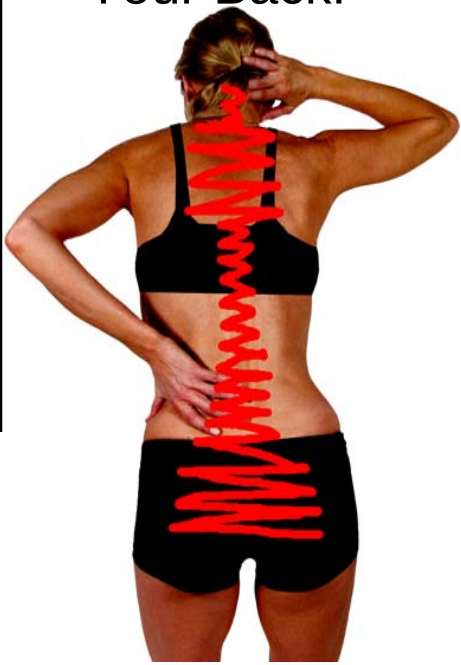
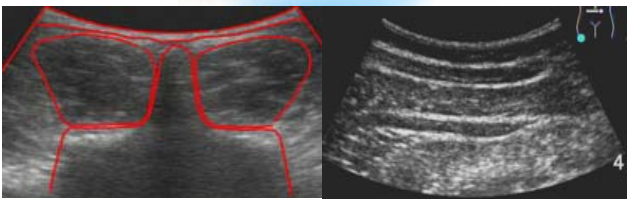
# STABILIZE

## The Essential Exercise For Your Back!



**Real Time Ultrasound Imaging Is Used During Specific Exercises As A Visual Biofeedback Tool**

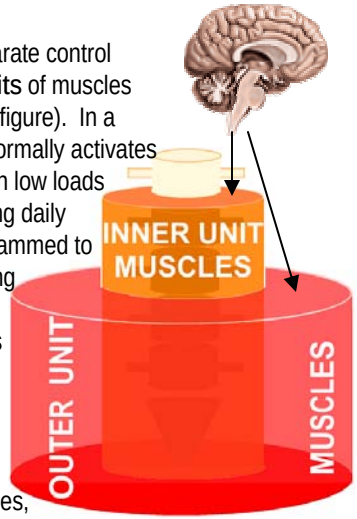


## *Why Stabilize?*

Low back pain will affect 80% of the population. And, although the pain may go away after 4 to 6 weeks, the deep stabilizing muscles of the lower back will remain impaired. Impaired deep stabilizing muscles provide poor segmental stiffness, and this predisposes your back to re-injury and a return of pain.

A study of people who recently injured their back showed **excellent long-term results** for those who performed specific back exercises guided by ultrasonography. In fact, the control group that did not perform specific exercises were **12.4 times** more likely to have a **return of back pain** during a three year follow up. Scientific research reveals no other treatment with comparable results. Only these specific back exercises have been shown to dramatically reduce recurrence of low back pain. To understand the problem and the solution, you first have to know how the muscles work in a healthy system.

## Back & Abdominal Muscles Control The Spine To Prevent Injury




The **brain** normally has separate control over the **inner** and **outer units** of muscles that surround the spine (see figure). In a **healthy system**, the brain normally activates **inner unit** muscles first when low loads are placed on the spine during daily activities. The brain is programmed to contract these deep stabilizing muscles to provide stiffness between individual segments of the spine. The most important **inner unit** stabilizing muscles of the lower back are the deepest layer of the abdominal muscles, **Transversus Abdominis**, and the deepest of the muscles in the lower back, **Multifidus**. These muscles work at all times during body movement, even when the movement is of a body part a long way from the spine, such as the shoulder. These muscles are much smaller and deeper, and do not generate great forces.

The brain contracts **outer unit** muscles later, when moderate to high loads are placed on the spine. These are large, strong, movement-producing muscles that may visibly 'bulge out' under the surface of your skin when contracted. The **inner unit** controls the individual segments or **parts** of the lumbar spine & pelvis, whereas the **outer unit** is only capable of controlling the **whole** spine in this region. The contraction of the **inner unit** builds gradually to produce sustained, low-grade forces that remain continuously active over long periods, like the "flow of cold molasses." Whereas, contraction of **outer unit** muscles turns on and off much quicker, like a "lightning strike."



## The PROBLEM

After a back injury or significant degenerative changes of the spine, the **inner unit** muscles become **impaired**. Studies show segmental muscle **atrophy of multifidus** at the same side of back pain. Other studies show that the brain no longer uses **separate control strategies** for the inner and outer units. Instead, the brain uses a simplified strategy of muscle control.

To help illustrate the differences in a healthy system vs. an injured system, let's compare the brain's strategy of muscle control to a **light switch** that controls multiple lights in a living room. The **healthy system** may be compared to a sophisticated "rotary dimmer dial" light switch with separate "joystick" controls. First, the brain gradually increases the inner unit's intensity level for control of low to minimal loads (similar to a dimmer dial). Then, as more spine stability is needed, specific muscles of the outer unit are added depending on direction of forces (joystick control) combined with intensity level (dimmer dial control). The **injured system** is more like a single "on/off" light switch. The brain does not seem to be able to differentiate between light and heavy loads and there is not separate control of inner and outer units.

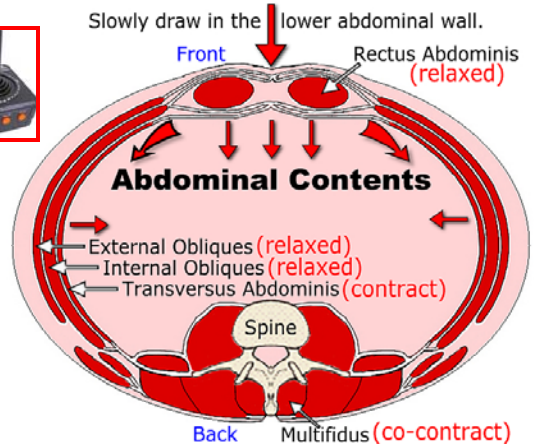
With an impairment of the inner unit muscles after injury, the outer unit muscles become **excessively active** in a compensatory attempt to stabilize the spine. The brain's new strategy results in spasm of outer unit muscles and torso rigidity during painful periods. **Transversus abdominis** seems to just **follow** the lead of over-active outer unit muscles of the abdominal wall (i.e., rectus abdominis, external oblique, and internal oblique). It also contracts in a phasic manner (lightning strike) instead of tonic (cold molasses). And, the segmental portion of **multifidus** at the level of injury tends to waste away (muscle atrophy) and does not contract during activities that place low to minimal load on the spine.



A final piece of the puzzle gives us a clear picture of the problem. The brain's muscle control strategy of the "injured system" does not automatically return to the previous two strategies of a "healthy system" once the pain goes away and you return to performing normal activities. The inner unit muscles remain impaired and provide poor segmental stiffness, and this predisposes your lower back to re-injury and a return of pain.

## The SOLUTION

In the first stage, we reprogram the brain to use a separate strategy for control of **inner unit** muscles. These muscles are retrained to contract in a "tonic" manner (low-grade, slow developing, continuous recruitment). You may also need to focus on reversing segmental muscle atrophy in the deep multifidus muscles. The diagram below shows what happens to the muscles during one type of specific exercise.



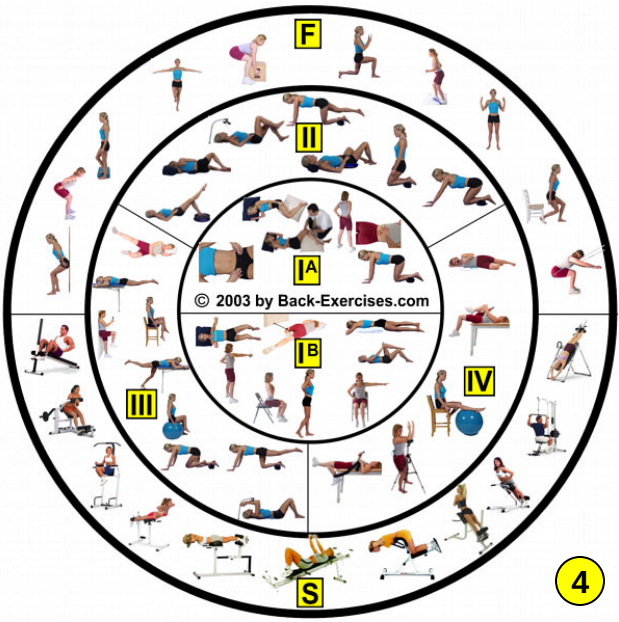

We use **facilitation and feedback techniques** during this initial stage of rehabilitation. These specific exercises are performed under the guidance of sonography, which is used as a biofeedback tool and to assess progress. The depth of the stabilizing muscles makes it difficult to accurately assess without this technology. Ultrasound scanning is the key to success and it also helps shorten recovery times. Once a patient has a clear understanding of the precise muscle contraction, the task is performed independently thousands of times. Why? Because research shows that…

**"Muscle control = pain control!"**

**“The key to exercise is targeting the right muscle for the right function.”**

As muscle control improves, patients are progressed to performing exercises in more functional and demanding positions. The second stage of treatment involves pre-contracting the inner unit muscles, then integrating normal outer unit movement control with advance stabilization exercises. Patients who experience difficulty in stage two, often benefit from using the STABILIZER Pressure Biofeedback.

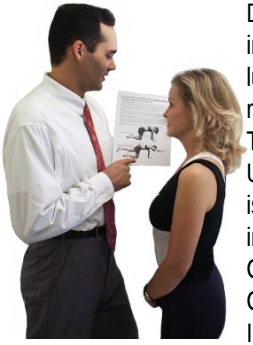
The third stage involves functional and advanced strength training. See a summary of the three stages below.



# Back Trainer Clinic

Location: Provo, UT
Phone: 888-562-7914

## Call for an evaluation with
## Howard A. Knudsen, DPT, CSCS



Dr. Knudsen has advanced training in the evaluation and treatment of lumbopelvic dysfunction. He received a Doctor of Physical Therapy degree from Creighton University in Omaha, Nebraska and is licensed as a physical therapist in Utah & California. He is also a Certified Strength and Conditioning Specialist by NSCA. In 1999, he participated in a Spine Fellowship at Houston Spine Center. In October 2004, he participated in a Real Time Ultrasound Imaging Residency in British Columbia under Diane Lee and Jackie Whittaker with a limited focus on lumbo-pelvic neuromuscular dysfunction.

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**List of continuing education seminars attended**:
Ultrasound Imaging: Exercise Management of LBP: Oct, 2003.
The Science of Stability: For Low Back Pain: Oct, 2003.
Lumbo-Pelvic Stability: The Integrated Cylinder: Mar, 2003.
Muscle Energy Techniques For Lumbo-Pelvis: Feb, 2003.
Mulligan: Mobilization With Movement: Jan, 2003.
McConnell: Shoulder, Thoracic, & Neck: Nov, 2002
Soft Tissue Mobilization For The Back, FO-1: 2001.
Repetitive Strain Injury Involving the Neck & Arms: 2000.
The Spine, Level 2: 1999.
The Spine, Level 1: 1999
Functional Capacity Evaluation: Feb 1999.
Evaluation & Treatment of Low Back Dysfunction: 1998.
Functional Relationships of the Lower Half: 1998.
Fundamentals of Radiology for PTs: 1997.

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More information on this subject can be found at:
**http://www.Back-Exercises.com**

Are you a **rehabilitation specialist** who wants to be trained to perform limited ultrasonography for lumbo-pelvic neuromuscular dysfunction? Contact us at 888-562-7914 or PTdoctor@aol.com for more details.