

Background and research for Cobble Treadmill/walking surface:

Summary:

I am offering a new treadmill cobblestone track technology to one or more interested manufacturers for licensing, purchase or joint venture. This technology is patent protected by two U.S. utility patents.

It is my vision that the cobblestone track has three distinct applications. These include use in the gym, rehabilitation center and home. If desirable I will work with the manufacturers in the development of these applications.

Rehabilitation Center:

Background:

According to the **2010 Census**, there were 40.3 million people who were 65 years and over on April 1, 2010. The older population's share of the total population has also been trending upward. **According to the U.S. Centers for Disease Control and Prevention** one-third of Americans aged 65+ falls each year. Every 15 seconds, an older adult is treated in the emergency room for a fall; every 29 minutes, an older adult dies following a fall. Falls are the leading cause of fatal injury and the most common cause of nonfatal trauma-related hospital admissions among older adults. Falls result in more than 2.3 million fall injuries treated in emergency departments, including over 650,000 hospitalizations and more than 20,000 deaths.

Balance disorders and weakness are common causes of falls in the elderly (reference #1). The article below demonstrates that walking on a cobblestone mat surface resulted in improvements in balance and physical performance among adults 60 and over as well as a significant reduction in blood pressure.

The following is an excerpt from Medical News Today: Cobblestone-like walking paths are common in China. The activity is rooted in traditional Chinese medicine and relates to some of the principles of reflexology, in that the uneven surface of the cobblestones stimulate and regulate "acupoints" located on the soles of the feet. These acupoints are purportedly linked to all organs and tissues of the body. Although there is considerable anecdotal evidence indicating the health benefits of cobblestone walking, (e.g., pain relief, sleep enhancement, improved physical and mental well-being), until recently no controlled studies have been undertaken to scientifically evaluate its benefits and efficacy.

A randomized study:

A randomized study titled “Improving Physical Function and Blood Pressure in Older Adults through Cobblestone Mat Walking: A Randomized Study” has shown that cobblestone mat walking causes significant improvements in the elderly. After a 16 week intervention, it was found that cobblestone mat walking, significantly improved balance and physical function compared to conventional walking. It was also found that after a 16 week intervention, significant reductions in blood pressure (both systolic and diastolic) were noted.

Discussion:

I have applied this cobblestone mat surface technology to a treadmill track. This new exercise modality could be utilized by rehabilitation centers in skilled nursing facilities, hospitals and offices to improve balance and physical function.

Physical therapists often perform balance and gait assessments in the elderly following injuries and illnesses. When indicated, balance training and gait training are initiated. Balance training and gait training are often considered covered services by Medicare and private insurances when used for rehabilitation in the elderly. Balance training and gait training are key focuses in rehabilitation centers located in skilled nursing facilities, acute hospitals and offices.

The cobbles configuration...

Home:

Discussion:

A home version of the treadmill with cobblestone track would have very positive effects for the elderly population in terms of balance, physical function and lowering blood pressure. This would help seniors to prevent falls and help lower blood pressure in a non-pharmaceutical way. It is hypothesized that walking on cobblestone surfaces strengthens the muscle of the lower extremities. Having a home version of the cobblestone track treadmill would be excellent for the millions of baby boomers who need continued balance training and reduction of blood pressure and a way to exercise.

Gym: Cobble Track: Google cross training and sand running

The popularity and benefits of running outside on trails and on irregular surfaces has been widely documented. Feeling the terrain has become popular to point that barefoot running has been popularized in recent time. Running on the beach, in parks, through neighborhoods have also become very popular. For thousands of years, the Chinese have been walking on river stones (cobble like surfaces) for medicinal reasons.

Putting a cobblestone track treadmill in a gym would offer the members a completely new and unique experience. It would give the runner/walker an irregular surface simulating the outdoors. It would offer increased shock absorption, more foot stimulation, balance training, strengthening, spring off with every step.

The irregular feel of the cobble surface gives running and walking a unique experience. Increased shock absorption in the actual cobbles and mat surface lessens the impact on your feet and knees. No other manufacturer can offer this due to patent protection.

The cobble configuration in the gym application will continue to be domed, however, the cobbles will be somewhat flexible. As one runs or walks, the cobble will flex under the foot to allow increased shock absorption, lessening the impact on lower extremity joints and bones.

Repetitive motion for long periods of time causes injury. Hitting the same place on the joint, using the same tendons and ligaments over and over leads to overuse and eventually arthritis. Using a cobblestone track will simulate being outside and will cause slightly different motion with each step.

Running on an irregular surface offers the runner a slight instability with each step. The instability leads to increased motion in the transverse and frontal planes. This causes the stabilization muscles of the foot and leg to fire. This leads to increase muscle strength, balance and increased joint range of motion.

Trend towards feeling the ground. Minimalist shoes and running barefoot have become popular. A cobblestone track will allow a running or walker, even though shoes to feel some irregularity. This will have the effect of causing the stabilizing muscles to fire, resulting in strengthening, increased range of motion, balance and proprioception training.

Repetitive motion accounts for more than 50% of athletic injuries. When the foot hits in exactly the same place over and over again leads to this type of injury. Shoes and foot

inserts may mitigate the injury, but running on an irregular surface eliminates this repetitive motion problem. Every step is different. Every step involves different stresses, different muscle use, different biomechanics, and different wear on the joints. This is why trail running or running outdoors is very popular. Minimalist shoes are very popular.

Running is primarily a sagittal plane motion exercise and utilizes the same joint surfaces, muscles, and tendons. Running on irregular surfaces such as sand, trails, grass and the Cobble Track utilizes much more frontal plane and transverse plane motion. This causes the joints to move differently, cause more stabilization muscles to fire and increases muscle tone, strength and balance. It would also decrease long term injury due to decrease repetitive motion.

Home:

Having a home version of the cobblestone track treadmill would be excellent for the millions of baby boomers who need continued balance training and reduction of blood pressure and a way to exercise. By increasing balance and strength, this type of exercise could prevent many types of common injuries created by falling. Balance training, which results in improved balance can help prevent falls.

Additional thoughts, data and supporting Articles:

We have formed a team to develop and present our new cobblestone track. With such diversified experience and knowledge, there exists much synergy to develop applications for this new track technology.



Cobblestone walking good for seniors, lowers blood pressure among other things

Main Category: [Seniors / Aging](#)

Article Date: 30 Jun 2005 - 16:00 PDT

A recently completed study by scientists at the Oregon Research Institute (ORI) in Eugene confirmed earlier findings from a pilot study that walking on a cobblestone mat surface resulted in significant reductions in blood pressure and improvements in balance and physical performance among adults 60 and over. An article published in an early online publication of the Journal of the American Geriatrics Society summarizes the study results in a randomized trial.

"These are very exciting results," notes John Fisher, Ph.D., one of the lead scientists on the study. "Compared to conventional walking, the experience of walking on the river rock-like surface of these manufactured cobblestone mats improved participants' balance, measures of mobility, as well as reducing their blood pressure. These issues are highly important for preventing and delaying the onset of frailty among older adults, as well as helping them maintain their current health status."

Cobblestone-like walking paths are common in China. The activity is rooted in traditional Chinese medicine and relates to some of the principles of reflexology, in that the uneven surface of the cobblestones stimulate and regulate "acupoints" located on the soles of the feet. These acupoints are purportedly linked to all organs and tissues of the body. Although there is considerable anecdotal evidence indicating the health benefits of cobblestone walking, (e.g., pain relief, sleep enhancement, improved physical and mental well-being), until recently no controlled studies have been undertaken to scientifically evaluate its benefits and efficacy.

"We visited China and noticed that adults of all ages spent about 30 minutes each day walking, standing, and sometimes dancing on these beautifully laid paths of river stones in the parks and gardens of large cities. They did this for their health every day of the week. We used manufactured mats that replicated these cobblestone

paths and developed a special protocol so that participants gradually got used to walking on the uneven surface of the mats," reported Fisher.

Participants in the study, which was funded by the National Institute on Aging (Grant AG20470), were divided into an experimental group -- the cobblestone mat walkers -- and a control group which took part in conventional walking activities for one hour, three times per week for 16 weeks. At the end of the study, mat walkers were found to have better scores on measures of balance, physical function, and blood pressure than those in the conventional walking group. This new physical activity could provide a different choice of physical activity that is therapeutic and health-enhancing and that can be done quickly and easily in the comfort of one's home. The mats are available directly from the Oregon Research Institute in Eugene, Oregon. Please phone 541.484.2123 for more information.

Oregon Research Institute, founded in 1960, is a non-profit behavioral research center with offices in Eugene and Portland, Oregon and Albuquerque, New Mexico. ORI is a nationally and internationally recognized research organization, committed to conducting behavioral research to improve the health of all citizens.

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Home: Having a home version of the cobblestone track treadmill would be excellent for the millions of baby boomers who need continue balance training and reduction of blood pressure and a way to exercise. This type of exercise could prevent many types of common injuries created by falling. Improving balance can help prevent falls.

Section:

1. Rehabilitation Centers Use: including render

- a. According to the US census, the elderly population in the United States is estimated at ____ million. It is projected that the Baby Boomers will... As a person ages, maintaining balance while walking becomes more and more of a problem. It is estimated that elderly fall ____ time per year. In addition to balance problems, high blood pressure and debility are very prevalent.
- According to the **US Census 2010**

1. The older population is an important and growing segment of the United States population.¹ In fact, more people were 65 years and over in 2010 than in any previous census.²
 2. Between 2000 and 2010, the total population increased by 9.7 percent, from 281.4 million to 308.7 million. Growth over the decade was even faster for the population 65 years and over, which grew 15.1 percent.
 3. The largest growth rate for a ten-year age group was for males 85 to 94 years old (46.5 percent).
 4. According to the 2010 Census, there were 40.3 million people who were 65 years and over on April 1, 2010 (Table 1).
 5. The older population's share of the total population has also been trending upward.
- According to the **U.S. Centers for Disease Control and Prevention:**
 - One-third of Americans aged 65+ falls each year.
 - Every 15 seconds, an older adult is treated in the emergency room for a fall; every 29 minutes, an older adult dies following a fall.
 - Falls are the leading cause of fatal injury and the most common cause of nonfatal trauma-related hospital admissions among older adults.
 - Falls result in more than 2.3 million fall injuries treated in emergency departments, including over 650,000 hospitalizations and more than 20,000 deaths.
 - In 2000, the direct medical cost of fatal and nonfatal fall injuries totaled over \$19 billion, \$28.3 billion in 2010 dollars.
 - The financial toll for older adult falls is expected to increase as the population ages and may reach \$54.9 billion by 2020.
 - In 2000, the direct medical cost of fatal and nonfatal fall injuries totaled over \$19 billion, \$28.2 billion in 2010 dollars.
 - The financial toll for older adult falls is expected to increase as the population ages and may reach \$54.9 billion by 2020. One third of Americans aged 65+ falls each year, meaning every 15 seconds an older adult is treated in the emergency room for a fall.
 - In 2007, more than 18,000 older Americans died from injuries related to unintentional falls.
 - In 2009, over 2.2 million nonfatal fall injuries in people aged 65+ were treated in emergency departments and over 581,000 of these patients were hospitalized.
 - In 2000, the total cost of fall-related injuries in older adults exceeded \$19 billion (equal to \$28.2 billion in 2010).

- By 2020, the annual direct and indirect cost of fall injuries is expected to reach \$54.9 billion.

Questions: Where would all the technology be put (low profile, types of cobbles, etc.)

TX Podiatrist Describes Exercises to Strengthen Foot Muscles

Trail running bolsters feet and ankles, which benefits hikers by preventing sprained or rolled ankles, plantar fasciitis, knee problems, and shin splints. Plus, running gets you in top hiking shape by working quads, hamstrings, calves, glutes, hips, shoulders, and abs. Here's how to use running to get in prime trail condition this season. 1. ABCs - Use your big toe to air-write the alphabet, advises **Dr. Marybeth Crane**, podiatrist, foot and ankle surgeon, and life-long runner. The wide variety of movements improves flexibility and works foot and ankle muscles, both of which reduce your risk of sprains.



2. Towel crunches - To strengthen the interossei and lumbricals, the tiny toe muscles that provide stability for navigating uneven terrain, Crane recommends this exercise: Put your foot on a towel and scrunch or grab the towel with your toes (either seated or standing). Do it 10 times, take a 30-second break, and repeat twice. If this gets easy, try grabbing a pen or marker with your toes instead. Source: Allison Pattillo, *Backpacker Magazine* [May 2012]

Reference # 1- Common Causes of Falls in the Elderly*

Adapted with permission from Rubenstein LZ. Falls. In: Yoshikawa TT, Cobbs EL, Brummel-Smith K, eds. Ambulatory geriatric care. St. Louis: Mosby, 1993: 296–304.

Accident, environmental hazard, fall from bed
Gait disturbance, balance disorders or weakness, pain related to arthritis
Vertigo
Medications or alcohol
Acute illness
Confusion and cognitive impairment
Postural hypotension
Visual disorder
Central nervous system disorder, syncope, drop attacks, epilepsy

*—Listed in approximate order of occurrence.

Adapted with permission from Rubenstein LZ. Falls. In: Yoshikawa TT, Cobbs EL, Brummel-Smith K, eds. Ambulatory geriatric care. St. Louis: Mosby, 1993: 296–304.

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Exercise in preventing falls and fall related injuries in older people: a review of randomized controlled trials

Br J Sports Med 2000;**34**:7-17 doi:10.1136/bjsm.34.1.7

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- **Accepted** 23 September 1999

Abstract

Objective—To assess the effectiveness of exercise programs in preventing falls (and/or lowering the risk of falls and fall related injuries) in older people.

Design—A review of controlled clinical trials designed with the aim of lowering the risk of falling and/or fall injuries through an exercise only intervention or an intervention that included an exercise component

Main outcome measures—Falls, fall related injuries, time between falls, costs, cost effectiveness.

Subjects—A total of 4933 men and women aged 60 years and older.

Results—Eleven trials meeting the criteria for inclusion were reviewed. Eight of these trials had separate exercise interventions, and three used interventions with an exercise programed component. Five trials showed a significant reduction in the rate of falls or the risk of falling in the intervention group.

Conclusions—Exercise is effective in lowering falls risk in selected groups and should form part of falls prevention programed. Lowering fall related injuries will reduce health care costs but there is little available information on the

costs associated with programmed replication or the cost effectiveness of exercise programs aimed at preventing falls in older people.

Physical Therapy

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Balance and Ankle Range of Motion in Community-Dwelling Women Aged 64 to 87 Years: A Correlational Study

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Abstract

Background and Purpose. This study investigated the relationship between balance measures and ankle range of motion (ROM) in community-dwelling elderly women with no health problems. Identification of modifiable factors associated with balance may enable clinicians to design treatments to help reduce the risk of falls in elderly people. **Subjects.** The sample consisted of 34 women between the ages of 64 and 87 years ($\bar{X}=74.7$, $SD=6.0$). **Methods.** Goniometry was used to determine bilateral ankle active-assistive range of motion (AAROM) and passive range of motion. Balance capabilities were measured with the Functional Reach Test (FRT) and the Tinetti Performance-Oriented Mobility Assessment (POMA). Balance data for the FRT, POMA balance subtest, POMA gait subtest, and POMA total score were correlated with ankle ROM using the Pearson product moment correlation coefficient (PCC). **Results.** Correlations between ROM and balance scores were found, ranging from .29 to .63. The POMA gait subtest and FRT resulted in higher correlations with ROM than did the POMA balance subtest (left total AAROM $PCC=.63$, .51, and .31). Correlations using composite ankle ROM scores were higher than individual motions. The strongest correlation existed between bilateral, total ankle AAROM and the POMA gait subtest scores ($PCC=.63$) **Conclusion and Discussion.** Correlations exist between ankle ROM and balance in community-dwelling elderly women. Additional research is needed to determine whether treatment directed at increasing ankle ROM can improve balance.

***Br J Sports Med* 2001;35:144-145 doi:10.1136/bjsm.35.3.144**

Physical activity to prevent falls in older people: time to intervene in high risk groups using falls as an outcome

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Fall related injuries and the resulting deaths in older adults are a major, and increasing, health problem world wide.¹⁻³ About 30% of people over 65 years of age fall at least once a year, and about half of these do so recurrently.^{1,3,4} A fall may result in a fracture, particularly in an older person, and about 90% of hip fractures result from falls.⁵ The outcome of a hip fracture is fatal in 12–20% of cases.⁶ The annual cost of fall related fractures in the United States is estimated to be \$10 billion.⁷ Furthermore, the incidence of hip fractures continues to rise steadily, even when age adjusted figures are used.^{1,2}

There are many causes of falls, and they are reviewed in detail elsewhere.^{8,9} Some of the major categories of risk factors for falling are:

- General physical functioning
- Gait, balance, and physical performance
- Musculoskeletal and neuromuscular measures
- Demographic factors—for example, age, race
- Sensory impairments
- Medical conditions
- Indicators of general health
- Medication use
- Psychological, behavioural, social, and environmental factors

- **Barefoot Runners Need to Start Slowly: WI Podiatrist**

- Podiatrist **Dr. April Borchardt** with Prevea Health says she was initially against barefoot running. However, after looking into it and trying it out, she says her mind was changed... slightly. "The key is that it's not for everybody and that's what I found out," said Borchardt. Borchardt says a major benefit of barefoot running is that it strengthens small foot muscles that are unused because of the traditional types of shoes.



Dr. April Borchardt

- But to do it safely, she says you have to have the right foot type. Often, she says, many patients of hers try running barefoot too much and too quickly, leading to problems. "A lot of that comes down to not conditioning properly. So, they decide to go for their full two mile run the first time in a Vibram FiveFinger, which is not going to work. It's really, you start out with 5 minutes, and gradually increase your time slowly."
- Source: Bill Miston, *Fox News* [6/2/12]



1. [Least Effective Exercises Slideshow](#)

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Repetitive Motion Injuries Overview

Repetitive motion injuries are tissue injuries that occur as a result of repeated motions. They are among the most common injuries in the United States. All of these disorders are made worse by the strains of daily living.

Repetitive motion injuries make up over 50% of all athletic-related injuries seen by doctors and result in huge losses in terms of cost to the workforce. Simple everyday actions, such as throwing a ball, scrubbing a floor, or jogging, can lead to this condition.

The most common types of repetitive motion injuries are [tendinitis](#) and [bursitis](#), injuries to tendons and bursae, respectively. These disorders are difficult to distinguish and often coexist.

Tendinitis

- A [tendon](#) is a white fibrous tissue that connects [muscle](#) to bone and allows for movement at all joints throughout the body. Because tendons must be able to bear all of the weight of the attached muscle, they are very strong.
- Tendinitis is an [inflammation](#) of the tendon. (Whenever you see "-itis" at the end of a word, think "inflammation.")
- Common sites of tendinitis include the [shoulder](#), the [biceps](#), and the [elbow](#) (such as [tennis elbow](#)).
- Males are slightly more likely to have this disorder.
- The inflammation of the tendon usually occurs at the site of insertion into bone.
- Tendons run through a lubricating sheath where they connect into muscle, and this sheath also may become inflamed. This condition is known as tenosynovitis.
 - Tenosynovitis is almost identical to tendinitis because both have identical causes, symptoms, and treatment.
 - Tenosynovitis of the [wrist](#) may be involved in [carpal tunnel syndrome](#), the most common [compression nerve](#) disorder, but this cause-and-effect relationship has never been proven.

Bursitis

- [Bursae](#) are small pouches or sacs that are found over areas where friction may develop and serve to cushion or lubricate the area between tendon and bone.
- Bursitis is inflammation of a bursa sac.
- Over 150 bursae are in the body.

- Most bursae are present at birth, but some come into existence in sites of repetitive pressure.
- Common areas where bursitis can occur include the elbow, [knee](#), and hip.
- Different types of bursitis include traumatic, infectious, and gouty.
- Traumatic bursitis is the type involved with repetitive motion injuries.
- Traumatic bursitis is most common in people younger than 35 years of age.

Repetitive Motion Injuries (cont.)

Dr. Shiel received a Bachelor of Science degree with honors from the University of Notre Dame. There he was involved in research in radiation biology and received the Huisking Scholarship. After graduating from St. Louis University School of Medicine, he completed his Internal Medicine residency and Rheumatology fellowship at the University of California, Irvine. He is board-certified in Internal Medicine and Rheumatology.

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Repetitive Motion Injuries Causes

Repetitive motion disorders develop because of [microscopic](#) tears in the tissue. When the body is unable to repair the tears in the tissue as fast as they are being made, inflammation occurs, leading to the sensation of [pain](#).

Causes of repetitive motion injuries include the following:

- Repetitive activity
- [Trauma](#)
- Crystal deposits (such as in [gout](#))
- Friction
- Systemic disease ([rheumatoid arthritis](#), gout)

Repetitive Motion Injuries Symptoms

- Tendinitis: The most common symptom associated with tendinitis is pain at the site involved. Tendinitis is made worse by active motion of the inflamed tendon. The skin overlying the inflamed tendon may be red and warm to the touch.
 - Biceps: The painful spot is usually in the groove where the arm meets the shoulder. You can reproduce the pain by flexing your elbow at 90 degrees and trying to turn your hand palm up ([supination](#)) against resistance.
 - Tennis elbow: This pain is in the elbow and is reproduced by cocking your wrist back (extending the wrist) as if you are bringing a tennis racket back to hit the ball.
 - Golfer's elbow: This pain also occurs in the elbow but is made worse by flexing the wrist forward as if you are hitting a golf ball.
 - Rotator cuff: Raising your arm out to the side reproduces this pain. The painful area is usually over the affected shoulder.
- Bursitis: Common symptoms include pain, tenderness, and decreased [range of motion](#) over affected area. Redness, swelling, and a crunchy feeling ([crepitus](#)) when the joint is moved may also be found.
 - Knee: This condition involves swelling over the bottom part of the [kneecap](#) that is red and warm to the touch. Usually, the range of motion of the knee will be less because of the pain that bending and straightening the knee causes.
 - Elbow: Pain, swelling, and redness are found over the elbow. The pain gets worse when you flex and extend your arm at the elbow.
 - Hip: Pain is increased by walking or by lying on the affected side. Bringing your leg away from and toward the midline of the body can also reproduce the pain

When to Seek Medical Care

When to call the doctor

- Pain with movement of [arms](#) and legs
- Tenderness over a joint or where a tendon connects
- Redness and increased warmth over joint
- Pain that wakes you from [sleep](#)
- Inability to sleep on affected side
- Inability to carry on normal activities of daily living (such as brushing your teeth or taking a shower)

When to go to the hospital

- Certain signs and symptoms may mean that you have an [infection](#) and should be seen by a doctor immediately.
 - [Joint pain](#) or tenderness that is associated with [fever](#), chills, [nausea](#), or vomiting
 - If more than one joint is involved at the same time or the joint pain migrates from one joint to another
 - A history of high-risk behavior (unprotected sexual activity with multiple partners, IV drug use, history of [sexually transmitted disease](#))
- Any severe joint pain also needs a visit to your hospital's [emergency department](#).