

Increase Awareness, Responsibility: Lessons from the 'Sonic Attacks'

By Fan-Gang Zeng, PhD

At the time of this writing, we were celebrating National Audiology Awareness Month in October. Increasing awareness is important and usually brings good things to our profession; "audiologist" has been consistently ranked the best job in America. The job prospect is getting even brighter with baby boomers starting to settle into their golden years and need hearing care. Indeed, global hearing aid sales are up, growing by 5.7 percent compared with last year. Implementation of the OTC Hearing Aid Act will likely spur further growth, improving both access and affordability to meet customers' varying needs in an expanding market.

What comes after awareness? Here, I share lessons from the "sonic attacks" stories and argue that we need to increase responsibility too.

Like many of you, I have been following the mysterious sonic attacks on American diplomats and their families in Cuba and, more recently, in China. The affected individuals complained about tinnitus, dizziness, headaches, or other neurological symptoms after hearing strange loud sounds. Although neither the nature nor the consequence of the

alleged attacks has been determined, the story has led to not only strenuous diplomatic relationships and advisory travel warnings but also widespread media coverage and intense scientific debate.

Havana blamed the illness on noisy crickets (doi:10.1126/science.aau5386). Engineers thought that the strange loud sound was a result of intermodulation distortion, like beats in music, from two otherwise inaudible ultrasound surveillance devices (gizmodo, March 3, 2018). The latest culprit is microwave radiation, which may generate transient sounds that can be heard via bone conduction in the head (*The New York Times*, Sep. 1, 2018).

So far, only one peer-reviewed article has been published on the neurological manifestations of the sonic attacks by a team of researchers from the University of Pennsylvania (*JAMA*. 2018;319(11):1125). The researchers found that among the 21 affected individuals, 18 reported hearing directional, intensely loud and tonal sounds at the onset of symptoms, with most of them still experiencing a variety of sensory and neurological symptoms when examined six months after the onset.

Among the 10 authors of the Penn study, none seemed to have any audiological expertise despite the fact that a large portion of the patients' symptoms were ear-related. Consequently, the quality of the audiological tests, data analysis, and presentation of the results was poor. The authors only examined the air-conducted pure-tone audiogram data, and reported that "moderate to severe sensorineural hearing loss was identified in three individuals." Examination of their audiometry data (eTable 10 in the supplement) showed that four patients had moderate-to-profound loss (40 dB loss or more for at least one tested frequency) and three had mild loss (25-40 dB loss), including two with unilateral loss and two with low-frequency loss. Given the mean age of 43 years, the two unilateral cases could be a result of sudden hearing



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loss. Without a bone-conduction test, it would be hard to rule out whether the two cases with low-frequency loss might have a conductive component. Additionally, no objective (e.g., auditory brainstem response or otoacoustic emissions) or other behavioral tests were employed.

Except for expert interviews and relaying the news, the audiological community has remained surprisingly quiet even though both the source of the

attack and its main symptoms are right up our alley. A PubMed and Google Scholar search performed on Oct. 2, 2018, found no articles by any audiological, hearing, or otological journals on the sonic attack topic. While ultrasonic or microwave hearing is not something we deal with daily, the basic mechanism remains the same because, once demodulated, either type of hearing transmits through the well-known bone-conduction mechanism. I remember

Dobie and Wiederhold debunked the ultrasonic hearing story when it made a big wave in 1992 (*Science* 1992; 255:1584). So far, nobody has stepped up to discredit the microwave hearing theory.

Only when we are willing and able to tackle these tough questions can we demand and deserve the respect from our professional friends, trust from our patients, and payment from insurance companies. 