Second, to eliminate other concerns of Curthoys and Halmagyi we would like to point out again that our aim was to summarize the current study pool using the methods of a scoping review[2]; that is a systematic approach to chart the study landscape of a clinical area, in our case the diagnostic studies in vestibular medicine. Therefore, within this work we systematically explored the increasing number of diagnostic studies comparing the HIT with other important vestibular function tests or a clinical diagnosis in patients with vestibular syndromes; that means we did not only focus on the HIT as erroneously assumed by Curthoys and Halmagyi. By describing key study characteristics, this scoping review provides an overview of all available comparative diagnostic studies fulfilling predefined inclusion and exclusion criteria. Applying state of the art methods[3] eliminates any arbitrary study selection—an unfounded concern of Curthoys and Halmagyi. Furthermore, we did not conflate any study data (another unfounded concern), but rather reported the range of test performance stratified by the HIT method and comparator test, and, if possible, by the underlying causes of the vestibular symptoms.

Third, overall, our review reflects disagreements in available study data. Particularly lacking sensitivity (determining the presence of the disease) when the HIT is compared with caloric testing, but its specificity (determining the absence of the disease) may reach 100% in some patients. Although there is a large amount of studies comparing the diagnostic value of the video HIT using the caloric test as a reference, in most cases there is no association between these tests owing to the different frequencies that are evaluated. Caloric testing activates low frequencies (around 0.003 Hz) of the horizontal vestibular-ocular reflex (VOR), whereas the HIT stimulates higher frequencies (around 5 Hz). Nevertheless, we and others[4] believe that the HIT by itself provides important information on the high-frequency VOR for each semicircular canal, but most likely it cannot substitute for caloric testing or replace a clinical diagnosis.

Finally, diagnostic studies are more complicated to interpret than interventional studies.[5] Considering the large number of diagnostic studies published in vestibular medicine and methodological challenges associated with this study type, we strongly recommend that further research considers the shortcomings identified by our review to improve clinical and economic outcomes, including better symptom-specific diagnosis and appropriate choice of treatment pathways.

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Between Current Implications and Future Perspectives

To the Editor We would like to respond to the invited commentary[1] to our meta-analysis and literature review on the benefit of imaging in children with unilateral sensorineural hearing loss (USNHL).[2] The authors suggest that our review (1) dismisses imaging for USNHL as useless in most children, and (2) frames imaging in a way that discourages patients and parents from imaging. However, we would like to emphasize that this is neither our message nor what we practice.

In their commentary, Lieu and Gantz[1] refer to the work of Tversky and Kahneman[3] on the influence of framing on decision-making. Their work enabled us to recognize the widespread assumption that the relatively frequent detection of inner ear abnormalities is sufficient reason to recommend imaging, with little reference to clinical consequences of diagnostic information or patient preferences.

In our review,[2] we address the diagnostic yield and different aspects of gathered diagnostic information. Besides focusing on the balance between benefits and drawbacks of imaging in USNHL, we explored the consequences of *not* performing imaging to evaluate whether this would pose a risk to patients. Negative consequences of not performing imaging are both infrequent and relatively mild. We encourage patients and physicians to discuss their preferences in the context of current evidence on implications of diagnostic information because the decision to perform imaging will depend on these. In practice, this means that if parents/patients place high value on knowing the cause of hearing loss, imaging will be performed. In this respect, we agree with Lieu and Gantz.[1] However, strongly recommending imaging is a form of positive framing that is not justified by available evidence.

A second point the authors raise[1] is the hope that through imaging in the future we will be better able to predict the course of hearing loss, identify concomitant problems, and hopefully also develop effective interventions. We share this hope, but until these potential benefits materialize, we think it is important to distinguish between current options and future perspectives when informing our patients.

Also, they point out that there are few rigorous studies describing large numbers of children to delineate risk factors, outcomes, or interventions. This is an important issue that we

too encountered in our study. Yet the use of imaging in this patient group is widespread. This indicates that only a fraction of findings is included for analysis and publication. If one of the reasons to perform imaging is scientific interest, the information obtained should be handled as such, and processed and shared through appropriate channels.

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2. Ropers FG, Pham ENB, Kant SG, et al. Assessment of the clinical benefit of imaging in children with unilateral sensorineural hearing loss: a systematic review and meta-analysis [published online April 4, 2019]. *JAMA Otolaryngol Head Neck Surg*. doi:10.1001/jamaoto.2019.0121

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In Reply We appreciate the response from Ropers and colleagues to our commentary,[1] and welcome the news that they do not dismiss imaging for children with unilateral sensorineural hearing loss. We agree that there is insufficient strong evidence to help guide the use of imaging for prognosis at this time, and we support the strong recommendation that future studies should address the research questions of prognostic value, comorbid conditions, and effective interventions in this population of children. Furthermore, we share the concern that most of the imaging currently performed is not easily accessible for research studies that we posit will derive benefit for this population.

Shared decision-making is a relatively recent ethical goal in medicine, and as physicians, our recommendations can have an outsized impact on patients' and families' decisions. This is why we referred to "framing" in our commentary.[2] Although we acknowledge that there can be drawbacks to imaging involving cost, radiation dose, and sedation, we as physicians do not always acknowledge the deep desire of patients and families to do everything possible to know *why* a child has hearing loss. Nor do we always recognize a family's reticence to proceed with testing if we ourselves are convinced that testing is the best course of action. Our point is that shared decision-making takes time, requiring listening to patient and/or family preferences and values, to formulate a joint decision. When a patient and family have difficulty making decisions, recommendations either for or against imaging from a physician can influence their decision. Although we routinely discuss imaging as a diagnostic modality, we do not always recommend having it done.

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Imaging for Pediatric Unilateral Sensorineural Hearing Loss

To the Editor I read with great interest the report by Ropers et al,[1] "Assessment of the Clinical Benefit of Imaging in Children with Unilateral Sensorineural Hearing Loss: A Systematic Review and Meta-analysis." The authors present a well-designed review of the literature of obtaining imaging for pediatric patients with unilateral sensorineural hearing loss. The authors reported that they were able to identify a cause of the hearing loss in more than 33% of patients, but concluded that none of these findings had therapeutic consequences and therefore suggest that obtaining imaging in all cases may not have high utility. These findings and recommendations brought up 2 areas of concern for me.

First, I was surprised to read that no retrocochlear tumors were identified in this cohort of 1504 patients, because within the past year I have identified 2 such cases. First was a patient with left single-sided deafness and no other neurologic symptoms who was found to have a 55-mm posterior fossa glioma. The second was a patient with unilateral deafness, presumed to be congenital, who was found to have a 20-mm vestibular schwannoma. Both had been followed up since young childhood for presumed congenital unilateral sensorineural hearing loss by otolaryngologists, and neither had had any imaging. Although I acknowledge that these cases are anecdotal, they highlight the importance of identifying potentially life-threatening causes of unilateral hearing loss, and may contribute to the discussion during shared decision-making as the authors suggest.

Second, unilateral deafness is a new and growing indication for cochlear implantation.[2,3] Identifying favorable vs unfavorable anatomy for cochlear implantation among patients with unilateral sensorineural hearing loss will become an even more important indication for imaging among this patient cohort.

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