Research 2010-2011

Altmann


Abstract: This study compared the effects of spontaneous speech and executive function on gait and investigated the effects of single-task gait speed on dual-task costs. Twenty-one older adults (74.7 years, SD 5.9) and 23 younger adults (22 years, SD 1.2) walked for 60 s while performing an auditory Stroop task and a spontaneous speech task; they also performed each task in isolation. Walking while talking significantly reduced gait speed in both groups; however, only older adults experienced significant cognitive-motor interference during the Stroop task. Stride duration variability and gait symmetry were also affected by the speech task in older but not younger adults. Dual-task costs on gait speed were greater in slow-walking older adults than fast walkers. These results demonstrate that spontaneous speech is a highly demanding task that has a profound impact on gait in older adults, especially those with gait speed <1 m/s.


No abstract


No abstract


BACKGROUND: Dual tasking can interfere with activity after stroke.
OBJECTIVE: The authors examined the interactions between 3 different cognitive tasks and the swing and double-limb support (DLS) components of the gait cycle in community-dwelling individuals poststroke.
METHODS: Acquisition of cognitive and gait data were synchronized to study the cognitive-motor interference effects during the different phases of the gait cycle. Participants performed 3 different cognitive tasks in isolation and in combination with walking as well as a single walking task. Tasks were performed continuously for 3 minutes, generating 131 +/- 39 gait cycles per person for analysis for each walking trial. Data were analyzed for 8 participants 7.6 +/- 4.2 months poststroke.
RESULTS: A significant increase was found in the proportion of the gait cycle spent in DLS in dual-task walking because of an increased duration of the DLS phase associated with paretic weight acceptance. There was a
significant dual-task effect on nonparetic swing duration: participants reduced the amount of time in paretic single-limb stance in the 3 dual-task conditions. Temporal asymmetry of gait did not increase significantly under dual-task conditions. Reaction times were not affected by whether the stimuli were present during the swing or DLS phase of the gait cycle.

**CONCLUSIONS:** The findings from this pilot study provide evidence that cognitive-motor interference during gait may be influenced by the phase of the gait cycle, especially DLS involving paretic weight acceptance, which may affect community ambulators with hemiparetic stroke.


**Abstract:** Parkinson’s disease is commonly accompanied by cognitive issues that limit participation in activities of daily living. Unfortunately, most current treatment paradigms and pharmacotherapeutics fail to address the cognitive impairment demonstrated in this population. Mounting evidence in healthy older adults suggests that aerobic exercise may improve cognitive function. This article describes a patient with Parkinson’s disease prescribed 8 weeks of aerobic exercise. Despite very high performance at baseline, the participant improved on several cognitive measures post exercise. The results of this investigation mimic the research in healthy older adults. We therefore suggest that future large scale randomized trials are warranted to evaluate the efficacy of aerobic exercise for ameliorating declines in cognitive performance in persons with PD.


**Abstract:** Several researchers have suggested that the maintenance of global coherence (topic maintenance) and local coherence (maintenance between utterances) in discourse requires cognitive resources. This study directly tests this hypothesis by examining the relationship between cognitive variables and coherence in narrative discourse produced by mobility-impaired stroke survivors under single (talking) and dual (talking and walking) task conditions. Although there were no effects of the dual task on coherence, global coherence was significantly disrupted regardless of the single or dual task condition. Moreover, global coherence strongly correlated with cognitive function measures, whereas local coherence did not. Findings are consistent with two interpretations: (1) that global and local coherence may be subserved by different cognitive processes or (2) that maintaining global coherence is a more difficult task and thus will show effects of cognitive impairment before local coherence is impaired. These are both testable hypotheses for future research. Learning outcomes: After reading the manuscript, the reader will be able to: (1) understand and differentiate between local and global measures of coherence; (2) discuss the effects of a dual task, walking and talking, on global coherence in a gait-impaired group of stroke survivors; (3) understand why the maintenance of global coherence in discourse might be more cognitively demanding than the maintenance of local coherence.

BACKGROUND: Although many dysphagia screening protocols have been introduced in recent years, no validated, physician-administered dysphagia screening tool exists for acute stroke that can be performed at the bedside. Based on the psychometrically validated Mann Assessment of Swallowing Ability (MASA), we developed the Modified MASA (MMASA) as a physician-administered screening tool for dysphagia in acute stroke.

OBJECTIVE: The purpose of this study was to complete initial validation of this new screening tool for dysphagia in acute ischemic stroke.

METHODS: Two stroke neurologists independently performed the MMASA on 150 patients with ischemic stroke. Speech-language pathologists performed the standard MASA on all patients. All examiners were blinded to the results of the other assessments. Interjudge reliability was evaluated between the neurologists. Validity between the screening tool (MMASA) and the clinical evaluation (MASA) was assessed with sensitivity/specificity and predictive value assessment.

RESULTS: Interobserver agreement between the neurologists using the MMASA was good (k=0.76; SE=0.082). Based on the comprehensive clinical evaluation (MASA), 36.2% of patients demonstrated dysphagia. Screening results from the neurologists (N1 and N2) identified 38% and 36.7% prevalence of dysphagia, respectively. Sensitivity (N1: 92%, N2: 87%), specificity (N1: 86.3%, N2: 84.2%), positive predictive value (N1: 79.4%, N2: 75.8%), and negative predictive value (N1: 95.3%, N2: 92%) were high between the screen and the comprehensive clinical evaluation.

CONCLUSIONS: This preliminary study suggests that the MMASA is a potentially valid and reliable physician-administered screening tool for dysphagia in acute ischemic stroke. Use of this tool may facilitate earlier identification of dysphagia in patients with stroke prompting more rapid comprehensive evaluation and intervention.


No abstract


OBJECTIVE: To compare the effectiveness of the McNeill Dysphagia Therapy Program, a systematic exercise-based rehabilitation framework for swallowing remediation, with traditional swallowing therapy techniques paired with surface electromyography (sEMG) biofeedback.

DESIGN: Matched case-control study.

SETTING: University medical center.

PARTICIPANTS: Dysphagic patients referred to an outpatient swallowing therapy service.

INTERVENTIONS: Cases were individually matched to 2 separate controls for age, sex, and primary medical diagnosis (N=24). Cases were patients with dysphagia who entered the McNeill Dysphagia Therapy Program from September 2006 to October 2008. Controls entered a traditional swallowing therapy program augmented with sEMG biofeedback (traditional therapy with biofeedback group) from February 1994 to June 1999.

MAIN OUTCOME MEASURES: The primary outcome was the proportion of patients who improved clinical swallowing ability and functional oral intake. The secondary outcomes were the presence (or not) of tube feeding, physiologic change on instrumental swallowing studies, and occurrence of aspiration on posttreatment assessment.

RESULTS: Case patients were more likely to demonstrate dysphagia recovery at posttreatment re-evaluation (adjusted odds ratio for dysphagia recovery=13.0 [95% CI, 1.27-63.89]; Mantel-Haenszel chi(2)=6.7; P=.009; relative
risk reduction=.69). Dysphagia was reduced by 69% in the McNeill Dysphagia Therapy Program treatment group compared with the traditional therapy with biofeedback group.

**CONCLUSIONS:** Both approaches facilitated improved swallowing function. The McNeill Dysphagia Therapy Program resulted in superior outcomes compared with traditional dysphagia therapy supplemented with sEMG biofeedback.


No abstract

5. **Sia I, Carvajal PJ, Carnaby-Mann GD, Crary MA.** Linear distance measurements from fluoroscopic swallow studies: variability, error, and reliability. **Manuscript in review Feb 2011.**

No abstract

**Abstract:** This paper is a practical update on clinically valuable applications of aural (acoustic) immittance measures. Topics include advances in instrumentation, the importance of using a high frequency probe tone with infants up to the age of 6 months, contributions of acoustic reflexes to the diagnosis of auditory neuropathy spectrum disorder, and new CPT codes for acoustic immittance measurements.


No abstract


**Abstract:** Children with auditory processing disorders (APD) were fitted with Phonak EduLink FM devices for home and classroom use. Baseline measures of the children with APD, prior to FM use, documented significantly lower speech-perception scores, evidence of decreased academic performance, and psychosocial problems in comparison to an age- and gender-matched control group. Repeated measures during the school year demonstrated speech perception improvement in noisy classroom environments as well as significant academic and psychosocial benefits. Compared with the control group, the children with APD showed greater speech-perception advantage with FM technology. Notably, after prolonged FM use, even unaided (no FM device) speech-perception performance was improved in the children with APD.


**Abstract:** Hearing loss is a pervasive global healthcare concern with an estimated 10% of the global population affected to a mild or greater degree. In the absence of appropriate diagnosis and intervention it can become a lifelong disability with serious consequences on the quality of life and societal integration and participation of the affected persons. Unfortunately, there is a major dearth of hearing healthcare services globally, which highlights the possible role of telehealth in penetrating the underserved communities. This study systematically reviews peer-reviewed publications on audiology-related telehealth services and patient-clinician perceptions regarding their use. Several databases were sourced (Medline, SCOPUS, and CHINAL) using different search strategies for optimal coverage. Though the number of studies in this field are limited available reports span audiological services such as screening, diagnosis, and intervention. Several screening applications for populations consisting of infants, children, and adults have demonstrated the feasibility and reliability of telehealth using both synchronous and asynchronous models. The diagnostic procedures reported, including audiometry, video-otoscopy, oto-acoustic emissions, and auditory brainstem response, confirm clinically equivalent
results for reliability and effectiveness of telehealth applications compared to conventional methods. The limited information on patient perceptions reveal mixed findings and require more specific investigations, especially post facto surveys of patient experiences. Tele-audiology holds significant promise in extending services to the underserved communities but require considerable empirical research to inform future implementation. remote telehealth-enabled tests and conventional face-to-face versions.


**Abstract:** Although more investigations are required, initial findings certainly demonstrate that the vuvuzela exceeds the permissible occupational noise exposure levels in South Africa and poses a significant recreational risk of noise-induced hearing loss. Preventive measures such as public awareness and hearing protection should be prioritised as an important health care approach in sporting events where the vuvuzela is used, especially in view of the upcoming World Cup. The vuvuzela has reached iconic status and should be kept as part of the South African soccer culture, but measures to protect spectators’ hearing must be considered of paramount importance.


**Abstract:** Permanent hearing loss is a leading global health care burden, with 1 in 10 people affected to a mild or greater degree. A shortage of trained healthcare professionals and associated infrastructure and resource limitations mean that hearing health services are unavailable to the majority of the world population. Utilizing information and communication technology in hearing health care, or tele-audiology, combined with automation offer unique opportunities for improved clinical care, widespread access to services, and more cost-effective and sustainable hearing health care. Tele-audiology demonstrates significant potential in areas such as education and training of hearing health care professionals, paraprofessionals, parents, and adults with hearing disorders; screening for auditory disorders; diagnosis of hearing loss; and intervention services. Global connectivity is rapidly growing with increasingly widespread distribution into underserved communities where audiological services may be facilitated through telehealth models. Although many questions related to aspects such as quality control, licensure, jurisdictional responsibility, certification and reimbursement still need to be addressed; no alternative strategy can currently offer the same potential reach for impacting the global burden of hearing loss in the near and foreseeable future.


**OBJECTIVES:** To determine (i) noise exposure levels of spectators at a FIFA 2010 designated training stadium during a premier soccer league match; and (ii) changes in auditory functioning after the match.

**METHODS:** This was a one-group pretest–post-test design of football spectators attending a premier soccer league match at a designated FIFA 2010 training stadium in Gauteng, South Africa. Individual spectator noise exposure for the duration of the football match and post-match changes in hearing thresholds were measured with pure-tone audiometry, and cochlear functioning was measured with pure-tone audiometry, and cochlear functioning was measured with distortion product otoacoustic emissions (DPOAEs).

**RESULTS:** The average sound exposure level during the match was 100.5 LAeq (dBA), with peak intensities averaging 140.4 dB(C). A significant \( p=0.005 \) deterioration of post-match hearing thresholds was evident at 2 000 Hz, and post-match DPOAE amplitudes were significantly reduced at 1 266, 3 163 and 5 063 Hz \( p=0.011, 0.019, 0.013 \), respectively.

**CONCLUSIONS:** Exposure levels exceeded limits of permissible average and peak sound levels. Significant
changes in postmatch hearing thresholds and cochlear responsivenes
s highlight the possible risk for noise-induced hearing loss. Public awareness and personal hearing protection should be prioritised as preventive measures.


No abstract


Abstract: An acceptable acoustical environment is necessary for effective communication and learning. Children who experience abnormally poor speech perception in noise, including those with normal hearing sensitivity, are at risk for speech and language delay, reading disorders, psychosocial problems, and academic failure. The biological bases of speech perception in noise are complex and include processes at cortical as well as sub-cortical levels of the auditory nervous system. In children, the ability to perceive speech in degraded listening conditions improves significantly with age in parallel with developmental changes in the auditory nervous system. Difficulty in listening to speech in noisy surroundings is a common symptom associated with auditory processing disorders (APD). Clinical assessment of speech perception in noise quantifies potential problems that a child might face in daily listening situations. Optimally, pediatric speech in noise tests are designed to meet minimal psychometric criteria. A speech in noise test should be appropriate for the child’s age and native language so as to minimize the role of linguistic factors. A diagnosis of APD should not be made based solely on a speech in noise test but, rather, on a battery of tests, each exploring a different auditory process. Speech in noise tests should be used and interpreted with extreme caution when assessing auditory processing in children with co-existing peripheral hearing loss. Children with normal hearing sensitivity, whose performance on tests using competing acoustic signals is below normal, can benefit from specific intervention and the use of signal enhancing devices such as FM systems.


Abstract: We report hearing outcomes in a sample of 56 college students self-identified as “normal hearing.” At one or more test frequencies (0.25-8 kHz), 7% of the ears had thresholds >25 dB HL and 12% had thresholds >20 dB HL. The proportion of ears with abnormal findings decreased when three frequency pure-tone-averages (PTAs) were used. Low-frequency hearing loss (PTA ≥16 dB HL at 0.5, 1 and 2 kHz) was detected at a lower rate (2.7%) than high-frequency loss (PTA ≥16 dB HL at 3, 4, and 6 kHz; 7.1% of ears). All subjects reported normal hearing during pre-study telephone interviews, yet not all subjects had normal hearing as defined by well-accepted criteria. Although a subset of the subjects had elevated thresholds at high frequencies, there was minimal evidence for “notched” audiograms using conventional notch depth definitions. The data suggest that routine screening and education regarding hearing loss risk factors are critical because college students do not always self-identify early changes in hearing thresholds. Large-scale systematic investigations of college students’ hearing status appear to be warranted as the current sample size was not adequate to precisely measure the potential contributions of different sound sources to the elevated thresholds measured in some subjects. There was, however, a statistically reliable relationship in which personal music player use was correlated with decreased hearing status in male subjects.
Holmes


**Abstract:** The ability to communicate freely over the telephone remains a necessity in today's rapid-paced world. Ease in talking over the telephone can be elusive to individuals with acquired hearing loss and remains, despite advances in technology, a primary concern of hearing aid wearers. Although clients with hearing loss are rightly demanding more from their amplification systems, audiologists are left with little research into the efficacy of telephone-specific communication strategies or the efficacy of telephone communication training for individuals with hearing loss. One reason for the paucity of research is the absence of a standardized method for determining telephone abilities. This study details the validation of a listener/partner self-assessment tool specific to the telephone, the Self Perceived Abilities on the Telephone, through structured conversational ratings. Discussion centers on forces driving the use of conversation-based strategies in audiological rehabilitation diagnosis and treatment.

Kricos


No abstract


No abstract

Le Prell


**Abstract:** Age-related functional decline of the nervous system is consistently observed, though cellular and molecular events responsible for this decline remain largely unknown. One of the most prevalent age-related functional declines is age-related hearing loss (presbycusis), a major cause of which is the loss of outer hair cells (OHCs) and spiral ganglion neurons. Previous studies have also identified an age-related functional decline in the medial olivocochlear (MOC) efferent system prior to age-related loss of OHCs. The present study evaluated the hypothesis that this functional decline of the MOC efferent system is due to age-related synaptic loss of the efferent innervation of the OHCs. To this end, we used a recently-identified transgenic mouse line in which the expression of yellow fluorescent protein (YFP), under the control of neuron-specific elements from the thy1 gene, permits the visualization of the synaptic connections between MOC efferent fibers and OHCs. In this model, there was a dramatic synaptic loss between the MOC efferent fibers and the OHCs in older mice. However, age-related loss of efferent synapses was independent of OHC status. These data demonstrate for the first time that age-related loss of efferent
synapses may contribute to the functional decline of the MOC efferent system and that this synaptic loss is not necessary for age-related loss of OHCs.


**Abstract:** We report pure-tone hearing threshold findings in 56 college students. All subjects reported normal hearing during telephone interviews, yet not all subjects had normal sensitivity as defined by well-accepted criteria. At one or more test frequencies (0.25-8 kHz), 7% of ears had thresholds >25 dB HL and 12% had thresholds >20 dB HL. The proportion of ears with abnormal findings decreased when three-frequency pure-tone-averages were used. Low-frequency PTA hearing loss was detected in 2.7% of ears and high-frequency PTA hearing loss was detected in 7.1% of ears; however, there was little evidence for “notched” audiograms. Routine screening and education regarding hearing loss risk factors are critical as college students do not always self-identify early changes in hearing. Large-scale systematic investigations of college students’ hearing status appear to be warranted; the current sample size was not adequate to precisely measure potential contributions of different sound sources to the elevated thresholds measured in some subjects. There was, however, a statistically reliable relationship in which personal music player use was correlated with decreased hearing status in male subjects.


**Abstract:** Hearing loss encompasses both temporary and permanent deficits. If temporary threshold shift (TTS) and permanent threshold shift (PTS) share common pathological mechanisms, then agents that reduce PTS should also reduce TTS. Several antioxidant agents have reduced PTS in rodent models; however, reductions in TTS have been inconsistent. This study first determined whether dietary antioxidants (beta-carotene, and vitamins C and E) delivered in combination with magnesium (Mg) reliably increase plasma concentrations of the active agents. Then, additional manipulations tested the hypothesis that these nutrients reduce acute TTS insult in the first 24 hours following loud sound, as well as longer lasting changes in hearing measured up to 7 days post-noise. Saline or nutrients were administered to guinea pigs prior to and after noise exposure. Sound-evoked electrophysiological responses were measured before noise, with tests repeated 1-hour post-noise, as well as 1-, 3-, 5-, and 7-days post-noise. All subjects showed significant functional recovery; subjects treated with nutrients recovered more rapidly, and had better hearing outcomes at early post-noise times as well as the final test time. Thus, this combination of nutrients, which produced significant increases in plasma concentrations of vitamins C and E and Mg, effectively reduced hearing loss at multiple post-noise times. These data suggest free radical formation contributes to TTS as well as PTS insults, and suggest a potential opportunity to prevent TTS in human populations.


**Abstract:** Acquired hearing loss, which can develop after noise insult or ototoxic drug treatment, is a significant clinical, social, and economic issue. A major advance in our understanding came with the discovery that intense metabolic activity in the inner ear drives the formation of free radicals (short-lived, unstable, highly reactive clusters of atoms) in multiple types of cells in the inner ear after both noise and drug insult. Animal studies have now clearly shown that free radicals formed during and after metabolic stress importantly contribute to acquired hearing loss. These new mechanistic insights provided for the first time a rationale for directly treating the inner ear to prevent hearing impairment. Consequently, use of free radical scavengers, or, antioxidants, to prevent acquired hearing loss became a clinically relevant research goal. Many laboratories have now demonstrated that a variety of free radical scavengers reduce the potential for acquired hearing loss in animal subjects. Scientific data, supporting the use of these agents to prevent environmentally acquired hearing loss, is reviewed. Translational investigations are now essential to confirm
the potential utility of these agents in the human inner ear. This article reviews the pharmacologic otoprotective agents in or approaching clinical trials to prevent noise and drug-induced hearing loss.


**Abstract:** Noise-induced hearing loss (NIHL) is a significant clinical, social, and economic issue. Although we once thought virtually all NIHL was a consequence of mechanical damage to cells in the inner ear, we now know that intense metabolic activity drives the formation of free radicals (short-lived, unstable, highly reactive clusters of atoms) in the inner ear. Studies in animals have clearly shown that free radicals formed during and after noise importantly contribute to NIHL, and many laboratories have demonstrated that free radical scavengers (“antioxidants”) reduce NIHL in animal subjects. Our group, including investigators at multiple institutions, has specifically shown the combination of beta-carotene, vitamins C and E, and magnesium is highly effective in preventing NIHL and sensory cell death in guinea pigs and mice. Others have shown benefit in animal models with agents such as N-acetylcysteine, D-methionine, and ebselen. Use of free radical scavengers, or, antioxidants, to prevent noise-induced deficits has thus become a clinical research goal. Given the multitude of intracellular events that occur during and after noise, it is possible that combinations of agents will ultimately prove to be a useful therapeutic approach. Translational investigations are essential to confirm potential utility of these agents in the human inner ear.

6. **Le Prell, C. G., Gagnon, P.M., Bennett, D.C., and Ohlemiller, K.K. (2011).** *Nutrient-enhanced diet reduces noise-induced damage to the inner ear and hearing loss.* Translational Research, in press.

**Abstract:** Oxidative stress has been broadly implicated as a cause of cell death and neural degeneration in multiple disease conditions; however, the evidence for successful intervention with dietary antioxidant manipulations has been mixed. In this study, we investigated the potential for protection of cells in the inner ear using a dietary supplement with multiple antioxidant components, selected for their potential interactive effectiveness. Protection against permanent threshold shift (PTS) was observed in CBA/J mice maintained on a diet supplemented with a combination of β-carotene, vitamins C and E, and magnesium when compared to PTS in control mice maintained on a nutritionally complete control diet. Although hair cell survival was not enhanced, noise-induced loss of Type II fibrocytes in the lateral wall was significantly reduced (p<0.05), and there was a trend towards less noise-induced loss in strial cell density in animals maintained on the supplemented diet. Taken together, our data suggest that pre-noise oral treatment with the high-nutrient diet can protect cells in the inner ear and reduce PTS in mice. Demonstration of functional and morphological preservation of cells in the inner ear with oral administration of this antioxidant supplemented diet supports the possibility of translation to human patients, and suggests an opportunity to evaluate antioxidant protection in mouse models of oxidative stress-related disease and pathology.

Logan


No abstract

No abstract


No abstract


No abstract


No abstract


Abstract: Portions of left inferior frontal cortex have been linked to semantic memory both in terms of the content of conceptual representation (e.g., motor aspects in an embodied semantics framework) and the cognitive processes used to access these representations (e.g., response selection). Progressive non-fluent aphasia (PNFA) is a neurodegenerative condition characterized by progressive atrophy of left inferior frontal cortex. PNFA can, therefore, provide a lesion model for examining the impact of frontal lobe damage on semantic processing and content. In the current study we examined picture naming in a cohort of PNFA patients across a variety of semantic categories. An embodied approach to semantic memory holds that sensorimotor features such as self-initiated action may assume differential importance for the representation of manufactured artifacts (e.g., naming hand tools). Embodiment theories might therefore predict that patients with frontal damage would be differentially impaired on manufactured artifacts relative to natural kinds, and this prediction was borne out. We also examined patterns of naming errors across a wide range of semantic categories and found that naming error distributions were heterogeneous. Although PNFA patients performed worse overall on naming manufactured artifacts, there was no reliable relationship between anomia and manipulability across semantic categories. These results add to a growing body of research arguing against a purely sensorimotor account of semantic memory, suggesting instead a more nuanced balance of process and content in how the brain represents conceptual knowledge.
OBJECTIVE: Language impairment is a common symptom of Alzheimer disease (AD), and is thought to be related to semantic processing. This study examines the contribution of another process, namely visual perception, on measures of confrontation naming and semantic association abilities in persons with probable AD.

METHODS: Twenty individuals with probable mild-moderate Alzheimer disease and 20 age-matched controls completed a battery of neuropsychologic measures assessing visual perception, naming, and semantic association ability. Visual discrimination tasks that varied in the degree to which they likely accessed stored structural representations were used to gauge whether structural processing deficits could account for deficits in naming and in semantic association in AD.

RESULTS: Visual discrimination abilities of nameable objects in AD strongly predicted performance on both picture naming and semantic association ability, but lacked the same predictive value for controls. Although impaired, performance on visual discrimination tests of abstract shapes and novel faces showed no significant relationship with picture naming and semantic association. These results provide additional evidence to support that structural processing deficits exist in AD, and may contribute to object recognition and naming deficits.

CONCLUSIONS: Our findings suggest that there is a common deficit in discrimination of pictures using nameable objects, picture naming, and semantic association of pictures in AD. Disturbances in structural processing of pictured items may be associated with lexical-semantic impairment in AD, owing to degraded internal storage of structural knowledge.


No abstract.
OBJECTIVE: Dysphagia is the main cause of aspiration pneumonia and death in Parkinson disease (PD) with no established restorative behavioral treatment to date. Reduced swallow safety may be related to decreased elevation and excursion of the hypopharyngeal complex. Increased submental muscle force generation has been associated with expiratory muscle strength training (EMST) and subsequent increases in hypopharyngeal complex movement provide a strong rationale for its use as a dysphagia treatment. The current study’s objective was to test the treatment outcome of a 4-week device-driven EMST program on swallow safety and define the physiologic mechanisms through measures of swallow timing and hyoid displacement.

METHODS: This was a randomized, blinded, sham-controlled EMST trial performed at an academic center. Sixty participants with PD completed EMST, 4 weeks, 5 days per week, for 20 minutes per day, using a calibrated or sham, handheld device. Measures of swallow function including judgments of swallow safety (penetration-aspiration [PA] scale scores), swallow timing, and hyoid movement were made from videofluoroscopic images.

RESULTS: No pretreatment group differences existed. The active treatment (EMST) group demonstrated improved swallow safety compared to the sham group as evidenced by improved PA scores. The EMST group demonstrated improvement of hyolaryngeal function during swallowing, findings not evident for the sham group.

CONCLUSIONS: EMST may be a restorative treatment for dysphagia in those with PD. The mechanism may be explained by improved hyolaryngeal complex movement. CLASSIFICATION OF EVIDENCE: This intervention study provides Class I evidence that swallow safety as defined by PA score improved post EMST.


No abstract
**INTRODUCTION:** The hallmark characteristic of adductor spasmodic dysphonia (ADSD) is irregular and uncontrollable spasms within the intrinsic laryngeal muscles, resulting in erratic disruption of normal voicing.

**METHODS:** Using a random assignment and the inclusion of a behavioral sham to determine the effect of voice therapy after initial botulinum toxin type A (BTX-A) injections for ADSD, this study examined duration of injection benefit, perceived vocal quality of life from the Voice-Related Quality of Life (V-RQOL) scale, acoustic measures of vocal instability, and perceptual ratings of voice quality. Measures of these variables were collected before initial injection; 3, 7, and 12 weeks postinjection; and immediately before reinjection. Thirty-one individuals with ADSD participated in this study. One-third received no further intervention after BTX-A injection, one-third received a standard 5-week course of voice therapy after BTX-A injection, and one-third received a 5-week course of sham voice therapy after BTX-A injection.

**RESULTS AND CONCLUSIONS:** Significant effects were observed on perceived quality of life and acoustic variables for all participants, over time. Participants who received voice therapy after BTX-A injection did not experience longer injection effect duration or significantly greater improvements in V-RQOL or acoustic variables than participants in BTX-A only or BTX-A plus sham therapy groups. Additionally, perceptual ratings of voice quality improved for all participants in response to BTX-A injection. For participants in this investigation, undertaking voice therapy did not appear to exert significant beneficial effects on the variables of interest.
respectively. For detection of aspiration, EPPF was significantly associated with an AUC = 0.88 and with an EPPF < 5.24, which had a sensitivity of 57.15% and a specificity of 100%.

**CONCLUSIONS:** The data from this pilot study suggest that in patients with PD, objective airflow measures from voluntary cough production may identify at-risk penetrator/aspirators. To our knowledge, this is the first study to evaluate the discriminative ability of voluntary cough airflow characteristics to model airway compromise in people with PD.


**OBJECTIVE:** Dysphagia is the main cause of aspiration pneumonia and death in Parkinson disease (PD) with no established restorative behavioral treatment to date. Reduced swallow safety may be related to decreased elevation and excursion of the hyolaryngeal complex. Increased submental muscle force generation has been associated with expiratory muscle strength training (EMST) and subsequent increases in hyolaryngeal complex movement provide a strong rationale for its use as a dysphagia treatment. The current study’s objective was to test the treatment outcome of a 4-week device-driven EMST program on swallow safety and define the physiologic mechanisms through measures of swallow timing and hyoid displacement.

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**RESULTS:** No pretreatment group differences existed. The active treatment (EMST) group demonstrated improved swallow safety compared to the sham group as evidenced by improved PA scores. The EMST group demonstrated improvement of hyolaryngeal function during swallowing, findings not evident for the sham group.

**CONCLUSIONS:** EMST may be a restorative treatment for dysphagia in those with PD. The mechanism may be explained by improved hyolaryngeal complex movement. **CLASSIFICATION OF EVIDENCE:** This intervention study provides Class I evidence that swallow safety as defined by PA score improved post EMST.


**PURPOSE:** Outcomes from studying the coordinative relationship between respiratory and swallow subsystems are inconsistent for sequential swallows, and the lung volume at the initiation of sequential swallowing remains undefined. The first goal of this study was to quantify the lung volume at initiation of sequential swallowing ingestion cycles, and to identify the respiratory pattern(s) surrounding each sequential swallow ingestion cycle. The second goal was to compare these results to existing data for single swallows.

**METHOD:** Twenty healthy young adults served as participants, 9 males and 11 females, between 19 and 28 years of age (mean age 22 years). Participants completed 2 trials each of 100 mL water self-delivered by cup and by straw. Calibrated respiratory inductance plethysmography, surface electromyography, and a contact throat microphone were used to detect respiratory parameters, identify swallow-related muscle contraction, and identify swallowing sounds, respectively.

**RESULTS:** Significantly higher lung volume initiation for trials delivered by straw and more variable respiratory patterns surrounding cup and straw sequential swallowing ingestion cycles existed compared to single swallows.

**CONCLUSIONS:** Results show that as the physiologic demands of swallowing deviate from single, small bolus swallows the integration of the swallowing and respiratory systems change. This may reflect obligate differences in airway protection strategy and prolonged competition for respiratory resources

Abstract: The purpose of this study was to determine if individuals with Parkinson's disease (PD) demonstrate abnormal respiratory events when swallowing thin liquids. In addition, this study sought to define associations between respiratory events, swallowing apnea duration, and penetration-aspiration (P-A) scale scores. Thirty-nine individuals with PD were administered ten trials of a 5-ml thin liquid bolus. P-A scale score quantified the presence of penetration and aspiration during the swallowing of a 3-oz sequential bolus. Participants were divided into two groups based on swallowing safety judged during the 3-oz sequential swallowing: Group 1 = P-A ≤ 2; Group 2 = P-A > 2. Swallows were examined using videofluoroscopy coupled with a nasal cannula to record respiratory signals during the event(s). Findings indicated that expiration was the predominant respiratory event before and after swallowing apnea. The data revealed no differences in our cohort versus the percentages of post-swallowing events reported in the literature for healthy adults. In addition, individuals with decreased swallowing safety, as measured by the P-A scale, were more likely to inspire after swallows and to have shorter swallowing apnea duration. Individuals who inspired before swallow also had longer swallowing apnea duration. The occurrence of inspiratory events after a swallow and the occurrence of shorter swallowing apnea durations may serve as important indicators during clinical swallowing assessments in patients at risk for penetration or aspiration with PD.
Spankovich


**BACKGROUND:** Evidence from animal models suggests that redox homeostasis (the balance between oxidative stressors and antioxidants) and vascular health are important in the pathogenesis of sensorineural hearing loss (SNHL) and that dietary nutrients that have roles in these processes could influence the susceptibility to SNHL.

**PURPOSE:** To examine associations between total nutrient intakes and auditory function outcomes in an older human population.

**RESEARCH DESIGN:** Descriptive characteristics and dietary data from food frequency questionnaires were collected in a cross-sectional study design and analyzed for associations with auditory function outcomes (i.e., otoacoustic emissions and pure tone audiometry measured in a sound-treated room by an audiologist).

**STUDY SAMPLE:** 2111 adults, 49–99 yr of age

**RESULTS:** Higher carbohydrate, vitamin C, vitamin E, riboflavin, magnesium, and lycopene intakes were all significantly associated with larger TEOAE amplitude and better pure tone thresholds. Higher cholesterol, fat, and retinol intakes were significantly associated with lower TEOAE amplitude and worse pure tone thresholds.

**CONCLUSIONS:** These data suggest that nutrients with known roles in redox homeostasis and vascular health are associated with auditory function measures in a human population. Further investigation is warranted to determine direct and indirect influences of dietary intake on measures of auditory function and to explore which nutrients/nutrient combinations are predictive of SNHL.


**OBJECTIVES:** Diet is one of the few modifiable risk factors for age-related hearing loss. We aimed to examine the link between dietary and supplement intakes of antioxidants, and both the prevalence and 5-year incidence of measured hearing loss. Design: Cross-sectional and 5-year longitudinal analyses. Setting: Blue Mountains, Sydney, Australia. Participants: 2,956 Blue Mountains Hearing Study participants aged 50+ at baseline, examined during 1997-9 to 2002-4. Measurements: Age-related hearing loss was measured and defined as the pure-tone average of frequencies 0.5, 1.0, 2.0 and 4.0 kHz >25 dB HL. Dietary data were collected in a semi-quantitative food frequency questionnaire, and intakes of α-carotene; β-carotene; b-cryptoxanthin; lutein and zeaxanthin; lycopene; vitamins A, C and E; iron and zinc were calculated. Results: After adjusting for age, sex, smoking, education, occupational noise exposure, family history of hearing loss, history of diagnosed diabetes and stroke, each standard deviation (SD) increase in dietary vitamin E intake was associated with a 14% reduced likelihood of prevalent hearing loss, odds ratio, OR, 0.86 (95% confidence interval, CI, 0.78-0.98). Those in the highest quintile of dietary vitamin A intake had a 47% reduced risk of having moderate or greater hearing loss (>40 dB HL) compared to those in the lowest quintile of intake, multivariable-adjusted OR 0.53 (CI 0.30-0.92), P for trend = 0.04. However, dietary antioxidant intake was not associated with the 5-year incidence of hearing loss. Conclusions: Dietary vitamin A and vitamin E intake were significantly associated with the prevalence of hearing loss. However, dietary antioxidant intake did not increase the risk of incident hearing loss. Further large, prospective studies are warranted to assess these relationships in older adults.

**Abstract:** The purpose of this article is to expand your awareness of public health, to offer examples of public health domains in audiology, and to suggest how we as a profession can improve our “public health footprint.”

**Troche**


**OBJECTIVE:** Dysphagia is the main cause of aspiration pneumonia and death in Parkinson disease (PD) with no established restorative behavioral treatment to date. Reduced swallow safety may be related to decreased elevation and excursion of the hyolaryngeal complex. Increased submental muscle force generation has been associated with expiratory muscle strength training (EMST) and subsequent increases in hyolaryngeal complex movement provide a strong rationale for its use as a dysphagia treatment. The current study's objective was to test the treatment outcome of a 4-week device-driven EMST program on swallow safety and define the physiologic mechanisms through measures of swallow timing and hyoid displacement.

**METHODS:** This was a randomized, blinded, sham-controlled EMST trial performed at an academic center. Sixty participants with PD completed EMST, 4 weeks, 5 days per week, for 20 minutes per day, using a calibrated or sham, handheld device. Measures of swallow function including judgments of swallow safety (penetration-aspiration [PA] scale scores), swallow timing, and hyoid movement were made from videofluoroscopic images.

**RESULTS:** No pretreatment group differences existed. The active treatment (EMST) group demonstrated improved swallow safety compared to the sham group as evidenced by improved PA scores. The EMST group demonstrated improvement of hyolaryngeal function during swallowing, findings not evident for the sham group.

**CONCLUSIONS:** EMST may be a restorative treatment for dysphagia in those with PD. The mechanism may be explained by improved hyolaryngeal complex movement. **CLASSIFICATION OF EVIDENCE:** This intervention study provides Class I evidence that swallow safety as defined by PA score improved post EMST.


**Abstract:** The purpose of this study was to determine if individuals with Parkinson’s disease (PD) demonstrate abnormal respiratory events when swallowing thin liquids. In addition, this study sought to define associations between respiratory events, swallowing apnea duration, and penetration-aspiration (P-A) scale scores. Thirty-nine individuals with PD were administered ten trials of a 5-ml thin liquid bolus. P-A scale score quantified the presence of penetration and aspiration during the swallowing of a 3-oz sequential bolus. Participants were divided into two groups based on swallowing safety judged during the 3-oz sequential swallowing: Group 1 = P-A <= 2; Group 2 = P-A >= 3. Swallows were examined using videofluoroscopy coupled with a nasal cannula to record respiratory signals during the event(s). Findings indicated that expiration was the predominant respiratory event before and after swallowing apnea. The data revealed no differences in our cohort versus the percentages of post-swallowing events reported in the literature for healthy adults. In addition, individuals with decreased swallowing safety, as measured by the P-A scale, were more likely to inspire after swallows and to have shorter swallowing apnea duration. Individuals who inspired before swallow also had longer swallowing apnea duration. The occurrence of inspiratory events after a swallow and the occurrence of shorter swallowing apnea durations may serve as important indicators during clinical swallowing assessments in patients at risk for penetration or aspiration with PD.


**Abstract:** The purpose of this study was to determine if individuals with Parkinson's disease (PD) demonstrate abnormal respiratory events when swallowing thin liquids. In addition, this study sought to define associations between respiratory events, swallowing apnea duration, and penetration-aspiration (P-A) scale scores. Thirty-nine individuals with PD were administered ten trials of a 5-ml thin liquid bolus. P-A scale score quantified the presence of penetration and aspiration during the swallowing of a 3-oz sequential bolus. Participants were divided into two groups based on swallowing safety judged during the 3-oz sequential swallowing: Group 1 = P-A <= 2; Group 2 = P-A >= 3. Swallows were examined using videofluoroscopy coupled with a nasal cannula to record respiratory signals during the event(s). Findings indicated that expiration was the predominant respiratory event before and after swallowing apnea. The data revealed no differences in our cohort versus the percentages of post-swallowing events reported in the literature for healthy adults. In addition, individuals with decreased swallowing safety, as measured by the P-A scale, were more likely to inspire after swallows and to have shorter swallowing apnea duration. Individuals who inspired before swallow also had longer swallowing apnea duration. The occurrence of inspiratory events after a swallow and the occurrence of shorter swallowing apnea durations may serve as important indicators during clinical swallowing assessments in patients at risk for penetration or aspiration with PD.
Abstract: Experimental studies of sentence production in Parkinson's disease (PD) are rare. This study examined the relationship between cognitive abilities and performance on two sentence production tasks, sentence repetition and sentence generation, in which complexity was manipulated. Thirty-eight older adults aged 60 to 85, half with PD, completed the two language tasks plus a cognitive battery. Participants with PD performed more poorly in the repetition task overall, especially in fluency, but differences were no longer significant once cognitive ability was controlled. In contrast, on the sentence generation task the PD group was significantly impaired on all language dimensions and overall performance. While cognitive ability accounted for significant variance in all measures of sentence generation, the PD group remained significantly impaired when these factors were controlled. These findings suggest that, while language production is influenced by cognitive abilities, it can be significantly impaired in PD over and above the effects of differences in cognitive abilities.


Abstract: Sialorrhea is a common and often debilitating, socially isolating and embarrassing symptom for patients with Parkinson disease (PD). The treatment of sialorrhea involves the management of saliva production, and is complicated in this disease by the risk of aspiration. Two novel approaches to the treatment of this symptom in PD have recently been published.


BACKGROUND: Identification of people with Parkinson disease (PD) who are at risk for aspiration is important, especially because of the high prevalence of aspiration pneumonia.

METHODS: Fifty-eight consecutive patients (Hoehn and Yahr stage II-III; average age 72.3) were enrolled in the study. Measures of airflow during voluntary cough production and the degree of penetration/aspiration on a 3-oz oropharyngeal swallow task, derived from videofluorographic images, were examined.

RESULTS: To detect at-risk people (those with penetration and/or aspiration on the 3-oz swallow task), four objective measures of voluntary cough (compression phase duration [CPD], expiratory phase rise time [EPRT], expiratory phase peak flow [EPPF], and cough volume acceleration [CVA]) were collected. CPD, EPRT, EPPF, and CVA measurements produced significant area under the curve (AUC) analyses and likelihood ratios equal to 0.83:2.72, 0.71:2.68, 0.69:1.75, and 0.78:18.42, respectively. CPD, EPRT, EPPF, and CVA measurements demonstrated sensitivities of 95.83%, 70.83%, 87.50%, and 84.53%, and specificities of 64.71%, 73.53%, 50.01%, and 97.06%, respectively. For detection of aspiration, EPPF was significantly associated with an AUC = 0.88 and with an EPPF < 5.24, which had a sensitivity of 57.15% and a specificity of 100%.

CONCLUSIONS: The data from this pilot study suggest that in patients with PD, objective airflow measures from voluntary cough production may identify at-risk penetrator/aspirators. To our knowledge, this is the first study to evaluate the discriminative ability of voluntary cough airflow characteristics to model airway compromise in people with PD.


Abstract: Ataxia-telangiectasia (A-T) is a rare autosomal recessive disorder caused by mutations in the ATM gene, resulting in faulty repair of breakages in double-stranded DNA. The clinical phenotype is complex and is characterized by neurologic abnormalities, immunodeficiencies, susceptibility to malignancies, recurrent sinopulmonary infections, and cutaneous abnormalities. Lung disease is common in patients with A-T and often progresses with age and neurological decline. Diseases of the respiratory system cause significant morbidity and are a frequent cause of death in the A-T population. Lung disease in this population is thought to exhibit features of one or more of the following phenotypes: recurrent sinopulmonary infections with bronchiectasis, interstitial lung disease, and lung disease associated with neurological abnormalities. Here, we review available evidence and present expert
opinion on the diagnosis, evaluation, and management of lung disease in A-T, as discussed in a recent multidisciplinary workshop. Although more data are emerging on this unique population, many recommendations are made based on similarities to other more well-studied diseases. Gaps in current knowledge and areas for future research in the field of pulmonary disease in A-T are also outlined.