

# clinical conduit



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## Upcoming Course Schedule

### Lumbopelvic Course

Mar 31-Apr - Grapevine, TX

### Pilates Course

Mar 24-25 - Iowa City, IA  
Aug 18-19 - Plano, TX

### Knee Course

June 9-10, 2007 - Plano, TX  
Jul 14-15, 2007 - San Antonio

### Cervical Course

Nov 3-4, 2007 - Grapevine

### Foot-Ankle Course

Mar 3-4, 2007 - Salina, KS  
Sep 29-30, 2007 - Grapevine

A detailed description of the course content and learning objectives is available at our web site — [www.continuing-ed.cc](http://www.continuing-ed.cc)



## No Pain – No Gain for Achilles Tendinopathy Rehabilitation?

We generally try to avoid symptom reproduction when providing intervention strategies for our patients. One exception to this rule may be the use of intensive, painful eccentric exercise when managing tendinopathies. Over the past twenty years the literature has been pretty overwhelming that eccentric exercise is the best way to regain tensile capability and restore the histological features inherent to normal tendons. The story I've heard (albeit unsubstantiated) is that Hakan Alfredson, who is a leading researcher in this area, was suffering from chronic Achilles tendosis. He asked his colleagues to perform surgery and they all declined. So he attempted to force the issue by performing heavy eccentric exercise in hopes of causing a rupture. Much to his surprise he found that while painful, his

symptoms began to subside over time. This seemed to validate the unfounded claims (at that time) of Curwin and Stanish who proposed eccentric training as a restorative necessity for recovery.

To justify this approach I think it is important to define the specific mechanisms of pathology. Many have been offered but could generally be classified as mechanical, vascular, and/or neural dysfunctions. The mechanical theory suggests that biomechanical loading exceeds the tendon's physiological limits in an area of vascular compromise. A more recent theory suggests a relationship between radiculopathy and tendinosis with the neural mediated degranulation of mast cells and the release of pain mediators. Regardless of the underlying mechanism the result is a midsubstance, thickened tendon with irregular collagen structure and fiber orientation. Most importantly

this is in the absence of prostaglandin mediated inflammation. In other words, the pathology is that of collagen degeneration and not an inflammatory tendonitis.

The proven exercise regimen proposed by Alfredson, et al requires 180 repetitions/day with the **absence** of pain as the criteria for increasing the tendon overload to recreate the noticeable exercise pain. More specifically, the patient performs 3 sets of 15 repetitions of "heel drops" twice per day with the knee straight and bent to challenge the gastrocnemius and soleus respectively. Obviously, using the presence of mild pain as criteria for progression, the patients need to be carefully selected and educated on the discomfort that must be endured to realize a desirable outcome. For me, the selection criteria includes, a midsubstance pathology where the patient understands that the exercise should and will cause pain during and for up to one hour

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## The Female Athlete Triad:

The American College of Sports Medicine clearly defines the three components of the female athlete triad as disordered eating, amenorrhea, and osteoporosis. As our profession moves towards autonomous practice it is important that we recognize these interrelated findings and address their cause(s), prevalence, treatment, and consequences. I want to briefly review the signs and symptoms associated with the triad so as to heighten our awareness that when one component is identified that the others should be thoroughly screened.

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## Achilles Tendinopathy Eccentric Exercise continued ...

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Ohberg L, et al. Neovascularization in Achilles tendons with painful tendinosis but not in normal tendons: an US investigation. *Knee Surg Sports Traumatol Arthrosc.* 2001 Jul; 9(4):233-8.

Rees JD, et al. Current concepts in management of tendon disorders. *Rheumatology.* 2006. 45:508-21.

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after the exercise session. Also, it is important to note that it takes at least 12 weeks for the patient to achieve the therapeutic goals of the program. Contraindications to this approach would include the presence of autoimmune disorders such as rheumatoid arthritis or lupus or the presence of insertional tendinosis. Not only has this program been shown to restore function but many investigators have shown histological changes such as reduction in tendon volume and neovascularization.

There are many variables that can be introduced to control the intensity of the eccentric heel drop progression. They include the range of motion, influence of gravity, speed of motion, and the amount of overload.

Other predisposing factors should also be evaluated and corrected to alleviate biomechanical overload. These include intrinsic factors such as excessive pronation in midstance and poor flexibility as well as extrinsic factors such as training errors and inappropriate shoe wear.

Other treatments that have shown good evidence of effectiveness include the application of a glyceryl trinitrate patch (Nitro-dur at 1.25 mg/day) to provide local vasodilation and sclerosing injections to minimize neovascularization. Unfortunately, there is minimal or equivocal evidence for electrotherapeutic modalities and physical agents such as cryotherapy, ultrasound, and low-intensity laser.



### Question of the Month

*I enjoyed your article on measuring the functional status of your shoulder patients. What tips or outcome tools do you use for your knee patients?*

G.K., MPT - WI



There are a variety of knee outcome scales to assist the clinician in evaluating the progress of your patient. The selection of a specific tool should be based on what type of information is important to you in defining the patient's status. Generally, there are three different types of outcome measures – 1) quality of life scales; 2) Disease or condition specific scales; and

3) Regional body part scales. Let me give an example or two from each category. The actual assessment forms and investigations on their validity, reliability, and responsiveness are readily accessible in text books, journal articles, or on the internet.

Probably the most common health status and quality of life scale is the SF-36. This widely used self-administered questionnaire consists of 36 questions from 8 subscales ranging from physical abilities to pain/vitality, and social, emotional, and mental health.

Condition specific knee outcome tools include the Western Ontario MacMaster Osteoarthritis Index (WOMAC) and the Knee Injury and Osteoarthritis Outcome Score (KOOS) for arthritic conditions, the

Lysholm knee scoring scale and the International Knee Documentation Committee's (IKDC) knee ligament evaluation form for ligamentous injuries; and the Kujala anterior knee pain scale for patellofemoral disorders. Variations of the disease specific tools are the activity specific scales. Knee examples include the Tegner activity scale and the American Academy of Orthopedic Surgeon's Sports Scale.

Finally, some outcome measurement tools may be body part specific. The most common example from the physical therapy profession is the LEFS (Lower Extremity Functional Scale) that was developed and published in *Physical Therapy* in 1999. This scale can be used for a variety of hip, knee, and ankle pathologies. The final example of knee specific (but not condition specific) scale is the Activities of Daily Living Knee Outcome Survey.

Questions you would like addressed in a future issue can be sent to [mulliganpt@tx.rr.com](mailto:mulliganpt@tx.rr.com)



**Triad Resources:**

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[www.femaleathletetriad.org](http://www.femaleathletetriad.org)

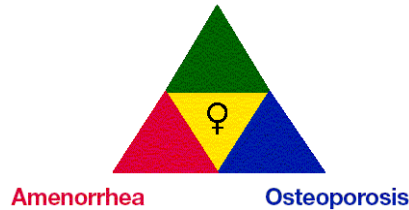
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**"Featured Internet Link"**

Musculoskeletal Disorders

<http://www.biomedcentral.com/bmcmusculoskeletdisord>

Biomed Central (BMC) is an independent publishing house that provides immediate open access to peer-reviewed biomedical research. The on-line journal that I have found quite helpful is BMC's Musculoskeletal Disorders. All of their original research articles are made **freely** and permanently accessible at the time of publication.

**Female Athlete Triad** continued -**Disordered Eating****Disordered Eating**

The common conception of an eating disorder would be that the athlete has anorexia (self-imposed weight loss, altered body image, or an intense fear of becoming obese) or bulimia nervosa (binge eating; compensatory behaviors to prevent weight gain with diuretics, laxatives, fasting or self-induced vomiting; or great concern about body weight and shape). However, the health care professional should also recognize poor dietary habits which provide inadequate energy sources for their athletic demands would also constitute an eating disorder.

**Amenorrhea**

As with eating disorders, menstrual dysfunctions represent a continuum of abnormalities that good range from extremely long menstrual cycles (oligomenorrhea) to the absence of the menstrual cycle (amenorrhea). Amenorrhea was previously thought to be the result of low body fat or weight but research has not supported this contention. It is more likely that is the result of a mismatch between energy demand and supply that could be common in exercising females. It is important to note that amenorrhea is not an expected result of training but the symptom of an underlying medical problem. The diagnosis of amenorrhea requires that other causes such as pregnancy, thyroid dysfunction, or polycystic ovarian syndrome be ruled out before the finding is attributed to aggressive training.

**Osteoporosis**

Prior menstrual history has been identified as the best predictor of current mineral bone density. Amenorrhea results in a low concentration of ovarian hormones such as estrogen which is needed for calcium absorption and for calcium deposit into bone. With low estrogen levels the health of the bone is compromised and at risk for fractures.

**What can we do? What is our role?**

Intervention should be a multidisciplinary effort. The dietician for nutritional advice, the physician for medical management, and the psychiatrist for counseling. The therapist and athletic trainer can play an important role in exercise and training guidance. Prevention is the key to managing this unfortunate triad. If we can recognize the signs and symptoms we may be able to proactively provide the appropriate supervision, education, and referral.

**Considerations in Prescribing Spinal Exercise**

Sometimes we don't use the same critical thinking in prescribing our spinal rehabilitation exercises as we do with some of our extremity patients. I'm quick to realize the physiological and functional differences between the tonic, stabilizing function of the rotator cuff muscles as opposed to the phasic, prime moving function of the axiohumeral muscles like the pectoralis major and latissimus dorsi. Consequently, I prescribe exercise differently for the deep cuff muscles vs. the superficial lat and pec muscles. The same analogy could be used when training the muscles that stabilize the lumbar spine

In 1989, Bergmark first described the spinal musculature based on its structure and function classifying them as "global" or "local" muscles. Global muscles are longer, larger muscles located further from the axis of rotation and are responsible for controlling spinal orientation. They produce motion and stabilize the spine against externally applied loads with isometric or eccentric contractions. Examples of these muscles include the rectus abdominus, internal and external obliques, iliocostalis, longissimus, and quadratus lumborum. Conversely, the "local" muscles are shorter and smaller and located close to the axis of the few segments they control. These muscles are tonic in nature and control segmental arthrokinematic stability. The most important local muscles in the lumbar spine include the deep portion of the multifidi and transverses abdominus.

In asymptomatic subjects, the local stabilizers will contract first when unexpected loads are applied to the spine while patients with low back pain will often erroneously recruit global muscles that fire at inappropriate times with a longer latency action even after the stimulus has been removed. While both muscle groups are important they each have unique roles and responsibilities. In the symptomatic patient I think it is important to first restore the arthrokinematic stabilizing function of the deep, local muscles before proceeding to train the integrated, phasic function of the global muscles.

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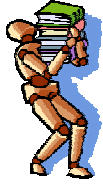
Please note our new email address  
[mulliganpt@tx.rr.com](mailto:mulliganpt@tx.rr.com)

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1901 Pintail Parkway  
Euless, TX 76039

Phone: 817-488-2061  
Fax: 817-684-7201  
Email: [mulliganpt@tx.rr.com](mailto:mulliganpt@tx.rr.com)  
[www.continuing-ed.cc](http://www.continuing-ed.cc)

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To be prepared against  
surprise is to be trained -  
to be prepared for surprise  
is to be educated

  
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## Rotational Step Up



To emphasize proximal hip control for those with identified weakness in the gluteals and poor patellofemoral tracking I like to progress my patients to incorporating a rotational movement during the lateral step up exercise. The focus is on a controlled internal rotation during the descent and concentric hip external rotation during the ascent. The patient should keep the trunk erect during the exercise emphasizing the vertical element of the movement. I encourage a step height (usually 4-8") that will allow the heel (rather than the toes) to contact the floor so as to minimize substitution assistance from the down leg during the exercise. It is important to pay attention to the limb mechanics during the exercise and keep the exercise arc of motion below the symptom threshold.

## Rehabilitation Exercise Technique

## Spine Exercise Considerations continued from previous page -

After proprioceptive and motion deficits have been addressed it is time to start training the transversus abdominus and multifidi. The emphasis is on identifying this musculature and precisely training its endurance function. Once that has been accomplished then attention is turned towards a careful progression of co-activating the global musculature. As the patient's symptoms subside you can begin an integrated, dynamic approach to exercise where you are having the patient perform functional activities that are relevant to their lifestyle. The overall philosophy is an "inside-out" approach beginning with local isolated function and progressing towards task-specific exercises.



## Featured Home Study Program Principles of Joint Mobilization

A recent study by Vermeulen in the June issue of Physical Therapy last year confirmed the importance of high-grade joint mobilization techniques in the management of adhesive capsulitis. While both low and high-grade mobilization therapy were beneficial, the high-grade techniques were more effective in improving range of motion and reducing disability. This

prospective, randomized clinical trial (with a PEDro score of 8/10) should remind us of the potential value of our joint mobilization techniques. In a previous multiple-subject case report the same author also demonstrated the effectiveness of applying these techniques at the end range of the available motion. If you need a review of the scientific principles of joint mobilization therapy we have a home study that covers the underlying rationale of these therapeutic interventions. The home study details arthrokinematic motion, joint morphology, rules of mobility, articular congruence, and treatment applications, indications, and precautions.

If you are interested in learning more about manual therapy and the role of joint mobilization you may want to look at our on-line home study entitled "Principles of Joint Mobilization". This inservice can viewed or read free of charge. A post-test for CEU credit is available at <http://www.continuing-ed.cc/homestudy.htm> for a reasonable fee for clinicians licensed in Texas.



### Home Studies Now Available Study and learn at your own pace at home!

Foot-Ankle Anatomy	.3 CEUs
Achilles Tendinopathy	.2 CEUs
Lateral Ankle Instability	.2 CEUs
Knee Meniscal Injuries	.2 CEUs
Orthopedic Hip Injuries	.2 CEUs
Goniometric Examination	.2 CEUs
<b>Principles of Joint Mobilization</b>	<b>.2 CEUs</b>
Functional Anatomy of the Shoulder	.3 CEUs
Scapular Significance: Ortho Perspective	.2 CEUs
Proximal Humerus Fracture Rehab	.2 CEUs
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