Clinical Summaries Supporting Air Pulse Therapy for Dysphagia

Studies Using Air Pulse Therapy

- “The application of oropharyngeal air pulses was observed to be well tolerated by all subjects.”

- “There were no negative health outcomes, supporting the safety of OAPA.”
- “OAPA was judged as comfortable and acceptable by patients, and had good ease-of-use with clinicians and health care workers.”

- “…there may be preferred types of oropharyngeal air pulses for facilitating swallowing in stroke.”

Effects of oropharyngeal air-pulse stimulation on swallowing in healthy older adults. Theurer J, Czachorowski K, Martin L, Martin RE. (2009) Dysphagia 24:302-313. **Conclusions:** “This study provides the first evidence that air-pulse trains delivered bilaterally are associated with significant increases in saliva swallowing rates in healthy older adults.”
- “These findings indicate that oropharyngeal air-pulse stimulation facilitates the elicitation of saliva swallowing in older adults.”
- “…the facilitatory effect of air-pulse stimulation on swallowing may be quite robust across the adult age span.”
- “The present findings also provide support for the view that oropharyngeal sensory stimulation plays an important role in swallowing initiation.”

Conclusions: “Oral-sensory stimulation and covert swallowing were found to activate many neural correlates of volitional swallowing. Both motor and sensory regions of the volitional swallowing system were engaged by oral air pulse stimulation.”
“Oral-air pulse stimulation may augment sensory input and engage both brainstem and cerebral control centers, potentially impacting the volitional components of swallowing. In patients with unilateral sensory deficits, oral-sensory stimulation, applied to the intact side may bilaterally engage the cerebral swallowing control region.”


Conclusions: “Dysphagic stroke patients tend to demonstrate significantly lower dry swallowing rates than healthy older controls.”


- “Bilateral air-pulse stimulation was associated with the activation of a bilateral network including the primary somatosensory cortex and the thalamus, classic motor areas (primary motor cortex, supplementary motor area, cingulate motor areas), and polymodal areas (including the insula and motor cortex).”
- “…oropharyngeal stimulation can activate a bilaterally distributed cortical network that overlaps cortical regions previously implicated in oral and pharyngeal sensorimotor functions such as tongue movement, mastications and swallowing.”


- “This is the first study to show that stimulation of the human oropharynx with air-pulse trains facilitates swallowing, particularly when the stimulation is applied bilaterally.”
- “…oropharyngeal sensory stimulation plays an important role in swallowing initiation.”
- “all subjects reported that air-pulse stimulation evoked a strong, irrepressible urge to swallow”
- “air-pulse stimulation was associated with a significant increase in swallowing frequency”
- “trend that bilateral stimulation was associated with greater swallowing facilitation than unilateral stimulation”

Related Support for Cortical Stimulation in Swallowing


- “…there is growing evidence that the neural network for swallowing is capable of experience dependent plasticity. … For example, sensory stimulation of the oropharynx with air-pulse trains has been shown to increase resting swallowing rates in tube-fed patients with dysphagia after stroke and activate the cortical swallowing network in controls.”

- “In the swallowing system, it has been proposed that effective recovery of swallowing function after unilateral stroke is associated with increases in cortical excitability and cortical area map size of the unaffected hemisphere.”


- “…an understanding of swallowing neuroplasticity is necessary in terms of explaining and predicting the 1) behavioral effects of injury to the swallowing nervous system and 2) effects of swallowing interventions applied in rehabilitation.”
- “These studies on sensory neuroplastic effects are highly significant because they provide the first evidence that sensory experience can drive plasticity within the neural system that mediates swallowing.”


Conclusions: “Plasticity of the undamaged hemisphere has been shown to underlie the spontaneous resolution of dysphagia after stroke, but equally has been shown to be absent in those patients for whom dysphagia persists.”

“This article has highlighted the potential role of primary afferent and cortical stimulation in promoting plasticity of spared cortex and subsequent return of swallowing function in patients with persistent dysphagia after stroke.”


- “After hemispheric stroke, neuroplastic adaptation permits the control of swallowing musculature to be reorganized to the unaffected hemisphere.”
- “Much more work is required to investigate the true impact of current dysphagia therapy and to work towards developing new therapies of the future.”

Health System Impact of Dysphagia


- “The presence of dysphagia resulted in a 23% increase in costs and a 30% longer LOS after controlling for relevant covariates.”
- “The 1-year cost to Medicare for persons with dysphagia post ischemic stroke was $4,510 higher than that for persons without dysphagia when controlling for age, comorbidities, ethnicity, and proportion of time alive.”
- “…an underreporting of dysphagia via ICD-9 codes exists and that the number of patients with post-stroke swallowing impairment may be even higher than previous reports.”
- “…patients with post-stroke dysphagia had more severe medical complications/issues, which supports the additional finding of a higher rate of mortality in those with than those without post-stroke dysphagia.”
- “Patients with post-stroke dysphagia were also significantly less likely to be discharged home and more likely to be discharged to a skilled nursing facility…”