

# ŠPORT QUO VADIS

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VŠC Dukla Banská Bystrica

PIEŠŤANY, 27.9.2018

Prevenencia poranení predného krížneho väzu u dospelievajúcej populácie - od teórie k praxi



# Predný krížny väz

- Hlavnou funkciou ACL je brániť **predo-zadnému posunu tibie voči femuru**
- ACL hrá významnú úlohu pri **stabilite** kolena, či už pri statickej alebo **dynamickej** funkcii
- Predný krížny väz tiež zabraňuje **nadmernej rotácii**
- Chronické poranenie ACL môže byť asociované so **zmenou kinematiky kolena**, a tiež štrukturálnymi zmenami

# Predný krížny väz

- Časté zranenie
- Mechanizmus: 1.kontaktný  
2.bezkontaktný
- Takmer 70% zranení ACL bezkontaktných (Monk 2010)
- Hlavný mechanizmus vzniku pri zmene pohybu (Tarmah 2016)
- Akútne zranenie kolena je často charakterizované **bolesťou a typickým sprievodným zvukom ruptúry**

# Ruptúra predného krížneho väzu



# Lever sign test



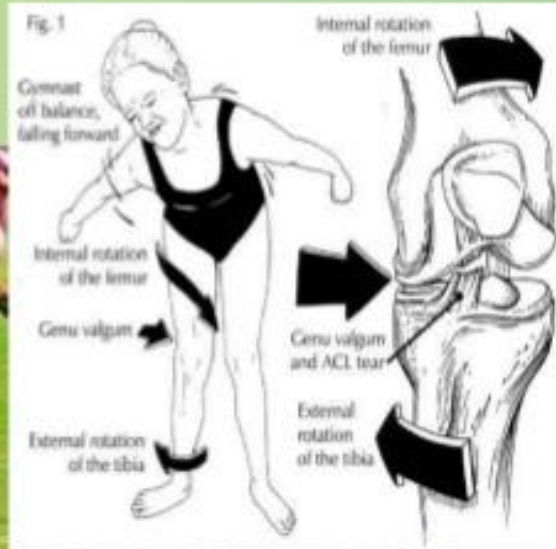
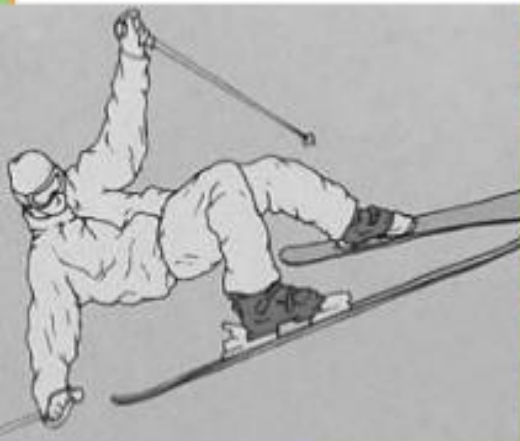
# Ruptúra predného krížneho väzu

- Izolované zranenie ACL tvorí iba **10% prípadov** (Monk)
- Poranenie ACL je často asociované s inými poraneniami, a to s kombinovaným poranením **collaterálnych ligament, poškodeným subchondrálnej kosti a meniskov**
- Pri diagnostike ruptúry ACL sa využíva **MRI a artroskopia**
- Možné manuálne vyšetrenia

# Mechanizmus poranenia

## MECHANISMS OF INJURY

- The skier falls back, trying to pull himself up, the boot levers the knee forward in conjunction with a forceful quadriceps contraction



Deceleration with change of direction



# Asymptomatic štrukturálne zmeny

[Sports Med.](#) 2016 Oct;46(10):1517-24. doi: 10.1007/s40279-016-0540-y.

## The Prevalence of Meniscal Pathology in Asymptomatic Athletes.

[Beals CT](#)<sup>1,2</sup>, [Magnussen RA](#)<sup>1,2</sup>, [Graham WC](#)<sup>3</sup>, [Flanigan DC](#)<sup>4,5</sup>.

### Author information

#### Abstract

**BACKGROUND:** Meniscal pathology is a commonly seen orthopedic condition that can affect a wide age range of patients. Athletes subject their menisci to an increased amount of stress during their careers and may increase their risk of meniscal pathology.

**OBJECTIVE:** The purpose of this systematic review is to evaluate the prevalence of isolated meniscal pathology in asymptomatic athletes.

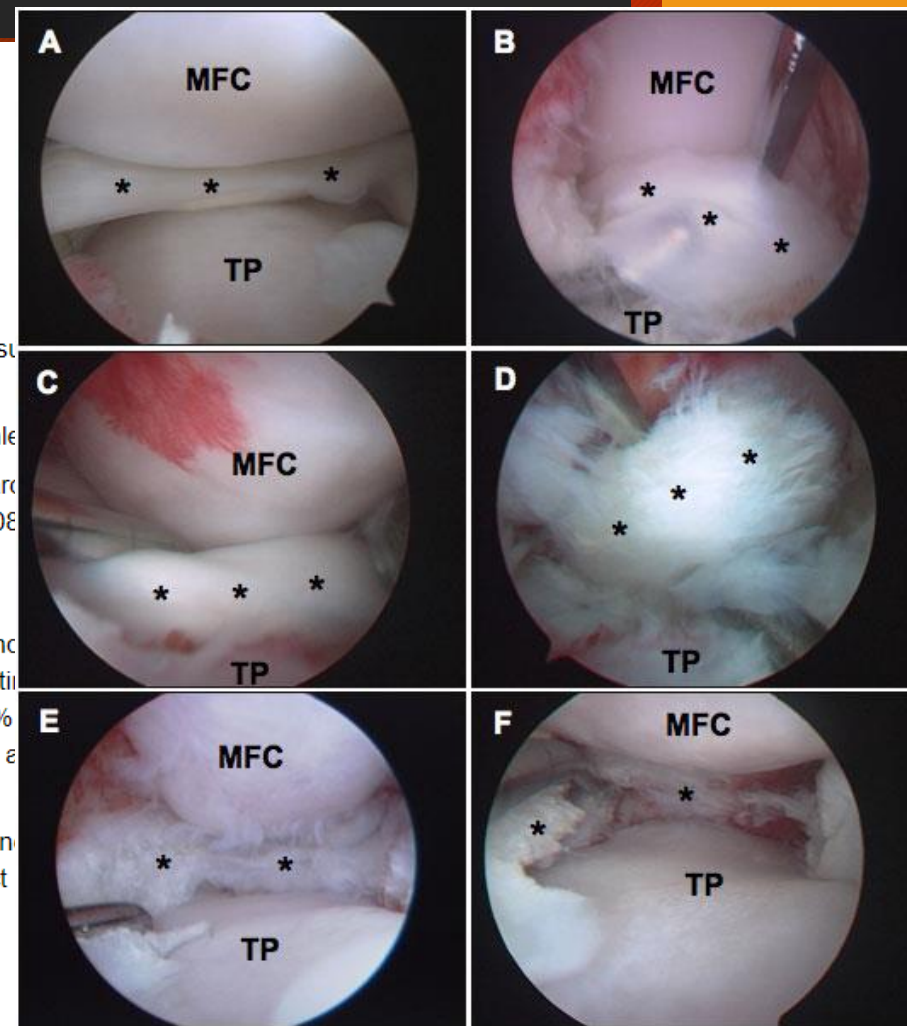
**METHODS:** A systematic review was undertaken to determine the prevalence of meniscal pathology in asymptomatic athletes. A search of multiple databases was conducted. Recreational and higher-level athletes were included. Fourteen articles including 295 athletes (206 male, 87 female) were identified for inclusion (age range 14-66 years, mean 31.2 years). Meniscal pathology was visualized with magnetic resonance imaging and graded on a 1-4 scale (grades 1 and 2 indicating intrasubstance damage, grades 3 and 4 indicating a tear).

**RESULTS:** There was an overall prevalence of 27.2 % (105/386) of knees with intrasubstance meniscal damage (grades 1 and 2), and 2.5 % (15/386) of knees with a tear (grades 3 and 4). When athletes were split into those who participate in pivoting sports versus non-pivoting sports, pivoting athletes showed an overall prevalence of 15.3 % (31/202) of knees with intrasubstance meniscal pathology and 2.5 % of knees with a tear. Non-pivoting athletes showed a prevalence of 54.5 % (61/112) of knees with intrasubstance meniscal pathology and 5.4 % (6/112) of knees with a tear.

**CONCLUSION:** The overall prevalence of isolated meniscal pathology in asymptomatic athletes was 31.1 % (27.2 % with intrasubstance meniscal damage and 3.9 % with a meniscal tear). More studies of age-comparable, non-athletic populations are necessary for direct comparison with these groups.

PMID: 27075327 DOI: [10.1007/s40279-016-0540-y](#)

[Indexed for MEDLINE]





# Rotácia ako častý rizikový faktor

Br J Sports Med. 2010 Sep;44(12):856-61. doi: 10.1136/bjsm.2008.051425. Epub 2008 Nov 28.

## **The common mechanisms of anterior cruciate ligament injuries in judo: a retrospective analysis.**

Koshida S<sup>1</sup>, Deguchi T, Mivashita K, Iwai K, Urabe Y.

### ⊕ Author information

#### Abstract

**BACKGROUND:** Although high prevalence of anterior cruciate ligament injuries (ACL) in judokas has been reported, there has been very little research concerning events preceding the injury.

**OBJECTIVE:** To determine the common situations and mechanisms of ACL injury in judo.

**METHODS:** A total of 43 cases of ACL injuries that had occurred during judo competition or practice were investigated, using questionnaires with interviews conducted by a single certified athletic trainer who has 20 years of judo experience to obtain information regarding the situation and mechanism in which the ACL injury occurred.

**RESULTS:** The number of ACL injuries when the participant's grip style was different from the style of the opponent (ie, kenka-yotsu style) (28 cases) was significantly greater than when the participant's grip style was the same as that of the opponent (ie, ai-yotsu style) (15 cases;  $p < 0.001$ ). The number of ACL injuries was significantly higher when the participant was attacked by the opponent than when counterattacked or when attempting the attack ( $p < 0.001$ ). In addition, being attacked with osoto-gari was revealed as the leading cause of ACL injury incidence among the participants (16.8%).

**CONCLUSIONS:** Grip style may be associated with ACL injury occurrence in judo. In addition, direct contact due to the opponent's attack may be a common mechanism for ACL injuries in judo.

PMID: 19042919 DOI: [10.1136/bjsm.2008.051425](https://doi.org/10.1136/bjsm.2008.051425)

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# Mechanizmus poranenia

training | ac



Original article

## High knee abduction moments are associated with patellofemoral pain (PFP) and anterior cruciate ligament (ACL) injury: Is PFP itself a predictor for subsequent ACL injury?

Gregory D Myer<sup>1,2,3,4</sup>, Kevin R Ford<sup>1,2,5</sup>, Stephanie L Di Stasio<sup>1,2,3,4</sup>

[Author affiliations +](#)

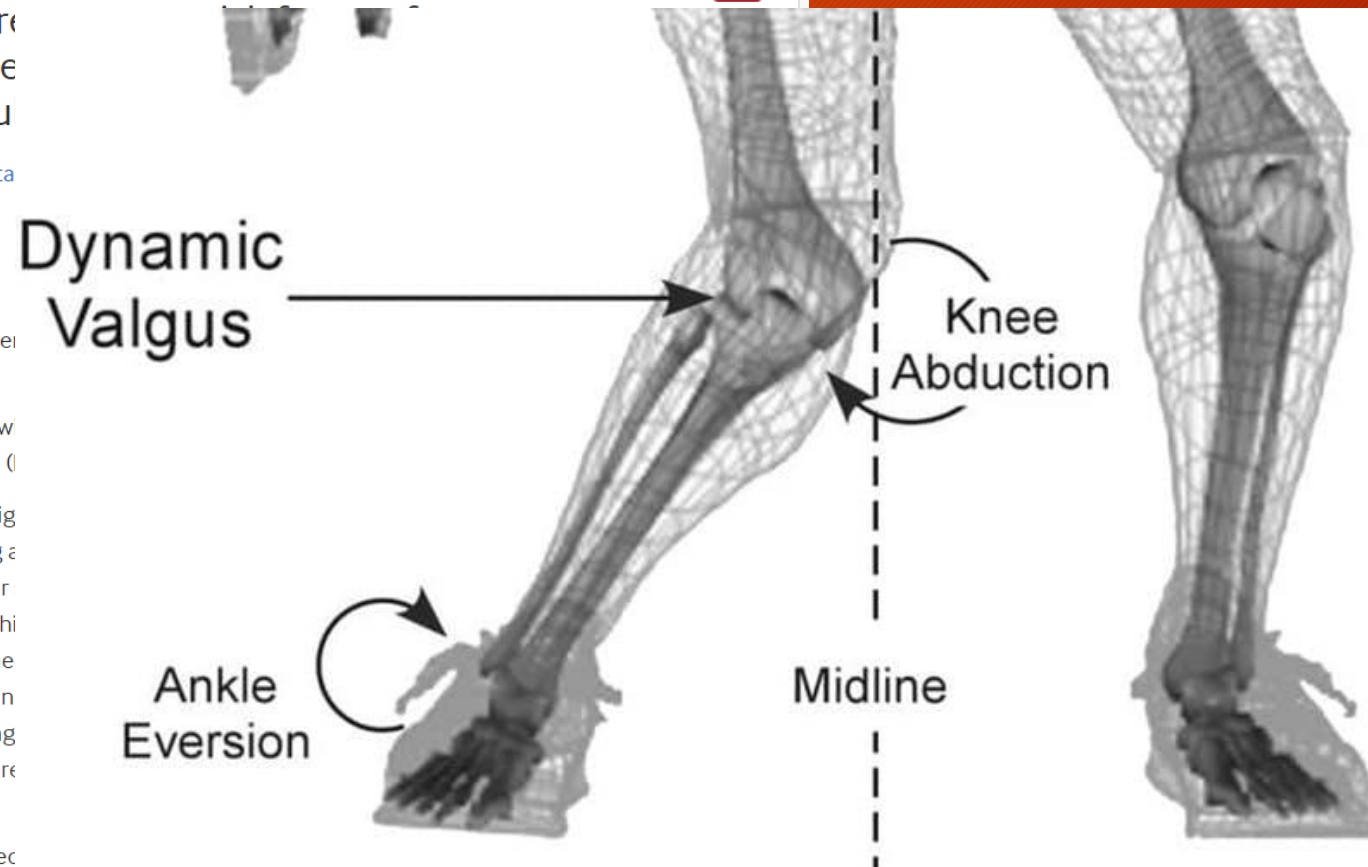
### Abstract

**Background** Identifying risk factors for knee pain and anterior cruciate ligament (ACL) injury is important for injury prevention cycle.

**Objective** We evaluated two unique prospective cohorts with rates and risk factors associated with patellofemoral pain (PFP) and ACL injury.

**Methods** The 'PFP cohort' consisted of 240 middle and high school athletes who underwent anthropometric assessment, strength testing and performance testing during a basketball season. 145 of these athletes met inclusion for their competitive season. The 'ACL cohort' included 205 high school athletes who underwent the same anthropometric, strength and biomechanical testing. We compared differences in anthropometrics, strength and biomechanical testing between PFP vs ACL injured athletes. We also compared differences in anthropometrics, strength and biomechanical testing between PFP vs ACL injured athletes.

**Results** KAM during landing above 15.4 Nm was associated with PFP risk threshold in our sample. Likewise, a KAM above 25.3 Nm was associated with a 6.8% risk for subsequent ACL injury.



# Narastající výskyt - možné příčiny

## Anterior Cruciate Ligament injuries in children and adolescents –a rare occurrence?

Posted on February 22, 2018 by BJSM

By Louise Shaw



Anterior Cruciate Ligament (ACL) injury, particularly in youths, has been the focus of recent media attention and parental concern in Australia<sup>1 2</sup>. This is not surprising given that ACL injury causes significant discomfort and disability, and may also result in reduced levels of physical activity and contribute to obesity<sup>3</sup>. ACL injuries also may cause long-term health problems such as an increased risk of arthritis<sup>4</sup>. Greater demands being placed on youth athletes through increased training, younger sports specialisation and emphasis on year-round competitive play has led to an increase in the diagnosis of sports-specific knee injuries<sup>5</sup>.

ACL tears in children and adolescents were previously thought to be rare but as imaging and clinical awareness of injuries in youth athletes has improved, the number of ACL injuries diagnosed in these age groups, has increased. Whilst in part this may be due to improved methods of diagnosis and treatment, research from the USA suggests that there are more ACL injuries<sup>6 7</sup>.

This study used routinely collected data to look at the number of hospital-admitted ACL-related injuries in 5-14 year olds between 2005-2015 in Victoria, Australia<sup>8</sup>. Data included patient age, sex, type of injury, activity at the time of injury and first listed procedure code.

Between 2005 and 2015, there were 320 hospital-treated ACL injuries, with 10 (3.1%) occurring in 5-9 year olds and 310 (96.9%) occurring in 10-14 year olds. According to gender, 175 (54.7%) of these injuries occurred in boys, with 145 (45.3%) injuries in girls. Sport was known to account for 56.6% of all ACL injuries. Most of these (52.4% for girls and 35.4% for boys) occurred while playing ball sports. The context of the activity at the time of

# Následky zranenia predného krížneho väzu

Acta Orthop Scand, 1994 Dec;65(6):605-9.

## Knee ligament injury, surgery and osteoarthritis. Truth or consequences?

Lohmander LS<sup>1</sup>, Roos H.

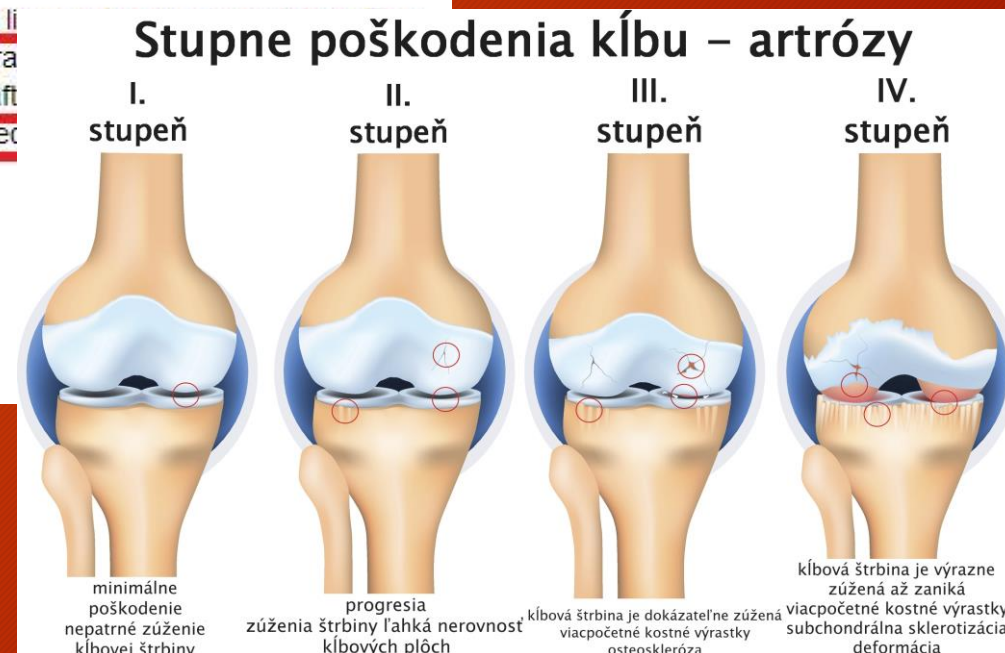
⊕ Author information

### Abstract

We reviewed reports that describe development of osteoarthritis of the knee after anterior cruciate li  
occurrence of posttraumatic osteoarthritis varied considerably from one report to another. The litera  
efficacy of cruciate ligament repair or reconstruction in retarding the progression of osteoarthritis aft  
prospective, controlled, randomized and masked studies that aim to evaluate the utility of ligament rec  
meniscus transplantation for preventing posttraumatic osteoarthritis.

PMID: 7839844

[Indexed for MEDLINE]



# Ďalšie faktory ovplyvňujúce vznik poranenia

- 1. Nedostatočná rozcvička
- 2. Malnutrícia
- 3. Genetika
- 4. Nedostatok spánku
- 5. Pretrénovanie
- 6. Jednostranná záťaž

# Životospráva

## Alcohol and recovery

**Reduced muscle glycogen synthesis**  
Mainly because guidelines for rapid glycogen synthesis are not followed

**Reduces cognitive function day after**  
which can decrease performance and increase risk of injury

**Sleep quality**  
may interfere with sleep quality



## Faster recovery may impair long term training effects

**Antioxidants**

**Ibuprofen and other NSAIDs**

**Icebaths**

**Etc..**



Do you want to perform tomorrow or 10 weeks from now?



# Strečing

[Eur J Appl Physiol](#). 2011 Nov;111(11):2633-51. doi: 10.1007/s00421-011-1879-2. Epub 2011 Mar 4.

## A review of the acute effects of static and dynamic stretching on performance.

Behm DG<sup>1</sup>, Chaouachi A.

### ⊕ Author information

#### Abstract

An objective of a warm-up prior to an athletic event is to optimize performance. Warm-ups are typically composed of activity, stretching and a sport-specific activity. The stretching portion traditionally incorporated static stretching. However, a number of studies demonstrating static stretch-induced performance impairments. More recently, there are a substantial number of studies demonstrating detrimental effects associated with prior static stretching. The lack of impairment may be related to a number of factors including the duration of stretching that is of short duration (<90 s total) with a stretch intensity less than the point of discomfort. Other factors include the type of performance test measured and implemented on an elite athletic or trained middle aged population. Static stretching benefits in some cases such as slower velocity eccentric contractions, and contractions of a more prolonged duration cycle. Dynamic stretching has been shown to either have no effect or may augment subsequent performance, especially if dynamic stretching is prolonged. Static stretching used in a separate training session can provide health related benefits. Generally, a warm-up to minimize impairments and enhance performance should be composed of a submaximal intensity activity followed by large amplitude dynamic stretching and then completed with sport-specific dynamic activities. Sports that require a high degree of static flexibility should use short duration static stretches with lower intensity stretches in a trained population. The possibilities of impairments.

PMID: 21373870 DOI: [10.1007/s00421-011-1879-2](https://doi.org/10.1007/s00421-011-1879-2)

[Indexed for MEDLINE]



# Prevenca poranení

- Meta-analýza od Meyer et al.
- Zahŕňala 19 štúdií
- n=26 225 účastníkov
- Neuromuskulárny a propioceptívny tréning redukoval riziko od 27%-51% (IRR 0.731, 95% CI 0.61 to 0.87). (IRR 0.493, 95% CI 0.29 to 0.85)





# Samotná diagnostika prevedenia

## Diagnostika pohybového aparátu



# (Ne)aplikácia do praxe

Downloaded from <http://bjsm.bmj.com/> on March 2, 2015. Published by [group.bmj.com](http://group.bmj.com/)

## Analysis

### ACL injury incidence in female handball 10 years after the Norwegian ACL prevention study: important lessons learned

Grethe Myklebust,<sup>1</sup> Arnhild Skjølberg,<sup>1,2</sup> Roald Bahr<sup>1</sup>

<sup>1</sup>Oslo Sport Trauma Research Center, Norwegian School of Sport Sciences, Department of Sports Medicine, Oslo, Norway  
<sup>2</sup>Orkanger Physiotherapy and Osteopathy, Orkanger, Norway

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Success in injury prevention in the short run is possible. Several studies have documented that injuries can be prevented if programme compliance is sufficient.<sup>1–6</sup> However, the efficacy of an intervention in a controlled trial does not mean that it will be widely adopted and sustained and have an impact on public health.<sup>7–9</sup> Finch<sup>9</sup> outlined the Translating Research into Injury Prevention Practice framework, emphasising that only research that can and will be adopted by the participants, the coaches and sporting bodies will succeed in the long run.

Anterior cruciate ligament (ACL) injuries is an example where there are controlled studies

(exercises programme), but whether or not teams chose to continue with prevention exercises depended on each team. Also, the physical therapists who took part in the intervention were no longer paid by the Oslo Sports Trauma Research Center to work with the teams. However, elite division teams and some of the first division teams had their own physical therapists who continued their regular work with the teams, but there are no data on how preventive exercises were used. Our injury surveillance showed that from 2001 the ACL injury rate increased gradually to 0.56 injuries per team in the 2004–2005 season (figure 1), that is, at least as high

# Príklady zlepšenia stability a neuromuskulárnej funkcie kolena - Drep



# HYPETROFIA ACL

- Cieľom štúdie od Grzelak et al. (2012) bolo zistiť, či ťažké cvičenie bude viesť k nárastu objemu ACL a PCL. Vzpierači boli vyšetrení pomocou MRI. Skupinu tvorilo 9 športovcov a kontrolnú skupinu tvorilo 19 probandov. A výsledok:
- **Boli pozorované signifikantné rozdiely v prierezových plochách ACL a PCL. Podľa autorov štúdie je toto prvá štúdia, ktorá poukázala na možnú hypertrofiu ligament, ktorá je spôsobená ťažkým tréningom od puberty. Autori tiež poznamenali, že začiatok tréningu mladých športovcov má zrejme väčší vplyv ako trvanie tréningu**



# St'azené nároky



# Posilnenie abduktorov



Format: Abstract ▾

Send to ▾

[Scand J Med Sci Sports](#). 2018 Feb;28(2):473-478. doi: 10.1111/sms.12923. Epub 2017 Jun 22.

## The association between eccentric hip abduction strength and hip and knee angular movements in recreational male runners: An explorative study.

[Brund RBK](#)<sup>1</sup>, [Rasmussen S](#)<sup>2,3</sup>, [Nielsen RO](#)<sup>4</sup>, [Kersting UG](#)<sup>1</sup>, [Laessoe U](#)<sup>1,5</sup>, [Voigt M](#)<sup>1</sup>.

⊕ Author information

### Abstract

Weak hip abductors may be related with increased hip adduction and knee abduction angular movement, which may be risk factors of lower extremity injuries. As the role of eccentric hip abduction strength (EHAS) on hip adduction angular movement and knee abduction angular movement (KABD) remains unclear, the purpose of this study was to explore the association between EHAS and hip and knee angular movement. In 100 healthy male recreational runners, EHAS was quantified using an isokinetic dynamometer, while hip and knee angular movements were collected using pressure-sensitive treadmill and Codamotion active marker system. Using multiple linear regression models (n=186 legs), no relationships between EHAS and hip and knee kinematics were found. A possible reason for the lack of relationship between EHAS and hip and knee kinematics may be owing to differences in the running kinematics. Some runners with weak EHAS may compensate the weakness by leaning toward the stance limb and thereby reduces the demand on the hip abductors with the consequence of increased knee abduction moment, which may lead to an increased knee abduction angular excursion. Possible, others mechanism as the quadriceps strength and activity in the hip and thigh muscles may also be able to explain the lack of relationship that may or may not exist. Despite the inconclusive results of this study, the findings may suggest that weak hip abductor muscles may be a relevant factor to focus on in future studies.

**KEYWORDS:** hip strength; patellofemoral; prevention; rehabilitation; running

PMID: 28543791 DOI: [10.1111/sms.12923](https://doi.org/10.1111/sms.12923)



Topic in Review

PMID: 11290686

## Knee instability isolated and complex

[Trinath K Kakarlapudi](#)<sup>1</sup> and [Derek R Bickerstaff](#)<sup>2</sup>

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This article has been [cited by](#) other articles in PMC.

In the past decade, several advances have occurred in the understanding, evaluation, treatment, and rehabilitation of knee instabilities. Despite these advances, an unstable knee still poses many challenges to treating clinicians because of the complexity of its nature and the demands of the patients, who are usually young and active sport enthusiasts. We present an overview of the various aspects of knee ligament instabilities.

### STABILITY AND INSTABILITY

[Go to:](#)

Stability of the knee joint is maintained by the shape of the condyles and menisci in combination with passive supporting structures. These are the 4 major ligaments, the anterior cruciate ligament (ACL), the posterior cruciate ligament (PCL), the medial collateral ligament (MCL), and the lateral collateral ligament (LCL). Significant contributions are also made by the posteromedial and posterolateral capsular components and the iliotibial tract. The muscles acting over the joint provide secondary dynamic stability.

Instability resulting from ligament injury may result from direct or indirect trauma. The most frequent mechanism is “noncontact,” involving cutting, twisting, jumping, and sudden deceleration.

### ASSESSMENT

[Go to:](#)

Assessment begins with a detailed history, including a description of the injury. The timing of an effusion (acute hemarthrosis usually occurs within 2 hours) and hearing or feeling a “pop” (highly suggestive of an



[acl-rehabilitation-1.jpg](#)



[140324 wp besser.jpg](#)



[1.jpg](#)



# Zlepšenie stability kolena ako prediktívny faktor prevencie





# ŠPORT QUO VADIS

PIEŠŤANY, 27.9.2018

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**Ďakujem za pozornosť**