

# OHSU invention puts unsteady walkers on firmer footing in effort to prevent falls

*Researchers test an audio device that uses tones to help seniors and others with balance problems*

By **AYESHA McADAMS-MAHMOUD**  
THE OREGONIAN

Fred Kawabata sometimes falls. In the middle of the night, it's difficult for him to travel from his bed across the soft carpet to the bathroom, with his balance permanently altered seven years ago by a rare virus that attacked his inner ear.

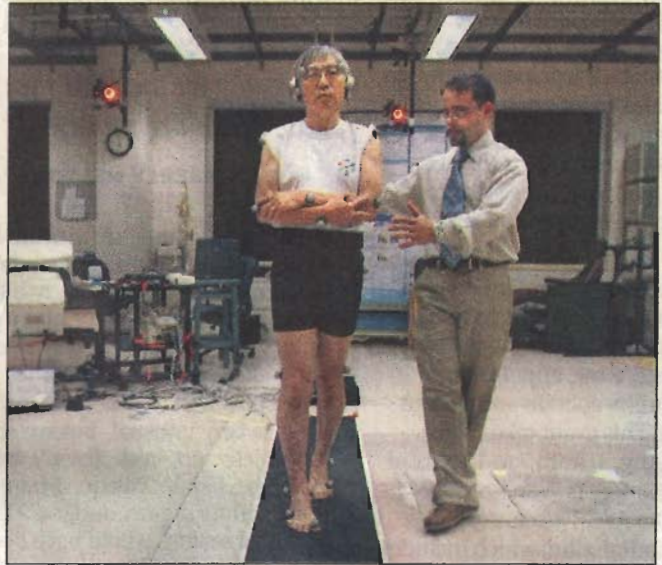
"There are times when I reach down for something ... I lose my balance and fall on the floor," he says.

The condition led Kawabata, 66, a retired electronics engineer who enjoys hiking, to the Balance Disorders Lab at Oregon Health & Science University, where an Italian engineer has been testing a portable audio device intended to help people with balance disorders.

Marco Dozza, 27, a doctoral candidate in bioengineering at the University of Bologna in Italy, developed the prototype for the device as his master's thesis. He made his way to Portland via the working relationship of Fay Horak, director of the Balance Disorders Lab, and his academic adviser at the University of Bologna.

"And you know, Bologna is Portland's sister city," he says. "It's true; you can look it up."

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**Marco Dozza (right), a doctoral candidate in bioengineering at Italy's University of Bologna and a fellow at Oregon Health & Science University, spots Fred Kawabata, 66, as the Beaverton man tests a device designed to help people correct balance disorders. The two are in the Balance Disorders Lab at OHSU.**

# OHSU: Device alerts person when balance tilts

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Instead of making cell phones or computers like his engineering buddies, Dozza says he wanted to use engineering to solve biological problems.

His adviser and Horak had the idea for the device, something that could "code the information of movement into sound," Dozza recalls. Under their supervision, Dozza spent five months develop-

ing it. He was his first test subject, then his co-workers and other students. His most expensive material: a plastic cylinder that cost \$1.

"I was only supposed to be (in Portland) for four months testing the device, but since the results were pretty good, I got a job here and stayed for four years," Dozza says. He is now a doctoral fellow at OHSU.

Dozza's device — he refers to it as ABF, for audio biofeedback — is a collaboration between researchers at the Neurological Sciences Institute at OHSU and the University of Bologna. The device may help people with balance problems correct them on their own, according to the July issue of the journal *Archives of Physical Medicine and Rehabilitation*.

Kawabata, who lives in Beaver-

ton, is among the one-third of people 65 and older who have balance problems. In addition, the device may help people with diabetes or those who have had strokes because they tend to have severe balance problems caused by missing or inaccurate sensory information in their eyes, feet or — most significantly — inner ear.

The device substitutes auditory cues for the missing or inaccurate sensors by sending tones through headphones. Much like a carpenter's level, it alerts the person if he leans outside a predetermined "safe zone." Tones get louder if a person tilts right or left. They get lower in pitch if the person sways backward, higher if the person sways forward, says Dozza, one of three authors of the journal article.

Dozza, along with Horak and

another researcher, Lorenzo Chiari, tested Kawabata and 17 others — nine with balance problems, nine without. The patients wore the audio device while walking and standing on a foam surface with their eyes closed, and all were better able to maintain their balance.

The portable device, clipped to a belt like a pager, is intended for therapy, not everyday use.

"If I had (the device), I think I could be a little more confident in my day-to-day activities," Kawabata says.

Though the device helps people, such as the elderly, whose balance is naturally impaired, the possibilities for people without such problems are exciting, Dozza says. "This helps healthy people, too. Balance could be improved in athletes and others."

Dozza is working on a wireless version of the device, which could have software uploaded onto a pocket-size electronic organizer or cell phone.

The team of researchers has applied for a patent and, according to Dozza, thinks the device could be an affordable, advanced design if ever marketed to the public.

"We are waiting on a company to tell us, 'You guys tell us how to do it, and we'll make it happen,'" Dozza says.

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