The Journal of International Advanced Otology

J Int Adv Otol 2023; 19(4): 269–270 • DOI: 10.5152/iao.2023.170723

Editorial

Artificial Intelligence (AI) in Otology: What Will the Future Be?

O. Nuri Özgirgin

Department of Otolaryngology-Head and Neck Surgery, Bayındır Hospital, Ankara, Turkey

ORCID iDs of the author: O.N.Ö. 0000-0002-2520-1859.

Cite this article as: Özgirgin ON. Artificial Intelligence (AI) in otology: What will the future be? *J Int Adv Otol.* 2023;19(4):269-270.

Our generation had the privilege of witnessing an outstanding progress and revolution in technology that also served for the evolution of medicine. The discovery of computers resulted in remarkable progress for technology and data processing, that is currently the foundation of every tool that is essential for life. Currently, tasks that normally require human intelligence such as visual perception, object and word recognition and complex decision making[1] can be performed thanks to data processing. This gives rise to the concept of artificial intelligence (AI) with deep learning at its core. AI has two projections, and both of these serve for its application in otology differently: *Supervised AI* that is used to predict the category or class of an item such as automatically differentiating the MRI views of the internal auditory canal, and *Unsupervised AI* being useful in searching for patterns.

The data processing in evaluation of vestibular disorders seems the most applicable for AI. Diagnostic tools such as videonystagmography presentation of otolith presence in different locations of semicircular canals that are screened with different type nystagmus; oculomotor test presentations; nystagmus patterns of different central pathologies; video head impulse test presentations with overt & covert saccades, gain parameters, and vestibular evoked myogenic potentials can all be easily presented as processed data and can quickly be adapted to deep learning configurations. Normal ranges of data can also be presented and classified with accuracy.

Additionally, the details such as differentiating the cupulolithiasis of the posterior semicircular canal whether on the canal side or the utricular side will have no difficulty to discriminate. Even for the experienced vestibulogist, it may be difficult to differentiate whether the down beating nystagmus delineates the anterior or posterior canal in some cases. It is possible to include more to better imply the potential efficiency of IA on vestibular system disorders.

Currently there are tele-consultation systems working pretty-well in international basis with human power that serves nicely for the otolaryngologists to better analyze and understand the videonystagmograms. Hence remote consultation systems are becoming effective between the otologist and the patient by presenting the recorded eye movements through preinstalled applications on mobile phones.

Even the presentation of auditory evoked brainstem responses can be prioritized for being processed by deep learning.

Deciding for the appropriate hearing devices due to the audiological data can also be supported by AI.

Imaging in otology has showed remarkable progress during the last few decades. Recent imaging of middle ear and inner ear disorders by MRI and CT's support otologists' treatment planning more precisely. The medical image data that will be retrieved by machine learning will create the required footprints to harness the recognized patterns of cochlea, semicircular canals, vestibule, or oval window.

Corresponding author: O. Nuri Özgirgin, e-mail: ozgirgin@icloud.com

Available online at www.advancedotology.org

The view of the inflamed tympanic membrane in pediatric cases can perplex health professionals outside of otology. Otitis media is one of the most frequent disorders in childhood and most patients are referred to emergency departments, primary care physicians and pediatric services. The accuracy of diagnosing acute otitis media and otitis media with effusion lies in between 44-51% when dealt with physicians other than otologists.[2] With the development of AI however, the otoscopic images can be introduced to machine learning for analysis and be quickly accessed with high accuracy. This remote access can be useful for all who may not have easy access to otologists.[3]

Otology will have the privilege of benefiting from AI-powered systems to shape the future of operating.[4]

REFERENCES

1. Bur AM, Shew M, New J, Artificial Intelligence for the Otolaryngologist: a State of the Art Review. *Otolaryngol Head Neck Surg*. 2019;160(4):603-611. [CrossRef]
2. Pichichero ME, Poole MD. Comparison of performance by otolaryngologists, pediatricians, and general practioners on an otoendoscopic diagnostic video examination. *Int J Pediatr Otorhinolaryngol*. 2005;69(3):361-366. [CrossRef]
3. Ezzibdeh R, Munjal T, Ahmad I, Valdez TA. Artificial intelligence and teleotoscopy: a window into the future of pediatric otology. *Int J Pediatr Orl*. 2022;160:111229. [CrossRef]
4. You E, Lin V, Mijovic T, Eskander A, Crowson MG. Artificial intelligence applications in otology: a state of the art review. *Otolaryngol Head Neck Surg*. 2020;163(6):1123-1133. [CrossRef]