Aspirometer

Rehabilitation   Pneumonia Prevention   Swallowing Disorders   Artificial Intelligence

University of Pittsburgh researchers have developed a novel, non-invasive, sensor-based, artificial intelligence method of detecting swallowing dysfunction.

Difficulty swallowing, or dysphagia, causes aspiration, the misdirection of food and liquid into the lungs. Dysphagia is a common medical condition resulting in malnutrition, pneumonia, respiratory failure, reduced quality of life, increased healthcare costs, and death, and affects at least 1 in 25 adults in the general population. In high-risk populations, prevalence increases to upwards of 100%.

Current dysphagia screening methods are subjective and lead to inaccurate rates of identification. Screening compliance is highly variable due to time, resources, and clarity of procedures. Furthermore, interpretation of diagnostic testing is also subjective, requiring time and labor-intensive training. The Aspirometer offers fast and accurate objective detection and measurement of swallowing function.

Indications

- Potential dysphagia due to:
    - Brain injury – stroke, traumatic brain injury, cerebral palsy
    - Neurodegenerative diseases: ALS, Parkinson's disease, multiple sclerosis, Huntington's disease, Guillain-Barre, myasthenia gravis, post-polio syndrome, muscular dystrophy, dementia
    - Latrogenic conditions – artificial airway, surgical resection, nerve injury
    - Other: organ transplant, sepsis, head and neck cancer, trauma

Advantages

- Screening: Provides immediate and accurate determination of aspiration status (yes/no).
    - Current screening protocols are often inaccurate, time consuming and overlooked.
- Diagnostics: Provides objective and non-invasive characterization of swallowing function and physiology.
    - Current methods are subjective and invasive (i.e., x-ray and endoscopy).
- Treatment: Provides biofeedback for patient self-monitoring and objective treatment progress monitoring for clinicians.
    - Current treatment rarely incorporates objective progress monitoring.

Invention Readiness

Across multiple clinical studies, Aspirometer's **screening** capability has achieved 90% accuracy in identifying aspiration. We are approaching this level of accuracy in **diagnostics** in the detection and measurement of swallowing physiology. Development of advanced **treatment** capabilities is currently underway, with foundations rooted in the current success of our screening and diagnostic algorithms.

IP Status:	**Inventor(s):**		**Related Publications:**
U.S. Patent No. 10,869,629 issued on December 22, 2020	Ervin Sejdic; Joshua Michael Dudik; James L. Coyle;	Amro El-Jaroudi; Zhi-Hong Mao; Mingui Sun Ph.D.	Not Applicable