

LOW BACK PAIN

According to Harvard University Professor [Paul Glazer, M.D.](#), low back pain is the second leading cause of work absenteeism in the US and leads to more loss of productivity than any other medical condition.⁵

Back pain in America accounts for an economic burden equivalent to coronary heart disease,²⁴ the nation's number one cause of death. [New research](#) published in the Journal of the American Medical Association (JAMA) shows that Americans are spending more money than ever to treat spine problems, but their backs aren't getting any better.¹³

Much of the problem has been our collective failure to teach patients why they must take an active role in keeping their discs hydrated and healthy. Healthy discs are composed of 85% water and function as sponge-like shock absorbers to keep the vertebrae from jamming together. But disc health begins deteriorating early in life and worsens as we age.

Over a period of years, our activities of daily living can squeeze more water from the discs than can diffuse in at night. This dehydration process is accelerated by such factors as excessive sitting,^{9, p. 136} or weight gain.²² As fluid is lost from the disc, it compresses, acid builds up, and the vertebrae commonly begin to jam. The acid build-up weakens the disc wall allowing it to be easily torn and water to be expelled at an even faster rate.^{9, p. 138}

More than 20 years ago, [William Kirkaldy-Willis M.D.](#), the renowned spine surgeon credited with first explaining how the spine degenerates,^{4,6,20} revealed that all of the blood vessels supplying the spinal discs disintegrate by age 3^{9, p. 137} thus eliminating their contributions to disc hydration and nutrient supply. From that point on, the discs must survive on the meager amounts of water and nutrients that slowly diffuse in from surrounding tissue when pressure on the discs is reduced while reclining.

THE ROOT CAUSE OF BACK PAIN

Most back pain is due to a combination of chemical and mechanical factors.^{14,17} Contributions from mechanical factors often occur during the '[Degenerative Cascade](#)' as shown in Figure 1.

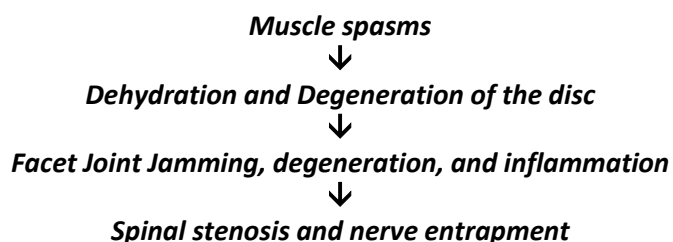


Figure 1. Mechanical factors contributing to the degenerative cascade of back pain. Adapted from ^{9, p.90}

The initial process of acid build-up commonly occurs undetected as there are no nerves inside the disc. A common chemical contributor to back and/or leg pain is when acid leaks out through a tear in the disc and stimulates the nerves along the outer disc wall.^{9, p. 241}

Treating the root cause of back pain means unloading the spine to increase the movement of water into the dehydrated disc. On a mechanical level this helps 'pump up' the disc and keep the vertebrae from jamming. On a chemical level, rehydrating the disc not only helps 'flush out' the harmful acid, it increases the flow of vital nutrients needed for the injured disc to heal.

Over a decade ago, Dr. Kirkaldy-Willis warned that:

"... if the normal lumbar spine is not unloaded at least once a day, cumulative and irreversible injury to the cell matrix [disc] takes place. As our society becomes more sedentary, the role of repetitive trauma is becoming more important. Awareness of this provides the opportunity to produce productive change."^{9, p.136}

Unfortunately, relatively few patients with back pain are being taught why they must unload their spine. Tens of billions of dollars in the US alone continues to be spent on treatments that merely address the mechanical factors while ignoring the ongoing disc destruction due to compression and subsequent dehydration. Consequently it should be no surprise that disability from back pain is increasing 14 times faster than the rate of birth.²⁰

Other world-renowned spine experts have recently confirmed Dr. Kirkaldy-Willis' earlier observations:

- In a [paper](#) presented to the Congress of Neurological Surgeons in 2005,⁸ neurosurgery professors Paul Kim, M.D., and Charles Branch, M.D., stated:

"A vicious cycle is created as early disc degeneration may stress the disc leading to an acid environment, which results in a shutdown of normal cellular metabolism."

They further indicated that this loss of cellular function leads to a cycle of ongoing disc destruction, pain and the 'degenerative cascade'.
- [Vert Mooney, M.D.](#), past president of the North American Spine Society ([NASS](#)) and current president of the International Intradiscal Therapy Society ([IITS](#)) has reported that:^{15,16}
 1. The disc is the most common site of back pain and may be responsible for up to 85% of cases.
 2. Most treatments focus on how to make you simply 'feel' better, not necessarily 'get' better.
 3. Disc degeneration changes the fluid within the disc from a normal 'alkaline' to a more irritating 'acidic' state.
 4. The acidity causes pain and can only be removed by a significant amount of fluid exchange.
 5. The quicker disc fluid is cycled the sooner pain will moderate.
 6. The goal of treatment is to wash away the acid through expanded motion of the disc.
- Award-winning and ongoing research by world-renowned disc physiologists [Jill Urban, Ph.D.](#) and [Sally Roberts, Ph.D.](#) (Oxford University, UK) indicates that:²⁴
 1. Disc degeneration starts as early as age 11, with 20% of teens having mild signs of degeneration.
 2. Disc degeneration is strongly associated with poor nutrient supply and acid build-up.
 3. The acid build-up leads to nerve irritation and disc herniation.
 4. Current treatments attempt to reduce pain rather than repair the degenerated disc.
 5. Even in degenerate discs the disc cells can retain the ability to synthesize new disc material.

To summarize these authoritative findings, lack of water and nutrients to the disc is the main reason discs begin breaking down. This is a process that starts early in life with dehydration of the disc leading to altered metabolism, poor nutrient supply, and acid build-up. The consequence of this acid build-up is nerve irritation, back and/or leg pain and ongoing disc destruction. But when the discs are provided with water and nutrients the acid is reduced, pain moderates, and the disc cells have the ability to regenerate new disc material.

THREE BASIC WAYS TO INCREASE DISC HYDRATION-- Reclining, Exercise & Spinal Decompression

1) Reclining. During our daily activities each lumbar disc loses approximately 20% of its water volume and 1.5 millimeters in height by evening.¹ Disc hydration starts as soon as you recline (unload the discs) and requires at least 7 full hours to reclaim the water and height lost during the day.²³ Degenerating discs have weaker absorption capacity and take much longer to rehydrate.² Lying down during the day to unload and hydrate the discs is an option, but simply is not practical for most busy people.

2) Exercise. It has long been believed that exercising the core muscles supporting the low back could pump water and nutrients back into the lumbar discs – a process known as convection. New research suggests this may not be true, including the studies noted below:

- Research from Stanford and Harvard medical schools recently showed that rapid fluctuation of load – such as between flexion and extension of the lumbar spine – does not deliver water and nutrients to the center of the disc where most of the acid accumulates and degeneration occurs.¹²
- Jill Urban, Ph.D. and her colleagues at Oxford University wrote, *‘Small nutrients such as oxygen and glucose are supplied to the disc’s cells virtually entirely by diffusion. Convective transport, arising from load induced fluid movement in and out of the disc, has virtually no direct influence on transport of these nutrients.’*²⁵ In other words, without the ‘small nutrients’ the disc cells and tissue can’t survive.
- An [Australian study](#) examining the MRI’s of Olympic athletes suggests elite athletes have a greater degree of lumbar disc degeneration and experience more back pain than the normal population.¹⁹

Having strong and flexible core muscles helps stabilize the spine. Certain core exercises help reduce back pain by ‘pumping’ water to the outer disc wall. It appears, however, that core exercises have only minimal effect on moving water and ‘smaller nutrients’ into the center of the disc where they have the potential to reverse the degenerative process.

3) Spinal decompression. The idea for aggressive disc rehydration arose from the discovery by NASA scientists that [astronauts](#) return to earth up to 2.5 inches taller.^{9, p. 382} During weightlessness the astronauts’ discs are unloaded and able to absorb abnormally large amounts of water from the surrounding tissue. The influx of water caused the disc to expand and the astronauts to grow taller. This temporary height increase inspired spine researchers to discover that using traction to decompress the lumbar discs had a similar rehydrating effect on earth.

Neurosurgeon of the year [Charles Burton, M.D.](#), former Chairman of the U.S. Food & Drug Administration (FDA) Advisory Panel on Neurological Devices, spent decades researching the beneficial effects of spinal decompression. Dr. Burton writes, *“Intermittently decompressing the spine increases the flow of water and nutrients into the disc, reverses the degenerative process and begins to reverse disc protrusion and progressive scoliosis.”*³

- Using anti-gravitational traction, Dr. Burton and his colleagues at the [Sister Kenny Institute](#) in Minneapolis demonstrated that frequent traction with a pull of approximately 25% of body weight for 15 minutes provided the following benefits:
 1. Substantial pain relief and high patient satisfaction (85% rating it ‘good to excellent’).^{9, p. 385}
 2. Reduced the need for surgery in 76% of surgical candidates.^{9, p. 386}
- Using the same anti-gravity traction device described by Burton, [A.W. Janke and research colleagues](#) showed radiographic (x-ray) evidence that lumbar discs increased an average of 1.5 mm in height after 15 minutes of traction using 25% of body weight.⁷
- German spine expert [Jurgen Kramer, M.D.](#) noted that 10 minutes of lumbar traction increased disc height an average of 1.8 mm due to water absorption.^{10, p. 27} Dr. Kramer concluded this short period of traction was comparable to 8-9 hours of rest in a horizontal position. He also noted traction helped treat the mechanical causes of back pain by:^{10, p. 100}
 1. Stretching and relaxing paravertebral muscles spasms.
 2. Helping restore vertebral joints to their normal position.
 3. Helping reduce spinal stenosis and nerve entrapment.
- For decades, doctors in Russia and Hungary have used [pool traction](#) to successfully treat low back pain. Patients are suspended in water by a chest belt and then 5 lb weights are secured to each ankle thus applying a form of traction. Researchers at the Hungarian Institute of Rheumatology used ultrasound measurements and determined that 20 minutes of pool traction:
 1. Increased disc height and hydration by an amount equivalent to lying down for 8 hours.¹¹
 2. Effectively mitigates pain, enhances joint flexibility, and improves the quality of life for patients with lumbar disc disease.¹⁸
- Neurosurgeons Gustavo Ramos, M.D., and William Martin, M.D., at the University of Texas inserted pressure sensitive probes into the L4-5 disc of patients to determine the effect of spinal decompression on relieving disc pressure. [The study](#) showed that in order to create negative pressure in the disc a pulling force greater than 35 lbs is required.

Treatments designed to more aggressively hydrate the disc are needed since passive diffusion of water and nutrients to the center of the disc while lying down is a slow and incomplete process. Part of the reason for this limitation is because even when we are lying down, there is still approximately 30 lbs to 40 lbs of compressive forces on the low back discs due to normal muscle tension.^{9, p. 382} Research shows that stretching the low back with a pull of 35 lbs or more creates negative pressure or ‘vacuum effect’ in the low back discs.²¹ The ‘vacuum effect’ pulls water into the disc at an accelerated rate and can achieve a similar amount of rehydration in 15 to 20 minutes as reclining for 7-8 hours.

SPINAL STRETCH®

Spinal Stretch® is a new and innovative device for spinal decompression. Using simple, non-motorized traction, Spinal Stretch® is the world's most cost-effective, convenient, and portable way to stretch and decompress the lumbar spine in virtually any environment including the patient's home, office, or hotel room.

The Spinal Stretch® is composed of sturdy components weighing only 4 lbs yet provides a therapeutic pulling force well within the range recommended by Dr. Burton to create a 'vacuum effect' that pulls water into the disc for restorative healing.

- In a study* conducted by [Thomas Storer, Ph.D.](#), Spinal Stretch® was shown to exert pulling forces equivalent to 42% to 63% of subjects' body weight. Thirteen subjects were tested for the maximum amount of tension developed with the Spinal Stretch, following the manufacturer's recommendations for use. Pulling forces with subjects wearing the chest belt ranged from 68 lbs to 136 lbs, representing a range of 42% to 63% of body weight, with an average of $55\% \pm 5\%$ (mean \pm SD). The average pull without the chest strap was equivalent to 43% of the body weight (70 lbs).

*Assessing The Pulling Force of Spinal Stretch, by Thomas W. Storer, Ph.D., Professor of Kinesiology, El Camino College, and Adjunct Professor of Medicine, Geffen School of Medicine, U.C.L.A (2-8-09)

SUMMARY

Spinal Stretch® was developed to focus on the root cause of back pain – the compressive forces of the weight of the body on the low back discs. Spinal Stretch® decompresses the spine with pulling forces in the therapeutic range, allowing inward movement of water and nutrients to the disc interior. This rehydration results in removal of the acid formed in the dry disc that has caused damage and pain. Regular and frequent use of Spinal Stretch® offers many back pain sufferers a simple, convenient, effective, and inexpensive way to actually treat the root cause of their low back pain.

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