

A New Option in Strength Training Exercise for Older Adults – And Others

By **Dr. Martha Hinman, PT, PDT, EdD, CEEAA**



Dr. Martha Hinman has over 40 years of experience as a physical therapist and educator. She received her entry-level degree in physical therapy and master's degree in health education from the Medical College of Georgia. She earned her doctorate in Allied Health Education and Administration from the University of Houston and recently completed a doctorate in physical therapy from Nova Southeastern University in Florida. She is also a Certified Exercise Expert for Aging Adults (CEEAA).

Many older adults don't have either the motivation, or the cognitive or physical ability, to participate in an active rehabilitation program. Therefore, physical therapists are often limited to engaging these individuals in very low-level functional activities. I saw a need for other interventions that were more passive, easy and user-friendly, and I'm pleased to have been involved with the design of a novel device called the VibeTech 1™ and its successor, the newly introduced VibeTech 2™.

The VibeTech 2™ is a semi-recumbent strength training and therapeutic vibration system, which is commercially available, and FDA registered in the U.S. It delivers precise measures of vibration therapy in a seated, non-weight bearing position, targeting key muscle groups in the lower extremities and lower back responsible for standing and walking. It simulates partial weight-bearing physical activity in patients and is particularly useful for those who are too weak or deconditioned to perform physical activity on their own.

Progressive Treatment for All Levels of Ability

Patients sit in the device and place their feet on a footplate. Treatments can be provided with or without active involvement from the patient. When a patient is strong enough, a therapist can instruct the individual to perform leg presses, calf extensions, and even sit-ups while receiving treatment in a safe, seated position. The therapist also can manually press against the patient's thighs to work the legs through a range of motion under load, with the added benefit of simultaneous application of stimulating vibrations. Over time, a patient may progress by increasing leg pressure and vibration intensity to accelerate their rehabilitation.

The beauty of this equipment is that even someone with mild to moderate dementia can benefit from treatment because it doesn't require a high level of attention or understanding. You can give simple commands like "Push against the footplate," and in many cases these individuals



will do that reflexively. For some of our patients with dementia and Alzheimer's disease, it presents a new option to add to our bag of tricks to engage them actively in the rehab process.

VibeTech Is Different

When whole body vibration systems first came on the market 20 years ago, I saw various devices marketed at every conference I went to. They were all basic modifications of the same design – a platform that the patient stood on which provided whole body vibration from head to toe. However, I frequently found that both young and older patients couldn't tolerate the magnitude of the vibrations produced by these machines. Some complained of head shaking or migraine headaches triggered by these devices. They also had restrictions for people with joint implants --- a large percentage of our senior population.

Then the marketing for some of these devices got out of control, making claims that the equipment could do things such as enable weight loss which was unsupported by the scientific literature. As a faculty member and researcher, it made me want to get more involved in research to discover what the true benefits of this technology might be for our geriatric population.

When VibeTech wanted to design something that could be used in a seated position I was really excited because that was new. The device has truly been an answer to our rehabilitation prayers in that it has provided both the positional support and safety features we were looking for, while reducing the need to eliminate so many good candidates for this type of technology.

Just as athletes get motivated when we bring out high-end equipment, our seniors get motivated when they have the opportunity to work on a piece of equipment that incorporates their needs. This not only offers physical benefits in helping to initiate movement and improve their gait but it also brings psychological benefits by building their confidence and motivating them to use it.

Many therapeutic modalities, like electrical stimulation, are designed for strengthening specific muscle groups. They can be time consuming to set up, and there's a risk of skin irritation particularly for patients with fragile skin. Some of the newer bionic devices do offer some very good results, but it can be cumbersome to get patients in and out of them.

This device treats multiple body systems and tissues. It offers a range of vibration from low magnitude that stimulates bone growth to middle and higher ranges that can trigger muscle contractions, improve blood flow to the legs, relieve joint pain, and provide proprioceptive input from the feet that facilitates better balance.

I tell patients it's like getting a double dose of exercise. Vibration is a passive stimulus. Then, adding the leg press motion brings an active, cognitive component. A lot of new research coming out on bone growth suggests that we use more novel stimuli to prevent accommodation. Otherwise, bones, like muscles, exposed to the same exercises and repetitions will adapt and stop responding. By varying the intensity of the load of the vibratory stimulus and combining it with resistance, you can "surprise the bones and muscles" by providing new stresses that require constant adaptation. That's what these patients need for functional activity.



Both Passive and Active Strength Training for All Ages

It's not just a piece of vibration equipment usable in a geriatric setting but a progressive exercise machine. It can really take someone the full gamut from being totally non-weight bearing, wheelchair-dependent, and allow them to start getting some sensory input through the device that will then stimulate some active participation and enable them to move to a strengthening mode.

In our experience, physical therapists have said that utilizing the device at the onset of a patient's daily therapy program is the ideal way to increase tolerance for other therapy modalities, because a 10-minute session activates nearly all of the muscle fibers throughout the lower extremities and lower back. This helps to reduce exertion levels when performing other exercises. Patients with osteoarthritis and other joint pain, leg pain and low back pain who have been treated with the equipment have reported that their pain level has dropped or completely diminished with treatment. And, some of our patients have gained one to three inches of sit-and-reach flexibility from a single treatment.

Beyond the senior population, rehab facilities can use the device to treat patients of all ages immediately after an injury or surgery, before atrophy can set in. It can be used to help patients recover from common injuries including ankle sprains, ACL/MCL/Achilles tendon tears, torn meniscus, hamstring strains, contusions and stress fractures; and allow athletes to exercise in a controlled fashion during recovery from joint injury. Down the road, we'd like to test its ability to help diabetics with neuropathy, or children with autism who need sensory input to help focus their attention. In addition, we know that many patients experience the adverse effect of blood clots forming in their legs post-operatively, despite prophylactic measures such as blood thinners and compression stockings. The muscle contractions that are passively stimulated in the lower extremities by a bedside vibration device could be a future application that could minimize clot formation and avoid a potentially life-threatening outcome.

Randomized Controlled Trial

I was a co-investigator on our first pilot clinical study that was conducted at Northern Oaks Rehabilitation Center in Abilene, Texas as part of a National Institutes of Health grant. This study compared the differences in outcomes of several functional measures among a group of nursing home residents who were assigned to receive usual physical therapy care (i.e., exercise, balance and gait training) or usual therapy plus sessions with the VibeTech device. The very encouraging results from that pilot study prompted design improvements in the equipment leading to the generation of the VibeTech 1™ semi-recumbent therapeutic vibration rehabilitation system and a larger randomized controlled trial. The positive results of the follow-on study have now led to the creation of the VibeTech 2™, which enables both treatment and functional assessments to take place on the same machine to demonstrate the immediate and long-term benefits of treatment.



Additional Background

Dr. Martha Hinman, PT, DPT, EdD, MHEd is a physical therapist with over 40 years of experience including 36+ years in higher education. She is the Founding Chair and Professor in the School of Physical Therapy that is developing at Anderson University in Greenville, SC. Dr. Hinman has published over 30 articles and abstracts, presented at numerous professional and continuing education conferences, and served as a consultant on several NIH-funded grants related to her areas of interest. She is currently a member of the education, research, and geriatrics sections of the APTA and a site reviewer for the Commission on Accreditation in Physical Therapy Education (CAPTE); she previously served two terms on CAPTE and is a past chair of the Commission. Dr. Hinman also operates the Hinman Network which is an independent educational consulting business for PT and PTA education. Dr. Hinman maintains her home in Abilene, TX.

Hinman's clinical interests and experience focus on health promotion and wellness for older adults; she was among the first group of PTs to be certified as an exercise expert for aging adults (CEEAA). Her research interests include tests and interventions related to fall and fracture prevention in older adults (i.e., balance assessment and training, osteoporosis management), along with investigations involving complementary therapies such as magnets and vibration.

She has been awarded the Outstanding Research Presentation Award (1993, 1994, 1995, and 2001) and Outstanding Faculty Award (2007) by the Texas Physical Therapy Association and has been recognized nationally by the American Physical Therapy Association with the Linda Crane Memorial Lectureship (2006) and the Distinguished Geriatric Educator Award (2011). She received the Distinguished Service Award from CAPTE (2015) and the Stanford Award from the American Physical Therapy Association for publishing the most influential article in the 2014 volume of the *Journal of Physical Therapy Education*.