

# clinical conduit



## Why the emphasis on the hip when it's my knee that hurts?

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There has been an increased emphasis on hip exercise training in the past few years for patients suffering from patellofemoral pain. In the 80s, there was a lot of attention focused on normalizing lower quarter biomechanics through orthotic control of abnormal pronation at the subtalar joint. In the 90s, based on the work of McConnell, our focus turned toward influencing patellar tracking based on altering the recruitment of the vastus

medialis and correcting abnormal patellar orientation. While both of these perspectives have their merits it seems like the most recent literature has highlighted the role of controlling femoral position. The gluteus medius has an important role in the frontal plane posture of the femur while the gluteus maximus is needed to eccentrically control the amount of internal rotation of the femur. An interesting study was conducted by Powers, et al; that showed

that the kinematics of excessive lateral displacement of the patella was influenced by the weight bearing status of the limb. In the non-weight bearing position, the patella rotates relative to the femur, while in the weight-bearing position it is the femur rotating underneath the patella. In the figure below note that in the weight-bearing condition (B) the lateral patellar tilt is the result of an altered femur position while in non-weight-bearing the patella has tilted relative to the femur. (Fig C)

### 2006 Schedule

#### Knee Course

Jun 10-11 Grapevine, TX  
Jun 24-25 Chicago, IL  
Jul 15-16 Baltimore, MD

#### Cervical Course

Aug 19-20 Chicago, IL

#### Pilates Course

May 20-21 Chicago, IL  
Sep 30 - Oct 1 Baltimore

#### Shoulder Course

Aug 19-20 Baltimore, MD  
Oct 7-8 St. Louis, MO

#### Lumbopelvic Course

Jul 15-16 Chicago, IL

#### Foot-Ankle Course

Sep 9-10 Chicago, IL  
Nov 18-19 St. Louis, MO

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)



Fig A - Cross-sectional view of normal patellofemoral alignment



Fig B - Weight bearing kinematics of the femur internally rotating under the patella

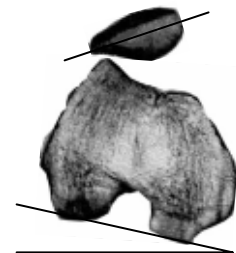


Fig C - Non-weight bearing kinematics of the patella laterally rotating relative to the femur.

*continued on page 2*

## Can ACL Injuries be Prevented?



It has been estimated that about 70% of anterior cruciate ligament injuries are caused by non-contact mechanisms. This percentage may approach 90% in female athletes. Many potential contributing factors have been identified and could be classified as anatomical, hormonal, environmental, or biomechanical in nature. Probably the most modifiable of these variables are those of a biomechanical influence. In other words, can neuromuscular and proprioceptive training programs decrease the chance of a non-contact ACL rupture?

*- continued on page 3*

## Patellofemoral Rehabilitation continued ...

### References

Powers CM, et al. Patellofemoral kinematics during weight-bearing and non-weight-bearing knee extension in persons with lateral subluxation of the patella. A preliminary study. *J Orthop Sports Phys Ther.* 2003; 33:677-685.

Tyler TF, et al. The role of the hip muscle function in the treatment of patellofemoral pain syndrome. 2006. *Amer J Sports Med.* 34:630-636.

Mascal CL, et al. Management of patellofemoral pain targeting hip, pelvis, and trunk muscle function: 2 case reports. *J Orthop Sports Phys Ther.* 2003; 33:647-660.

Ireland, ML, et al. Hip strength in females with and without patellofemoral pain. *J Orthop Sports Phys Ther.* 2003; 33:671-66.

An important muscle to eccentrically control unwanted or excessive femoral internal rotation is the gluteus maximus. Rehab exercises such as a step down should be monitored for a "medial collapse" which is manifested as a pronation movement of the entire lower quarter kinetic chain. In the picture below note the increased femoral internal rotation and knee valgus that would alter patellar tracking. This patient needs to be trained to keep the patella over the foot.

In another article published in the American Journal of Sports Medicine last month by Tyler, et al; the authors found that improvements in hip flexion strength combined with increased iliotibial band and iliopsoas flexibility were associated with excellent results in patients with patellofemoral pain syndromes. As far back as 1976, Nicholas, et al, recognized the importance of hip strength in the management of this type of injury. Tightness in the anterior hip muscles allow increased anterior pelvic tilt and internal rotation of the femur which potentially alter patellar contact forces as mentioned before. The secondary function of the iliopsoas to eccentrically control the internal rotation of the femur may also be an additional mechanism to normalize lower extremity kinematics and patellar tracking. Numerous other studies by Ireland, et al, Mascal, et al, and Janda have also demonstrated that weakness proximal to the symptomatic area is often present with injuries to the lower extremity.

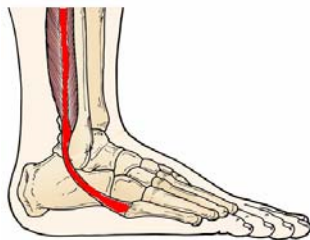
The conclusion I've reached from the research over the past 30 years is that attention needs to be administered from the core to the floor (hip) and from the ground up (subtalar joint mechanics) in addition to evaluating the obvious impairments at the knee (tight lateral and weak, pliable medial structures).



Medial collapse with excessive femoral internal rotation, genu valgus, and subtalar joint pronation

*"I have a patient that had a peroneal tendon repair and re-routing procedure. Do you have a protocol for this type of patient?"*

D.R., PT - Florida



### Question of the Month



Peroneal tendon subluxations are surgically managed in a variety of ways - soft tissue reconstruction, bone block procedures, achilles tendon tissue transfers, rerouting under the calcaneofibular ligament, and/or groove deepening procedures. I would highly recommend consultation with the referring surgeon to learn the exact surgical technique and to mutually decide upon an appropriate rehabilitation progression. Generally, the patient is placed in a short-leg cast for the first 3-4 weeks. The patient

progresses to a short-leg walking boot that allows increased weight bearing over the second month. Bone block procedures may be managed even more conservatively (often requiring 4-6 weeks of non-weight-bearing immobilization). Active range of motion commences at about one-month post-op with a gradual return to ADL function expected to take 3-4 months. Particular care should be taken in the cautious reacquisition of talocrural dorsiflexion and



subtalar inversion during the early phases of rehab. Ultimately, it is important to normalize first ray mechanics through restoration of normal mobility and/or the use of an orthotic.

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

# We're moving!

Beginning July 1<sup>st</sup> please direct your correspondence to us at our new address - 1901 Pintail Pkwy, Euless TX 76039. No change in our telephone number or e-mail address. If you need to work on your lifting mechanics this summer let us know - we'll have some boxes for you to practice on.



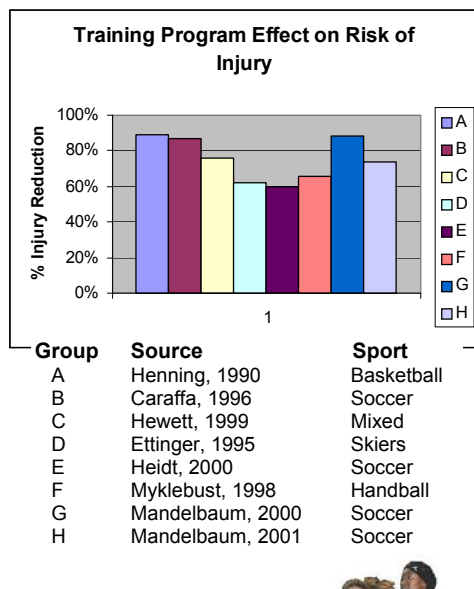
## ACL Injury Prevention continued -



While these types of training programs can not be expected to prevent direct contact injuries that cause the type of trauma pictured to the left; it has been

shown by a number of researchers that non-contact injuries can be reduced by a specific program of strength, flexibility, and agility training. Particularly important is to teach the athlete to anticipate external forces, loads, and positions that could injure the knee. Neuromuscular training techniques can be implemented that will not only prevent injury but potentially enhance performance. An emphasis is placed on high risk maneuvers like jumping, landing, pivoting, and quick changes in position in a controlled environment. This type of training is equally important in the return to function rehabilitation phase following an ACL injury.

In the figure below note the 60-90% decrease in ACL injuries following specific prevention programs. As you can see the significant effects were in a variety of sports suggesting that this type of training can be beneficial to any high-risk athletic activity. It is exciting to see that our research attention is now turning towards viable means to not just rehabilitate, but prevent these devastating injuries.



Mandelbaum BR, et al. Effectiveness of a neuromuscular and proprioceptive training program in preventing ACL injuries in female athletes. *Am J Sports Med.* 2005. 33(7)1003-1010



## Considerations for Reducing Disability Time in the Injured Worker

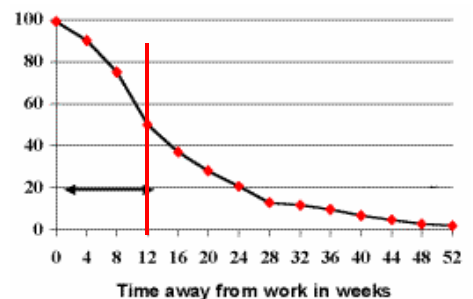


During the discussion at a recent journal club meeting I was reminded of an important consideration regarding the management of an injured worker. In an article from the 2000 Winter issue of the *Journal of Workers Compensation* by Jennifer Christian, she offered statistics on the likelihood of returning to work as contrasted from the amount of time the worker is away from their job on disability leave. As you might suspect, the longer the worker is out the less likely they are to return to their job. In fact, at about the 12 week mark, the worker has only a 50% chance of return to their previous job. I also noticed a rather precipitous increase in the slope during the 6-12 week window of time in the graph below.

It reminds me of our important responsibility in not just managing the injured worker's impairment but the psychosocial aspects of the injury that will directly affect their perception of the resultant functional limitations and ultimate disability.

Early concern for the injured worker's state of mind and assimilation back into the work place on modified work duties not only helps reduce the indemnity costs but increases the likelihood that the worker will successfully return to gainful employment.

### Time is of the Essence



**At 12 weeks, employees have only a 50% chance of ever returning to work**

Full text access to the article can be found at [http://www.webility.md/jwc\\_w2000.htm](http://www.webility.md/jwc_w2000.htm)

New address as of July 1<sup>st</sup> will be 1901 Pintail Pkwy; Euless, TX 76039

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4305 Country Lane  
Grapevine, TX 76051

Phone: 817-488-2061  
Fax: 817-488-2061  
Email: [mulliganpt@comcast.net](mailto:mulliganpt@comcast.net)  
[www.continuing-ed.cc](http://www.continuing-ed.cc)

The "Clinical Conduit" newsletter is an every other month publication available to any allied health care provider free of charge upon request. Individuals who would like to be included on the email distribution list should contact the editor at [mulliganpt@comcast.net](mailto:mulliganpt@comcast.net).



## Rehabilitation Exercise Technique

"Reputation is given while character is earned"



### Squats

The squat exercise is an excellent rehabilitation technique for restoration of lower extremity strength and power. It is important to train correctly so as to minimize the risk of injury and realize the full potential of the exercise. Here are a number of pointers to consider at each joint:

#### Spine:

The lumbar spine should be braced in a neutral position with the head up and eyes looking straight ahead to minimize spinal flexion.

#### Hips:

This is the joint where the primary motion of the squat should occur. When initiating the exercise the feet should be directly under the slightly flexed hips.

#### Knees:

The knees should be "soft" and the patient should minimize forward tibial motion as the center of gravity is lowered. The toes should remain visible if looking down and the knees should drop directly over the center of the foot.

#### Feet:

The feet should be about shoulder width apart and the body weight should be distributed through the midfoot. The body weight should move from the toes towards the heels on the descent and reverse on the ascent.

The exercise starts by "sticking the butt out" slowly and controlling the eccentric descent. The return to a more extended posture should be quicker and more explosive. The general goal is to squat until the thighs are parallel to the floor but may be limited secondary to technique correctness or specific pathology protection. ACL and patellofemoral patients may need to limit the depth of the squat to minimize anterior tibial shear or high patellofemoral articular stress.

  
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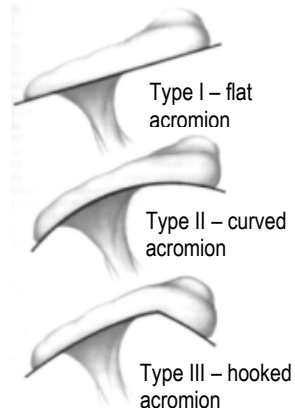


## Featured Home Study Program Functional Anatomy of the Shoulder

I'm fond of saying "structure governs function". My point is that a firm understanding of anatomy is the basis for many of our examination and intervention strategies. As an example I've found numerous citations in the literature that correlate the anatomical shape of the acromion with the likelihood for success in the non-operative rehabilitation of subacromial impingement syndrome. Type II and III acromions (curved or hooked in shape) are associated with a higher risk for rotator cuff pathology and are more resistant to typical conservative interventions. If you're like me sometimes it's hard to remember all those important anatomical morphologies that we once had memorized. Maybe you could benefit from a good anatomy review that has some functional relevance. If so, review our home study on functional shoulder anatomy available at <http://www.continuing-ed.cc/homestudy.htm>. If desired, a post-test for CEU credit is available for a reasonable fee.

Morrison DS, et al. Non-operative treatment of subacromial impingement syndrome. *J Bone Joint Surg Am.* 1997 May;79(5):732-7

Wang JC, et al. The relationship between acromial morphology and conservative treatment of patients with impingement syndrome. *Orthopedics.* 2000 Jun;23(6):557-9.



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