Finding Our Balance

By Chuck Dinerstein, MD, MBA — March 17, 2020

Balance is an intricate “dance” of multiple sensory inputs. But what happens when one of them stops working as well as it should? As it turns out, hearing loss has unanticipated consequences.

Being balanced is a complicated “dance” of sensory inputs from our nerves, indicating where there is more or less pressure, the vestibular system's “little stones,” the otoconia, and our visual system that knows the horizon should be horizontal. When these systems are impaired, as in diabetic neuropathy, where you can accurately sense your feet, we become increasingly unsteady. When you add getting up in the middle of the night in a dimly lit room, without a clear horizon, you are entering a perfect storm of unsteadiness, and your risk of falling, with its attendant complications, rises. [1] Hearing loss has been associated with balance issues, and a new meta-analysis gathers the evidence.

The researchers considered English-language studies ultimately identifying 28 articles on hearing and balance in healthy adults, as well as individuals with Alzheimer’s, hearing or vestibular loss [2], and blindness.

- In individuals with vestibular dysfunction, sound, depending upon the type, could both enhance or diminish balance. The kind of sensory substitution we would typically associate with an enhanced sense of smell or hearing in individuals that are blind.
- In individuals with congenital blindness, the auditory cues of sound “improve postural control.”
The researchers suggest that this sensory substitution is a manifestation of changing priorities for sensory inputs. Less vestibular or proprioceptive information requires you to pump up the volume of visual or auditory information. And while auditory information plays just a minor role when all of our senses are intact, they may play an increasing role as a substitute. Older people, who are at greatest risk for falls that result in more serious injuries, like hip fractures, are the same individuals with decreased proprioception, vision and hearing; as I said, the perfect storm.

It is unclear how auditory cues work, but it seems to do with “auditory anchoring.” Constant sounds from one direction help us locate ourselves within space in much the same way that visuals clues as to the horizon reduce our body’s sway. Interestingly, it seems that white noise that contains a full spectrum of frequencies is a better anchor than pure tones; perhaps that has to do with the loss of high-tone frequencies, the most common loss among the elderly. One consequence of hearing serving as a locational anchor is that alternating sounds cause balance to deteriorate. However, alternating sounds in a regular rather than irregular rhythm were less likely to be associated with increased sway. The researchers suggest that this is because rhythmic alterations in timing and intensity may serve the same anchoring function as a single source; that only when sound is moving irregularly does it lose value as an anchor.

We take balance as a given. The instability of our infant bodies is not remembered, and only episodic imbalance (fueled by drinking?) is a reminder of this wholly unconscious function. But as it once again turns out, the ability of our bodies that we take for granted are complex integrations of a host of sensations. And when one sensation is in decline, other senses step forward to pick up the slack and improve the situation as best they can.

[1] That is why a night light, illuminating hallways, and bathrooms is an inexpensive and useful aid in preventing these types of injuries.

[2] The ears have at least two functions besides providing a place to rest your glasses; they have separate systems to gather auditory information, while the vestibular system is intimately involved in balance.

Source: Auditory Input and Postural Control in Adults A Narrative Review JAMA Otolaryngology-Head and Neck Surgery DOI: 10.1001/jamaoto.2020.0032

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