Dear Colleagues and Friends,

We are delighted to welcome you to **2nd International Pediatric Audiology Congress** in the vibrant city of Istanbul, Türkiye on April 4–6, 2025. This signature event takes place jointly with the **15th International Symposium EURO-CIU** to create a dynamic platform for learning, networking, and collaboration under the theme of Bridging Gaps in Pediatric Audiology.

This meeting gathers distinguished speakers, audiologists, researchers, and clinicians from around the world to explore the latest developments in Pediatric Audiology and represent a unique collaboration between leading universities, associations, and clinics from diverse regions.

We are proud of hosting such a multicenter/ multidisciplinary event and providing opportunity to advance collective knowledge, improve patient outcomes, and strengthen the global pediatric audiology community. We warmly invite you to join oral presentations, panels, workshops and poster session to contribute to the future of pediatric audiology.

We welcome you to this significant scientific platform, wishing you a productive and exciting meeting!

Best Regards,

on behalf of the Organizing Committee

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2nd International Pediatric Audiology Congress – IPAC 2025

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Oral Presentations

I Studies

(ID-6958) A case of a child with misophonia and hyperacusis: assessment and management of auditory hypersensitivity

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Introduction: Misophonia and hyperacusis are auditory disorders that can significantly affect a child's daily life. This case study presents a 12-year-old girl with normal hearing thresholds but increased sensitivity to sound, resulting in emotional distress and avoidance behaviors.

Case presentation: The patient experienced extreme discomfort with repetitive environmental sounds, particularly chewing and pencil clicking. Audiological assessment revealed that pure tone hearing was within normal limits, but loudness discomfort levels (LDL) were low, consistent with hyperacusis. The Dunn Sensory Profile assessment revealed high auditory sensitivity and a tendency to avoid sounds. *Treatment and intervention:* A multidisciplinary approach including cognitive behavioral therapy (CBT), desensitisation with graduated sound therapy and psychoeducation was recommended for the patient and family. Environmental modifications such as controlled sound exposure and the use of noise reduction strategies were also included in the treatment plan.

Keywords: misophonia • hyperacusis • Dunn Sensory Profile • child

(ID-6845) An overview of tinnitus in children: prevalence, etiology, and management strategies

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Tinnitus is defined as the perception of sound without an external auditory stimulus. Although it has been extensively studied in adults, it is also commonly observed in children. Detecting tinnitus in children can be challenging, as younger individuals often have difficulty articulating the sounds they hear. Consequently, the true prevalence of tinnitus in children remains uncertain. However, studies suggest that tinnitus is more widespread among the pediatric population than previously estimated. The prevalence ranges from 6% to 29% in children with normal hearing, while it increases from 34% to 66% in children with hearing loss. Exposure to loud noise and the presence of hyperacusis further elevate the risk of tinnitus in children. The primary etiological factors contributing to tinnitus in children include hearing loss, noise exposure, ototoxic medication use, neurological and psychological conditions, and genetic predisposition. Middle ear infections and conditions such as ADHD Attention Deficit Hyperactivity Disorder (ADHD) are also significant risk factors. Tinnitus can negatively affect children's academic performance, social interactions, and emotional development. It is often associated with sleep disturbances, attention deficits, anxiety, and depression, highlighting the importance of early diagnosis. Diagnostic approaches for pediatric tinnitus involve audiological tests (pure-tone audiometry, otoacoustic emissions, auditory brainstem responses), psychosocial evaluations, and child-friendly, play-based assessment tools. Management strategies include education and counseling, sound therapy, psychological support, and non-pharmacological interventions. Cognitive behavioral therapy (CBT) and white noise devices are among the most effective treatments. To better understand tinnitus in children, long-term follow-up studies are needed, and diagnostic and treatment methods tailored specifically for pediatric populations should be developed. This review aims to evaluate the prevalence, causes, diagnostic methods, and management strategies for tinnitus in children while providing insights for future research in this field.

Keywords: tinnitus • children • prevalence • etiology • hearing loss • noise exposure • pediatric audiology

(ID-6932) Auditory and language skills in cochlear implanted children of deaf parents

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Introduction: Cochlear implants (CIs) provide critical auditory sensory input required for the acquisition of speech and language in children with congenital severe to profound hearing loss. Numerous studies have demonstrated that the

quantity and quality of parental interaction significantly impact CI outcomes. Therefore, lack of speech input might harm auditory, speech, and language development after CI in implanted children whose parents are deaf.

Aim: The aim of this study was to compare the auditory and language skills of children with cochlear implants with deaf parents (CIDP) to those with cochlear implants with normal-hearing parents (CINH).

Material and methods: Eight CIDP (3 female, 5 male) and 8 CINH (3 female, 5 male) were included in this study. They received unilateral CIs. The CIDP had additional caregiver(s) (such as grandmother, grandfather) with normal hearing, who communicated orally and provided auditory input. The caregivers of the CINH group were their parents who had normal hearing. Their receptive and expressive language development was evaluated using the Test of Early Language Development (TELD-3). Their auditory skills development evaluated using the Meaningful Auditory Integration Scale (MAIS).

Results: There was no significant difference between the groups in terms of chronological age ($p = 0.17$, $p > 0.05$), hearing aided age ($p = 0.19$, $p > 0.05$), age at implantation ($p = 0.81$, $p > 0.05$) and duration of CI use ($p = 0.11$, $p > 0.05$). Furthermore, no significant difference was found between the groups' receptive language ($p = 0.34$, $p > 0.05$), expressive language ($p = 0.31$, $p > 0.05$), and MAIS ($p = 0.23$, $p > 0.05$) scores.

Conclusions: The findings of this study indicate that CIDP may improve their auditory and language skills after cochlear implantation, similar to CINH. A longitudinal study with a larger sample size is recommended to investigate the auditory and language development of CIDP.

Keywords: auditory skills • language skills • deaf parent • cochlear implant

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(ID-7077) Auditory brainstem response findings in incomplete partition malformations: preliminary results

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Introduction: Inner ear malformations (IEM) account for about 20% of congenital hearing loss cases. Incomplete Partition (IP) malformations, which have normal external dimensions but abnormal internal cochlear structure, are the most common subgroup of IEM. Auditory brainstem response (ABR) is a crucial diagnostic tool for assessing IP anomalies (IP-I, IP-II, IP-III).

Aim: The aim of this study was to evaluate ABR findings according to subgroups of IP anomalies.

Material and methods: The study included individuals who were followed up in Hacettepe University Faculty of Medicine, Department of Otorhinolaryngology, diagnosed with IP malformation on radiologic imaging and underwent ABR evaluation. Participants were evaluated on an ear basis, with 8 ears having IP-I, 30 ears with IP-II, and 3 ears with IP-III included in the study. ABR findings were analyzed statistically.

Results: Participants' ages ranged from 2.5 months to 8 years. In IP-I ears, wave V wasn't observed at 99 dB nHL, and cochlear microphonics (CM) were seen in one ear at 2.5 ms. In IP-II, wave V was recorded in 56.67% of ears, with thresholds ranging from 40 to 99 dB nHL (mean: 69.65 ± 14.78 dB nHL). CM were not detected in IP-III, ABR was obtained in all of IP-III cases, with wave V threshold at 73.33 ± 6.24 dB nHL and latency of 7.43 ± 0.54 ms.

Conclusions: Preliminary results revealed varying ABR outcomes across IP malformation subgroups. The absence of ABR in IP-I ears suggests poorer auditory outcomes, while the IP-II group showed highly variable results. These findings will enhance the literature and aid in clinical understanding of ABR outcomes in these anomalies.

Keywords: incomplete partition • auditory brainstem response • hearing loss

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(ID-6964) Auditory intervention in pediatric patients with single-sided deafness and cochlear nerve deficiency

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Aim: This study aimed to evaluate auditory intervention options in pediatric patients with single-sided deafness (SSD) and cochlear nerve (CN) aplasia, with a particular focus on the feasibility of bone-anchored hearing aids (BAHA) as an alternative rehabilitation strategy.

Material and methods: Seven pediatric patients (3 males, 4 females, mean age: 5.14 ± 3.32 years) diagnosed with SSD were analyzed. All patients exhibited CN aplasia in the affected ear. Additionally, cochlear anomalies were identified in five patients: Michel deformity ($n = 1$), cochlear hypoplasia type II ($n = 1$), and cochlear aperture anomaly ($n = 3$). Auditory rehabilitation strategies were determined based on patient age and anatomical considerations.

Results: Cochlear implantation was considered contraindicated due to the presence of CN aplasia. Instead, based on current clinical guidelines and available literature, soft band BAHA was recommended for patients younger than five years, while percutaneous/transcutaneous or adhesive BAHA was suggested for those older than five years. Given the limited evidence regarding auditory rehabilitation in SSD patients with CN aplasia, these recommendations were made with the aim of providing optimal auditory stimulation through bone conduction.

Conclusions: While SSD cases typically present with a normally developed cochlea and CN in normal hearing ear, significant inner ear malformations and CN deficiency may be observed in the affected ear. CI is a well-established intervention in SSD patients with an intact CN, however, in cases of

CN aplasia, necessitating alternative rehabilitative approaches. Current literature on auditory intervention in SSD patients with CN aplasia remains sparse. In our clinical practice, BAHA was proposed as the primary auditory intervention for these patients. Further longitudinal studies are required to assess the auditory outcomes and overall benefit of BAHA in this patient population. Evaluating speech perception, localization abilities, and quality-of-life outcomes in these children will be crucial in refining management strategies.

Keywords: cochlear aplasia • single sided deafness • SSD • bone anchored hearing aid

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(ID-6943) Behavioral and self-reported listening effort in cochlear implant users: insights from the dual-task paradigm and T-EEAS

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Introduction: Cochlear implant (CI) users may require increased effort to process auditory information and may rely more on visual cues during speech perception in comparison to those with normal hearing (NH). Audiovisual integration can improve speech perception and reduce listening effort in noisy environments, especially in individuals with hearing loss. However, the precise impact of audiovisual integration on listening effort remains to be fully elucidated, and this remains an area of ongoing research.

Aim: This study aimed to evaluate listening effort and audiovisual integration in young adults with CIs and NH, identify group differences, and examine the relationship between these measures.

Material and methods: The study included 30 unilateral CIs with bilateral profound hearing loss (15 prelingual, 15 postlingual) and 30 NH individuals aged 18–30 years. All participants were assessed for audiovisual integration, as well as behavioral and subjective listening effort. The dual-task paradigm was used to assess behavioral listening effort. The Turkish Expanded Version of the Effort Evaluation Scale (T-EEAS) was used for the subjective listening effort. Audiovisual integration was evaluated in four conditions: auditory-only, visual-only, congruent audiovisual, and incongruent audiovisual. Audiovisual integration and listening effort measures were compared between groups, and correlations between the test measures were analyzed.

Results: Behavioral listening effort was found to be significantly higher in the CI group compared to the NH group ($p < .05$). The CI group had significantly higher T-EEAS quiet, noise subscale, and total scores than the NH group ($p < .05$). Statistically significant differences were observed between NH and CI groups in all audiovisual integration conditions ($p < .05$). A moderate negative correlation was found between behavioral listening effort and auditory-only, congruent audiovisual, and fusion responses ($p < .05$). A strong negative correlation was observed between T-EEAS total scores and auditory-only, congruent audiovisual, and fusion responses ($p < .05$).

Conclusions: CI users exhibited poorer audiovisual integration performance and higher listening effort than NH individuals. These findings suggest that targeted audiovisual training strategies may enhance speech perception and reduce listening effort in CI users, which has implications for rehabilitation programs.

Keywords: listening effort • audiovisual integration • cochlear implant

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(ID-6887) Benefits of contralateral hearing aid for unilateral cochlear implanted children, linked bimodal fitting

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Introduction: Bimodal hearing is a non-invasive alternative for people with residual hearing in other ear (Ching et al, 2009). Nearly 75% of adult CI recipients have aidable acoustic hearing in the non-implanted ear that could be used in a bimodal hearing configuration.

Aim: To evaluate the influence of bimodal fitting of Phonak Naida Link UP hearing aid (PNL) on speech perception abilities for unilateral Advanced Bionic cochlear implanted children with Naida Q90 sound processor.

Material and methods: Multi-center research from four centers (Hearing & Speech Institute, Zagazig University, Minia University and Bahtim Health Insurance Hospital). The study included two unilateral cochlear implant user groups: 1st group included 92 prelingual children and 2nd group 17 postlingual children. Assessment was first done 3 months after CI processor fitting. PNL then was fitted. Testing was repeated at three and 6 months after PNL fitting for all subjects. Assessment was done using: aided hearing thresholds at 500, 1000, 2000 and 4000 Hz, Arabic version of Auditory Perception of Alphabet Letters (APAL) test in quiet and noise, Speech Intelligibility Rating (SIR), Categories of Auditory Performance (CAP) and Hearing disability ratings using Meaningful Auditory Integrated Scale questionnaire (MAIS).

Results: A significant improvement was found in all assessment aspects for the two groups especially after 6 months of bimodal hearing using contralateral PNL with unilateral CI.

Conclusions: The auditory asymmetry between both ears is not a barrier for bimodal stimulation, the electric and acoustic signals coming from each ear are well tolerated by both pre- and postlingual children, who significantly benefit more from bimodal stimulation overtime.

Keywords: bimodal hearing • cochlear implant • Naida link • prelingual and post lingual hearing loss • APAL • SIR • CAP

(ID-6955) Bilateral cochlear nerve hypoplasia in CAPOS syndrome: a case report

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Introduction: CAPOS syndrome (**c**erebellar ataxia, **a**reflexia, **p**es cavus, **o**ptic atrophy, and **s**ensorineural hearing loss) is a rare autosomal dominant disorder caused by mutations in the *ATP1A3* gene. It is characterized by early-onset neurological symptoms and progressive hearing loss, often manifesting as auditory neuropathy spectrum disorder (ANSD).

Aim: Hearing impairment in CAPOS syndrome can significantly affect speech and language development, making early diagnosis and intervention essential. Here, we present an 11-year-old girl with CAPOS syndrome and hearing loss due to bilateral cochlear nerve hypoplasia, for whom cochlear implantation was recommended.

Case report: An 11-year-old female with a genetically confirmed *ATP1A3* mutation was referred for hearing evaluation due to communication difficulties. Her newborn hearing screening was normal, but hearing loss was diagnosed at age six. Pure-tone audiometry revealed bilateral moderate hearing loss (pure-tone average: 50 dB right, 45 dB left). ABR testing indicated bilateral cochlear microphonic responses with absent neural waveforms, consistent with ANSD. MRI showed bilateral cochlear nerve hypoplasia. The patient wears hearing aids at school but often removes them at home, relying heavily on lip-reading. Speech perception testing showed poor auditory-only recognition (three-syllable: 13/24, one-syllable: 2/24). In an auditory-visual condition, her sentence recognition was 60%, but she struggled with longer sentences. Her language skills were delayed, estimated at a 4-year-old level, and her speech intelligibility was poor. She also has dystonia and receives neurological, ophthalmologic, physiotherapy, and special education support.

Results: Due to her poor auditory speech perception, limited hearing aid benefit, and reliance on visual cues, bilateral cochlear implantation was recommended. Although cochlear nerve hypoplasia may affect implant outcomes, some ANSD patients show auditory improvements with implants. Additionally, progressive optic atrophy in CAPOS syndrome may further impair lip-reading ability over time, making auditory skill enhancement crucial for future communication. A cochlear implant trial is planned to assess auditory and language gains.

Conclusions: Hearing loss in CAPOS syndrome progresses over time, underscoring the need for continuous audiological monitoring. Cochlear implantation may provide auditory benefits even with cochlear nerve hypoplasia. A multidisciplinary approach is essential to optimize communication and support.

Keywords: CAPOS syndrome • cochlear implant • cochlear nerve hypoplasia

(ID-6977) Bridging language and social cognition: theory of mind development in children with cochlear implants

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Introduction: Theory of mind (ToM), a critical aspect of social cognition, refers to the ability to attribute mental states – such as beliefs, desires, and emotions – to oneself and others. ToM typically develops between ages 3 and 5 and is closely linked to language acquisition. While cochlear implants (CIs) enable auditory access and support language development in children with hearing impairment, ToM and broader aspects of social cognition in CI users may follow an alternative trajectory.

Material and methods: Participants included a CI group ($N = 6$, ages 48–70 months) and an age-matched normal-hearing (NH) control group ($N = 6$). ToM was assessed using the Theory of Mind Scale. Language proficiency was measured with the Test of Early Language Development (TELD-3). Social behavior was evaluated using the Social Competence and Behavior Evaluation (SCBE-30), and emotional expressiveness was assessed via the Child Emotion Expressiveness Questionnaire.

Results: Preliminary ToM assessments revealed consistent success across all tasks among NH children (6/6 in Diverse Desire, Diverse Belief, and Knowledge Access; 5/6 in Contents False Belief and Explicit False Belief). In contrast, children with CIs demonstrated lower performance (2/6 in Diverse Desire, 3/6 in Diverse Belief, 4/6 in Knowledge Access, 2/6 in Contents False Belief, and 1/6 in Explicit False Belief). TELD-3 results indicated weaker receptive (73.3 ± 20.3, range: 55–112) and expressive (71.8 ± 23.4, range: 47–108) language proficiency in the CI group compared to NH children (receptive: 107 ± 6.3, range: 100–115; expressive: 107 ± 10.8, range: 98–121). NH children also scored higher in social competence (51 ± 9.4, range: 40–58) than CI users (46.5 ± 6.4, range: 35–56). Anger–aggression scores were comparable (CI: 16.5 ± 5.5, range: 12–26; NH: 17.2 ± 2.2, range: 14–19), as were anxiety – withdrawal scores (CI: 17.6 ± 3.8, range: 13–24; NH: 17.7 ± 7.4, range: 11–31). Emotional expressiveness was slightly lower in the CI group for both positive emotion expression (12.5 ± 1.2, range: 11–14 vs. 13 ± 2.4, range: 10–15) and negative emotion expression (36.2 ± 7.8, range: 27–47 vs. 40.8 ± 8.7, range: 27–48).

Conclusions: These early findings suggest that social cognition in children with CIs is shaped not only by language development but also by broader socio-emotional factors,

highlighting the need for integrated interventions targeting ToM, language, and emotional understanding

Keywords: theory of mind • cochlear implants • language development • social cognition • emotional expressiveness

(ID-6937) Central auditory processing differences in dizygotic twins: case study

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Introduction: Auditory processing skills play a crucial role in speech comprehension,particularly in challenging listening environments. These skills vary among individuals due to genetic and environmental factors. While monozygotic twins tend to exhibit more similar auditory processing abilities due to their identical genetic makeup, dizygotic twins, who share only 50% of their genetic material, may present differences in auditory processing skills.

Case report: In this study, the central auditory processing abilities of 13-year-old male dizygotic twin brothers,both in the 8th grade,were evaluated. Both children had normal hearing thresholds and no middle ear pathology. In the auditory processing skills checklist completed by their parents, Child 2 received a higher score compared to Child 1 (9 vs. 5), indicating greater listening difficulties. Additionally, Child 2's academic performance was reported to be lower than that of his twin brother. The Turkish Anatolian Central Auditory Processing Disorder Test Battery was administered to both children, and significant differences were observed in specific test.

Results: Dichotic Sentence (DC) Test: Child 1 scored 10 points in both the right and left ears, whereas Child 2 scored 9 points in the right ear and 4 points in the left ear. Dichotic Word (DW) Test: Child 1 scored 42 points in the right ear and 32 points in the left ear, while Child 2 scored 16 and 15 points, respectively. Filtered Word (FW) Test: Child 1 scored 19 points in the right ear and 13 in the left, totaling 32 points, whereas Child 2 scored 9 points in both ears, totaling 18 points. Dichotic Monosyllabic Competing Word (DMCW) Test: Child 1 scored 32.75 points in the right ear and 30.5 points in the left, totaling 63.25 points. In contrast, Child 2 scored 11.25 points in both ears, totaling 22.5 points.

Conclusions: The findings indicate that while Child 1 exhibited ear asymmetry in the DW and FW tests, Child 2 demonstrated ear asymmetry in the DC test. Moreover, Child 2's total scores in the DC, DW, FW, and DMCW tests were lower compared to Child 1. These results suggest a possible delay in interhemispheric information transfer and may contribute to Child 2's difficulties in listening and academic performance. Furthermore, the findings highlight that auditory processing skills can differ between dizygotic twins.

Keywords: central auditory processing • dichotic listening • academic performance • dizygotic twins

(ID-6833) Children's Tinnitus Questionnaire: a novel tool for assessing the impact of tinnitus on a child's everyday life

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Introduction: Self-report instruments are commonly used in tinnitus clinics, but they are presently available only for adults. There is a lack of a validated multi-item instrument to capture tinnitus-related problems in children and their impact on everyday life. This study has developed and validated a specifically child-centered questionnaire to assess the impact of tinnitus.

Material and methods: Development of the tool consisted of several stages. Following a pilot study on 12 children with tinnitus, a validation study was done on a further 192 children with tinnitus aged between 11 and 14 years. The children had an audiological examination, completed a Visual Analogue Scale (VAS) and the newly framed questionnaire.

Results: The development and validation process resulted in the new 11-item Children's Tinnitus Questionnaire (CTQ). It includes items concerning the impact of tinnitus on functional, cognitive, emotional and social domains. The validity of the new tool has been established by finding significant correlations between it and VAS loudness ($r = 0.42$), VAS annoyance ($r = 0.67$), and VAS coping ($r = –0.41$). Validity has also been confirmed by measuring differences in CTQ scores and 4 groups of children having graded incidences of tinnitus. The internal consistency assessed with Cronbach's alpha was high ($\alpha = 0.82$).

Conclusions: The Children's Tinnitus Questionnaire (CTQ) is the first fully validated multi-item instrument designed specifically for children. The tool has the potential to become a valuable new instrument for use in clinical practice and research, it might be useful for assessing the impact of tinnitus on those children who find that the condition creates problems in their everyday life.

Keywords: children tinnitus questionnaire • CTQ • children with tinnitus

(ID-6888) Clinical findings in cochlear implant users with auditory neuropathy spectrum disorder: a retrospective analysis

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Introduction: Auditory neuropathy spectrum disorder (ANSD) is a type of hearing impairment in which neural responses are absent or abnormal, while preneural responses are present. ANSD has been identified as a common cause of hearing impairment, accounting for 10 to 15% of permanent childhood hearing loss cases.

Aim: The primary objective of this study is to examine the clinical findings of cochlear implant (CI) users with ANSD who were followed at the Audiology Clinic of Marmara University Faculty of Medicine. The secondary objective is to ascertain whether diagnostic possibilities and patient management strategies in the ANSD population would improve as organisational experience and knowledge increased.

Material and methods: A retrospective file review was performed on patients diagnosed with ANSD and who underwent CI surgery at Marmara University Medical Faculty Hospital between 2002 and 2024. A comprehensive review of the patients' demographic and clinical information was conducted, encompassing risk factors, newborn hearing screening programme results, additional health problems, age at onset of hearing loss and age at diagnosis, hearing status, duration of hearing aid use, and speech performance before and after CI surgery.

Results: The present study comprised 45 patients (17 female, 28 male). As the time between the age at first diagnosis and the age at diagnosis of ANSD increased, pure-tone average ($p = 0.013$) and speech test results ($p = 0.04$) with CIs worsened. As the age of onset of hearing aid use prior to CI was delayed, performance on speech tests with CIs also decreased ($p = 0.042$). Conversely, an increase in auditory training time was associated with improved speech test results with CI ($p = 0.005$). Furthermore, a decrease in both the age at diagnosis of ANSD ($p = 0.002$) and the age at surgery ($p < .0.001$) was observed as the present day was approached.

Conclusions: Early diagnosis, timely intervention, and auditory training have been shown to have a significant impact on the outcomes of CI in patients with ANSD. However, advancements in clinical awareness have resulted in earlier interventions being made over time.

Keywords: auditory neuropathy • cochlear implant • hearing loss

(ID-6935) Development of a computer-based Speech Recognition Test in Noise for Preschool Children

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Introduction: School-aged children engage in communication, socialization, and learning in environments characterized by background noise and reverberation. The ability to perceive language in noisy and often loud environments, such as classrooms and playgrounds, presents a significant challenge for all children in mainstream schools. This challenge arises from the fact that their perceptual, cognitive, and linguistic skills have not yet fully matured. Therefore, it is essential to assess speech recognition in noise in younger age groups and provide necessary support at an early stage.

Aim: This study aims to develop a Speech Recognition Test in Noise for preschool-aged children and to establish age-specific speech recognition thresholds.

Material and methods: In this study, children's books for children aged 3–6 years were reviewed, and high-recognition words were selected. These words were illustrated in a way that is appropriate for the children's age and cognitive level. A list of 24 words was created for each group and transferred to the developed computer-based test software. The test was administered twice to 138 participants aged 3–6 years, with a 15-day interval, using a test-retest design. The speech recognition threshold in noise for each age group was determined using the signal-to-noise ratio (SNR).

Results: As a result of the study, the signal-to-noise ratio (SNR) values for the Speech Recognition Test in Noise for Preschool Children were found to be –8.1 dB, –8.9 dB, and –10.7 dB for Group 1, Group 2, and Group 3, respectively. The retest SNR values were –8.0 dB, –9.3 dB, and –11.1 dB, respectively. These findings were found to be consistent with previous developmental and speech perception in noise studies conducted for preschool children aged 3–6. No significant difference was detected between the test and retest SNR values ($p = 0.102$).

Conclusions: It was concluded that the Speech Recognition Test in Noise for Preschool Children is a reliable assessment tool for evaluating speech recognition ability in noise in young children.

Keywords: speech understanding • speech recognition • speech recognition in noise • signal-to-noise ratio

(ID-6949) Development of a new test battery to assess selective auditory attention for the Turkish pediatric population

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Introduction: Selective auditory attention is the ability of an individual to consciously distinguish and focus on a specific sound or speech from a variety of sounds in their environment. This is an important cognitive process, especially in noisy environments or when there are multiple sound sources. This ability allows an individual to determine which sound information to prioritize and is one of the basic components of the auditory processing process. Selective auditory attention plays a critical role, especially in speech comprehension, language development, and academic success.

Aim: For school-aged children, it is critical to select important information and ignore the distractors, and it is the main precondition for learning. Therefore, tests that evaluate selective auditory attention are an important tool for supporting language development and shaping educational programs, especially in children. The aim of this study was to develop a test battery that behaviorally assesses selective auditory attention in children.

Material and methods: The behavioral oddball paradigm was adopted for selective auditory attention and male and female voices were used. 200 monosyllabic words were selected for both female and male voices and some words were determined as deviant stimuli (at a rate of 10%). A total of 40 words, 20 for female and male voices, were determined as a deviant stimulation. The semitone thresholds of deviant words were increased to +3. Deviant words were presented at different times for both female and male voices. The participant was asked to respond only when there was a change in the frequency of the male voice. The results were determined as a percentage depending on the number of correctly guessed words. Editing of the recorded material was done using Audacity.

Results: Selective auditory attention scores were obtained as 82 ± 5.70% in the spatially separated condition.

Conclusions: This selective auditory attention test is an effective and reliable test battery that can be performed in a short time, especially on children aged 6–12.

Keywords: auditory attention • spatial hearing • pediatric audiology

(ID-6963) Development of a sentence verification test to evaluate listening effort

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Introduction: Listening effort refers to the cognitive resources allocated to auditory tasks, particularly in challenging acoustic environments, increased task demands, and when listeners strive to maintain optimal performance. Various methods including self-report questionnaires, physiological measurements, and behavioral assessments can be used to evaluate listening effort.

Aim: To our knowledge, no standardized and accessible test battery incorporating a sentence verification task for assessing listening effort exists in audiology clinics in Türkiye. This study aims to develop the Turkish Sentence Verification Test as a behavioral measure to assess listening effort.

Material and methods: Fifteen normal-hearing adults and fifteen adult cochlear implant users participated in the study. The Turkish Sentence Verification Test is a computer-based assessment consisting of sentences structured according to Turkish grammar. Participants were instructed to evaluate the semantic validity of presented sentences (determine whether sentences were true or false), and their response times were recorded. Pupil dilation was measured during the test, and listening effort was additionally assessed through self-report measures.

Results: In the developed Turkish Sentence Verification Test, four lists were created, each containing 30 sentences (15 meaningful-true, 15 meaningless-false) to be administered under four different listening conditions (quiet, +8 dB SNR, +4 dB SNR, 0 dB SNR). The accuracy rate, error rate, non-response rate, mean reaction time for meaningful sentences, and mean reaction time for meaningless sentences differed significantly between the normal-hearing group and cochlear implant users across all test conditions ($p < .001$).

Conclusions: Due to its accessibility, ease of administration, and interpretability, the Turkish Sentence Verification Test is expected to be a valuable tool for assessing speech comprehension and listening effort in clinical settings. Furthermore, it may contribute to a more comprehensive evaluation of individuals' real-world communication abilities.

Keywords: listening effort • sentence verification • cochlear implant

(ID-6906) Development of an auditory cognitive test battery for adults with hearing loss: a novel assessment tool

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Introduction: The reduction or regression of input to auditory cortex with hearing loss makes listening more effortful and requires more top-down sensory, attentional and cognitive compensation. This can then reduce the resources available to contribute to other tasks and potentially negatively impact cognitive function. Aims: This study aims to develop and validate a novel auditory-cognitive test battery to assess the impact of hearing loss on cognitive performance in adults.

Material and methods: The test battery was designed to evaluate auditory-based short-term memory, working memory, attention, executive function, and long-term memory. It was first administered to three age groups of adults with normal hearing ($n = 70$) and then to individuals using hearing aids ($n = 20$) and cochlear implants ($n = 21$). A validity and reliability analyses was performed for the normal hearing group, followed by a comparison of cognitive skill scores across the groups.

Results: Statistical analysis confirmed that the developed test battery is a valid and reliable assessment tool. Results from hearing aid and cochlear implant users revealed a significant decline in working memory, attention, phonemic fluency, and semantic fluency subtests compared to individuals with normal hearing.

Conclusions: The auditory-cognitive test battery is a reliable tool for assessing cognitive function in adults with hearing loss. It effectively highlights the cognitive challenges faced by hearing aid and cochlear implant users, offering valuable insights for both clinical and research applications.

Keywords: cognitive skills • hearing loss • hearing aid • cochlear implant

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(ID-6876) Effect of tinnitus on speech perception and cognitive functions

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Introduction: Tinnitus acts as a distracting sound, making conversation in noisy environments more difficult and leading to decreased cognitive resources. Studies in this field in the literature have different methodologies and show inconsistent results.

Aim: The aim of our study is to examine the effect of chronic tinnitus on cognitive functions and speech understanding in noise.

Material and methods: 25 individuals with chronic tinnitus and normal hearing, 25 individuals with normal hearing and without tinnitus (controls) were included in the study. All participants were evaluated to standard and high frequency pure tone audiometry. All participants were applied the Montreal Cognitive Assessment Test to demonstrate that they had normal cognitive functions. Afterwards, Speech, Spatial Perception and Hearing Quality Scale, TURMatrix Test and Listening Effort (LE), P300 test, Visual Aural Digit Span Test (VADS), Stroop TBAG test were applied to all participants. LE was measured using a dual task paradigm using a –5 dB signal-to-noise ratio (SNR). The P300 test was performed in silence and in the presence of background noise at a –5 dB SNR.

Results: Comparisons between groups were analyzed using Student's *t*-test for normally distributed data and Mann–Whitney *U* test for non-normally distributed data. No significant difference was found between the tinnitus group and the control group in the LE task. In the TURMatrix Test, significant differences were found between the two groups in the adaptive and nonadaptive procedures. No significant difference was found between the groups in the P300 latencies performed in the silence and in the presence of –5 SNR background noise. In the P300 test, a significant difference was found between the noise-induced latency change (P300 latency performed at –5 SNR minus P300 latency performed in silence) in both groups. Statistically significant differences were found between the groups in Speech Perception and Hearing Quality scores, Stroop effect and VADS scores.

Conclusions: This study shows that chronic tinnitus can negatively affect cognitive functions and the ability to understand speech in noise. It also demonstrates the importance of using electrophysiological tests, personal questionnaires to detect this effect in tinnitus patients.

Keywords: tinnitus • speech understanding in noise • cognitive functions

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(ID-6899) Effectiveness of transcutaneous vagal stimulation on treatment of chronic tinnitus

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Introduction: Transcutaneous vagus nerve stimulation (tVNS) is a non-invasive neuromodulation method that has been investigated for the treatment of tinnitus. The vagus nerve is connected to the brainstem and limbic system, playing an important role in sensory and autonomic functions. The effect of tVNS on tinnitus treatment is based on

its potential to modulate neuroplasticity in the auditory cortex and limbic system, thereby reducing tinnitus perception.

Aim: This study aims to evaluate the effectiveness of tVNS in individuals with subjective chronic tinnitus.

Material and methods: Thirteen individuals (6 female, 7 male), aged 18–50 years (mean age 41.46 ± 8.04), with at least one year of subjective tinnitus complaints, were included in the study. İnitial tests, including evaluations of hearing thresholds, tinnitus frequency, tinnitus loudness, and residual inhibition using Madsen Astera 2 audiometer (Otometrics, Denmark), as well as diffusion tensor imaging (DTI), Visual Analog Scale (VAS), Tinnitus Handicap Inventory (THI), Beck Depression Inventory (BDI), and Beck Anxiety Inventory (BAI), were conducted. DTI was performed with a Siemens Avanto 1.5 Tesla MRI scanner (Erlangen, Germany) to evaluate apparent diffusion coefficient (ADC) and fractional anisotropy (FA) values in the corpus geniculatum laterale, Heschl's gyrus, inferior colliculus, and lateral lemniscus regions. Subsequently, participants underwent 30-minute sessions of tVNS using the Vagustim TENS device for 10 sessions over two weeks. The initial assessments were repeated after treatment.

Results: This study demonstrates that a two-week tVNS treatment in individuals with subjective chronic tinnitus leads to significant improvements in depression (BDI) and tinnitus handicap (THI) scores (respectively, $p = 0.047$, $p = 0.007$). Additionally, a significant decrease was observed in inferior colliculus FA values assessed with DTI ($p = 0.001$). Although a reduction in VAS scores was noted, it was not statistically significant ($p > 0.05$). Furthermore, no significant changes were found in BAI scores, tinnitus frequency, intensity, or residual inhibition ($p > 0.05$).

Conclusions: These findings suggest that tVNS may be an effective treatment option for alleviating tinnitus-related handicaps and depression. The decrease in inferior colliculus FA values following tVNS indicates that the effects of tinnitus on central auditory pathways may be modulated through neuroplastic changes. Further large-scale studies are needed to evaluate the long-term effects.

Keywords: tinnitus • neuromodulation • vagus nerve

(ID-6972) Electrically evoked auditory brainstem response (eABR) variability in inner ear malformations: a preliminary study

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Introduction: Cochlear malformations and cochlear nerve deficiencies can significantly impact auditory performance in cochlear implant (CI) users. Electrically evoked auditory brainstem responses (eABR) are an objective tool used to evaluate neural activation following cochlear implantation. Understanding the variability in eABR responses across different malformation types may contribute to optimizing CI programming and post-implantation rehabilitation strategies.

Aim: This study aims to investigate eABR thresholds and latencies in CI users with cochlear malformations (CH I, CH II, CH III) compared to those with normal inner ear anatomy and to determine whether malformation type affects eABR responses.

Material and methods: This preliminary study included cochlear implant users with CH I, CH II, and CH III malformations, all of whom also had cochlear nerve deficiency, as well as individuals with normal inner ear anatomy. eABR recordings were obtained from three cochlear regions: apical, medial, and basal electrodes. The threshold levels and latencies were assessed across groups.

Results: The findings suggest that cochlear hypoplasia and cochlear nerve deficiency may affect eABR responses. Individuals with inner ear malformations generally exhibited higher eABR thresholds and prolonged latencies compared to those with normal inner ear anatomy. In contrast, CI users with normal inner ear structures showed lower thresholds and stronger neural responses. Additionally, threshold levels and latencies differed across apical, medial, and basal electrodes, suggesting that cochlear region variations may influence neural activation.

Conclusions: This preliminary study indicates that cochlear hypoplasia and cochlear nerve deficiency may affect eABR responses, which could have implications for CI programming and auditory rehabilitation. Further research with a larger sample size is needed to better understand the relationship between anatomical differences and auditory outcomes.

Keywords: inner ear malformations • cochlear hypoplasia • cochlear nerve deficiency • eABR • cochlear implant

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(ID-6931) Evaluation of executive functions of cochlear implant users with saccadometry and cognitive tests

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Introduction: Saccadometry is an advanced ocular motor test that allows the functional evaluation of the various brain regions and circuits involved in the generation of fast, appropriate, purposeful, and accurate saccadic eye movements. Saccadometry evaluates the analysis of phase data, which provides further insight into lesion localisation, and antisaccade analysis, which provides windows into cognition, emotional regulation, response inhibition and executive function. Saccadometry consists of prosaccade (PS) and antisaccade (AS) tests that progressively increase cognitive demand.

Aim: The objectives of this study were to determine whether the saccadometry test reliably assessed in cochlear implant recipients and to explore the relationship between saccadometry test results and executive functions of cochlear implant users.

Material and methods: 25 CI users and 25 normal hearing (NH) participants (age range 10–18) took part in the study. Saccadometry Test, Auditory P300 responses, Behavior Rating Inventory of Executive Function (BRIEF), and Auditory-Visual Digit Span Test (AVDST) were obtained.

Results: There was no statistically significant difference between the mean ages of the two groups (p: 0.36 > 0.05). Antisaccade latencies were delayed significantly in CI group when compared with the NH group (p: 0.04 < .0.05). P300 amplitudes were decreased significantly in CI group when compared with NH group (p: 0.03 < .0.05). When we compered the modality scores, visual modality scores were greater than auditory modality scores at CI group (p: 0.04 < .0.05). The NH group had higher scores than the CI group when we compared the intersensory fusion scores (p: 0.027 < .0.05).

Conclusions: The results suggest that saccadometry can be performed reliably in CI users. Saccadometry, P300, and AVDST results may help to explain some of the differences in executive function observed in CI users.

Keywords: executive functions • saccadometry • cochlear implant

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(ID-6878) Evaluation of narrative skills of children with hearing loss

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Introduction: Narrative is defined as "speech text units beyond the sentence level". Narrative skills support children's verbal language and listening abilities.

Aim: Comparing the narrative skills of children with hearing loss (HL) and normal hearing children (NH) was the purpose of the study.

Material and methods: In this study, including 27 children with HL and 27 children with NH between the ages of 4–8. The Turkish Early Language Development Test (TEDIL) was used to assess children's early verbal language development. The Edmonton Narrative Norms Instrument (ENNI) narrative tool has been used to assess children's language skills through narrative. The Average Utterance Length (MLU), the Number of Different Words (NDW), the Total Number of Words (TNW) and story structure scores were calculated for A1 and A3 stories from children's language samples.

Results: According to the TEDIL test, the composite scores for receptive language, expressive language, and verbal language of children with HL are statistically significantly lower than those of children with NH. When comparing children's narrative skills, a statistically significant difference was found between the groups in the Mean Length Utterance (MLU) scores at A1 story, A1 and A3 story structure scores in favor of NH children. There was a positive significant correlation between the ages of the children in the HL group in the scores of MLU at A1 and A3 story, as well as A1 and A3 story structure scores. Additionally, there was a positive statistically significant correlation between the ages of children with NH and their MLU scores at A1 story, A1 and A3 story structure scores, as well as between the mother's educational level and their A3 MLU in word scores.

Conclusions: The study concluded that children with hearing loss performed lower in language and narrative skills, including cause-and-effect reasoning and story inference, compared to those with normal hearing.These findings suggest that the language skills of children with hearing loss should be followed up, as well as narrative skills.

Keywords: cochlear implant • hearing aid • narrative • hearing loss

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(ID-6936) Evaluation of quality of life and hearing aid satisfaction in adults using hearing aid regularly and irregularly

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Introduction: Communication, social connections, and general well-being can all be greatly impacted by hearing loss. In order to improve hearing and quality of life, hearing aids are necessary instruments. Maximizing the advantages of hearing aids requires an understanding of the connection between consistent use, user happiness, and life quality.

Aim: The purpose of the study was to examine the difference in quality of life and hearing aid satisfaction between individuals aged 50 to 85 who have been using hearing aids regularly for one year and those who have been using them irregularly, using scales with Turkish validity and reliability.

Material and methods: Thirty bilateral hearing-aided individuals (mean age: 67 ± 6, 15 male, 14 female) were included in the study. Two scales were used in our study. One will be used to measure the quality of life, the WHOQOL-BREF questionnaire, which is the short form of the World Health Organization Quality of Life Scale consisting of 26 questions. The other will be used to evaluate the duration of use and satisfaction with the hearing aid, the International Hearing Aid Evaluation Form (IOI-HA TR), consisting of 7 questions.

Results: The hearing aid satisfaction score of those who used hearing aids regularly was statistically significantly higher than that of those who used hearing aids irregularly ($p = 0.047$). When the WHOQOL-BREF subcategories were examined, there was no statistically significant difference between the groups in general health, physical health, mental health, social health, and environmental health subscores (p: 0.13, 0.16, 0.06, 0.5, 0.19, respectively). When the correlation between hearing aid usage duration and IOI-HA-TR score and WHOQOL-BREF subscores was examined, a positive correlation was observed between mental health and hearing aid usage duration ($p = 0.029$). Additionally, a positive correlation was observed between hearing aid usage duration and IOI-HA-TR score ($p = 0.016$).

Conclusions: Irregular use of hearing aids reduces adaptation, user satisfaction, and effectiveness. Inconsistent use can cause communication difficulties, leading to social isolation, stress, anxiety, and depression. Regular use is essential for optimizing benefits, enhancing auditory experiences, and improving overall well-being and mental health.

Keywords: hearing aid • quality of life • satisfaction

(ID-6826) Evaluation of the effect of tinnitus suffering time period on tinnitus discomfort

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Aim: The purpose of this study is to investigate whether the duration of tinnitus suffering in tinnitus patients has an effect on tinnitus discomfort.

Material and methods: 260 tinnitus patients were included in the study. The Tinnitus Handicap İnventory (THI) and the time periods of tinnitus suffering of these patients were investigated retrospectively. The relationship between these two data was evaluated with the Pearson correlation coefficient. In addition, the tinnitus handicap inventory scores were divided into two as above and below level 3 (corresponds to 38 points in THI) and the time periods of tinnitus suffering of these two groups were compared with the independent sample *t*-test.

Results: A statistically significant weak positive correlation was observed between the tinnitus handicap inventory and the time periods of tinnitus suffering ($p = 0.002$). Also, when the levels of the tinnitus handicap inventory were considered, the tinnitus duration of the group with the higher THI level (level 3 and higher) was found to be statistically significantly higher ($p = 0.026$).

Conclusions: As a result of our study, it was determined that individuals became more disturbed by tinnitus as the tinnitus suffering time period increased. This result emphasized the importance of clinicians including patients who apply for tinnitus treatment/therapy in the rehabilitation process as soon as possible.

Keywords: tinnitus • tinnitus duration • tinnitus discomfort

(ID-6910) Exploring sound sensitivity in children: the Turkish validation of the Pediatric Hyperacusis Questionnaire

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Introduction: Hyperacusis assessment in children is a critical step for early detection of auditory sensitivity problems.

Aim: This study aimed to adapt the Pediatric Hyperacusis Questionnaire Parent Form (P-HQ) into Turkish and to conduct validity and reliability studies.

Material and methods: The P-HQ Parent Form was adapted into Turkish and administered to 110 parents who volunteered to participate in the study. The reliability of the scale was assessed with Cronbach's alpha coefficient, and its validity was examined with explatory (EFA) and confirmatory factor analysis (CFA). Data analysis was conducted using IBM SPSS 21 and AMOS 23.

Results: Cronbach's alpha internal consistency coefficient indicated that the scale was highly reliable. CFA fit statistics revealed that the instrument provided an excellent fit with the data obtained from Turkish participants. Factor analysis revealed that the instrument had a two-factor structure, which explained 50.06% of the total variance.

Conclusions: Statistical analyses revealed that the Turkish P-HQ Parent Form is a valid and reliable scale. This scale will provide guidance for understanding children's auditory sensitivities and taking appropriate measures. Furthermore, the validity and reliability of the Turkish version makes an important contribution as one of the few tools used in the assessment of hyperacusis.

Keywords: children • hyperacusis • hyperacusis questionnaire • validity • reliability

(ID-6980) Immittance measurements in children aged 7–12 with different otologic findings

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Introduction: Wideband tympanometry (WBT) offers numerous advantages. It may also more distinctive information in detecting pathologies compared to traditional 226 Hz tympanometry. However, due to limited normative data, it is still not routinely used in many clinical settings.

Aim: To evaluate the outer and middle ear functions of children with different otologic findings with 226 Hz tympanometry and WBT, as well as to examine the distinguishing characteristics of these two methods.

Material and methods: A total of 32 participants ($n = 64$ ears), aged between 7–12 were included in the study. 226 Hz tympanometry and acoustic reflex tests were performed, followed by wideband tympanometry measurements. Volume, compliance, absorbance, and resonance frequency values were analyzed. The findings of both groups were compared.

Results: Twenty two children ($n = 44$ ears) exhibited a Type A tympanogram in traditional tympanometry, while 10 children ($n = 20$ ears) showed findings other than Type A (Type As, Ad, B, C). For the group with Type A findings

($n = 44$ ears), the mean tympanometric peak pressure was –9.2 daPa (min: –89, max: 72), the mean equivalent ear canal volume was 0.92 mL (min: 0.575, max: 1.545), and the mean resonance frequency was 833 Hz (min: 397, max: 1376). For the group with findings other than Type A ($n = 20$ ears), the mean tympanometric peak pressure was –177 daPa (min: –389, max: 185), the mean equivalent ear canal volume was 0.779 mL (min: 0.530, max: 1.490), and the mean resonance frequency was 808 Hz (min: 298, max: 1131). Absorbance values were found to differ across various frequencies between the two evaluated groups.

Conclusions: In this study, the outer and middle ear functions of children aged 7–12 with different otologic findings were evaluated using traditional 226 Hz tympanometry and WBT, and the distinguishing characteristics of these two methods were identified and discussed. Future studies with larger sample sizes and more detailed subgroup analyses are expected to contribute to a better understanding of the subject.

Keywords: immitance measurements • children • wideband • middle ear • resonance frequency

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(ID-7079) Investigating the perspective of parents with children with hearing loss on information and support process

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Introduction: The process of diagnosing hearing loss in children is a difficult time for their parents. Parents of children with hearing loss need detailed information about the nature of the hearing loss, the difficulties it may cause and the type of intervention that should be used. In addition to the need for adequate and accurate information, parents should be provided with appropriate emotional support during this process. It has been reported in the literature that audiologists, due to busy schedules, do not spend enough time with parents and often leave parents' questions unanswered.

Aim: The aim of this study was to evaluate the experiences and satisfaction of parents of children with hearing loss regarding the information and support processes.

Material and methods: Parents of 54 children with hearing loss aged 0–6 years were included in the study. Participants were asked to complete 2 forms. While the first form was the data collection form about the child with hearing loss, the second form was a semi-structured form, the perspective of parents with a child with hearing loss on the information and support process. Participants were asked to rate some questions on a scale of 1–5 and to choose one of the answers "yes", "no", "undecided" for others. SPSS statistical package program was used to evaluate the data.

Results: When asked whether adequate information was provided about newborn hearing screening (NHS), 37% of parents reported that adequate information was provided. When asked if they had received adequate support and information prior to the hearing test, 53.7% of parents reported that they had received adequate information. When asked about emotional support, 96.3% of parents were satisfied. Statistical analysis revealed a statistically significant difference between satisfaction with the NHS and satisfaction with the service received from the hearing aid/ cochlear implant centre ($p = 0.004$).

Conclusions: This study of 54 parents showed that there are gaps in information and support in the management of paediatric hearing loss. Although it is not new for parents to need more information and emotional support, it is important that these needs are properly met. The process of information and support should begin.

Keywords: parental perspective • hearing loss • information and support

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(ID-6946) Is physical activity intensity an important factor for balance skills in sedentary individuals? A pilot study

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Introduction: Sports and exercise improve balance skills and postural control. However, many individuals today adopt a sedentary lifestyle.

Aim: This study investigated whether the intensity of daily routine activity affects functional balance skills in sedentary individuals.

Material and methods: This prospective, cross-sectional study included 34 healthy individuals (28 females, 6 males, mean age: 22.00 ± 6.75) aged between 19–50 years, who did not do regular sports. The Physical Activity Scale-2 (PAS-2) was applied to determine the daily average physical activity level of the participants. Participants' height and weight information was obtained, and body mass index (BMI) was calculated. Functional Reach Test (FRT), Romberg Test (firm and foam surface), eyes open and closed One Leg Standing Test (OLST) and Timed Up and Go Test (TUG) were applied to all individuals. Data were analyzed using the Statistical Package for the Social Sciences 21. Normality distribution was evaluated with the Shappiro–Wilk test. The relationship between variables was examined using the Spearman or Pearson correlation test, according to the normal distribution of the data. The significance level was accepted as $p = 0.05$. Permission was obtained from the Karabük University SHC Ethics Committee for this study (Date: 19.06.2023, Decision: 2023/05).

Result: The mean PAS-2 score of the participants was 2238.48 mel/min/day. All participants had Romberg and eyes-open OLST scores of 30 seconds. Mean height was 164.38 ± 8.26 cm, mean weight was 58.76 ± 10.23 kg, mean BMI was 21.74 ± 3.65, mean FRT score was 36.85 ± 9.64 cm, mean TUG score was 7.15±0.78 seconds, and mean eyes-closed

OLST score was 21.68 ± 10.67 seconds. There was no correlation between the PAS-2 score and height, weight, BMI, FRT, TUG, Romberg, and OLST scores ($p > 0.05$).

Conclusions: This study shows that there is no relationship between physical activity levels and balance skills in individuals who are sedentary. Our findings show the importance of regular exercise in improving functional balance skills.

Keywords: physical activity • sedentary life • balance • daily activity

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(ID-6986) Is it possible for atypical forms of BPPV to cause vestibular deficits?

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Introduction: In this study, researchers focused on two rare BPPV forms mimicking central vestibular disorders. They are characterized by peripheral down-beating positional nystagmus and positional vertigo triggered by sudden head movements during acute attacks: (1) apogeotropic posterior canal (APC) BPPV and (2) anterior canal (AC) BPPV canalithiasis.

Aim: To investigate the vestibular deficit in the affected canal and utricle of patients with rare vertical canal BPPV forms.

Material and methods: In this study, the study group consists of 23 patients (mean age: 56.86 ± 12.21 years, min–max: 29–73, female/male ratio = 0.91) with rare BPPV forms (AC or APC BPPV). In 23 patients, a complete vestibular evaluation was performed. To diagnose BPPV, Dix–Hallpike or Semont, McClure-Pagnini, and central head-hanging diagnostic maneuvers were used. In the case of APC or AC BPPV, video head impulse tests (vHIT) and ocular vestibular myogenic potentials (oVEMPs) were performed before the treatment.

Results: The APC rate was 78.3% (18/23) and the AC rate was 21.7% (5/23). The APC was more common than AC (APC/AC ratio: 3.6/1) in this study sample. The mean VOR gain of the affected canal was 0.74 ± 0.088. In the rare BPPV group, during the acute BPPV attacks, 7 patients (30.43%) had canal deficit (VOR gain < .0.80) on the affected canal, and 10 patients (43.48%) had utricular deficit (7 of them absent P1-N1, 3 of them decreased P1-N1 amplitude) on the affected side.

Conclusions: In this study, it was revealed that vestibular deficits in the affected utricle and canal may be seen in acute BPPV stages. Therefore, objective vestibular evaluation is recommended in patients with atypical forms of BPPV.

This study was supported by TUBITAK-2219 International Postdoctoral Research Fellowship Program in Italy (Application No: 1059B192300149).

Keywords: apogeotropic posterior canal BPPV • anterior canal BPPV • vestibular deficit • vestibular loss

(ID-6925) Knowledge of interjections in children with cochlear implants: an investigation

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Introduction: Research on children with cochlear implants and their emotional processing primarily focuses on perception abilities, particularly in emotion labeling tasks. While most voice-emotion research relies on prosodic features, the role of interjections – key elements in conveying emotional cues – remains underexplored.

Aim: This study investigates interjection knowledge in children with cochlear implants as a foundational step before assessing their emotion perception and expression skills.

Material and methods: The study included 15 children with cochlear implants (26.66% female, 73.34% male), aged 7–14 years (mean = 11.06 ± 2.07), who had been receiving rehabilitation support for at least five years. Fourteen commonly used Turkish interjections were identified, and their knowledge levels were assessed in three stages: word recognition, definition, and contextual use. Participants who provided meaningful responses to at least two stages were classified as accurate, indicating their knowledge of the interjections.

Results: Knowledge levels varied among participants, with recognition rates ranging from 66.66% to 100%. The mean knowledge level was 88.57% (*SD* = 10.53%). The 95% confidence interval for knowledge levels (82.83%, 94.30%) suggests consistently high recognition among children with cochlear implants. A chi-square test was conducted to examine differences in accurate and inaccurate responses to interjections based on gender and age groups. Participants were categorized into two age groups: 7–10 years and 11–14 years. Given the small sample size, Fisher's exact test *p*-values were used for statistical interpretation. The analysis revealed no significant differences in interjection responses based on gender ($p > 0.05$) or age groups ($p > 0.05$). The internal consistency of the interjection responses was evaluated using Cronbach's alpha, which was calculated as 0.9218, indicating excellent reliability.

Conclusions: The findings suggest that children with cochlear implants have high interjection knowledge in Turkish. Gender and age did not significantly influence interjection knowledge. Further studies should incorporate interjection stimulus sets with sound-emotion components to address research gaps. Additionally, examining interjections across different languages and cultural contexts could enhance understanding of linguistic emotional competence.

Keywords: cochlear implant • children • interjections • emotions • knowledge

(ID-6898) Misophonia and speech-in-noise perception: the role of visual triggers

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Introduction: Misophonia is a disorder characterized by reduced sound tolerance, manifesting as behavioral, emotional, and physiological reactions to specific trigger stimuli, influenced by memory, attention, and neurocognitive processes. Previous research suggests that multisensory integration and the mirror neuron system may play a role in the mechanisms underlying misophonia.

Aim: The primary aim of this study was to assess speech-in-noise perception in individuals with misophonia, specifically under conditions involving visual triggers. The secondary objective was to evaluate frequency-specific auditory attention in individuals with misophonia.

Material and methods: The study included 62 participants aged 18–30 years (31 with misophonia, 31 controls). Participants were administered the Misophonia Assessment Questionnaire, pure-tone audiometry, the Frequency-Specific Auditory Attention Test for Adults, and the Turkish Matrix Test. The Turkish Matrix Test was conducted in three stages at a fixed intensity of 65 dB SPL with a 0 dB signal-to-noise ratio, using a non-adaptive paradigm. In the first stage, no visual stimulus was presented. In the second stage, a neutral visual stimulus was presented, and in the third stage, visual trigger stimuli were used.

Results: In the Turkish Matrix Test, no statistically significant difference was observed between individuals with misophonia and the control group in the absence of visual stimuli or in the presence of a neutral visual stimulus ($p > 0.05$). When exposed to misophonia-triggering visual stimuli, individuals with misophonia exhibited significantly lower speech-in-noise perception scores in both the right and left ears, compared to the control group ($p < .0.05$). In the Frequency-Specific Auditory Attention Test for Adults, no significant group differences were observed in scores from the general lists, mid-frequency lists, or high-frequency lists ($p > 0.05$). However, in the low-frequency lists, individuals with misophonia achieved significantly higher scores compared to the control group ($p < .0.05$).

Conclusions: These findings support previous research and strengthen the hypothesis that misophonia involves multisensory processing. Moreover, these results suggest a potential effect of misophonia on frequency-specific auditory attention mechanisms.

Keywords: misophonia • speech-in-noise perception • visual triggers • multisensory integration

(ID-6948) Outcomes of fitting with loudness discomfort level and real ear measurement: listening comfort, discrimination, and patient satisfaction

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Introduction: Conducting real ear measurement (REM) ensures the hearing aid users have sufficient auditory stimulation, while loudness discomfort level (LDL) measurement provides this stimulation to be at a level that will not disturb individuals. In this regard, using REM and LDL measurement together in hearing aid fitting may help both increase auditory performance and ensure individual comfort.

Aim: To investigate short-term outcomes of fitting, based on loudness discomfort level (LDL) and real ear measurement (REM) in bilateral hearing aid users. Speech reception thresholds (SRT), speech discrimination scores (SDS) and hearing aid satisfaction levels were examined.

Material and methods: A total of 13 bilateral hearing aid users older than 45 years old were participated. SRT, SDS and satisfaction levels were examined with International Outcome Inventory for Hearing Aids (IOI-HA-TR), Satisfaction with Amplification in Daily Life (SADL) questionnaire, Khalfa Hyperacusis Scale, and SDS before the application. Subsequently all participants had their hearing aids fitted based on LDL and REM. Outcome measurements were repeated after 10 days, and results were compared.

Results: The application was found to have a significant effect on SRT and SDS scores (SRT: $Z = 2.810$, $p = 0.005$, SDS: $t = 8.607$, $p < .0.001$). After application, the SRT decreased by 5 dB, and the SDS score increased by 13.85%. However, no significant difference was observed in SADL, IOI-HA, and Khalfa Hyperacusis Scale results ($p > 0.05$).

Conclusions: The study demonstrated that REM and LDL-based adaptations improve speech intelligibility in hearing aid users but do not create a significant change in patient satisfaction in the short term. Future researches will enhance comprehensive understanding of the subject.

Keywords: REM • bilateral hearing aid • LDL • speech discrimination score • hearing aid satisfaction questionnaires

(ID-6922) Parental views of children with hearing loss on audiology services in Türkiye

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Introduction: Although auditory implants and hearing aids (HA) support language, speech, cognitive, and social

development areas, audiologists are essential in the assessment and (re)habilitation for the management of hearing loss (HL). Most existing studies prioritize auditory outcomes, while parental satisfaction and perspectives on the audiology services their children receive remain insufficiently addressed.

Aim: This study aims to evaluate the parental perspectives, expectations, and satisfaction of children using auditory implants or HA regarding audiologists or audiology services in Türkiye.

Material and methods: Parents of children using HA or auditory implants from different cities and age groups across Türkiye were included. Data were collected using a demographic form and a questionnaire developed by the researchers. The demographic form included 20 questions, while the Parental Perceptions of Audiologists Questionnaire comprised seven sections with a total of 36 questions. Responses were measured using five-point and three-point Likert scales.

Results: A total of 150 parents participated in the study, with the mean age of children being 7.1 ± 3.7 years. Among the children, 50% were cochlear implants, 40.02% were HA, 3.99% were bone-anchored HA, and 5.99% were bimodal users. A total of 87.3% of parents stated that audiologists played a significant role in their understanding of their child's HL, while 80% reported that they could communicate easily with their audiologists. However, 68% of the participants considered the role of the audiologist in managing HL to be highly important, and 53.3% believed that audiologists made a significant contribution to their quality of life. Finally, trust in the audiologist for selecting the most suitable hearing device for the child's HL was rated as very high by 58% of the participants. Additionally, 62.7% perceived the audiologist's professionalism in device adjustments and technical evaluations as excellent. The responses to open-ended questions revealed that parents highlighted the inadequate employment of audiologists and difficulties in accessing audiological services – particularly in the Eastern and Southeastern Anatolia regions.

Conclusions: Parents, particularly those in rural areas, face difficulties in accessing audiology services. To improve the healthcare process, reduce appointment waiting times, and increase audiologist employment, there is an urgent need for solutions all over the country.

Keywords: audiology services • audiologists • parental satisfaction • hearing loss

(ID-6832) Prevalence of tinnitus in a sample of 43,064 children in Warsaw, Poland

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Introduction: Tinnitus affects both adults and children. Children rarely complain spontaneously of tinnitus, and their parents are not aware of the condition. The prevalence of tinnitus in children differs considerably between studies, and large studies are needed to reliably estimate how many children experience tinnitus symptoms.

Aim: The goal of the study was to estimate the prevalence of tinnitus in a large sample of schoolchildren.

Material and methods: Results from 43,064 children aged 11 to 13 years old, as well as their parents, were collected. This study was population-based, epidemiological research, conducted in the general, paediatric population of school-age children in Warsaw, Poland. Pure-tone audiometric testing was done, and hearing thresholds were determined from 0.5 to 8 kHz. Both the children and parents answered questions about the presence of tinnitus in the child.

Results: The study showed that tinnitus affected 3.1% of the children, but it was significantly more frequent (9%) in children with hearing loss. We found that 1.4% of the parents were aware of the presence of tinnitus in their children.

Conclusions: Children should be routinely asked whether they experience tinnitus and if so, they should be included in the thorough assessment and management of the condition.

Keywords: tinnitus • hearing screening

(ID-6950) Profile and reasons for admission of childhood hearing loss in the audiology clinic

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Introduction: Childhood hearing loss is a significant public health issue affecting approximately 38.7 million children worldwide. According to the World Health Organization, 60% of childhood hearing losses can be treated or prevented if diagnosed early. Therefore, regular hearing tests and early diagnosis play a critical role in hearing healthcare services.

Aim: This study aims to retrospectively analyze reasons for admission of children who applied to the audiology clinic and the hearing test results and to determine the profile of childhood hearing loss.

Material and methods: This retrospective study includes data from 211 children who applied to the audiology clinic between July and December 2024. The demographic data, reasons for admission, hearing test results, and comorbid conditions of the children were analyzed.

Results: The children included in the study, 42.2% were female ($n = 89$) and 57.8% were male ($n = 122$), with an average age of 59.39 months ($SD = 34.72$) and 64.16 months (SD = 32.25), respectively. The most common reason for admission was hearing evaluation (27%), followed by suspected hearing loss (17.5%), open-mouth breathing and snoring (15.6%), middle ear infection (14.3%), speech delay (12.3%), and speech-language disorders (13.3%). Out of 211 children, hearing test result of 83 children were obtain from database, 55.42% of them had normal hearing, while 6.02% had very mild, 14.46% mild, 8.43% moderate, 4.82% moderate-severe, 6.02% severe, and 4.82% profound hearing loss. A significant proportion of children admitted for hearing loss evaluation had risk factors such as premature birth (4.74%), a history of intensive care unit (ICU) stays (8.06%), consanguineous marriage (1.42%), and a family history of hearing loss (1.90%). While 67.3% of participants ($n = 142$) had no additional medical conditions, 32.7% ($n = 69$) had various syndromic and non-syndromic disorders.

Conclusions: Childhood hearing loss requires early diagnosis and intervention. This study highlights the need to improve hearing screenings, identify risk factors, and adopt a multidisciplinary approach. Prematurity, ICU stays, and family history are significant risk factors. Children with comorbid conditions should be closely monitored. Screening programs should prioritize high-risk infants and children.

Keywords: hearing screening • pediatric audiology

(ID-6902) Serous otitis media and dynamic visual acuity in children: insights from functional head impulse testing

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Introduction: Serous otitis media (SOM) is characterized by fluid formation in the middle ear cavity. Although SOM mostly manifests itself with hearing loss, it also causes complaints related to the vestibular system in addition to hearing loss. The functional head impulse test (fHIT) was developed as a new test method to evaluate the functionality of vestibulo-ocular reflex (VOR) gain and dynamic visual acuity. In our study, it was aimed to examine the diagnostic contribution of the fHIT test to evaluate vestibular function in children with SOM.

Aim: The aim of this study was to evaluate the VOR functionality of children with SOM at different head accelerations in the lateral semicircular canal using the fHIT and to compare the Percentage of correct Answers (PCA) results obtained in fHIT with healthy children.

Material and methods: A total of 76 children, including 17 participants with unilateral SOM with a mean age of 6.82 ± 1.66 years, 25 participants with bilateral SOM with a mean age of 5.80 ± 1.58 years, and 34 participants with no health problems (control group) with a mean age of 6.85 ± 1.84 years, were included in this study. All participants underwent fHIT test only in the lateral semicircular canals. fHIT results were evaluated by total PCA and PCA values at head accelerations of 4000, 5000, 6000°/s^2.

Results: In our study, a statistically significant difference was obtained between the right lateral canal total PCAs (mean percentage of correct responses in the range of 4000–6000°/s^2) between the groups in lateral SSC ($P < .05$). In addition, a significant difference was obtained between the groups at 4000 and 6000°/s^2 in the right lateral canal ($P < .05$), but no significant difference was obtained at 5000°/s^2 in the right lateral canal and at all head accelerations in the left lateral canal ($P > .05$).

Conclusions: We suggest that SOM partially affects the VOR functionality and fHIT can be used to evaluate VOR functionality in children with SOM. Future studies should include more patients and examine the complementarity of fHIT with other vestibular tests evaluating the VOR.

Keywords: functional head impuls test • fHIT • serous otitis media • SOM • vestibulo-ocular reflex • VOR

(ID-6947) Significant effect of different types of speech processor on musical perception in adolescent cochlear implant users

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Introduction: Speech processors can be broadly classified into two categories: off-the-ear (OTE) and behind-the-ear (BTE). While the functions of these processors are exactly the same, the location of the external component on the head causes a noticeable variation in the placements of the microphones.

Aim: The aim of this study is to investigate the effects of BTE and OTE speech processors on the pitch and melody perception abilities of adolescent cochlear implant users.

Material and methods: A total of 17 adolescents, 9 BTE and 8 OTE users, between the ages of 12–18, who underwent cochlear implantation (CI) at Hacettepe University and were followed up at the audiology department were included in the study. Pitch Direction Discrimination (PDD) and Melodic Contour Identification (MCI) tests were applied to

the participants. A quick subjective test measuring the frequency of music listening, the enjoyment of music listening, and understanding of the lyrics was also administered to each participant.

Results: There was no statistically significant difference between the two groups in terms of duration of CI use ($p = 0.06$), but a significant difference was obtained in duration of CI daily use ($p = 0.005$). There was no statistical difference between the groups in the frequency of listening to music ($p = 0.30$), enjoyment ($p = 0.17$) and understanding lyrics ($p = 0.73$). No significant difference was observed in PDD thresholds between groups ($p = 0.16$), but a significant difference was obtained in MCI scores ($p = 0.01$).

Conclusions: Our study shows that processor type may be more important in more difficult tasks. This study particularly emphasizes the importance of speech processor type in terms of melody perception and daily CI use in adolescent CI users.

Keywords: music perception • pitch perception • speech processor

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(ID-6942) Speech Sound disorders and auditory processing

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Introduction: Children diagnosed with speech sound disorders (SSDs) encounter difficulties in speech perception, especially listening in background noise.

Aim: This study compared the auditory processing profiles of children with SSD and typically developing (TD) children as described by parent questionnaires, behavioral language and auditory tests, and auditory evoked responses.

Material and methods: Parents of 40 Greek Cypriot children 7–10 years old completed questionnaires related to listening characteristics of their children. The children were evaluated by a battery comprising language, phonology, auditory processing tests, and auditory evoked responses. Twenty four (24) children with a history of SSD and 16 typically developing (TD) children formed the experimental and control groups respectively.

Results: Significant differences between the groups included CHAPS questionnaire indices of performance in noise and quiet, phonological processing indices, auditory brainstem response interwave I–V latencies. There were significant correlations between ABR I–V latencies and behavioral indices of phonological processing like rhyme identification, first syllable localization, first phoneme identification, word finding, and word repetition.

Conclusions: These findings indicated auditory processing deficits in children with a history of SSD, even after completion of their treatment. There were moderate to strong correlations in performance in noise and quiet, phonological processing, and auditory pathway conduction times as indicated by ABR interwave latencies. Poor discrimination of speech in noise imposes discrepancies between incoming auditory information and retained phonological representations which disrupts the implicit processing mechanisms that align auditory input with phonological representations stored in memory. Clinicans may consider assessment of auditory processing in children with SSD to formulate more effective therapeutic intervention strategies.

Keywords: speech sound disorders • auditory processing • phonology

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(ID-6831) Symptoms of auditory processing disorders (APD) in children with tinnitus

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Introduction: Children rarely self-report having tinnitus and so there is limited understanding of the problems they face and how tinnitus affects their daily lives. In situations where peripheral hearing is normal and the patient reports difficulty understanding speech, one may consider the co-occurrence of other causes, such as central auditory processing disorders (CAPD).

Aim: The aim of the study was to assess the presence of CAPD symptoms in children with tinnitus.

Material and methods: The study group consisted of 10,582 children 13 years old. The study material included questions about tinnitus experience, screening pure tone audiometry, and the results of the Scale of Auditory Behaviors (SAB), in its Polish adaptation, which was used to assess whether they may have CAPD. Results In children with tinnitus, symptoms that may indicate CAPD were observed. In 2849 children, an SAB total score of less than 46 was obtained, an indication for an extended diagnosis. Among these same children 33.7% experienced tinnitus. The more frequently a child experienced tinnitus, the lower the mean overall SAB score.

Conclusions: Children reporting tinnitus should receive additional diagnostic tests for CAPD. The diagnosis should be multispecialty and, in addition to hearing tests, include an in-depth interview, psychological and pedagogical evaluation, and psychoacoustic tests.

Keywords: CAPD • tinnitus

(ID-6896) Technology use in young cochlear implant recipients and its differences from typically hearing peers

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Introduction: Technology is essential for communication and connection in adolescence. Young people with cochlear implants (CIs) face unique challenges and opportunities in engaging with the digital world. Understanding their technology use can help ensure they fully benefit from its potential.

Aim: the aim of our study was to obtain knowledge regarding the technological features of the devices that adolescences with CIs know and use, to investigate the ways in which they interact with technology, including social media, computer use and music listening, and to look into any differences between them and individuals with normal hearing (NH).

Material and methods: The study included 36 cochlear implant (CI) users (15 female, 21 male, mean age 18.2 ± 3.98, range 8–25) and 38 normal hearing (NH) participants (16 female, 22 male, mean age 20.2 ± 2.23, range 13–25). For CI users, being a stable unilateral, bimodal, or bilateral CI user for at least one year. The researchers designed a questionnaire to gather descriptive data on hearing loss (for CI users), technology use habits, communication habits, gaming habits, and demographic information about CI users and NH individuals.

Results: When technology usage habits were compared between the two groups, NH participants scored significantly higher for 'using technological tools to acquire new skills' ($U = 489.0$, z = –2.38, p = 0.025), 'web-based content production' ($U = 437.0$, $z = -2.94$, $p = 0.003$), 'messaging in daily life' ($U = 439.0$, $z = -2.74$, $p = 0.006$), 'using internet-based communication tools'($U = 476.0$, $z = -2.36$, $p = 0.018$), 'using bluetooth feature of electronic devices' ($U = 487.0$, $z = -2.18$, $p = 0.029$), and 'using internet-based applications in school and classroom work'($U = 496.0$, $z = -2.08$, $p = 0.037$), while CI users scored significantly higher for 'frequency of gaming' ($U = 450.0$, $z = -2.59$, $p = 0.010$),'having difficulty communicating while gaming'($U = 433.0$, $z = -2.90$, $p = 0.004$), and 'the need to use subtitles while watching videos' ($U = 460.5$, $z = -2.64$, $p = 0.008$). Also, CI users reported using the internet and technology mostly for watching videos (77.8%), social media (75.6%) and messaging (62.2%), while NH participants reported using it mostly for social media (94.9%), watching videos (74.4%) and listening to music (71.8%).

Conclusions: The results of the study indicate notable differences in technology usage patterns between young CI users and NH individuals. CI users may encounter challenges in certain aspects of technology use, which can shape their preferences and behaviors.

Keywords: cochlear implant • adolescence • technology

(ID-6852) The cochlear implant challenge in children with multiple disabilities over the past ten years

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The present contribution examines the last 10 years of medical literature on the benefits of cochlear implantation in children who are deaf or hard of hearing (DHH) with additional disabilities. The most recent literature concerning cochlear implants (CIs) in DHH children with additional disabilities was systematically explored through PubMed, Embase, Scopus, PsycINFO, and Web of Science from January 2012 to July 2023. We performed a two-stage search strategy and we selected a total of 61 articles concerning CI implantation in children with several forms of additional disabilities: autism spectrum disorder, cerebral palsy, visual impairment, motor disorders, developmental delay, genetic syndromes, and intellectual disability. Our results showed that, overall, many children with additional disabilities benefit from CIs by acquiring greater environmental sound awareness. This, in turn, improves non-verbal communication and adaptive skills, with greater possibilities to relate to others and to be connected with the environment. Instead, despite some improvement, expressive language tends to develop more slowly and to a lesser extent compared to children affected by hearing loss only. Further studies are needed to better appreciate the specificities of each single disability and to personalize interventions, not restricting the analysis to auditory and language skills, but rather applying or developing cross-culturally validated instruments able to reliably assess the developmental trajectory and the quality of life of DHH children with additional disabilities before and after CI.

Keywords: Usher syndrome • Waardenburg syndrome • autism • cerebral palsy • cochlear implant • intellectual disability

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(ID-6975) The effect of vascular loop syndromes on tinnitus

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Introduction: Tinnitus is the auditory perception of a meaningless sound without any external or internal acoustic stimulus. The prevalence of any form of tinnitus in adults ranges between 4.1% and 37.2%, with an average of 14.1%. The most common cause of tinnitus is said to be otologic disorders, primarily sensorineural hearing loss. The presence of a vascular loop formed by the anterior inferior cerebellar artery (AICA) in the internal acoustic canal has been described as potentially causing tinnitus by compressing the cochleovestibular nerve, although debates continue about the relationship between this condition and tinnitus.

Aim: In this study, we aimed to determine the frequency and types of vascular loop syndromes in patients presenting with tinnitus.

Material and methods: Patients who presented to the ENT clinic of Istanbul Aydin University Medical Park Florya Hospital with tinnitus between November 2021 and February 2025 were included in the study. Data from 115 patients who had temporal bone MRIs, consisting of 63 men (55%) and 52 women (45%), were analyzed. The age of the patients ranged from 6 to 78 years, with an average age of 45.3 years.

Results: Pathologies were detected in the MRIs of 53 patients (46%). In one patient, a tumor was found in the internal acoustic canal, 9 patients had mastoiditis, 2 had unilateral vertebral artery hypoplasia, 2 had both mastoiditis and unilateral vertebral artery hypoplasia, and 39 patients (34%) were diagnosed with vascular loop syndrome. of these 39 patients, 22 (56%) had type 1, 11 (28%) had type 2, and 6 (16%) had type 3 vascular loop syndrome. The cerebellopontine angle houses vital neurovascular structures such as cranial nerves V, VII, VIII, and the anterior inferior cerebellar artery (AICA), and its complex anatomy often leads to neurovascular compression syndromes.

Conclusions: Compression of the facial-vestibulocochlear nerve complex by AICA can lead to various clinical manifestations, including hemifacial spasm, tinnitus, and hemiataxia. Although vascular compression is a known cause of certain neuralgias, its relationship with otological symptoms such as tinnitus, hearing loss, and dizziness remains uncertain.

Keywords: tinnitus • anterior and inferior cerebellar artery vascular loop syndromes

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(ID-6858) The professional development course for therapists in Kyrgyzstan working with children with hearing loss

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The Lehnhardt Foundation has launched a unique project in Kyrgyzstan aimed at developing an online training course for therapists working with children with hearing impairments. In Kyrgyzstan the course is organized by the International Association of Hearing Rehabilitation Specialists in partnership with the State Pedagogical University in Bishkek. The course focuses on the rehabilitation of children with cochlear implants. The report presents the key stages of the project, including the analysis of the target audience's needs, creating educational materials, and conducting practical sessions and exams. It highlights positive outcomes like improved support for children and families, participant feedback, and challenges faced by organizers. The project aims to not only enhance and develop educators' professional skills but also foster a sustainable educational environment that supports the successful rehabilitation of children with hearing impairments. The professional development course is aimed at supporting practical skills for educators necessary when working in resource-limited environments, as well as raising awareness about modern methods and approaches to the rehabilitation of children with hearing impairments. The report outlines the structure and topics of the course, access to materials, and the timeline and format for completing the training. Thirty educators in Kyrgyzstan completed the training course, enhancing their knowledge of rehabilitating children with hearing impairments. Participants received a state-recognized certificate from the Pedagogical University in Bishkek, equivalent to 144 academic hours. Participants gain access to methodological materials for further application in their practice. Educators who successfully passed the exam are added to the registry (an open resource) of early intervention specialists. The Lehnhardt Foundation project marks a significant step in the field of inclusive education for children with hearing impairments in Kyrgyzstan. The Pedagogical University in Bishkek plans to integrate this course into the curriculum for final-year students. The introduction of a registry for early childhood educators helps parents from the regions to obtain information about educators near them. The implementation of the professional development course contributes to strengthening professional communities and creating a sustainable foundation for further improving the inclusive education of children with hearing impairments in Kyrgyzstan.

This unique initiative for Kyrgyzstan is implemented by the Lehnhardt Foundation with the support of the KIND Hörstiftung grant program.

Keywords: online training course • rehabilitation • cochlear implant and hearing aid • therapists education

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(ID-6897) The impact of ASMR and misophonia on emotion recognition

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Introduction: In everyday life, certain sounds can trigger involuntary physiological and emotional responses, leading to sensitivities categorized as misophonia and autonomous sensory meridian response (ASMR). These sensory experiences elicit subjective emotional reactions and can lead to functional and structural changes in brain regions associated with emotional perception.

Aim: This study aims to evaluate the auditory and auditory-visual emotional perception of individuals with ASMR and misophonia, which can also be defined as a difference in sensitivity to sound.

Material and methods: The ASMR-15 scale and the Misophonia Questionnaire (MQ) were initially administered to identify participants. Forty-eight individuals (mean age: 31,54 ± *SD* = 7,25) aged 18–45 years, with bilateral type A tympanograms and pure tone averages better than 20 dB, were included in the study. We then administered the Maudsley Obsessional Compulsive Inventory (MOCI), the Emotional Communication in Hearing Questionnaire (EMO-CHeQ), and auditory and video-based auditory/facial emotion recognition tests to the misophonia, ASMR, and control groups.

Results: No significant differences were found between the misophonia, ASMR, and control groups in the auditory and video-based auditory/facial emotion recognition tests ($p > 0.05$). Significant differences were observed between the misophonia and ASMR groups on the EMO-CHeQ, and between the misophonia and control groups on the MOCI ($p < .0.05$). Females' MQ scores were significantly higher than males', and males outperformed females in identifying the emotion of anger in the video-based auditory/facial emotion recognition test ($p < .0.05$). A negative correlation was found between increasing age and the recognition of surprised and neutral emotions in the auditory emotion recognition test ($p < .0.05$).

Conclusions: Age and gender may influence voice sensitivity and emotional perception. Consistent with the literature, a positive correlation was observed between the severity of misophonia and the likelihood of a diagnosis of obsessive-compulsive disorder. While there may be differences in the recognition of emotion in speech between individuals with ASMR and misophonia, further research is needed.

Keywords: autonomous sensory meridian response • ASMR • misophonia • emotion recognition

(ID-6909) The onset of facial nerve stimulation as a side effect ten years after cochlear implantation

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Introduction: Cochlear implantation (CI) restores auditory perception by directly stimulating the auditory nerve through electrical impulses, bypassing the damaged or nonfunctional cochlea. While CI is generally regarded as a safe procedure, postoperative complications have been documented in various studies. Among these, abnormal stimulation of the facial nerve has been identified as a significant complication.

Aim: This study aims to evaluate the potential causes and solutions of facial nerve stimulation occurring after long-term cochlear implant use.

Material and methods: A 2.5-year-old child received an Advanced Bionics HiRes 90K Advantage CI with a HiFocus 1J lateral wall electrode. At the time of implantation, electrode selection was not based on specific anatomical or clinical considerations. No signs of facial nerve stimulation were reported preoperatively or in the immediate postoperative period. A decade after implantation, the patient began experiencing facial nerve stimulation. When the cochlear implant processor was active, facial nerve stimulation was observed; however, no facial nerve stimulation occurred when the processor was turned off. Electrode integrity assessments, including electrophysiological tests (integrity tests), yielded results within normal limits. Radiological imaging confirmed bilaterally normal 7th and 8th cranial nerves, as well as normal middle and inner ear structures.

Results: Due to suspected soft device failure contributing to facial nerve stimulation and the patient's inability to use the implant, the initial cochlear implant was explanted and replaced with a Cochlear™ Nucleus® CI522 lateral wall electrode. However, facial nerve stimulation persisted following activation of the cochlear implant processor one month postoperatively.

Conclusions: In the literature, no reports have documented facial nerve stimulation caused by an active cochlear implant processor after ten years of implantation. However, in our case, the patient exhibited facial nerve stimulation. This finding underscores the need for individualized electrode selection in cochlear implantation, considering factors such as anatomical variations, prior implantation history, and long-term auditory outcomes. A multidisciplinary approach is essential for the optimal management of such cases. Lateral wall electrodes may increase the risk of facial nerve stimulation, especially in patients with anatomical predispositions. In such cases, perimodiolar electrodes could serve as a safer alternative by minimizing the likelihood of off-target electrical stimulation.

Keywords: facial nerve stimulation • cochlear implantation • lateral wall electrodes • perimodiolar electrodes

(ID-6860) Use of machine learning in ABR test findings in children: preliminary results

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Introduction: Auditory Brainstem Response (ABR) test is an important electrophysiological assessment used together with behavioral tests to diagnose hearing loss.

Aim: The aim of this study is to estimate the intensity threshold and latency of the V wave in ABR tests performed in children using machine learning methods. In this way, it is aimed to save time during the ABR test, contribute to early diagnosis in cases where the test cannot be performed due to sleep problems in children with special needs, and obtain more objective and reliable results by preventing late diagnosis problems.

Material and methods: In this study, a dataset consisting of 88 ABR waveforms consisting of 32 hearing-impaired and normal-hearing individuals from the pediatric group between the ages of 0–8 was analyzed using machine learning techniques. The V wave latency values of the ABR test were estimated using the deep learning model Artificial Neural Networks (ANN). The model was trained using the Levenberg-Marquardt technique for optimization using the MATLAB program.

Results: R^2 values were used to evaluate the performance of the model. The corresponding R^2 values of the training, validation and test sets were determined as 0.99, 0.97 and 0.92, respectively. The Levenberg–Marquardt algorithm was used to optimize the training and test parameters for data evaluation, aiming to estimate wave V features with maximum

precision. A classification accuracy of 92.9% was achieved for ABR waveforms matched with the trained machine learning model.

Conclusions: The preliminary results obtained demonstrate the potential of machine learning models to objectify and increase the accuracy of ABR interpretation. The results of this study are expected to significantly increase the diagnostic efficiency in pediatric audiology. The potential to reduce the time and level of expertise required for ABR assessments is expected to support a faster and more comfortable assessment process for patients and audiologists. The use of machine learning models has the potential to reduce the workload of audiologists in a clinical setting by enabling faster and more accurate ABR tests.

Keywords: pediatric hearing loss • machine learning • auditory brainstem response test

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(ID-6912) Visual perception in children with cochlear implants: preliminary results

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Introduction: Visual perception is the interpretation of visual information in the environment. It includes many components such as color-shape perception, spatial perception, motion perception, and figure-ground discrimination. Hearing loss affects sensory perception processes. This effect can also manifest on visual perception.

Aim: This study aims to evaluate the visual perception skills of children with cochlear implants as well as to examine the possible effects of hearing loss on visual perception.

Material and methods: Verbal and Nonverbal Cancellation Test was developed by Weintraub and Mesulam in 1985. The test is used to evaluate the spatial distribution of attention. The test evaluates cognitive skills such as visual-spatial perception, visual scan, sustained attention, reaction speed, and reaction inhibition. The test was standardized for Turkish society as part of the Neuropsychological Test Battery for Cognitive Potentials. Fifteen children aged 6 to 11, who were cochlear implant users and undergoing routine check-ups at the Hacettepe University Audiology Department were included in the study. Personal information was collected from the participants through a demographic information form. Then, the testing phase was carried out in a quiet room free from distracting stimuli.

Results: The results showed that children using cochlear implants exhibited differences in several types of subscores compared to the normative values of typically developing children. Similar or contradictory findings have been reported in the literature.

Conclusions: There is a limited number of studies in the literature on the visual perception skills of children with cochlear implants. This study aims to address this gap and presents our preliminary findings on visual perception in these children. Children should receive support in areas where differences are observed. Visual perceptual exercises should be integrated into rehabilitation programs.

Keywords: cochlear implant • cancellation test • visual perception • visual-spatial perception • visual scan

II Graduate and Undergraduate Projects

Graduate Project Presentations

(ID-6918) Auditory performance analysis of patients with bilateral simultaneous, bilateral intermittent and unilateral cochlear implants

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Aim: There are two applications of bilateral implantation, either simultaneously or intermittently. It is thought that bilateral simultaneous, bilateral intermittent and unilateral cochlear implantation are thought to have varying effects on hearing. The aim of this study is to evaluate the effects of these implantation types on auditory performance.

Material and methods: 105 children using cochlear implants in Gaziantep Hearing Center between October 2021 and January 2022 were included in the study. LIP, MTP and MAIS from the EARS test battery were administered to the participants.

Results: While 53 of the participants included in the study were men, 52 were women. The mean age of the participants was 44.05 ± 9.02 months. In our study, the scores obtained from the LIP, MTP test and MAIS questionnaire were found to be significantly higher as the participants' age increased. No statistical difference was observed when the scores of the test and MAIS questionnaire were compared. It was observed that the age of cochlear implant surgery was significantly higher in those who could not complete MTP12. In addition, a positive, weak and significant correlation was found between the age of cochlear implant surgery and MAIS scores. A positive correlation was found between the time between the two implants and the MAIS scores.

Conclusions: As a result, in our study, it was observed that auditory performance increased with age. There are studies compatible with this in the literature. There was no statistical difference between bilateral simultaneous, bilaterally intermittent and unilateral implantation. Studies have shown that bilateral implantation is more advantageous than unilateral, and bilateral simultaneous implantation is more advantageous than bilateral intermittent implantation. The reason why we obtained results that are inconsistent with the literature may be that the skills in the tests were acquired in the first 6 months of hearing.

Keywords: bilateral simultaneous • bilaterally intermittent • unilateral

(ID-6921) Development and usability evaluation of virtual reality-based auditory rehabilitation in children with cochlear implants: a pilot study

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Introduction: Cochlear implant users face challenges in central auditory processing skills, such as sound localization, auditory discrimination, temporal resolution and speech perception in noise. Interactive rehabilitation methods are considered to be effective in supporting central auditory processing skills in addition to traditional auditory training. Therefore, virtual reality applications that simulate realistic conditions are increasingly being used in rehabilitation processes.

Aim: This study aims to develop and evaluate the usability of a virtual reality restaurant simulation game designed to support central auditory processing skills in children with cochlear implants.

Material and methods: A restaurant game prototype consisting of six levels, ranging from easy to difficult, was developed, involving tasks such as understanding and accurately delivering customer orders. In the pilot study, the Game Observation Checklist, the Children's Game Evaluation Form, the System Usability Scale and One-on-One Interview Forms were used to assess the gaming experience of eight children with bilateral cochlear implants, eight normally hearing children and their parents. Usability was evaluated using these forms. Additionally, participants played the six level prototype and their game scores were compared across groups.

Results: The average System Usability Scale score was 84.69 for parents of normally hearing children and 85.94 for parents of children with cochlear implants. According to the Children's Game Evaluation Form, the parameters of ease of use, attitude, intention to continue, fun and satisfaction were found to be at a high usability level, exceeding 90% for both normally hearing children and children with cochlear implants. When comparing the game scores of the two groups, the normally hearing group obtained significantly higher scores at all levels compared to the cochlear implant group ($p < .0.01$).

Conclusions: The developed game demonstrated high usability and was well received by both children and their families. We consider this game to be a potentially innovative and supportive alternative to traditional auditory rehabilitation methods. It is planned to evaluate the effectiveness of the final version of the game. This research, derived from a doctoral dissertation, was supported by the Istanbul Aydin University Scientific Research Projects Commission with decision number 2024/11.

Keywords: cochlear implant • central auditory processing • virtual reality • auditory rehabilitation • usability

(ID-6924) Development of a mobile application for rehabilitation of decreased sound tolerance disorders in children and adolescents

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Introduction: Decreased sound tolerance disorders (DSTD) are a common condition in children and adolescents, characterized by hypersensitivity to sounds and the resulting in negative reactions to these sounds. DSTD is subdivided into subtypes such as hyperacusis and misophonia and can negatively affect individuals' daily lives. Current treatment methods are limited and generally require specialist follow-up rehabilitation. The aim of this study is to develop a mobile application for children and adolescents with DSTD that provides counseling and sound enrichment therapy content aimed at reducing discomfort with sounds.

Material and methods: The study will consist of the development and piloting phases of the mobile application. The counseling section will provide informational videos about hyperacusis and misophonia for children and their parents, while the sound enrichment therapy section will create custom stimulations from nature sounds, instrumental musics and complex noise sounds. After 14 users with autism spectrum disorder (ASD), a group in which DSTD is common, have used the app for at least one month, pre- and post-tests will be conducted and the results will be analyzed.

Results: The content of the counseling and sound enrichment therapy sections will be shaped in line with expert opinions during the development phase of the application. The content of the application will be optimized according to the experts' feedback. Then, the effectiveness of the application will be evaluated with a pilot study conducted on individuals diagnosed with ASD. At this stage, the effect of the therapy on symptom severity and discomfort level in individuals with DSTD will be investigated. It is expected to develop a successful application and analyze the feedback received from users. The project is supported by TUBITAK 2214 International Doctoral Research Fund.

Conclusions: This study will contribute to the limited studies on DSTD rehabilitation for children and adolescents and present an effective mobile application to improve sound tolerance. The app can be extended as an alternative for clinical therapies and can serve as a guide.

Keywords: counseling • hyperacusis • misophonia • mobile application • sound enrichment

(ID-6916) Evaluation of device satisfaction and quality of life of adolescent group cochlear implant users wearing behind the ear and not behind the ear

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Aim: BTE or OTE speech processors have advantages and disadvantages over cochlear implant users. In our study, it was aimed to evaluate the device satisfaction and quality of life of adolescent cochlear implant users with OTE and BTE processors.

Material and methods: In the study, 98 children using cochlear implants in Gaziantep Hearing Center between October 2021 – January 2022 were included in the study. Quebec Assistive Technology User Satisfaction Assessment (Q-YTKMD) questionnaire and Mf07-01 Study Quality of Life (Pf36) Form were administered to the participants.

Results: 58 participants were male, 40 were female, and the mean age was 14.66 ± 2.83. The service satisfaction level of BTE users was higher than the level of satisfaction they felt from the device, while OTE users were close to each other. A negative correlation was found between the age of starting to use cochlear implants and the level of device satisfaction in BTE and OTE users. OTE users' device and total satisfaction levels were found to be significantly higher than BTE users. In BTE and OTE users, a negative correlation was found between age and Energy/Vivacity/Vitality, which is the subtitle of quality of life. A positive and significant relationship was found between device satisfaction and quality of life in BTE and OTE users.

Conclusions: As a result, it has been observed that OTE users have higher device satisfaction than BTE users. However, in the literature review, there are results that are compatible with our study, but there are also inconsistent results. It has been determined that the increase in device satisfaction increases the quality of life. In addition, it has been observed that the age of starting to use cochlear implants affects device satisfaction and quality of life.

Keywords: speech processor • device satisfaction • quality of life

(ID-6824) Investigation of the effect of family education on language development of hearing impaired children

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This researchs goal is investigating the effects of family's education level on the language development. With this, other goals are, gender, early diagnosis, applying hearing aids, socio-economic level and family's education levels effect on deaf childrens language development. The Turkish Early Language Development Test (TEDIL) was used in the study.

Individuals diagnosed with hearing loss between the ages of 2 and 8 and using hearing aids or cochlear implants were included in the study. Individuals with additional disabilities other than hearing impairment were not included in the study. The study was carried out in "Özel Yekta Özel Eğitim ve Rehabilitasyon Merkezi" in Şanliurfa/Haliliye, April–June 2021. A total of 54 people participated in the study. 48.1% (26 people) of the individuals participating in the study were girls and 51.9% (28 people) were boys. The average age of the individuals participating in the study was 4 years and 9 months. In research, we looked at the difference between before family education and 2 months of family educations effects on language development. With the results, We seen major differences between family with high education, and poor education in those two tests ($p < .0.05$) gender, socio-economic level and family's education levels tiny effects on receptive, expressive, general language also seen ($p > 0.05$) with the family's education level, we seen that applying hearing aids and early diagnosis have major effects on receptive and expressive development and general language development ($p < .0.05$). As a result of the study, family education is related to receptive, expressive and general language development and early diagnosis and instrumentation is related to receptive, expressive and general language development, gender, socioeconomic level of the family and educational status of the family were not found to be related to language development.

Keywords: family education • deaf child • hearing • language • language development

Undergraduate Project Presentations

(ID-6978) Evaluation of central auditory abilities in experienced action video game players adolescents

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Introduction: Action video game playing is associated with enhanced visual perception. However, it has been observed that there are not enough studies examining auditory skills.

Aim: The aim of this study was to examine temporal processing and auditory memory skills in action video game players and individuals with little to no video game experience.

Material and methods: 39 action video game players and 35 individuals with little to no video game experience were included in the study. Frequency pattern test, duration pattern test, random gap detection tests were applied to the participants to evaluate temporal auditory processing skills. Digit span and backward digit span tests were applied to evaluate auditory memory capacity.

Results: There were no significant differences between the action video game playing and non-playing groups in frequency pattern (respectively, 69.74 ± 15.55, 68.85 ± 17.70, $p > 0.05$), duration pattern (respectively, 84.35 ± 14.69, 86.71 ± 13.71, $p > 0.05$), random gap detection (respectively, 7.16 ± 4.90, 8.91 ± 7.21, $p > 0.05$), digit span (respectively, 5.56 ± 0.71, 5.51 ± 0.98, $p > 0.05$) and backward digit span (respectively, 3.94 ± 0.81, 3.60 ± 0.82, $p = 0.05$) tests.

Conclusions: In conclusion, this study showed that auditory skills did not increase in action video game players. Further research is needed to evaluate the possibility of video games as an intervention tool, especially for individuals who may have auditory processing difficulties.

Keywords: video game players • temporal processing • auditory memory

Speech Presentations for Panelists/ Speakers

(ID-6952) Acoustic change complex: it's place in pediatric evaluation

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Acoustic change complex (ACC) refers to auditory cortical potentials elicited in response to a change in an ongoing, long-term auditory stimulus. Although ACC is recognized as a promising tool for assessing speech discrimination abilities, its clinical application remains limited. Previous studies have demonstrated the test-retest reliability of ACC in children and its feasibility for measurements in both infants and children has been established. Notably, ACC can be recorded in the absence of attention and, in some cases, may serve as a more sensitive measure of speech sound discrimination than behavioral assessments in infants. ACC has been utilized to investigate sound discrimination abilities in children with hearing loss, auditory processing disorder, and auditory neuropathy spectrum disorder. Furthermore, it can be recorded in young children and infants, both with and without hearing aids, and may have potential applications in fine-tuning hearing aid settings. Additionally, ACC may contribute to guiding rehabilitation strategies and identifying cochlear implant candidates. The technique can be applied in children with cochlear implants and auditory brainstem implants. Despite its advantages, ACC presents several challenges. Its reliability is influenced by age, and the choice of stimulus parameters – such as type, rate, duration, and interstimulus interval – can affect responses due to heightened neural refractoriness in children. Moreover, myogenic noise can complicate data analysis; in such cases, multichannel recordings may help improve the signal-to-noise ratio. Ensuring that the child remains quiet, alert, and still during testing is crucial; however,

achieving these conditions can prolong the ACC assessment process. Nevertheless, ACC remains a potential alternative to traditional methods. Future research should explore the relationship between objective ACC measurements and behavioral psychophysical tests in children, focusing on narrow age groups and diverse clinical populations with large sample sizes. Additionally, age-related effects should be carefully considered when applying, analyzing, and interpreting ACC data across pediatric populations.

Keywords: acoustic change complex • auditory discrimination • hearing loss

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(ID-6979) Advanced considerations in pediatric hearing aid fitting: evidence-based perspectives

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Pediatric hearing aid fitting is essential for early intervention, shaping language, cognition, and long-term communication. Timely diagnosis and amplification support neuroplasticity and optimize speech perception. This presentation explores evidence-based strategies, individualized fitting approaches, family engagement, and emerging technologies. Special emphasis is placed on complex cases such as auditory neuropathy spectrum disorder (ANSD), tinnitus management, and conductive hearing loss, including bone-anchored solutions.

Key principles of pediatric hearing aid fitting early identification and intervention: Early diagnosis and amplification are essential for auditory development, ensuring access to sound during critical language acquisition periods. Pediatric-specific hearing aids: Devices must be durable, tamper-resistant, and adaptable to anatomical growth. Role of the pediatric audiologist: Precise fitting, real-ear verification, and continuous monitoring ensure optimal auditory outcomes. Consistency and follow-up: Regular adjustments and parental education are crucial to sustaining hearing aid use and preventing developmental delays. Family engagement is fundamental in maximizing hearing aid benefit. Caregivers reinforce daily use, facilitate auditory learning, and advocate for educational accommodations. Interactive tools and children's literature on hearing loss promote self-confidence and social inclusion. Advanced considerations in pediatric hearing aid fitting speech perception in noise: Advanced signal processing, directional microphones, and remote microphone systems enhance speech clarity. Cognitive and neurodevelopmental factors: Individualized programming is required due to variations in working memory, auditory processing, and attention. Asymmetrical and unilateral hearing loss: Effective binaural hearing strategies help maintain auditory symmetry and enhance spatial awareness in children with asymmetric hearing loss. Smart hearing technologies: AI-driven and self-adjusting hearing aids provide personalized amplification, though pediatric validation remains necessary. Management of complex hearing loss cases: *ANSD*: Careful assessment of amplification benefit is required, with cochlear implantation considered when conventional aids prove insufficient. *Tinnitus*: Though uncommon, integrated sound therapy in hearing aids may mitigate symptoms. *Conductive Hearing Loss*: Bone-conduction and bone-anchored hearing aids including softband solutions, bypass the conductive pathway and provide direct cochlear stimulation.

A child-centered approach integrating clinical expertise, technology, and family support optimizes pediatric hearing aid outcomes. Evidence-based strategies refine pediatric amplification, ensuring accessibility, adherence, and long-term success.

Keywords: paediatric hearing aid fitting • early diagnosis

(ID-6973) Auditory and cognitive skills from assessment to therapy

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Auditory and cognitive skills are required for people to make sense of their surroundings, communicate successfully, and actively participate in learning processes. Assessing these skills in children and adults with hearing loss, as well as implementing appropriate treatment strategies, are critical components of auditory rehabilitation. Auditory and cognitive abilities must be considered simultaneously during the rehabilitation process since auditory perception is closely linked to cognitive functions and is not just dependent on hearing. The auditory information delivered by hearing aids or cochlear implants is only significant when combined with cognitive skills. Cognitive talents are essential for identifying and interpreting speech because they help people analyze, interpret, and respond to auditory stimuli. The cognitive processes involved in auditory perception can be stated as follows: *Selective attention*: Allows people to focus on the speaker's voice by separating it from the background noise. *Auditory memory*: Uses contextual signals to help you recall words inside a sentence. *Working memory*: Helps link words and sentences together during speech. *Semantic memory and auditory closure*: Auditory closure, in example, enables people to fill in missing or misheard words depending on the overall meaning of a statement. *Executive functions* (e.g., problem solving and information organization): Assist in understanding essential ideas during conversations and developing suitable responses. Language acquisition also requires cognitive ability. The link between auditory and cognitive processes is bidirectional: precise and consistent auditory input promotes cognitive functions, while well-functioning cognitive abilities enhance auditory perception. As a result, approaches that combine auditory and cognitive talents not only improve overall communication but also assist people in better integrating into society, thereby enhancing their quality of life.

Keywords: auditory skills • cognitive skills • hearing loss • rehabilitation

(ID-6929) Auditory Brainstem Implant Course/ Hands on workshop

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Auditory Brainstem Implantation (ABI) is a crucial intervention for patients with profound hearing loss or total deafness due to the absence of the auditory nerve or cochlea. Preoperative audiological evaluation begins with obtaining a detailed case history, including the onset and progression of hearing loss, and extends to a series of diagnostic tests. These include frequency-specific pure-tone or behavioral audiometry in each ear, speech audiometry, and electrophysiological evaluations such as ABR. In addition to these, radiological imaging for evaluation anatomical structures is very crucial. All these ensures the identification of patients who will benefit most from ABI and helps to predict post-implantation outcomes, enhancing the quality of life and auditory rehabilitation process. The multidisciplinary approach involving otolaryngologists, audiologists, and speech therapists is critical in achieving the best possible results. During surgery, utilisation eABR for assisting proper electrode placement in lateral recess is very crucial. The electrode contact points are stimulated via intraoperative test module of the software, neural responses are collected via an ABR device, which are linked to each other. By testing different channel combinations, depending on obtaining eABR responses, the placement of the electrode can be changed. Very often, the stimulation parameters are modified to obtain clear eABR waves, and removing response from the artefacts. Post-op programming, that is; initial fitting of the device is usually done around 4 weeks after the surgery as long as there are no medical considerations. Monitorization of the vital functions with a medical doctor is important during the initial fitting as serious side effects can occur. After the inital fitting, the electrical comfort and threshold levels are increased gradually in each programming session based on the subjective responses of the user. During these sessions, aided free field thresholds are obtained, both with pure tones and speech sounds. These also guide the clinician in device programming. The frequency of follow up visits are usually high in the first year of implantation. Not only device programming follow up sessions, but also auditory rehabilitation sessions are very crucial for optimal outcomes.

Keywords: auditory brainstem implants • pre-operative tests • intra-operative tests • post-op device programming

(ID-6944) Auditory implants and cognitive development: beyond hearing restoration

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Cognitive development is a multidimensional process that is closely linked to the development of other skills; difficulty or delay in one skill can negatively impact overall cognitive development in children. One of the key areas strongly associated with cognitive deficits is hearing loss. The deterioration in auditory input experienced by children due to hearing loss can negatively affect the normal development of cognitive, psychomotor, and behavioral skills. It has been reported that auditory implants not only improve communication skills but also enhance cognitive functions. Children with good hearing performance through cochlear implants can compensate for their sensory deficits in phonological encoding of speech through working memory and other cognitive skills. Although the number of studies investigating attention, memory, and language skills together in children using auditory brainstem implants is very limited, existing research has similarly suggested that auditory brainstem implants enhance not only language but also memory and attention skills. On the other hand, early cochlear/ auditory brainstem implantation plays a crucial role in supporting cognitive development by leveraging neuroplasticity. During early childhood, the brain exhibits high plasticity, allowing it to reorganize and adapt to auditory input more effectively. By providing access to sound at critical period, auditory implants facilitate the development of auditory pathways, which in turn enhances language acquisition, memory, and overall cognitive functions. Beyond merely restoring hearing, auditory implants serve as a catalyst for cognitive growth, enhancing neural plasticity, language acquisition, and overall cognitive function, ultimately shaping a stronger foundation for lifelong learning and development.

Keywords: auditory implants • hearing • cognitive

(ID-6828) Auditory N1 and N2 to pure-tone and consonant-vowel stimuli in developmental dyslexia: revisiting the anchoring-deficit hypothesis

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Introduction: Developmental dyslexia (DD) is one of the most studied disorders in childhood. The anchoring-defict hypothesis is viewed as a specific type of impaired-attention as an explanation to dyslexia deficits. Here we used auditory event-related potentials (AERPs) to shed light on these issues since several authors reported the existence of language and learning impairments. AERPs reflect the activation of different neuronal populations and are suggested to contribute to the evaluation of auditory discrimination (N1), attention allocation and phonological categorization (N2).

Aim: This study aims to investigate and document AERP changes in a group of children with DD and discuss auditory N1 as an eletrophysiological biomarker to DD, supported by the anchoring-deficit hypothesis.

Material and methods: AERPs were recorded to pure-tones and consonant-vowel stimuli (CV) in an auditory oddball paradigm in 7 Portuguese children with DD and 11 gender- and age-matched controls.

Results: Results revealed perceptual deficits for pure-tone and CV stimuli (pre-attentional and auditory discrimination) in DD, related to N1 reduced amplitude ($p < .0.05$; *Fz*: 2.57 μV, *Cz*: 2.75 μV), compared to control group.

Conclusions: the findings in DD group support the anchor-deficit hypothesis for explanation of neurolinguistic deficits. Future studies are required to test if the anchoring-deficit is inherited and validate de auditory N1 as an eletrophysiological biomarker for DD. Aknowledgments: this work was funded by the Grant (FCT, 2022.05618.PTDC) supported by the Portuguese Foundation for Science and Technology (FCT).

Keywords: N1 • N2 • auditory processing • developmental dyslexia

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(ID-6879) Beyond hearing: challenges in speech discrimination and localization in children with CI and ABI

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Children with inner ear malformations typically receive cochlear implants (CIs); however, when CIs are insufficient, auditory brainstem implants (ABIs) may be provided, sometimes in the contralateral ear. Cochlear implant technology imitates the tonotopic organization of the cochlea to stimulate the auditory nerve directly. In contrast, ABI bypasses the cochlea entirely and delivers electrical stimulation directly to the cochlear nucleus in the brainstem. This fundamental difference in stimulation sites of these modalities leads to distinct speech discrimination and localization differences and challenges. This presentation discusses the mechanisms underlying speech discrimination and localization difficulties in children using CI and ABI. One of the primary challenges faced by CI and ABI users is the limited ability to process spectral and temporal cues necessary for speech perception. Cochlear implants have evolved significantly, enabling many users to achieve high levels of speech understanding, particularly in quiet environments. However, limitations in conveying fine temporal structure and pitch cues persist, impacting speech perception in complex auditory environments. Auditory brainstem implant users frequently encounter greater challenges because the cochlear nucleus lacks a well-defined tonotopic organization. As a result, open-set speech recognition remains a challenge for many ABI recipients, even after prolonged auditory rehabilitation. Sound localization is another critical skill where CI and ABI users experience difficulties. Localization relies on binaural cues, including interaural time differences and interaural level differences, both of which are processed by the brainstem. While CI users can utilize some binaural cues when receiving bilateral implantation, ABI recipients often struggle due to the diffuse nature of electrical stimulation within the cochlear nucleus. This results in reduced spatial hearing abilities. Despite the challenges mentioned, advancements in implant technology continue to progress toward improving auditory outcomes. However, to optimize speech discrimination and spatial perception abilities in the mentioned cases, personalized rehabilitation programs are essential. Further research is needed to improve ABI stimulation strategies and CI-ABI integration and develop new therapeutic interventions. By addressing these critical issues, this presentation aims to provide insights into the auditory challenges faced by pediatric CI and ABI users and discuss future directions for improving outcomes beyond basic hearing.

Keywords: cochlear implants • auditory brainstem implants • speech perception • auditory localization

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(ID-6885) Bridging the gap: a technological support for auditory training in children

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The auditory training process is essential for children with hearing loss to develop appropriate auditory skills, support language acquisition, and progress in parallel with their peers. Today, the use of technology and electronic devices is not limited to adults but has become widespread among children. This situation allows for the effective use of technological tools for educational purposes, which becomes a significant advantage. With the advancement of technology, various computer-based auditory training programs have been developed and made available for people with hearing loss. There is evidence in the international literature that computer/software-based educational tools support auditory perception and language skills in people with hearing loss. There was a lack in this area in our country. Therefore, we aimed to develop a web-based auditory training program for children as a Ph.D. thesis. This project was supported by TÜBİTAK (Scientific and Technological Research Council of Türkiye) with the project code number 123E427. The developed application was developed as a web-based application because it is easily accessible to all segments of society, practical, updatable, and independent of time and place. Our training program is designed for children aged 3–10 years and consists of 6 modules and 38 sub-sections/games. There are 3 different levels of difficulty in each section, and a pass criterion of 70% is set for the transition between the different levels. An option to work in the presence of background noise was added to some modules in the application. There are different stimuli in our application (animal sounds, environmental sounds, phonemes, monosyllabic words, multisyllabic words, sentences, and speech stimuli in the presence of background noise) and all vocalizations were produced by a female and a male voice artist. The web-based auditory training program developed within the framework of our study has the distinction of being the first comprehensive web-based auditory training program developed for children aged 3–10 years in our country, which allows remote monitoring.

Keywords: application • auditory training • auditory rehabilitation • hearing loss

(ID-6855) Bridging the gap: the critical role of spectral discrimination in pediatric CI and ABI fittings

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Auditory development progresses through four key stages: detection, discrimination, identification, and comprehension. While detection and identification/comprehension are routinely assessed in clinical practice using pure tone and speech audiometry, discrimination is often overlooked. However, neglecting this crucial step limits our ability to optimize hearing aid, cochlear implant (CI), and auditory brainstem implant (ABI) outcomes. This presentation emphasizes the critical role of spectral discrimination in bridging the gap between audiometry and speech audiometry. We will discuss the rationale for discrimination testing, its development, and its integration into clinical practice. Additionally, we will explore its applications in measuring the benefit of a hearing aid, in CI candidacy, and post-operative CI and ABI follow-ups. Using real case studies, we will illustrate how discrimination abilities impact speech understanding. Integrating spectral discrimination testing into our practice in HA, CI, and ABI applications allows us to optimize patient care, ensuring a more comprehensive auditory assessment and improved patient outcomes.

Keywords: spectral discrimination • cochlear implants • hearing aids • auditory brainstem implants

(ID-6938) Central auditory processing disorder: what we have learned and what comes next?

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Central Auditory Processing Disorder (CAPD) is characterized by difficulties in perceiving and interpreting auditory information. This disorder cannot be diagnosed using standard hearing tests, as it results from deficiencies in the auditory processing mechanisms of the central nervous system. Auditory discrimination, auditory pattern recognition, and temporal auditory processing are fundamental components of central auditory processing. The proper functioning of these components directly influences speech perception and language development. In several research studies in which I have participated, the temporal and suprathreshold auditory processing abilities of individuals from different pathological groups were evaluated, revealing significant differences in the diagnostic process. These findings emphasize the critical importance of assessing various auditory processing abilities across different pathological populations. However, for an accurate diagnosis of CAPD, test batteries must be adapted to the linguistic and cultural characteristics of the target population. In Türkiye, there is a need for reliable and scientifically validated tests for CAPD diagnosis. The limited availability of tests incorporating Turkish speech sounds, words, and sentences poses a significant challenge in the diagnostic process. As part of the Türkiye-Anatolia Central Auditory Processing Disorder Screening and Diagnostic Test Battery, developed by Prof. Fulya Yalçinkaya, a data collection process was initiated in February 2022, starting with young adults (18–25 years old), and is currently continuing with children (5–17 years old). I have been actively involved in this process, which is now approaching its final stages. Within the study, the screening tests applied include bilateral frequency tone pattern tests, auditory figure ground, dichotic sentence tests, dichotic word tests, and filtered word tests. For diagnostic purposes, dichotic frequency tone pattern tests, dichotic monosyllabic competing tests, and time-compressed sentence tests were administered. Upon completion of this research, the normative data obtained will contribute to the development of standardized tests for CAPD diagnosis in Türkiye. Consequently, early diagnosis of CAPD will be facilitated, and individualized therapy programs will be developed. The findings of this study will serve as a guideline for Turkish clinicians and researchers, providing a scientifically grounded approach to CAPD screening and diagnosis.

Keywords: central auditory processing disorder • auditory processing tests • Turkish diagnostic battery • normative data

(ID-6976) Clinical experiences in cases with additional disabilities

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Any physical, mental, emotional or behavioral impairment that makes the education of a child with hearing loss more complex is defined as an "additional disability". Hearing loss cases with additional disabilities face greater difficulties in audiological evaluation and auditory rehabilitation follow-up. This patient group should be followed with a multidisciplinary and interdisciplinary approach, in cooperation with relevant departments. Individuals with hearing loss and additional disabilities represent a diverse and complex group. They vary in terms of the type and degree of hearing loss, the type and degree of accompanying disabilities, and their general level of functioning. The Gallaudet Research Institute (GRI) has stated that approximately 41% of children with hearing loss have additional disabilities. The most common of these is intellectual disability, followed by learning disabilities and visual impairments. The percentage of additional disabilities seen in children with hearing loss is as follows: visual impairment 5.5%, intellectual disability 8.3%, autism 1.7%, physical disability 4.4%, specific learning disability 8%, attention deficit hyperactivity disorder 5.4%, emotional disability 1.8%, other 14.3%. It has been shown in many studies that patients with additional disabilities can obtain significant benefits from hearing technologies during their daily living activities and in educational environments. Audiologists need to provide counseling regarding the benefits of the use of amplification devices and the patient's expectation level. The goals of auditory rehabilitation may vary in individuals with additional disabilities of hearing loss. The degree to which functional residual hearing is maximized depends not only on the degree of hearing loss but also on the extent, degree, or impact of more than one disability that may be more predominant. As a result, auditory rehabilitation in these patients requires teamwork and more knowledge, experience, patience, effort and time. The support provided to these patients through

a holistic approach and appropriate rehabilitation programs is important in improving the quality of life of both the patient and their family.

Keywords: hearing loss • additional handicap • aural rehabilitation

(ID-6927) Clinical experiences: difficult cases and solutions

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Managing children with hearing loss presents unique challenges, particularly in complex cases where standard approaches may not yield the desired outcomes. These difficult cases often involve comorbid conditions, anatomical abnormalities, late diagnoses, or limited access to early intervention services. Drawing upon clinical experience and evidence-based practices is essential to developing tailored strategies for optimal outcomes. One common challenge is managing children with auditory neuropathy spectrum disorder (ANSD). Traditional amplification may not always be effective, and the variability in auditory nerve function complicates intervention planning. Cochlear implantation can be a viable solution, but careful patient selection, detailed electrophysiological assessments, and longitudinal monitoring are necessary to assess auditory development and speech perception. Another complex scenario involves children with additional disabilities, such as autism spectrum disorder or cerebral palsy, where hearing loss intersects with broader developmental needs. Multidisciplinary collaboration is critical, integrating audiologists, physiotherapists, occupational therapists, and educators to create holistic, individualized intervention plans. Children with cochlear malformations or ossified cochlea present surgical and rehabilitation challenges. In such cases, advanced imaging techniques guide surgical decision-making, while tailored programming and auditory-verbal therapy enhance outcomes. For those with partial electrode insertions or compromised cochlear anatomy, electro-acoustic stimulation or hybrid devices may provide a functional auditory range. Additionally, late identified children often exhibit significant language delays, necessitating intensive therapy and parental guidance to facilitate language acquisition. Ultimately, successful management of difficult pediatric hearing loss cases relies on clinical expertise, continuous adaptation, and close family involvement. By leveraging interdisciplinary collaboration and emerging technologies, audiologists can navigate complexities and empower children to achieve their full communicative potential, reinforcing the importance of early and individualized interventions in auditory rehabilitation.

Keywords: hearing loss • additional disabilities • auditory neuropathy • inner ear malformations

(ID-6953) Cognitive and communication outcomes in adult cochlear implant users: insights from prelingually and postlingually deafened populations

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Introduction: Assessing speech recognition outcomes in pediatric cochlear implant (CI) users has long been a focus of clinical and research efforts. However, the clinical population of CI users increasingly consists of both early-implanted, prelingually deafened children who reach adulthood and postlingually deafened adults implanted later in life. Current speech recognition assessments may fail to capture the complexities of real-world communication challenges in these adult groups. Particularly, high-variability speech (e.g., multiple talkers, accents, dialects) presents substantial challenges, requiring a broader approach to evaluating communication outcomes in these populations.

Aim: This tutorial session will discuss the need for more ecologically valid measures to assess long-term outcomes in both prelingually and postlingually deafened adult CI users. We will provide an overview of our studies on high-variability speech recognition, indexical processing (e.g., talker and accent identification), and the role of cognitive factors in shaping communication outcomes and variability in these populations.

Material and methods: First, we will highlight the limitations of traditional speech recognition assessments in capturing real-world communication challenges. Then, we will discuss findings from studies comparing early-implanted adult CI users, postlingually deafened adult CI users, and normal-hearing peers on high-variability speech recognition tasks. We will examine how cognitive factors – such as working memory, executive function, and phonological processing – contribute to performance.

Results: Adult CI users, both early-implanted and postlingually deafened, face distinct challenges dealing with high-variability speech compared to normal-hearing peers. However, our findings reveal key differences between prelingually and postlingually deafened CI groups, particularly in adapting to talker and linguistic variability. Standard clinical tests may overestimate real-world speech recognition abilities, since they do not account for talker adaptation, indexical processing, linguistic variability, or cognitive effort. Finally, individual differences in cognitive skills are associated with variability in speech perception outcomes, emphasizing the need for a comprehensive approach to better understand outcomes and address patient needs.

Conclusions: Speech recognition assessments must go beyond conventional clinical measures to optimize long-term outcomes both for pediatric CI users transitioning into adulthood, and postlingually deafened adults. Incorporating high-variability speech tests and cognitive-linguistic assessments will provide a more accurate representation of real-world communication abilities and inform targeted interventions for adult CI users.

Keywords: cochlear implants • children • adults • real world communication

(ID-6969) Enhancing language development: the role of cognitive skills in auditory implants

Çağla Dikderi

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The intersection of cognitive skills and auditory implants marks a dynamic field in enhancing language development for children with hearing impairments. Language acquisition involves more than receiving auditory input; it is closely linked to cognitive skills like memory, attention, and executive functions. These skills are essential for understanding and processing language, and their development is crucial for children using auditory implants, who often face challenges in language learning due to hearing loss. Auditory implants have emerged as key tools in overcoming the challenges of hearing impairments by providing access to sound, thus facilitating language development. Their effectiveness is significantly increased when accompanied by robust cognitive skills. Research indicates that children with auditory implants who develop these skills concurrently experience accelerated language acquisition and improved linguistic performance. Cognitive skills such as working memory and attention play critical roles in retaining phonological information and focusing on relevant auditory cues in noisy environments, contributing to more effective language learning. During critical developmental periods, the brain's plasticity is at its peak, allowing for more effective integration of auditory input with cognitive processes, thus promoting the development of strong language skills. Beyond restoring hearing, auditory implants also enhance cognitive functions foundational to language development, academic success, and social interactions. Innovative approaches combining auditory implant technology with targeted cognitive interventions hold promise for even greater strides in language development. In conclusion, while auditory implants provide necessary auditory input for language learning, the simultaneous development of cognitive skills is essential. This dual focus significantly enhances language development, providing children with a strong foundation for lifelong learning and effective communication.

Keywords: language development • auditory implants • cognitive skills

(ID-6919) Hearing in noise and current approaches

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Hearing in noisy environments remains one of the most significant challenges for individuals with hearing loss and is a primary complaint among hearing aid users. Traditional pure tone audiometry, while essential for diagnosing hearing loss, does not provide insight into a person's ability to understand speech in noise. Since background noise severely impacts speech perception, accurate speech-in-noise assessments are crucial for tailoring hearing aids and improving communication in real-world settings. Several speech-in-noise tests have been developed to address this issue. However, despite their clinical availability, these tests are not widely used across clinics worldwide due to factors such as test duration, language dependency, and the need for specialized equipment. Recent advancements emphasize the importance of ecological validity, meaning that test conditions should closely mimic real-life listening environments. The Ecologically Valid Hearing in Noise Test was introduced as an improved version of Hearing in Noise Test, incorporating alternative noise signals and a more effective speaker setup to enhance realism. In this test, multiple speakers are strategically positioned around the listener to better replicate everyday listening conditions. While Eco-HINT improves accuracy in assessing hearing difficulties in noise, its implementation requires specialized test environments and equipment, making widespread adoption a challenge. Another recent approach is the Audible Contrast Threshold test, which provides an alternative to traditional speech-in-noise evaluations. Audible Contrast Threshold utilizes spectrotemporally modulated noise signals to determine how much "contrast" a person requires to differentiate sounds in noisy environments. By presenting noise samples through headphones and analyzing patient responses, Audible Contrast Threshold objectively measures the level of hearing aid support needed in complex listening situations. Unlike conventional tests, Audible Contrast Threshold does not rely on speech materials, making it more adaptable across different languages and clinical settings. These current approaches offer promising improvements in hearing in noise. As audiology continues to evolve, these new methodologies will play a crucial role in providing personalized hearing solutions and improving the overall quality of life for individuals with hearing impairments.

Keywords: hearing in noise • audible contrast threshold • ecologically valid • current

(ID-6939) Hearing in Noise Test (HINT): from normalization to clinical practice

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Speech perception in noise is a complex process influenced by both auditory and cognitive factors. Younger children often experience greater difficulty in noisy environments due to their developing cognitive and auditory skills. To ensure accurate assessment, age-specific norms were established for both the adult version of the Turkish Hearing in Noise Test (HINT) and the Turkish Hearing in Noise Test for Children (HINT-C). These norms enable clinicians to reliably interpret test results and consider developmental factors in speech-in-noise evaluations. After normalization, HINT began to be used in clinical settings to assess speech perception abilities in children with hearing aids and cochlear implants. In our studies, we found that children using hearing aids typically require a higher signal-to-noise ratio (SNR) than their normal-hearing peers to achieve similar speech perception performance. Additionally, in children with cochlear implants, we observed that chronological age had a greater impact on speech recognition performance than age at implantation or inter-implant interval. Despite its clinical relevance, standard HINT testing

requires an audiometric test room, limiting accessibility in certain settings. In our ongoing study with normal-hearing adults, we aim to establish reliable norms without the need for a controlled testing environment. Future directions include expanding normative data for older adults and diverse hearing profiles, integrating HINT into routine assessments, and promoting clinician training for widespread implementation. These advancements will enhance the test's applicability and improve speech-in-noise evaluations across various settings.

Keywords: speech perception in noise • HINT • HINT-C

(ID-6881) Hearing rehabilitation in children at the Ferrara University Hospital

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Fitting hearing devices to infants requires special consideration at each stage of the process. Congenital hearing loss (HL) has implications for the hearing development of children, as well as their language, academic and social development. Hearing rehabilitation, with hearing aids (HAs) and Cochlear Implants (CIs), provide the basis for improving audibility and minimizing developmental delays in children with mild to profound hearing loss. In the assessment stage, electrophysiological hearing threshold estimates, especially in case of infants, must be set appropriately so that an accurate fitting can occur. In case of toddlers and preschoolers, behavioural testing can provide further threshold assessment. Indubitably, the verification that the electroacoustic performance of the hearing device meets the auditory features of the infant or toddler is a vital part of the process. Also, the evaluation of the effectiveness of the device completes the hearing device fitting process for infants with hearing loss. Aim of this presentation is to describe all the features of this process at the paediatric audiology of the University Hospital of Ferrara.

Keywords: hearing loss • rehabilitation • children

(ID-6984) Hearing screening

Şule Çekiç

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Hearing screening is the systematic application of a test or assessment under certain protocols to identify individuals with hearing impairment/disability in order to direct them for further assessment. This can be applied to all groups from newborns to geriatrics and performed using subjective and objective methods for the purpose of early diagnosis of hearing loss under certain programs. The screening programs have many components to ensure a successful screening, subsequent evaluation and follow-up. The population to be screened, the tests to be used, the protocol to be followed and the planning for the subsequent procedures are the primary among them. One of the most important of these components is the presence and support of the families. For example, the success or failure of the child's treatment may depend upon the parents' approach. This means, satisfied parents will cooperate well with healthcare providers, correctly follow the treatment plans, and be more likely to take the children for follow-up visits. Regardless of the age group, presence and participation of families in hearing screening programs is essential. When evaluating the success of a service, it is very important to consider the opinions of the service users. Since parents and/or other relatives of the patients are also service users, they should be included in all screening, diagnosis, and intervention activities. This highlights the importance of assessing the satisfaction level of parents and/or other relatives of the patients for the success of the hearing screening programs. Satisfaction measurements encourage good cooperation with the families. Reporting satisfaction with hearing screening programs is important to fulfill service providers' responsibility for public accountability, beyond better understanding users' expectations of the services to improve quality of care. However, it is seen that in many programs the satisfaction is unmeasured and/or unreported in different processes of the program. On the other hand, the cut-off criteria (critical values) for satisfaction level also are undetermined. As a conclusion, the users of the services should be included in all screening, diagnosis, and intervention activities processed by the service providers. Protocols must cover activities to support families and users' satisfaction measurements.

Keywords: hearing screening • families • satisfaction

(ID-6908) Hearing screening developments worldwide: are we making progress?

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Introduction ◆ Cost-effective detection of hearing disorders (new technology and devices) ◆ Newborn and later screens for hearing loss ◆ Audiology service user/ consumer views & quality audits ◆ Collaborative research opportunities – across borders and professions. The author will briefly summarise any progress highlights she has seen over her long career in audiology and participate in the panel discussion.

Keywords: hearing screening progress

(ID-7081) Medical research and pediatric audiology

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This presentation will include: 1) information about clinical trials of vaccine development for cCMV (cytomegalia virus), 2) screening for the cCMV after birth and challenges, and 3) treatments for hearing disability and additional disabilities after birth that are pharmaceutical, technological and therapeutic interventions. Prevalence of cCMV as a cause of hearing loss in children will be presented. Information about current gene therapy clinical trials for auditory neuropathy spectrum disorder as a result of the Otoferlin gene, prevalence of the otoferlin gene among children with hearing disorder and auditory neuropathy spectrum disorder will

be provided. Research on long QT, gene therapy clinical trials and FDA approved gene therapy for retinitis pigmentosa, gene therapy research and Alzheimer's disease and research with mice for presbycusis and its relationship to pediatric audiology will be presented. The ethical issues that have been raised about gene therapy are complex and will be discussed.

Learning objectives:
- participants will be able to describe the clinical trials that are now being conducted for a vaccine for cCMV;
- participants will be able to describe ethical issues of vaccine development and use;
- participants will be able to describe gene therapy clinical trials for Otoferlin, research on long QT, retinitis pigmentosa, Alzheimers and presbycusis and the relationship to pediatric audiology;
- participants will be able to describe the ethical issues that have arisen about gene therapy and hearing disorders.

(ID-6967) Multidisciplinary approaches for children with hearing loss and multiple disabilities: a comprehensive perspective

Deray Derim

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Optimal auditory experiences are essential for normal neurodevelopmental processes in infants and children. The ability to develop age-appropriate cognitive and linguistic skills is highly dependent on adequate and consistent exposure to auditory stimuli. If infants are unable to discriminate phonetic contrasts during the first year of life – due to hearing loss, environmental noise, attention deficits, dyslexia, intellectual disabilities, or other neurological conditions –their language acquisition, developmental trajectories, and academic achievements are significantly compromised. Hearing is a complex process involving both audibility (the ability to detect sounds via the peripheral auditory system) and intelligibility (the capacity to discriminate phonemes and assign meaning to auditory input through central auditory processing). The brainstem and auditory cortex are composed of intricate neural networks that facilitate spoken and written language acquisition. Any degree of hearing loss exceeding 15 dB can disrupt speech perception and learning (Martin, 1990). Additionally, individuals with hearing loss may detect speech sounds but struggle with comprehension, particularly in challenging listening environments. Beyond auditory impairment, the presence of co-occurring disabilities – such as autism spectrum disorder (ASD), attention-deficit/ hyperactivity disorder (ADHD), intellectual disabilities, cerebral palsy, genetic syndromes, and dyslexia – further complicates speech and language development. External factors, including delayed diagnosis, lack of amplification, insufficient rehabilitation, and poor interdisciplinary collaboration, can exacerbate these developmental challenges. This review emphasizes the necessity of early diagnosis and structured, multidisciplinary intervention strategies to optimize developmental outcomes for children with multiple disabilities. While advancements in auditory technology (e.g., hearing aids, cochlear implants) provide access to sound, they do not automatically lead to improved speech perception or language acquisition. Children's auditory neural plasticity, cognitive prediction skills, and social experiences differ significantly from those of adults, necessitating individualized and comprehensive intervention plans. A successful rehabilitative framework must incorporate: 1. A multidisciplinary team, including audiologists, speech-language pathologists, special educators, occupational therapists, music therapists, physiotherapists, and aquatic therapy specialists. Interventions should integrate auditory, cognitive, and neurolinguistic strategies. 2. Family-centered approaches, ensuring active parental involvement and home-based reinforcement of therapeutic goals. Intensive and regular rehabilitation enhances peer integration, developmental progress, social adaptation, and overall well-being. This paper discusses the latest evidence-based approaches for the management of children with hearing loss and coexisting disabilities, highlighting the role of interdisciplinary collaboration in optimizing outcomes.

Keywords: hearing loss • multiple disabilities • auditory processing • multidisciplinary intervention • language development • speech perception • pediatric rehabilitation

(ID-6930) Perception of Indexical Cues in Children and Adults (PICKA) and hearing devices

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Voice is a significant component of speech communication. The human voice can convey talker-specific information through indexical cues, such as speaker identity (e.g., age, sex) and emotional state (is the talker happy or angry?). Voice can also directly contribute to speech understanding, for example through speech segregation in cocktail-party listening. These are situations where listeners with hearing loss have most difficulties. Yet, no clinical test exists for voice and emotion perception, and hearing devices are not yet fitted for these purposes. The PICKA project was set up to unravel the role of voice perception for speech comprehension and identify the difficulties that children and adults with hearing devices (hearing aids, cochlear implants) experience in voice and speech perception. In addition, this project aimed at developing diagnostic tools that can be widely used in clinical settings and in various languages and countries. The PICKA project uses a test battery consisting of four tests, presented through a child-friendly serious game-like interface, each targeting a different aspect of voice or speech perception. The Fishy test measures voice cue sensitivity using an adaptive procedure. The Voice Gender test assesses how voice cues are used and weighed in a voice gender categorization task. The Child-friendly Coordinate Response Measure (CCRM) assesses how voice cues are used to discriminate between competing talkers in a speech perception task with single-talker speech maskers. The EmoHI test measures vocal emotion recognition of three basic emotions (happiness, sadness, anger) in non-language specific pseudospeech. This tutorial session will provide an overview of the PICKA project in three parts. Part one will focus on the background of the PICKA project and will provide an overview of the test populations. Part two will focus on efforts for making the project internationally applicable,

using Turkish as an example, by presenting the selection and preparation of the Turkish stimulus material and the design of the Turkish PICKA version. Part three will focus on statistical methods that can be used to characterize childhood developmental trajectories with and without hearing loss, and to investigate interactions with hearing status at the individual level and at a group level.

Keywords: voice • emotion • children • development • hearing loss • hearing aid • cochlear implant

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(ID-6957) Psychosocial effects of neurodevelopmental processes and neuromaturation: supporting the child and family in rehabilitation

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Neuromaturation is the development of the nervous system, essential for cognitive, emotional, and social growth. This process is influenced by genetic factors, environmental stimuli, and early sensory experiences. For children with hearing impairments, auditory rehabilitation plays a vital role in shaping their linguistic, cognitive, and emotional development. A key psychological need during neuromaturation is secure attachment, which is formed through consistent and responsive caregiving. Children with hearing impairments may struggle with attachment due to communication barriers, making early intervention programs crucial for emotional well-being. Other psychological needs include emotional regulation, autonomy, social interaction, exploration, and the establishment of boundaries. A nurturing environment fosters neurological and psychological well-being, supporting healthy development. Auditory rehabilitation enhances brain plasticity, emotional regulation, and sensory integration while strengthening attachment and improving social skills. It includes interventions like hearing aids, cochlear implants, and auditory-verbal therapy. Parental involvement is critical in ensuring successful outcomes, as research highlights its impact on children's linguistic and cognitive abilities. Family dynamics significantly influence neuromaturation. Secure attachment, emotional support, effective communication, stress management, and environmental stimulation all contribute to development. Parents of children with hearing impairments may experience emotional stress and uncertainty, making psychological counseling and parental training essential for strengthening the parent-child bond. In conclusion, neuromaturation in children, especially those with hearing impairments, depends on secure attachment, auditory rehabilitation, and supportive family dynamics. Early intervention, parental engagement, and a nurturing environment are key to optimizing their cognitive, emotional, and linguistic growth. Future research should focus on enhancing auditory rehabilitation strategies to improve overall well-being in these children.

Keywords: neuromaturation • child and adolescent • psychiatry • parenting • rehabilitation

(ID-6985) Selected topics in pediatric audiology: section 3

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Assessment, diagnosis and management of hearing loss in infants and children are main interests for audiologists. The pediatric population, which is a large population from newborn to adolescent, can experience many different hearing-related problems. Audiologists access pediatric cases at many different locations and provide a wide range of services. Hearing screening, diagnosis, treatment and therapies are primary topics of pediatric audiology. Beyond these, there are many other topics related to pediatric audiology, with many subheadings. For example, in patients with unilateral hearing loss, diagnostic procedure and intervention options vary significantly. Moreover, different clinical approaches can also be observed across childhood. Another subject, audiological evaluation in children with multiple disabilities, ensuring that they receive the appropriate care and support. The last example, education varieties regarding audiology and speech language therapy which brings differences in professional practice of audiologists on a global scale. By exploring all these topics, this session provides insights into best practice in pediatric audiology. The approaches to pediatric populations in different countries are also discussed.

Keywords: pediatric audiology • auditory rehabilitation • multidisciplinary approaches

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(ID-6926) Speech perception in noise of pediatric cochlear implant users: performance and influencing factors

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Hearing loss negatively affects speech intelligibility and leads to impaired speech understanding. Studies have shown significant differences in speech understanding between individuals with mild hearing loss and those with profound hearing loss. Implementing universal newborn hearing screening has significantly improved the early diagnosis of hearing impaired children. Advances in newborn hearing screening and hearing technologies have enabled children to use hearing aids or cochlear implants (CI) at an early age. Despite early intervention, children with hearing loss still face significant challenges, particularly in noisy environments such as schools. High noise levels and reverberation can negatively affect speech perception, reading abilities, auditory attention and academic skills. Considering these challenges, educational environments present further barriers for children with hearing loss. Moreover, children with hearing loss require a higher signal to noise ratio (SNR) than their normal hearing (NH) peers to achieve comparable speech perception performance. Studies have shown that children with cochlear implants have significantly poorer performance compared to NH children.

Additionally, children with CI are unable to benefit from voice pitch differences between target and masker speech. This further complicates their ability to understand spoken language in noisy environments. Advances in hearing technology, assessing speech perception in noise remains challenging, especially for young children. However, standardized speech in noise tests specifically designed for young children are limited. We have developed a new computer-based speech recognition test specifically designed to assess the performance of preschool aged children in noise. Speech recognition score variability in cochlear implant users is influenced by multiple factors, including age, duration of deafness, etiology, and linguistic and cognitive abilities. Additionally, studies have reported that working memory, attention, and speech perception in noise are intricately linked. Speech in noise tests should be used to evaluate this variability and to determine the efficacy of the assistive technology utilized. These tests offer a more accurate representation of realworld listening conditions and provide a more comprehensive assessment of functional communication skills.

Keywords: cochlear implant • pediatric audiology • speech in noise

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(ID-6870) Technological developments in auditory training and rehabilitation

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Hearing loss is a significant health issue that directly impacts individuals' language, communication, and cognitive development. Contemporary advancements in auditory rehabilitation and training are essential for enhancing the quality of life for individuals with hearing loss. This presentation will examine auditory training programs designed for individuals with hearing loss and the impact of digital technologies on the auditory rehabilitation process. Auditory rehabilitation encompasses sensory management, knowledge and skill (instruction), counseling, and auditory training. Innovative methods, including tele-audiology, artificial intelligence-driven auditory analyses, and mobile applications, serve as alternatives to conventional rehabilitation techniques and yield substantial improvements in the rehabilitation of individuals with hearing loss. In particular, applications that facilitate the understanding of speech in noisy environments and support communication using technology for individuals with hearing loss are noteworthy. In recent years, digital technologies, mobile applications, and personalized training programs have offered significant solutions to enhance the quality of life for individuals with hearing loss by improving their speech perception and communication abilities. Computer- or application-based auditory training programs, digital filtering systems that enhance speech signals, and applications integrated with hearing aids facilitate more effective communication for individuals in daily life. In auditory training for individuals with hearing impairment, alongside conventional methods, computer-based and mobile application-based programs gain prominence. Systems such as the Duyu-Yorum Computer-Based Auditory Training Program contribute to the development of cognitive and auditory perception by improving the auditory processing skills of individuals with hearing loss. This presentation will examine various auditory training methods for hearing loss in children and adults, along with current research in speech recognition, environmental sound awareness, music-based auditory training, and phonological awareness studies. The presentation will address the sustainability and efficacy of contemporary auditory rehabilitation and training programs, as well as potential innovative approaches for individuals with hearing loss. The potential of technological advancements in enhancing auditory skills will be assessed, and necessary studies in this area will be highlighted.

Keywords: auditory rehabilitation • assistive technology • auditory training, tele-audiology

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(ID-6974) Tele-audiological assessment: perspectives in the literature

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Telemedicine is defined as "the delivery of healthcare services and information via high-tech telecommunications technologies". The American Academy of Audiology (AAA) and American Speech-Language-Hearing Association (ASHA) have propagated and supported the use of telehealth services through position statement. These services are especially applicable for those patients with limited access to healthcare resources, cost-efficient and can be applied directly to patient care as well as indirectly for training health professionals. Telemedicine has been adapted to the field of audiology, known as tele-audiology, to provide remote hearing screenings, diagnostic testing, intervention, and/or rehabilitation services (e.g., hearing aid adjustment, cochlear implant programming). We can explain the tele-audiology evaluations under the following items: 1. *Home-based otoscopy*: Recently, artificial intelligence algorithms have been developed to improve the sensitivity and specificity of home based otoscopy using the smartphone-based machine learning algorithm; 2. *Hearing screening*: The researchers have examined the reliability of tablet-based, computer-based, and smartphone-based audiometry, but results have been mixed. These researchers found that, with proper planning, equipment, and financial resources, synchronous applications could be used to effectively evaluate infant hearing over long distaces; 3. *Diagnostic audiometry*: Online testing and machine learning will improve the both efficiency of tele-audiometry and its diagnostic power. However, thresholds are best-obtained when real-time noise monitoring is incorporated, especially in ambient noise; 4. *Diagnostic ABR*: In the literature it was found that there were no significant difference between in-person and remote tests results. In addition, it was stated that remote testing option can significantly reduce loss to follow-up rates in infants who fail their newborn hearing screenings. Future advancements in artificial intelligence, will continue to increase tele-audiology acceptance and application.

Keywords: tele-audiology • tele-medicine, assessment

(ID-6934) The Effect of music therapy on auditory and cognitive skills

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Temporal ordering is closely related with the importance of music. Considering the role of music in auditory skills, it is known that music also has a role in therapy. Despite the technical limitations of the cochlear implant with auditory therapy, an increase in the performance of individuals with cochlear implants in listening and music activities under challenging conditions was observed. One of the auditory therapy methods is musical therapy. In the literature, musical therapy is referred to the methods of stimulation of auditory processing in case of pathology. In general, various software and homework assignments are used for music therapy in the literature. Studies shows improvement in the musical skills of postlingual cochlear implant (CI) users after music therapy. Therapy programmes include exercises of discrimination and ordering of pitch and duration of tones, perception of rhythm and meter, recognition of melodic contour and timbre, training of temporal resolution, understanding of music lyrics with and without visual support, and use of a musical keyboard to play familiar children's songs. With the increase in the ageing population, the rate of cognitive deterioration is increasing and strategies to protect against this deterioration are becoming increasingly important. It is known that music, which we frequently encounter in every field, has cognitive benefits in addition to its auditory skills. Music playing influences brain and cognitive function, activating multiple brain areas and using cognitive and motor functions as well as multiple sensory systems, simultaneously. According to the cognitive reserve hypothesis, lifelong engagement with music may be a method of neurocognitive protection. Studies have shown that people who are engaged in music have better clinical outcomes than non-musicians and are able to maintain their cognitive functions even in the face of neurodegenerative burden. With this protection, the effects of neural degeneration on cognition during the aging process are slowed down and quality of life is improved. These findings prove that musical therapy is a good strategy to improve cognitive functioning. Also background music improves working memory and speeds up performance in skill tasks, however the role of personality type in influencing background music on cognitive and skill performance needs further investigation.

Keywords: music therapy • cognitive skills

(ID-6847) The use of Simplified Italian Matrix Sentence Test (SIIMax)

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Introduction: The Matrix Sentence Test is an adaptive speech audiometry test available in multiple languages. Its widespread use can be attributed to its valuable role in audiological evaluations, particularly for assessing hearing aids and cochlear implants.

Aim: The aim of this study is to report the experience of using the Simplified Italian Matrix Sentence Test (SIIMax) in the clinical routine of a tertiary pediatric audiological university hospital.

Material and methods: A total of 60 normal-hearing (NH) children (32 females, 28 males) and 78 hearing-impaired (HI) subjects (42 females, 36 males), aged 5–10 years, were consecutively evaluated using pure-tone audiometry and speech audiometry with SIIMax. Hearing aid (HA) benefits were assessed using free-field pure-tone and speech audiometry, as well as SIIMax with an SRT 50% measured at 65 dB HL (speech) and an initial signal-to-noise ratio (SNR) of +10 dB HL, both with and without HA.

Results: Participants with bilateral symmetric sensorineural hearing loss (HL) of varying degrees showed significantly improved SIIMAx scores when using HA. The improvement was related to the HA benefit measured by pure-tone audiometry (PTA) and changed by age. An average SRT 50 improvement of 2 dB HL was checked and analyzed across different age group. As expected, SIIMax accurately differentiated between NH and HI groups.

Conclusions: SIIMax proved to be a practical and time-efficient tool for use in pediatric populations. In particular, an adaptive SRT 50 was found to be a sensitive parameter for evaluating the effectiveness of HA in children.

Keywords: adaptive speech tests • children

(ID-6959) Tinnitus in children

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Tinnitus is defined as a sound perceived in children in the absence of an external sound source and is usually described as a ringing, humming or rustling sound. Although the exact

prevalence of pediatric tinnitus is unknown, studies show that it is present in children at a significant rate. Causes of tinnitus include hearing loss, exposure to loud noise, use of ototoxic medications, head or neck trauma, middle ear disease and psychosocial stressors. In some of the cases, no obvious cause can be found. The assessment of pediatric tinnitus is more complex than in adults because children have difficulty expressing their subjective experience. The diagnostic process should include taking a detailed history and asking about associated symptoms (dizziness, hearing loss, etc.). While ear structures are assessed by physical examination, tests such as pure tone audiometry, tympanometry and otoacoustic emissions should be used to determine the hearing function. Special tests, such as tinnitograms, can help determine the frequency and intensity of the sounds which the child is hearing. The treatment of tinnitus in children is largely based on conservative approaches. Counselling and information is one of the most important elements of treatment, and one study reported that 83.3% of pediatric patients subjectively benefitted from counselling. Hearing aids may be recommended in cases where there is associated hearing loss, but some studies show that the effect of these devices on tinnitus is limited. Methods such as tinnitus retraining therapy (TRT) and noise generators have been reported to be beneficial in some children. Cognitive behavioral therapy (CBT) may be particularly effective in reducing anxiety and stress associated with tinnitus. In conclusion, conservative approaches such as education and counselling should be preferred in the management of pediatric tinnitus.

Keywords: pediatric tinnitus symptoms • assessment • diagnosis • treatment

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(ID-6827) Validation of fitting in hearing devices: cochlear implant in inner ear malformation

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Introduction: Pediatric sensorineural hearing loss caused by IEM (inner ear malformation) accounts for approximately 20–40% of all cases of deafness. Cochlear implantation is the treatment of choice for most IEM. However, the resulting outcomes can vary significantly and are influenced by factors such as the type of cochleovestibular malformation, residual neural function, surgical approach, fitting management and the presence of syndromic or associated pathology.

Aim: to evaluate cochlear implant mapping parameters in cases of IEM and to assess audiological outcomes.

Material and methods: The study included a sample of 26 subjects with bilateral IEM. 85% of the sample underwent cochlear implantation. The age of implantation ranged from 12 months to 8 years. 27% of the subjects had neural hypolasia according to the Birman classification. 15% of the subjects were not candidates for CI due to cochlear aplasia or labyrinthine aplasia, and one case of IP-III who achieved a linguistic gain with the hearing aid. Management of these patients, during the fitting, included the finding of higher and variable impedance values, of ECAP often not detectable and of fold-over tips. Difficulties also were noted in case of incomplete insertion, facial nerve stimulation, the need for lower threshold levels (T-levels) and higher comfort levels (C-levels). Auditory perceptual skills were evaluated using the Infant Listening Skills Assessment (ILIP), Categories of Auditory Performance (CAP) and Speech Intelligibility Rating (SIR).

Results: All children who underwent CI became consistent device users. The most common malformation observed was EVA, while IP-I the least common malformation. In 11%, gusher complications were observed during surgery. Depending on the IEM, an increase was needed for PW, THR and MCL. The most frequent complication was facial nerve stimulation, observed in 50% of cases, along with the need to adjust loudness. 27% of the children had ILIP score <11 and CAP score <5, while the remaining 63% achieved CAP scores of 5–7 and ILIP scores of 12–16. The presence of a larger representation or better distribution of neural tissue correlate with better perceptual and linguistic outcomes. Malformation such as IP-II, with or without EVA, allow for significant perceptual and linguistic improvements.

Conclusions: Cochlear implantation in children with IEM, despite greater challenges and surgical risks, present significant difficulties during the fitting process, such as determining optimal stimulation levels. However, this does not preclude successful implantation or favorable results. In properly selected cases, cochlear implantation can be performed safely and effectively in children with IEM.

Keywords: validation • IEM

(ID-6884) Validation of hearing device fittings in pediatrics: the role of speech-language pathologists

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Introduction: Validating hearing device fittings in pediatric populations is a complex process, especially during early development when optimal device performance is crucial for communication and language acquisition. Hearing devices, such as hearing aids, cochlear implants, or other assistive technologies, require both technical expertise and a deep understanding of children's developmental needs. Speech-language pathologists (SLPs) are essential in ensuring these devices meet the needs of pediatric patients. They play a key role in assessing the functional outcomes of fittings, focusing on speech perception, communication, and language development.

Aim: This presentation outlines the clinical evaluation protocols at the Audiovestibology Unit in Varese, emphasizing the role of the SLP within the audiological team, and critically reviews the existing literature.

Material and methods: A search strategy using MeSH terms was applied to Medline (PubMed) and Web of Science. A systematic review was conducted following the PRISMA 2020 guidelines by two independent reviewers. The review included studies examining the measures used by SLPs to assess the

effectiveness of hearing device fittings in children with hearing loss, with no restrictions on publication year.

Results: The search identified 263 articles, with 11 studies meeting the inclusion criteria. These studies focused on children with sensorineural and conductive hearing loss (bilateral or unilateral) treated with cochlear implants or hearing aids. One study specifically examined children with autism spectrum disorder (ASD). The most frequently assessed domain was auditory skills, evaluated mainly through parental reports using instruments to assess auditory perception and listening in daily activities. Other areas investigated included receptive and expressive language, preverbal communication, intelligibility, speech production, quality of life, fatigue, academic achievement, and neuropsychological abilities.

Conclusions: SLPs are essential in validating hearing device fittings for pediatric populations, ensuring that the devices meet developmental needs. Parental reports play a key role in assessing functional auditory skills, highlighting the significance of family involvement in the process. Within the framework of a connectome model, a comprehensive assessment of other developmental areas, such as language acquisition, speech production, and communication, provides indirect insights into the functional benefits of the fitting, especially in young children.

Keywords: hearing device fitting • speech-language pathologist • pediatrics, outcomes

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(ID-6907) Variability in undergraduate European speech language therapy education with respect to audiology

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Introduction: Whilst European Universities usually follow longstanding 'Bologna Processes' for ECTs in undergraduate courses, ever-changing technologies, politics and staff mobility pressures may create barriers to interdisciplinary collaboration at community service levels – especially if chronic staff shortages exist. Cochlear Implantation teams (MDTs) tend to function and research excellently but don't serve general community clinical populations.

Material and methods: The author reviewed recommended EU standards/ ECTs since 2000, recording audiology content (hours and practical elements) for some European Speech and Language Therapy programmes, and comparing briefly to other jurisdictions like USA and South Africa.

Results: Some key findings will be presented on current course contents, noting the potential impact, for example, upon Auditory Processing assessment availability at Primary and Secondary Care levels in some countries.

Conclusions: Audiologists and Speech and Language Therapists need to work together for optimal efficiency and effectiveness, even if children with Speech or Language disorders have passed Hearing Screens. Educational elements and knowledge of overlap areas are vitally important at Undergraduate level.

Keywords: European Survey Undergraduate Speech+Language Therapy • audiology training elements • interdisciplinary collaboration

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(ID-6901) Variables influencing ITA-Matrix: language and cognitive functions in young adults implanted in childhood

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Introduction: There is little research on how the ability to recognize speech in noise develops over time in young adults implanted in childhood. Executive functions (EFs) are a set of high order cognitive processes and are considered among variables affecting speech perception in noise (SIN).

Aim: To increase knowledge of variables influencing development of speech perception in noise, especially for cognitive variables, to improve theoretical understanding and rehabilitation procedures.

Material and methods: 62 subjects aged 18–27 years have been recruited. 50% implanted with AB, 40% with Cochlear and 10% with Med-El devices respectively, with a mean follow-up 22 years. All of them followed oral rehabilitation, none of them had associated disabilities. Audiological tests included SF-PTA, speech perception in quiet, SIN with fixed SNR and adaptive Matrix sentence test. Language competences included lexicon and morphosyntax, while EF included short term and working memory, verbal working memory (VWM), fluid intelligence and auditory attention.

Results: Subjects showed nearly 100% for words and sentences in quiet and substantial deterioration for sentences in noise at SNR+10. ITA-Matrix values were significantly worse when compared to normative values, with a median SRT of –1.3 dB SNR for the whole sample. ITA-Matrix is strongly correlated to expressive vocabulary and morphosyntax, and with most executive function outcomes. The linear regression model VWM explained 21% of variance for ITA-Matrix, while in linear regression for audiological variables SF-PTA and sentences recognition in quiet explained 44% of variance.

Conclusions: These data contribute to the definition of average SIN long-term outcomes expected in subjects implanted during childhood whilst increasing our knowledge of the effects of variables such as age at CI, language and EF. Innovation of the present study highlights how the development of SIN is influenced by language competences and cognition even adjusting for age at CI and age at implant.

Keywords: Matrix sentence test • verbal working memory • executive function • language

(ID-6970) Vestibular evaluation and management of children with sensorineural hearing loss

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Diagnosing vestibular disorders in children is more challenging than in adults, primarily because young children cannot clearly express symptoms such as vertigo, dizziness, and imbalance. Moreover, children may consciously or unconsciously avoid activities that could reveal impaired balance performance, making it difficult for parents to detect these deficits. While posturomotor development issues resulting from vestibular dysfunction may be recognized, they may not always be attributed to the vestibular system. Moreover, in children, congenital or early-acquired vestibular system disorders may lead the central vestibular system to adapt to dysfunctional inputs and exhibit vestibular compensation, which can prevent symptoms from appearing. Due to vague symptoms, the lack of clear symptomatic expression, and the challenges associated with vestibular function assessments in pediatric populations, balance skills are not routinely evaluated in children diagnosed with sensorineural hearing loss. Vestibular disorders have been reported to cause developmental delays in children, particularly in gross motor skills such as head control, sitting, standing, and independent walking, which are considered fundamental developmental milestones. However, the impact of vestibular system disorders in children extends beyond postural balance. Vestibular input deficiency also affects cognitive functions related to visuospatial tasks, particularly spatial memory, spatial navigation, and mental rotation. Difficulties in spatial navigation and localization, which are often attributed to a lack of auditory input, may actually originate from vestibular and balance disorders or be further aggravated by them. In children with auditory and vestibular impairments, hearing loss interventions support developmental progress, while vestibular-specific interventions further enhance it. In those with postural balance dysfunction, vestibular rehabilitation improves postural stability, static and dynamic balance, and vestibular functions. Considering the prevalence of vestibular disorders in children with sensorineural hearing loss is crucial to prevent these conditions from being overlooked. The possibility of coexisting vestibular disorders in children with sensorineural hearing loss should not be disregarded, as early diagnosis and intervention are essential for optimizing developmental outcomes. Therefore, incorporating vestibular function evaluation into the clinical assessment of these children is of great importance in ensuring timely and appropriate management.

Keywords: balance • children • sensorineural hearing loss • vestibular disorders

(ID-6971) What should we pay attention to in the rehabilitative approach to a hearing loss patient with cognitive developmental delay?

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Cognition: is the brain's processing, storing, retrieving and manipulating information. More specifically, cognition: It refers to the processes by which sensory input is formatted, detailed, stored, recorded and used. Cognitive developmental delay is defined as deficiencies in cognitive skills, as well as deficiencies in the ability to live independently in the areas of social adaptation and self-care, and is classified as mild, moderate, severe and very severe. Hearing loss can affect the auditory perception process, causing negative effects on language acquisition, communication skills and cognitive development. Language has an important place in the cognitive development process. Insufficiency in language skills and lack of auditory stimuli in children with hearing loss also negatively affect the cognitive development (perception, concept formation, thinking skills and problem solving) process. At the same time, it negatively affects areas such as language-related learning disorders, speech disorders, social communication and academic success. Auditory rehabilitation for a child with cognitive developmental delay and hearing loss aims at early diagnosis, appropriate amplification, educational evaluation, individualized education program, appropriate educational environment and environmental regulation, and support in correct communication methods.

Keywords: hearing loss • cognitive developmental delay • auditory rehabilitation

Posters

(ID-7152) Acoustical analysis of timbre in cochlear implant processing strategies incorporating temporal fine structure

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Introduction: This study investigates the impact of cochlear implant (CI) sound processing strategies on timbre perception, focusing on strategies that encode temporal fine structure (TFS). Strategies such as MEDEL's Fine Structure Processing (FSP), designed to preserve TFS cues, were compared with conventional CIs-based strategies (e.g., cochlear's strategies), which predominantly rely on envelope cues. The objective was to assess how these strategies influence key timbre characteristics, including spectral centroid and spectral flux.

Material and methods: Eight musical instrument sounds from the Clinical Assessment of Music Perception (CAMP) test's timbre subtest were processed using MATLAB-simulated CI strategies. TFS information was extracted using the Hilbert transform with a cut-off value of 900 Hz to isolate low-frequency TFS components, closely resembling the characteristics of the FSP strategy. Acoustic parameter extraction was performed both before and after processing to assess changes in timbre features.

Results: Spectral centroid values for unprocessed instruments averaged 823 Hz, for TFS-processed instruments 593 Hz, and

for CIs-processed instruments 823 Hz. The observed reduction in spectral centroid values for TFS-processed stimuli may reflect enhanced low-frequency energy distribution resulting from TFS preservation. In contrast, spectral flux values averaged 0.92 for unprocessed instruments, 0.82 for TFS-processed instruments, and 0.41 for CIs-processed instruments.

Conclusions: Results confirmed that TFS information below 900 Hz had minimal impact on spectral centroid values. Conversely, spectral flux was shown to be more sensitive to TFS coding, particularly in dynamic, transient-rich stimuli. These findings underscore the potential advantage of TFS-encoding strategies in preserving timbre features, particularly for signals with rapid temporal fluctuations. However, previous studies have shown spectral centroid to be a more reliable predictor of timbre perception than spectral flux. This suggests that despite the stronger influence of TFS on spectral flux, the limited effect on spectral centroid may have more substantial implications for timbre perception in CI users.

Keywords: cochlear implant • sound processing strategies • temporal fine structure • timbre perception • spectral centroid • spectral flux • attack time

(ID-6951) Age, phonological processing and cognitive abilities in adult CI users

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Introduction: Phonological processing skills in adults with cochlear implants (CIs) may be influenced by both hearing loss experienced prior to implantation and the spectro-temporally degraded CI signal. Previous research in different listener populations has shown that a nonword repetition task (NWRT) is a useful measure of phonological processing, likely relying on working memory, reading ability, as well as age. However, NWRT performance has not been widely studied in adults with CIs.

Aim: This study aims to assess how age and hearing loss affect phonological processing skills of CI users in NWRT performance compared to normal hearing (NH) peers. We will also investigate the relationship between NWRT performance and cognitive functions that depend on phonological processing, to understand the individual differences in performance.

Material and methods: This study included 73 postlingual adult CI users (aged 24–87) with at least six months of CI experience and 44 NH individuals (aged 50–81). Participants completed the NWRT, which involved 40 nonwords of varying lengths (one to four syllables), presented audio-visually by a male talker and scored based on the percentage of correctly repeated whole nonwords. Participants completed a series of cognitive tasks, such as the spectro-temporal processing (SMRT), reading efficiency (TOWRE), and short-term memory (forward digit-span) tests, to explore their influence on NWRT performance.

Results: The NH group performed better in both total nonword scores ($M = 87.18\%$, $SD = 7.32$) and total phoneme scores ($M = 97.90\%$, $SD = 1.64$), compared to the CI group's total nonword ($M = 42.85\%$, $SD = 20.25$) and total phoneme scores ($M = 81.37\%$, $SD = 15.60$). Age-related declines in NWRT performance were observed within the CI group ($p < .0.05$), but no significant age effects were found in the NH group. Spectro-temporal processing was found to be the strongest predictor of performance ($r = 0.56$), followed by speed of lexical and phonological access ($r = 0.42$) and nonverbal reasoning ($r = 0.39$).

Conclusions: Our preliminary results suggest that auditory, cognitive, and linguistic processes contribute to NWRT performance. NWRT may serve as a reliable assessment of phonological processing in CI users. Future studies could be useful for understanding the relationship between NWRT performance and individual differences in speech recognition outcomes in adult CI users.

Keywords: cochlear implants • auditory processing • phonological skills

(ID-6834) Cochlear implantation in children with congenital herpes simplex virus

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Introduction: Herpes simplex virus is one of the most common viruses, with 90% of the population infected. Depending of the patient's age, type and site of infection, it can cause a variety of clinical syndromes, ranging from mild local infections to life-threating infections involving the central nervous system. Genital herpes in woman is dangerous to the fetus. Infection can occur during fetal life (5–8%), during childbirth (85%) or after birth (8–10%). Congenital herpes infection usually occurs though exposure to the virus during natural birth, through contact with virus-containing genital tract secretions. Infection by the droplet route or through lesions caused by the virus is also possible. Herpes virus infection leads to damage to the eyes and mucous membranes, disseminated disease, mental impairment or hearing loss. Hearing loss following infection is sensorineural and may be congenital, delayed or progressive, so children should have a routine hearing check at least once between 24 and 30 months of age.

Material and methods: The study group consisted 10 patients aged 7–56 months ($M = 22.5$, $SD = 15.222$) operated on between 2010 and 2020. Five patients were implanted bilaterally (with an appropriate intervals). Eight right ears and seven left ears were operated on. All patients had an auditory brainstem potentials (ABR) test before surgery. Postoperatively, the patients had two tests: Adaptive Auditory Speech Test (AAST) and free-field threshold audiometry. Nine patients

were using hearing aids prior to implantation; the average age of onset was 4.5 months.

Results: Preoperatively, the ABR threshold for the operated ear was at 500 Hz – *M* = 88.67 dB, at 1000 Hz – *M* = 98 dB, at 2000 Hz – *M* = 98.67 dB, at 4000 Hz – *M* = 99.29 dB. On the AAST test, the average score was 36.3 dB in quiet and –10.8 dB SNR in noise. The average free field threshold (for frequencies from 250 Hz to 6000 Hz) was 36.5 dB.

Conclusions: Cochlear implantation is an effective treatment for hearing loss in deaf children with congenital herpes virus infection. Patient outcomes can vary depending on the age of the child's implantation, co-morbidities or rehabilitation programme.

Keywords: congenital HSV • cochlear implantation

(ID-6836) Evaluation of auditory outcomes after CI in children with CHARGE syndrome

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Introduction: CHARGE syndrome is a rare syndrome caused by a genetic disorder. The acronym CHARGE came into use for newborn children with the congenital features of coloboma of the eye, heart defects, atresia of the nasal choanae, restricted growth or development, genital or urinary abnormalities, and ear abnormalities and deafness. The incidence is estimated to range from 0.1 to 1.2 per 10,000 live births, though the true incidence is unknown.

Material and methods: The study group consisted 8 patients aged 0–13 years-old (*M* = 4) operated on between 2013 and 2021. All patients had an auditory brainstem potentials (ABR) test before surgery. Postoperatively, the patients had two tests: Adaptive Auditory Speech Test (AAST) and free-field threshold audiometry. All were using hearing aids prior to implantation and had computed tomography performed before operation. Results before surgery hearing thresholds in each patient, across 0.5–4 kHz frequencies, were > 90 dB. All patients had anatomical abnormalities of the middle and inner ears. Mean hearing threshold in free-field audiometry test (after operation) was 49 dB. Average AAST results were: (1) in quiet: 43; (2) in noise: –6.125.

Conclusions: Cochlear implantation is a good way to compensate for hearing loss associated with CHARGE syndrome.

Keywords: CHARGE syndrome • cochlear implantation • auditory outcomes

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(ID-6835) Facial nerve palsy in child as a complication after otitis media

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Introduction: Facial nerve palsy is a serious social and clinical problem and is also the most common condition affecting the n. VII. It manifests as inability to perform certain movements due to lack of nerve stimulation to the muscles. It is a disability that greatly affects the patient's daily functioning and significantly reduces their quality of life. Characteristic symptoms include drooping of the corner of the mouth on the paralyzed side, impaired lacrimation and salivation, or Bell's palsy. Facial paralysis is extremely rare in the course of a middle ear infection.

Case report: In March 2018, when patient was 8, he developed facial nerve palsy. It occurred after suffering from otitis media, which was diagnosed a 8 days before the paresis. Symptoms reported by patient and parents were: blepharospasm, ear pain, dropping of the corner of the mouth and loss of taste sensation. Physical examination of ear was normal for left ear, in right ear visual signs of inflammation. To assess the diagnosis of facial nerve damage the House–Brackmann scale was used. On the left side, the paralysis was classified as grade I, and on the right side as grade IV/V. The patient was referred for pure-tone audiometry. The hearing threshold in the left ear was within normal. In the right ear there was a moderate conductive hearing loss with an average of 37.5 dB for air conduction and approximately 9 dB for bone conduction. The treatment applied: Dexaven 2 × 4 mg for 7 days, Polprazol 1 × 10 mg and Biofazolin 2 × 500 mg. Three weeks after discharge from the unit, the patient reported for follow-up. According to the House–Brackman scale, the paresis was grade I on the right side and grade II/III on the left side. The right ear showed a mild conductive hearing loss with an average air conduction of 28.5 dB and bone conduction of 10 dB.

Conclusions: In patient treated at the Institute of Physiology and Pathology of Hearing (IFPS), recovery was optimised by early diagnosis, application of appropriate treatment and strict adherence to treatment and rehabilitation management recommendations.

Keywords: otitis media • facial nerve palsy

(ID-6956) The audiovestibular evaluation in a patient with minimal change disease-related cerebral sinus venous thrombosis: a case report

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Introduction: Minimal change disease (MCD) is one of the primary causes of nephrotic syndrome (NS), a renal disorder associated with an increased risk of thrombosis. However, its relationship with cerebral sinus venous thrombosis (CSVT) has been rarely reported in the literature. Here, we present the audiovestibular findings of a patient who developed CSVT associated with MCD.

Case report: A female patient was diagnosed with MCD at the age of 17 and underwent repeated corticosteroid treatment. Cranial MRI revealed thrombosis in the left transverse and sigmoid sinuses. Following the thrombosis, she reported persistent non-positional dizziness, a sensation of lightheadedness, and hyperacusis. Audiological examination revealed bilateral hearing within normal limits according to pure-tone averages. The auditory brainstem response (ABR) test showed Wave V at normal latencies at 20 dB nHL for both ears in tonal (1 and 4 kHz) and click stimuli. In the bedside vestibular assessment, the Romberg test was negative, while the Unterberger test showed lateralization to the left. Additionally, a minimal dysmetric pattern was observed in both gait and past-pointing tests with eyes closed. The oculomotor and positional tests were normal in the videonystagmography (VNG) battery. In the video head impulse test (vHIT), a borderline decrease was observed in the left posterior semicircular canal, whereas gains in the other canals were within normal limits. The cervical vestibular evoked myogenic potential (cVEMP) test showed no response in the right ear at maximum intensity, while latencies up to 80 dB nHL in the left ear were within normal limits.

Conclusions: Based on these findings, a central pathology was suspected due to CSVT and cerebrospinal fluid pressure irregularities following MCD. This case represents the first detailed audiovestibular evaluation reported in the literature after an MCD diagnosis. We emphasize that vestibular symptoms in these patients should not be overlooked and that a multidisciplinary approach is essential for appropriate management.

Keywords: dizziness • cerebrospinal fluid • audiovestibular tests • vestibular dysfunction

(ID-6821) The influence of practicing traditional karate on static posturography parameters: observational study in children

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Introduction: Karate is a martial art in which sequences of defenses and attacks are carried out, and its practice requires various skills such as specialized balance. Karate evolution is revealed through the graduation of chromatic belts. Some studies show that practicing sports improves balance and postural control.

Aim: Check if practicing sport with children, namely karate, reveals better static posturography parameters in relation to a higher level of skill, a higher belt ranking.

Material and methods: Initially, otoscopy and screening tonal audiometry were carried out to rule out ear pathologies. Afterwards, each child was weighed and measured and the mCTSIB and LOS tests were carried out on the PhysioSensing® balance static posturography.

Results: The sample consisted of 15 children ($M = 9{,}80$ years; DP = 2,27 years) practicing karate at the MaiaSport club (Porto, Portugal). Statistically significant results were found for the variable oscillation speed with eyes open and closed with sponge using the Wilcoxon test. Spearman's correlation was used to compare the time spent practicing karate to the age of the children, obtaining moderate to strong correlation in the variables of compound swing speed ($r = -0{,}79$), reaction time (r = 0,56) and direction control (0,56; in terms of time spent practicing karate) and compound swing speed ($r = -0{,}83$) and reaction time ($r = 0{,}75$; age of the children).

Conclusions: Age shows a greater significant correlation than the time spent practicing karate, which can be explained by the maturation of the balance sensory systems that develops until adolescence. Future studies in adults with the same protocol or with a control group of children who do not practice any sport are suggested.

Keywords: children • posturography • karate • swing speed • reaction time