

In Tony Health Clubs, All Shook Up

Trend May Build Strength -- or Pose Risk

By Karen Pallarito
Special to The Washington Post
Tuesday, June 8, 2004; Page HE01

Remember the vibrating belts of mid-century "reduction machines" that were supposed to effortlessly trim your waistline? If you thought *they* looked silly, wait until you see what's shaking now in the fitness industry. New "whole body vibration" machines showing up in some swank health clubs and rehabilitation facilities are generating ripples of curiosity -- and concern. No Washington area gyms are among the early adopters.

The training method, pioneered in the 1970s by Russian Olympic sports trainers looking to boost muscle strength, flexibility, range of motion and more, involves standing on what looks like a high-end bathroom scale with handlebars. But even on a bad day, your home bathroom scale won't bounce like this.

Step up, flip the switch and, instantly, you're all aquiver. If there's anyone in the room you want to impress, it's too late now.

Reading the roster of vibration proponents, though, might stop your laughter.

Lance Armstrong, who claimed his fifth consecutive Tour de France bicycle race win last July, owns one body-shake device, called the Galileo, says its marketer, Orthometrix. So do nearly all the German Olympic training centers, the company says. The maker of a competing body-shake product, the Power Plate, counts among its users the Tampa Bay Buccaneers football team, the New York Mets baseball club and the Anaheim Mighty Ducks hockey squad.

Garrett Giemont, the Tampa Bay Buccaneers' strength and conditioning coach, says he has players use the Power Plate not to replace standard conditioning, but to loosen and massage sore muscles the day after a game. "I call it a tool in my toolbox," he said.

But it may not be just world-class athletes who can benefit from vibration exercise. Scientists are exploring a range of possible therapeutic applications that, if shown effective, could literally shake up the way we get fit, recover from illness and injury and manage chronic health conditions.

For example, some research suggests vibration may help build bone -- a finding that could lead to an alternative treatment for the 44 million Americans who, according to the National Institutes of Health, have either osteoporosis or low-bone mass, which is a precursor for the brittle bone disease. Studies may also one day confirm whether

vibration could help relieve arthritic and post-operative pain, control incontinence, restore blood flow to the extremities or activate the muscles of people with multiple sclerosis.

While there have been some high-quality human studies showing the technologies' benefits, as a whole the body of research is inconsistent and not comprehensive enough to permit broad conclusions. And hopes of benefit are offset by a nagging concern: Too much body rattling is a proven health hazard, particularly for people with long-term exposures, like truck drivers and jackhammer operators.

Shake Your Booty

Exactly how mechanical vibration might produce benefits for the body scientists don't know. Human research into the technique is relatively new.

The prevailing theory is that vibration stimulates the body's natural stretch reflex, much as when a doctor taps a patient's patella with a reflex hammer and elicits a knee-jerk reaction. Vibration causes the muscles to flex and relax involuntarily. Repeated rapid muscle contraction boosts blood flow to the muscles, bones and tissues and can even make you break a sweat.

The potential bone-building effects of vibration made national headlines in August 2001 when the journal *Nature* published a sheep study led by Clinton Rubin, director of the Center for Biotechnology at the State University of New York at Stony Brook. Adult female sheep exposed to gentle vibrations for 20 minutes a day increased bone density in their hind legs by 34 percent over a year, compared with a control group, the study found.

The findings aroused enormous interest. "I got thousands if not tens of thousands of e-mails asking, 'Should I be standing on my washing machine?'" Rubin recalls.

Some scientists speculate that vibration could be a particularly useful tool for older or obese individuals, who have trouble doing traditional weight-bearing exercise, or people who cannot tolerate pharmaceutical treatment.

For now, however, much of the medical evidence supporting vibration therapy is anecdotal.

Clifford Rosen, a past president of the American Society for Bone and Mineral Research and scientist at The Jackson Laboratory in Bar Harbor, Maine, has two women patients with low bone density who have been using a vibration platform for two years. Both women -- a 38-year-old with a muscle disorder and a 41-year-old who's been unable to tolerate drug treatment -- have seen their bone density stabilize since beginning vibration treatment, he said.

"I think it's a great option for some people," Rosen says.

Diane Kelly, a chiropractor in Arnold, says she's also seen good results since putting patients, including some who found traditional exercise painful and difficult, on a Power Plate she bought in October for between \$9,000 and \$10,000. One patient, a 69-year-old retired nurse, couldn't walk up stairs previously without having to stop, grab the railing and rest, Kelly said. Vibration training, she said, "strengthened her back and it gave her endurance so she could climb up stairs without panting."

Patrick Jacobs, an assistant professor and researcher with The Miami Project to Cure Paralysis at the University of Miami School of Medicine, has been using the Galileo for the past several months with able-bodied people to better understand the effects of vibration on flexibility and muscle strength. If his initial studies go well, he hopes to use the device with people with spinal cord injury. He wants to know, for example, whether patients who retain some degree of sensation and motor control can optimize use of their afflicted limbs through vibration training. Jacobs and research colleagues presented results of the initial studies at last week's annual meeting of the American College of Sports Medicine in Indianapolis.

One study found that vibration increased heart rate response, flexibility and muscle power in healthy adults; the other revealed significant neural changes in healthy subjects after vibration, findings that have promising implications for people spinal cord injury, said Kristina Beekhuizen, one of the researchers.

"I was very, very impressed with our preliminary results," said Jacobs.

Neither Jacobs and colleagues nor the university has any financial stake in the Galileo or Orthometrix.

Feeling the Burn

One aspect of whole body vibration is likely to have broad appeal: Compared with traditional forms of exercise, vibration training requires relatively little exertion. I agreed to try out two models -- the Galileo, used primarily by rehab facilities, physical therapists and medical research institutions, and the Power Plate, which dominates the sports and fitness market.

First, Bruce Harvey, a sales manager for Orthometrix Inc., gave me a demonstration of the Galileo at the company's headquarters in White Plains, N.Y. The Galileo vibrates in a unique teeter-totter motion within a range of 5 to 30 hertz (more on this below). That's mild compared with other machines on the market.

The model I tried had an oscillating plate barely large enough to accommodate my size 8-1/2 feet and a digital pad to adjust the speed and duration of the exercise.

You simply stand with knees slightly flexed on the oscillating plate, heels lifted a bit, and let your muscle reflexes do the work. Depending on the vibration frequency selected, you may need to grab on to the handlebars to steady yourself. Changing your body position

targets other muscle groups: A deep squat with legs slightly apart concentrates on the calves and quadriceps.

"So the entire body is being exercised depending on which muscle you tense," explains Reynald Bonmati, founder, chairman and chief executive of Orthometrix Inc., maker of Galileo.

Afterward, I felt as if my legs were weightless. But I also wondered whether some stiffness in my shoulder the following day resulted from all that shaking. Harvey said the platform's teeter-totter motion was probably not responsible. "There's absolutely no transmission of the vibration up to the shoulders," he said.

A few weeks later, personal trainer Chris Imbo of New York's tony Casa Fitness took me through the paces on the Power Plate, which the club installed for its members about six months ago. The vibrating plate on this unit moves in an up-and-down pattern and is roomy enough for the largest feet. That machine vibrates within a much higher range, starting at 30 hertz and topping out at 50 -- the number of times a hummingbird flaps its wings in a second. Having a better idea of what to expect, I enjoyed the machine's pulsing action at the lower frequency. But at full tilt, it felt as if I were being whipped to a froth.

A day later, my glutes and quadriceps definitely felt the burn, the same as I'd have felt after weight training.

Bad Vibes

If all this sounds good, consider what else we know about vibration. For decades, biomechanical engineers have reported on the occupational hazards associated with driving big rigs and using vibrating hand tools, jobs that involve long-term exposure to intense vibration.

Jackhammer operators are prone to a circulatory condition called Reynaud's syndrome that can numb fingers and damage blood vessels, say scientists at the University of Tennessee's Institute for the Study of Human Vibration. The institute studies medical risks tied to job-related vibration exposure, not vibration as exercise. Bus and truck drivers' chronic exposure to whole body vibration can lead to lower back problems. And studies suggest women who operate heavy machinery while pregnant may be at greater risk of miscarriage than women who don't.

The risk of harm, say researchers, is dependent on the duration, frequency and magnitude of the exposure.

Typically, vibration exercise is performed in short spurts. It takes 10 to 15 minutes to complete an entire workout, whether you're using it for rehab or exercise, and that's often repeated a couple times a week. Truck drivers, by contrast, often are exposed to jarring motion for hours at a time, day after day.

Frequency refers to the number of vibrations, or oscillations, per second. At 25 hertz, the targeted muscles receive 25 cycles of vibration per second, making them contract and relax as many times in the same period. Oddly, scientists have found the most troublesome vibration frequencies for the human body occur at the "slower" range of 4 to 8 hertz in the vertical position and 1 to 2 hertz in the side-to-side and front-to-rear directions. Magnitude is the so-called G-force, or acceleration, of the movement, and there is wide disagreement about the safe level. Vibration plates made for exercise and physical training deliver more than 8 g of force, says Rubin, the SUNY Stony Brook researcher. He insists that's far too much.

In a study published in the March 2004 issue of the Journal of Bone and Mineral Research, Rubin and colleagues found that exposing postmenopausal women to low-magnitude vibration -- less than 0.3 g -- for brief periods while they are standing can inhibit bone loss in the spine and thighbone.

"We are arguing that mechanical signals can be very beneficial to the skeleton," he says. "But just like any other drug or any other intervention that causes a response, there can be too much of a good thing." Using the commercially available vibration platforms for fitness, he said, "is jumping off your refrigerator."

Makers of vibration platforms reject that analogy, insisting the devices are safe.

"A professional athlete is not going to jeopardize their career by using something that is not safe and effective for them," said Chris Camacho, director of athletic and physiological applications at Power Plate North America in Culver City, Calif. Orthometrix executives likewise dismisses Rubin's concerns. "If it's good for muscle, believe me it's good for bone," said Bonmati, the company's chairman.

But few rigorous long-term safety studies have been published on the training method in humans. Studies on the method's effectiveness also fall short. Of the dozens published to date, few compare the method, long-term, against a control group or more traditional training. When randomized controlled trials have been conducted, they have produced conflicting results, especially concerning bone mass and strength, notes Pekka Kannus, chief physician of Finland's UKK Institute, which conducts health and exercise research.

Accordingly, many U.S. health and fitness experts urge caution.

"The evidence is equivocal regarding the benefits of vibration training," states William P. Ebben, a clinical assistant professor in the exercise science program at Marquette University in Milwaukee.

Going Slow

For those who'd like to still like to try whole body vibration, Rodney Corn, an educator with the National Academy of Sports Medicine, has this advice: Go easy and consult with your doctor first.

Whole body vibration is not recommended for people with fresh fractures or new implants, people with epilepsy, individuals prone to blood clots and women who are pregnant.

If you want to buy your own machine, start saving. Commercial units cost around \$10,000 (Power Plate recently cut the price on most models to \$8,500). The company's looking to roll out a home unit by year's end for around \$3,000. Galileo has no home unit yet. Or then again, maybe you can pick up one of those old jiggy belt things at an antique store or garage sale for a fraction of the price.

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