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Non-invasive Brain Stimulation Techniques in Human Beings

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Introduction

Oropharyngeal dysphagia is a common symptom of a variety of acute and chronic neurologic conditions, including Parkinson's Disease (PD), and is linked to pulmonary problems, which are a primary cause of death in these patients. Signs and symptoms of Dysphagia in Parkinson's disease patients have a weak correlation with objective measures. Findings from a video fluoroscopic examination. Age and severity are also factors. The severity of the illness and the length of time it has been present are not reliable predictors of prognosis dysphagia. In Parkinson's disease, deglutitive dysfunction does not occur. Levodopa therapy can help you feel better. And occasionally may deteriorate with dopamine precursor therapy. The exact underlying neurogenic mechanisms of swallowing dysfunction in PD are not well established and involvement of nondopaminergic mechanisms has been suggested. Recent comprehensive postmortem neuropathologic studies of PD patients have indicated that brain pathology (Lewy neurites and Lewy bodies) in PD originates in the olfactory bulb and visceromotor projections of the dorsal nucleus of the glossopharyngeal and vagal nerves in the medulla oblongata years before involvement of the nigrostriatal pathway and onset of somatomotor dysfunction, Atrophic and denervated pharyngeal constrictors and cricopharyngeus myofibers,8 axonal degenerative changes in vagal and sympathetic motoneurons innervating pharyngeal constrictors and cricopharyngeus, and degenerative changes of the predominantly sensory internal superior laryngeal branch of the vagus nerve have also been observed.

In dysphagic PD patients, these central and peripheral autonomic sensorimotor deficits may explain an impaired cough reflex, a delayed swallow reflex, and other symptoms. Pharyngeal peristaltic incoordination and inadequate relaxation of the upper esophageal sphincter. Together, these mechanistic anomalies contribute to self-reported dysphagia (28-41%), objective videofluoroscopic dysphagia measures (77-87%), and, eventually, aspiration pneumonia (11-45%) in Parkinson's disease patients. Dysphagia management in Parkinson's disease patients is currently inadequate. Dietary changes and swallowing maneuvers, dopaminergic and anticholinergic pharmacotherapy, expiratory muscle strengthening, and video-based biofeedback therapy are among the options. The use of cricopharyngeal myotomy and cricopharyngeus Botulinum toxin injection has resulted in mixed results, demanding more research to develop pathophysiology-based therapy methods. Because of the inability to identify and address the basic abnormalities in numerous organs that are impacted in these individuals, tangible progress in the management and treatment of neurogenic dysphagia, including those caused by PD, has been gradual.

To address this flaw, professionals from a variety of fields must work together. Disciplines that take a multidisciplinary approach tUYo fully apply the cutting edge discoveries in their respective disciplines to the study of swallowing disorders, contributions from multiple scientific disciplines such as biophysics, neuroimaging, neuroscience, neurology, otolaryngology, gastroenterology, and speech language pathology are required. This interdisciplinary collaboration has the potential to shift our focus away from mechanical peripheral deglutition assessment and management strategies like video fluoroscopy, manometry, and electromyography and toward a more holistic approach that includes knowledge of brainstem control mechanisms and cortical modulatory effects on deglutition. With a better understanding of neuronal mechanisms, we may be able to develop therapeutic techniques that go beyond simple rehabilitation to induce neuroplasticity and metaplasticity at the cellular and neuronal network levels.

Description

Recent advancements in imaging technologies, such as structural and functional connectivity approaches, as well as sophisticated analytic concepts like graph theoretical analysis, have enabled deeper and broader analyses of neural network dynamic functions. Furthermore, non-invasive brain stimulation techniques in humans, such as Transcranial Magnetic Stimulation (TMS) and transcranial direct current stimulation, have provided a unique insight of brain network architecture and dynamism, as well as prospective therapeutic applications. TMS can be used in single or paired pulse paradigms, as well as in repeating stimulation trains.

Strong evidence suggests that human TMS protocols induce cortical plasticity comparable to glutamatergic long-term potentiation-like and long-term depression-like effects seen in animal models using N-methyl-D-aspartate-receptor–dependent glutamatergic long-term potentiation and long-term depression. In human beings, N-methyl-D-aspartate-receptor antagonists efficiently prevent the facilitatory or inhibitory effects of TMS treatments, depending on the underlying condition of the targeted brain region. Michou who published their findings in this issue of Clinical Gastroenterology and Hepatology, employed TMS to assess cortical excitability in Parkinson's disease patients, looking at the neurophysiologic processes of dysphagia both on and off dopaminergic therapy. They demonstrated that combining non-invasive brain stimulation with neurotransmitter manipulation offers up a world of possibilities in translational neuroscience, allowing us to address basic concerns in patients with neurogenic dysphagia, such as those with Parkinson's disease.

The role of cortex in volitional and reflexive swallow has been confirmed by functional magnetic resonance imaging positron emission tomography and magnetic encephalography. Although a consistent ensemble of brain regions (sensorimotor, cingulate and insular cortices, lateral prefrontal and parietal regions) has been identified in the regulation of deglutition the specific role of different brain regions and their interactions still needs to be investigated further. For the resting state and during swallowing, functional connectivity of the swallowing network and interactions of implicated brain areas was recently described [1-5].

Conclusion

A Biofilms are complex alliances of many bacterial species and other

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organisms such as amoeba, fungi, viruses, or micro-algae that interact in natural and man-made environments. Catia Carreira, for example, published research on the impact of viral infections on microphytobenthos population dynamics and the creation of marine microbial mats. Understanding biofilm function necessitates mechanistic insights into community diversity and assembly, highlighted the huge bacterial variety of distinct stream ecosystems and the reliance of taxonomic abundance on the environment during the meeting's closing conference. He observed that biofilm diversity was lower in biofilms than in stream water communities, based on 454 pyro sequencing data from fluvial networks, and postulated that the local environment sorts biofilm formers from the bulk liquid. These findings imply that species sorting is a key factor in the formation of stream biofilms from the source population in the stream water. He also demonstrated that even very varied biofilms can build three-dimensional structures that are identical to single-species biofilms, implying that physical and demographic processes might lead to universal biofilm designs.

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Conflict of Interest

The Author declares there is no conflict of interest associated with this manuscript.

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