Age-related hearing loss is the 3rd most prevalent chronic disease in the United States, with 17% of adults reporting hearing loss. Only 20% of patients with age related hearing loss are using hearing rehabilitation devices [1]. When patients use this service it is often limited to unilateral amplification, even in the case of bilateral hearing loss.

Balance, like audition and other sensory functions, decreases with aging. The classical view of balance control is based on three main pillars: the vestibular organ, proprioceptive feedback, and visual cues. An increasing body of evidence suggests that the auditory system serves as a fourth supporting factor. Zhang et al. reported a significant benefit in postural balance in healthy subjects when presented with spatial auditory cues [2]. Sound localizing stimuli lead to a decrease in angle deviation in blindfolded healthy subjects performing the Fukuca test [3]. Sound localizing stimuli yield greater decreases in angle deviation in blindfolded healthy subjects when the source is at 0° in the azimuth plane as compared to 30, 45, 90 or via headphones.

Compared to healthy subjects, less focus has been given to balance and audition in the hearing-impaired. A recent study by our team showed an improvement in postural stability in patients exposed to a localizing sound source with hearing aids compared to without hearing aids [4]. Here, we show that hearing aids and cochlear implants have a beneficial effect on dynamic balance compared to unaided situations, especially in subjects with increased vestibular instability.

Patients were selected from the roster of clinical appointments at the OHSU otolaryngology service. Subjects were informed that this was a study examining the impact of sound on balance and navigation under different auditory conditions. Inclusion criteria were use of hearing aids or cochlear implants for > 3 months, hearing loss > 35 db in each ear, ability to understand verbal commands, and error > 20 degrees in a screen in the unaided condition.

Patients were tested in a standard conference room. A speaker located 1.85 meters in front of the patient at the patient’s ear height played a 65dB white noise during all conditions. Subjects wore goggles that completely obstructed light. Patients with bilateral cochlear implants, bilateral hearing aids, or bimodal were tested under four conditions: both devices on, only the left device on, only right device on, both devices off. Subjects performed a 50 pace Fukuca test and were then moved circumferentially and in silence back to the start location to prevent them from gauging performance.

The mean angle of deviation from 0° in the azimuth plane was derived from floor markers.