-less conscious thought
- Study concluded treatment should focus on motor speech planning, sequencing, and execution
- (Neumann et al. 2003)

# Treatment targeting feedback

- Rate of speech
  - feedback to cerebellum and compensates for problems with basal ganglia
    - i.e. metronomic speech & chorus speech
- Conscious attention of articulatory mechanisms
  - provides sensory & motor feedback leading to increased activation in motor & sensory cortex
    - Compensates for problems with basal ganglia
    - i.e. Muscle tension reduction

# Drug Therapy

- Controversy
  - Theophylline = induced stuttering
- Successful treatment
  - Levetiracetan
    - Successful in treatment patients with neurogenic stuttering due to epilepsy
- Needs further research

# Timing of Treatment Sessions

- Residential Programs
  - Intensive therapy for short duration
- Outpatient Treatment
  - Longer duration with less intensity
- Pros and Cons
  - Dependent on individual needs

# Conclusion

- Limited research
- Controversial Findings
  - No localized lesion vs. localized lesion in brain
  - Characteristics
  - Treatment Approaches
    - Cognitive vs. Motoric
- There is a need for continued research in neurogenic stuttering

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