

## Slide 1

Shakes & Breaks:  
An update on laryngeal  
dystonia

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## Slide 2

Disclosures

Financial: Employed at Elmhurst University, Speaker Honorarium  
Nonfinancial: None

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## Slide 3

Learning Objectives

- 1) Participants will be able to describe the clinical characteristics that differentiate laryngeal dystonia, dystonic tremor, and essential tremor.
- 2) Participants will identify assessment procedures for neurological voice disorders and potential functional voice co-morbidities.
- 3) Participants will describe behavioral and medical treatment options for neurological voice disorders.

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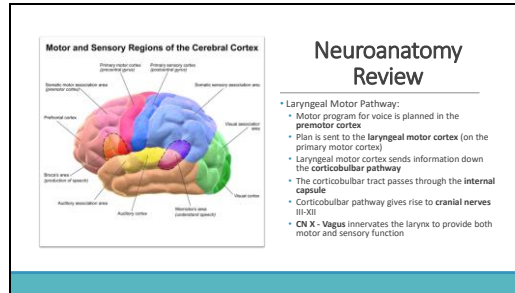
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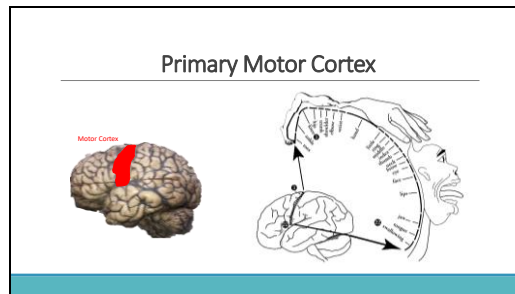
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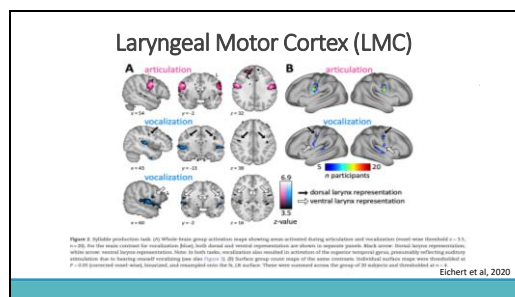
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### Laryngeal Motor Cortex

- There is an indirect neural network of cortical and subcortical loops that modulate vocal motor commands from the LMC.
- These loops receive information from and send information back to LMC to modify vocal output
- Role of **sensory feedback**
  - Mechanoreceptors in the mucosa of vocal folds gather sensory information during phonation
  - Feedback loop back to **central nervous system (CNS)**
  - Normally functional CNS plays an inhibitory role

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### Laryngeal Dystonia

- **Terminology change**
  - The term spasmodic dysphonia is being phased out
  - Now we have ADLD and ABLD
    - With or without Dystonic Tremor
- Impairment involves CNS pathways for volitional voice production
- Abnormal integration of sensory and motor information
- Dysfunction in multiple brain areas for Laryngeal Dystonia and/or Tremors

Simonyan et al., 2021

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### Laryngeal Dystonia

- Increased activation in brain regions that control voice
- Loss of inhibition in both motor and sensory systems
  - Impaired inhibition of involuntary muscle movements
  - In Hyperkinetic family of **Dyskinesias** (unwanted movements of neurological origin)
    - **Dystonia** is more specific
- Increased activation within subcortical structures (e.g., basal ganglia, cerebellum, cortical areas) during symptomatic speech
- Innate, reflexive, or emotional vocalizations are **unaffected** (e.g., laughing, crying)
  - Occurs in the periaqueductal gray in the midbrain

Simonyan et al., 2021

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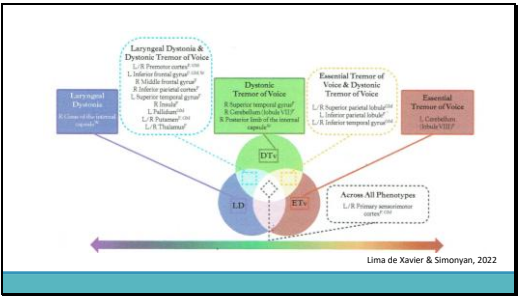
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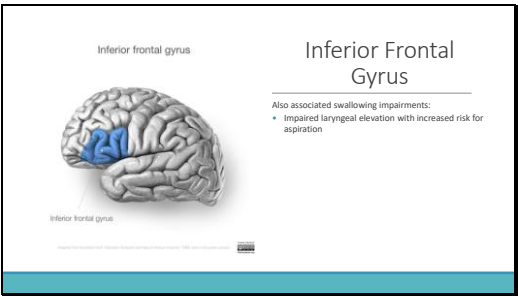
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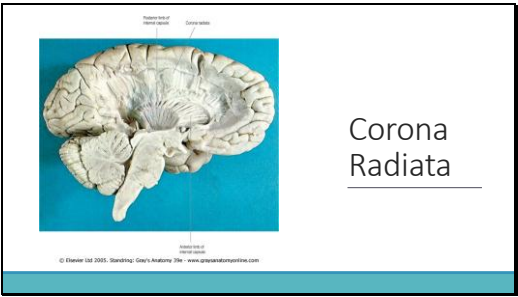
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### Laryngeal Dystonia: Types

- Abductor Laryngeal Dystonia (ABLD)
  - Much rarer
  - Characterized by spasms of the posterior cricoarytenoid, resulting breathy, voiceless breaks during voiceless phonemes
    - Count 60 to 69

Simonyan et al., 2021

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### Dystonic Tremor

- Rhythmic modulation of pitch and loudness during sustained phonation
- Occurs with LD in 30-50% of cases
- Occurs with ADLD or ABLD
  - <https://www.newsstationnow.com/politics/2024-election/i-cant-listen-to-myself-rfk-jr-reveals-neurological-disease/>
- Task specific
  - Symptoms present during dystonia tasks only (i.e., speech)
- Absent during passive respiration
- Irregular tremor evident only within the larynx

Simonyan et al., 2021

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### Other Dystonia Types

- Mixed LD (ADLD and ABLD)
- Singer's Dystonia
- Musician's Dystonia
- Cervical Dystonia
  - <https://www.youtube.com/watch?v=daNuCgoMfPE>

Simonyan et al., 2021

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### Essential Tremor

- Rhythmic modulation of pitch and loudness during sustained phonation
- Rhythmic voice stoppages that may sound breathy
- Older age of onset 60s-80s
- No task specificity
- Present during speech, passive respiration, and other laryngeal behaviors
- Head and/or hands often affected
  - <https://www.youtube.com/watch?v=QM8KPWLt7Q>

Simonyan et al., 2021; Barkmeier-Kraemer, 2020

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Spectrum or Overlap?

Johns, 2022

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Lima de Xavier & Simonyan, 2022

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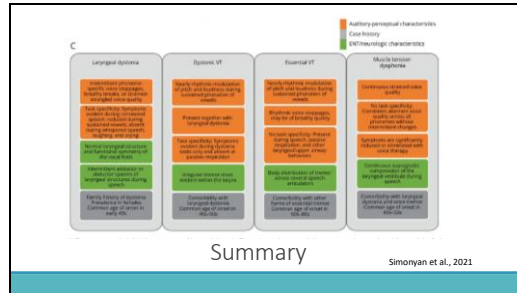
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## Slide 23

### Hyperfunctional Voice Disorders

- Muscle Tension Dysphonia**
  - Likes to co-occur with LD
  - Primary when it occurs in the presence of a normal larynx
  - "Dysphonia in the absence of current organic vocal pathology, without obvious psychogenic or neurologic etiology associated with excessive, atypical or abnormal laryngeal movements during phonation"
  - Secondary when it co-occurs with vocal folds lesions or to compensate for underlying weakness
  - Subtypes have been suggested
    - TVF vs FVF; lateral vs AP
  - Most common voice disorder that SLPs treat
  - Functional/behavioral** in origin that varies from mild to severe

Dejardins et al., 2022

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### Hyperfunctional Voice Disorders

- Functional Aphonia**
  - Total voice loss due to severe supraglottic compression
  - No adduction of true vocal folds during volitional voicing tasks or speech attempts
    - Voice sounds like a strained whisper with no appreciable phonation
  - Larynx is otherwise normal
    - No infection or paralysis/paresis
  - Can elicit TVF adduction with reflexive behaviors like coughing/throat-clearing
  - Often preceded by a URI\*
  - Can affect surrounding neck and strap muscles in severe cases

<https://www.youtube.com/watch?v=IV9dM9YGULs>



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Assessment

- Case History
- Videolaryngeal stroboscopy (VLS) with voice team
  - Need a laryngologist
- Patient Reported Outcome Measures (PROMS)
  - Vocal Handicap Index (VHI)
  - Singer's VHI
- Perceptual Assessment
  - CAPE-V
  - GRBAS

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Behavioral Assessment

- Maximum phonation time
  - See norms
- S to Z Ratio
  - See norms
- Laryngeal diadochokinetic rates (DDK)
  - Say /riki-ti-ti/ as fast as you can
  - Say /tu-tu-tu/ as fast as you can
  - Norm: about 4-5 syllables/sec
- Pitch glides
  - Use acoustic software to calculate semitones and compare to norms (18+ semitones)

<https://www.speechandhearing.net/laboratory/wasp/>  
Joshi, 2019; Lombard & Solomon, 2019

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Behavioral Assessment

- Counting 60 to 69
- Counting 80 to 89
- Laryngeal palpation
- Different types of voicing: higher pitch, crying/cooing, singing
- LD-specific speech stimuli

*Trial therapy can be a key component of the diagnostic process*

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LD-Specific Speech Stimuli

1. Repeating Sentences with Glottal Stops

Tom wants to be in the army.  
We eat eels every day.  
I want to put my doll in the cart.  
I hurt my arm on the iron bar.  
Are the olives large?  
Polly wanted to loll on the hearth.  
John argued ardently about honesty.  
Jack ran to get an apple for Sally.  
We mow our lawn all year.  
He dashed to the back of the factory.

Ludlow et al., 2018

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LD-Specific Speech Stimuli

2. Sentences with voiceless consonants before a vowel

He has gone home because he is hungry.  
The puppy bit the tape.  
Harry is happy because he has a new horse.  
During baby-hood he had only half a head of hair.  
Who says a mahogany highboy isn't heavy?  
A high, harsh voice is a handicap.  
Boys were singing songs outside of our house.  
Sally fell asleep in the soft chair.  
I saw six birds in that small nest.  
Intensity is one of several aspects of stress.

Ludlow et al., 2018

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LD-Specific Speech Stimuli

3. Repeating sentences in a whisper:

Tom wants to be in the army.  
We eat eels every day.  
Jack ran to get an apple for Sally.  
He has gone home because he is hungry.  
The puppy bit the tape.  
Boys were singing songs outside of our house.

4. Prolonging vowels for at least 10 seconds each:  
i: (the vowel sound in EAT)  
a: (the vowel sound in LAH)

5. Shouting phrases  
No! Not Now!  
Wait for me!

Ludlow et al., 2018

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### Functional vs Neurological

- How do I tell?
- Functional (i.e., MTD)
  - Consistent
  - Symptoms are present across all tasks and speech contexts
  - No phoneme-specific patterns
- Laryngeal Dystonia
  - Phonation breaks and/or stoppages with specific phonemes
  - "Tricks" – higher pitch, singing, emotional speech (e.g., crying) may yield clear, asymptomatic voice/speech

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### Shakes: Essential and Dystonic VT

- Best assessment task: Sustained phonation
- Need a scope to truly differentiate these
  - Essential VT: Shaking observed during passive respiration
  - Dystonic VT: Shaking only during speech/sustained phonation
- Consider – are head/limbs involved?
- Essential VT:
  - May hear voice stoppages, but these are usually rhythmic, breathy and not phoneme-specific
- Dystonic VT:
  - Co-occurs with phoneme-specific breaks (LD)

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### Treatment Options

- Medical
  - Botox
  - Medications
  - Surgical Options
- Behavioral
  - Voice Therapy
  - Support Group
  - Manage expectations and prognosis
    - Severe cases have used AAC

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### Medical Intervention: Botox Injections

- ADLD has a better response than ABLD
  - <https://www.youtube.com/watch?v=MbOUB5M3NTg>
  - <https://www.youtube.com/watch?v=tAk1K-xUm7M>
- Voice will often be very breathy in the 10-20 days immediately following an injection
  - Difficulty projecting
  - Dysphagia
- Period of "best" voicing is the middle third of the injection cycle
  - Will slowly wear off
  - How often to repeat?

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### Medical Intervention: Botox Injections

- May take a few injections to perfect patient-specific dose
- Usually inject TVFs but can also do supraglottic injections (i.e., FVFs)
- Can do injections unilaterally or bilaterally
  - Individual results vary!
  - Trial-and-error

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### Medical Intervention: Medications

- Beta blockers (-olol)
  - Treat Essential Tremor but often don't help the larynx that much
- Benzodiazepines
- Anticonvulsants
- Sodium oxybate has been found to significantly reduce symptoms in 82% of cases with alcohol-responsive LD
  - Only lasts 4 hours
  - Currently being studied

Simonyan et al., 2021

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### Medical Intervention: Surgeries

- Selective laryngeal adductor denervation-reinnervation
  - Only for ADLD
  - Irreversible and may not work
- Type II Thyroplasty
  - Titanium bridge inserted between vocal folds
  - Only offered in Japan
  - What RFK had

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### Behavioral Intervention: Voice Therapy

- For ADLD:
  - Semi-occluded vocal tract exercises (SOVT)
  - Resonant voice therapy (RVT)
  - Smooth or aspirate onsets
  - Change pitch
- For ABLD:
  - Glottal onsets
    - Eliminate /h/
  - Shorter duration of voiceless consonants
  - Change pitch

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### Behavioral Intervention: Voice Therapy

- For Tremor:
  - High, firm tongue position
  - Minimize extra jaw and lip movements
  - Postural stability
  - Expiratory Muscle Strength Training (EMST)
  - Possible presbylarynx approaches such as PhoRTE
    - Strength vs Shaking?

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Dysphonia International Support Group

•Formerly Greater Columbus Spasmodic Dysphonia Support Group

<https://dysphonia.org/find-support/>

<https://dysphonia.org/events/virtual-meeting-hosted-by-the-greater-columbus-dysphonia-support-groups/>

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