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Comments on published article 'An audit of UK audiological practice in specialist paediatric oncology centres regarding hearing assessment of children at risk of ototoxicity due to chemotherapy' by Brown *et al*.

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Letter to the Editors

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Dear Editors,

We read with interest the article entitled 'An audit of UK audiological practice in specialist paediatric oncology centres regarding hearing assessment of children at risk of ototoxicity due to chemotherapy', by Brown *et al*., published in your journal recently.[1] We work in one of the largest tertiary paediatric oncology centres in Europe, Alder Hey Children's NHS Foundation Trust. Whilst the article undoubtedly raises a very important aspect of what we do, there are a few points we would like to make that were missed. Hopefully, our comments will complement the article and inform the audience as to what we do here as best medical practice.

One, ototoxicity monitoring should not be left only to medical oncologists, but also needs to be assessed by a physician or surgeon specialising in ototoxicity. Medical assessment of the child from every possible angle should be undertaken by a physician or surgeon who specialises in paediatric otology, as evidently our oncology colleagues will require this information. It is not just a simple case of referral to audiology and performance of a hearing test. An oncologist with a special interest in ototoxicity is also desirable.

Two, both referrals and assessments of ototoxicity monitoring are time-critical, and there must be enough flexibility in a dedicated audiology team to follow this.

Three, use grading scales that assess up to 8 kHz to grade hearing loss as these frequencies can have an effect on the hearing function of a child. The detection of hearing loss in speech frequencies has implications for the chemotherapy regimen, which might be adjusted or replaced.

Four, it appears that the main emphasis in the paper by Brown *et al*.[1] was on extended high frequency audiometry. Assessing hearing loss predictors like extended high frequency and distortion product otoacoustic emission (DPOAE) growth can indicate early subtle cochlear changes, but does not alter the chemotherapy dose or administration method. In fact, changing chemotherapy based on predictive measures is inappropriate and poses a major risk. At the most, these tests warn the team for counselling the parents or carers that the chances of practical speech frequency hearing loss are increased.

Five, DPOAE/growth is a crucial test to be performed in all children. Monitoring DPOAE/growth in extended frequencies up to 12 kHz can replace extended high frequency audiometry in children in some instances when the latter is unavailable.

Six, baseline assessment is essential for several reasons, especially to diagnose other causes of hearing loss, including otitis media with effusion, posterior fossa tumours and a myriad of congenital genetic syndromes.

Seven, expanding on the above point, if there is more than one factor that can cause a hearing loss, it is the medical team's responsibility to tease out ototoxicity, which requires experience and knowledge.

Eight, tinnitus as a marker of cochlear damage does not preclude treatment or lead to dose adjustment, similar to extended high frequency audiometry and DPOAE. A large cohort of children will not be able to report tinnitus, but it is useful to ask older children.

Nine, vestibular assessment should be offered to all children who complain of balance problems after chemotherapy. For posterior fossa tumours, a baseline vestibular assessment should be performed in selected cases. The oncology team must warn about hearing and balance problems when undertaking chemotherapy.

Ten, children who are unable to undergo standard pure tone audiometry (e.g. those aged under four years or with cognitive challenges) are offered other conditioned audiometry such as visual reinforcement audiometry or performance audiometry – a 4, 6 and 8 kHz sound field and 4 kHz bone conduction audiometry are required.

Eleven, in some instances where behavioural audiometry is not possible, auditory brainstem response testing should be offered, either under natural sleep or with sedation, with click stimuli and no lower than a 4 kHz bone conduction tone pip from at least one ear.

Distortion product otoacoustic emission (with extended high frequency) testing under sedation will also be useful.

Twelve, every paediatric oncology centre will also have to deal with radiation ototoxicity. Furthermore, radiation might potentiate the toxicity of several chemotherapy agents. Therefore, this important aspect of ototoxicity monitoring following radiation must be considered by all paediatric oncology and audiology units. Radiation can cause delayed-onset hearing loss, so long-term follow up is needed.

We have developed an Alder Hey protocol with the practice as enumerated above, and work closely with the British Children's Cancer and Leukaemia Group and the British Association of Audiovestibular Physicians. We have audited our practice at the national level, which has led to continuous improvement in our practice. In addition, we are co-investigators in two international research projects investigating ototoxicity.

Reference

1 Brown ECM, Caimino C, Benton CL, Baguley DM. An audit of UK audiological practice in specialist paediatric oncology centres regarding hearing assessment of children at risk of ototoxicity due to chemotherapy. *J Laryngol Otol* 2021;**135**:14–20

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