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SCHWESTERN

*Linz*

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## Patellofemoral Pain - etiology, risk factors, conservative therapy

Florian Dirisamer

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Patellofemoral Pain  
what are the difficulties?

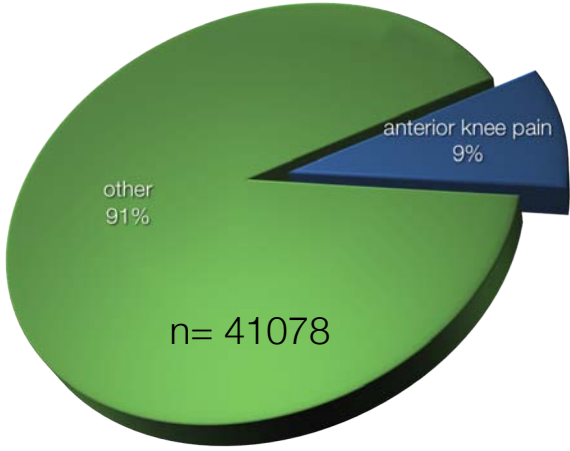



„... no other area of orthopaedic surgery has an iatrogenic failure rate as great as that for patients with chronic anterior knee pain.“  
Scott F. Dye

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Patellofemoral Pain  
Incidence of anterior knee pain



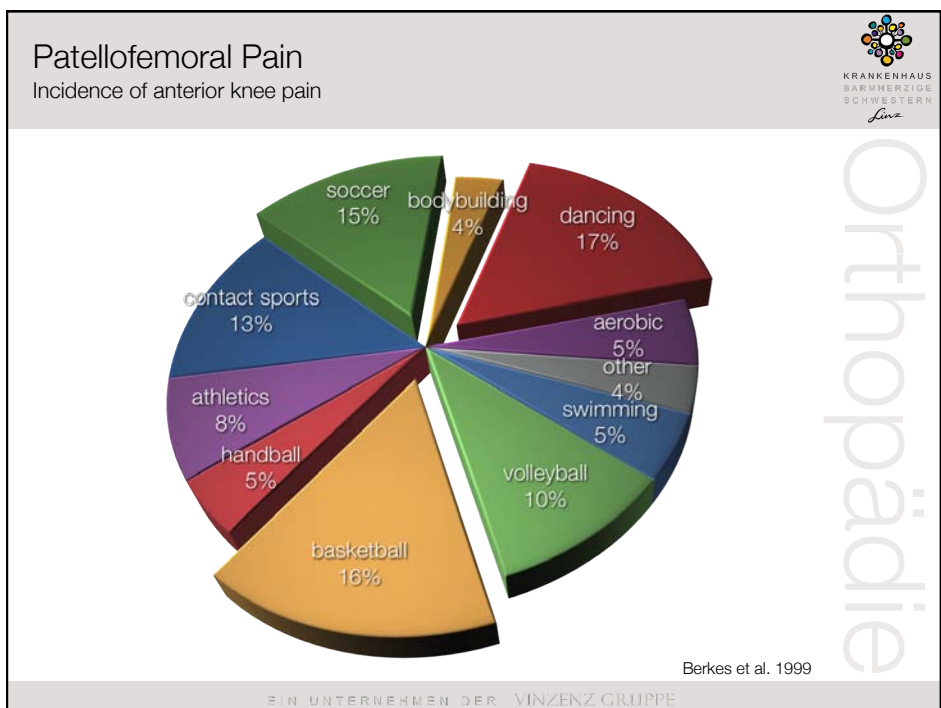
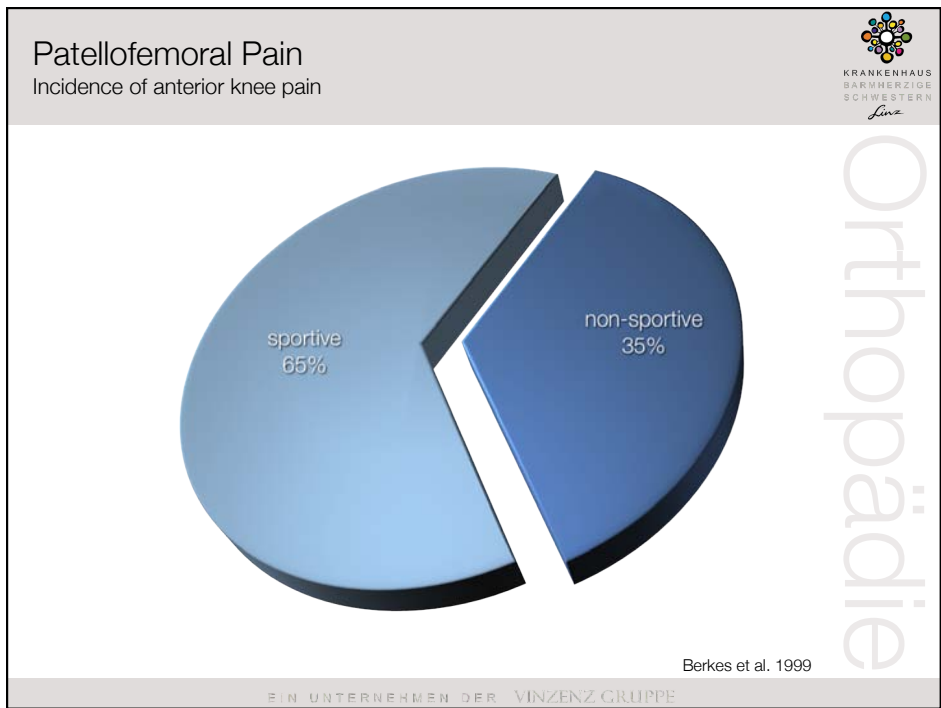
Category	Percentage
anterior knee pain	9%
other	91%

n= 41078

Berkes et al. 1999



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## Patellofemoral Pain

Where does the pain come from?





- Targets for conservative Treatment
  - Cartilage?
    - Hyaluronic Acid, Glucosaminesulfate, Chondroitine Sulfate
    - NSAIDS, Analgetics, Steroids
  - Bone?
    - unloading (Bracing, Taping, Immobilization)
    - NSAIDS, Analgetics, Steroids
  - Soft tissue?
    - Strengthening, Detonisation, functional training, Taping, ...
    - NSAIDS, Analgetics, Steroids

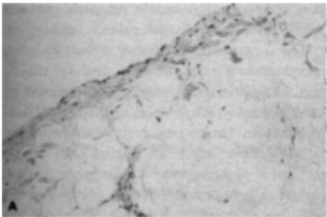
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## Patellofemoral Pain


Etiopathogenic Base



- Tissue Homeostatic Theory (Scott Dye, 1990s)
  - > 50% positive bone scan with intense uptake
  - histologic similar to a stress fracture
  - peripatellar soft tissue alterations (Hoffa, retinacula, synovium)
  - neurophysiologic and biochemical adaptations

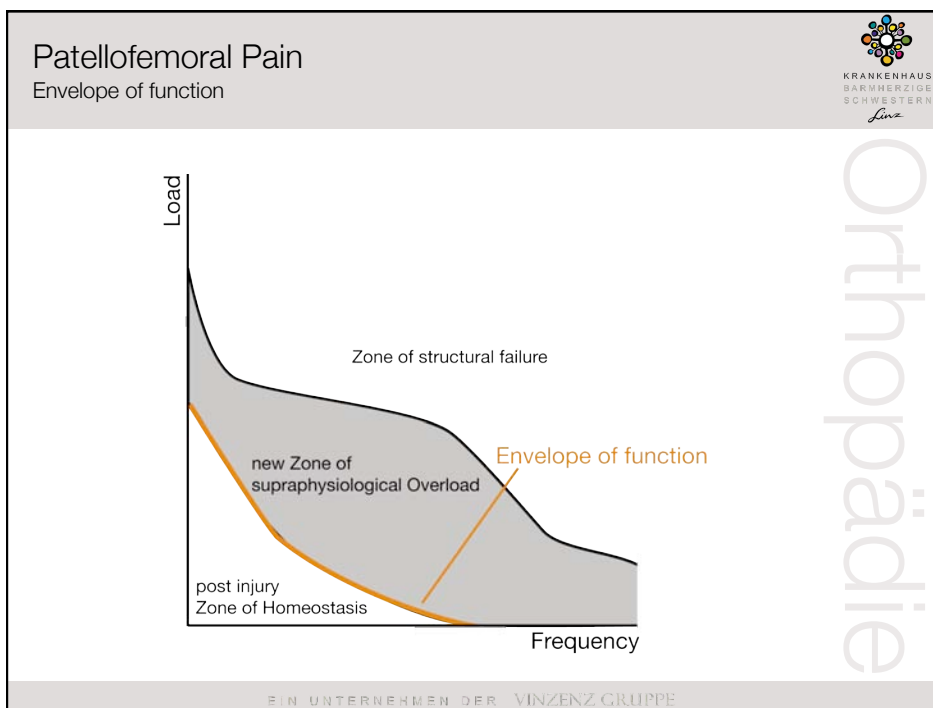
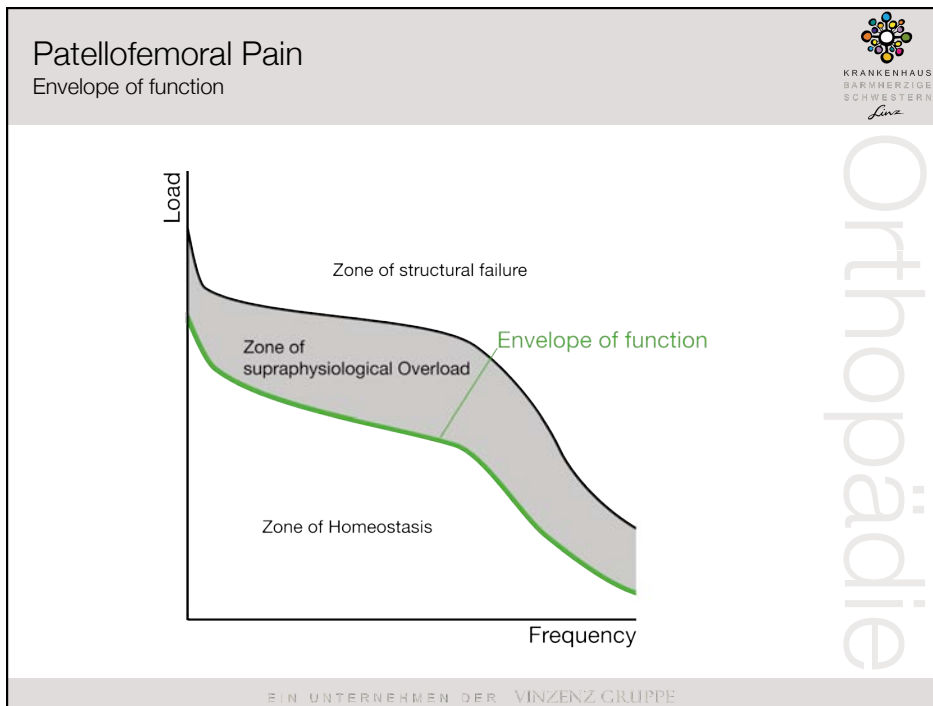


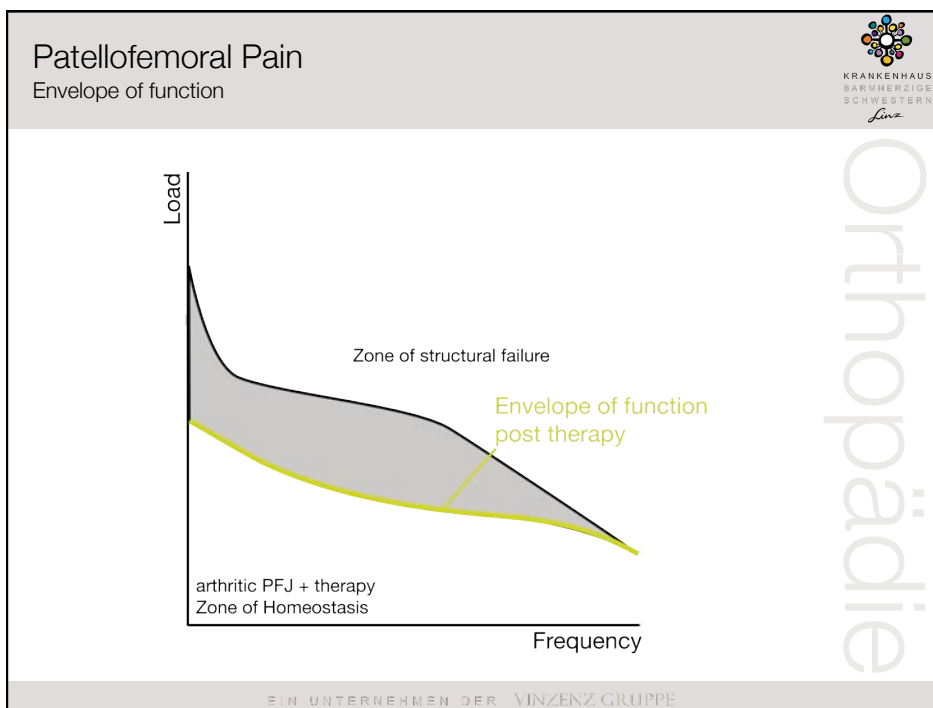
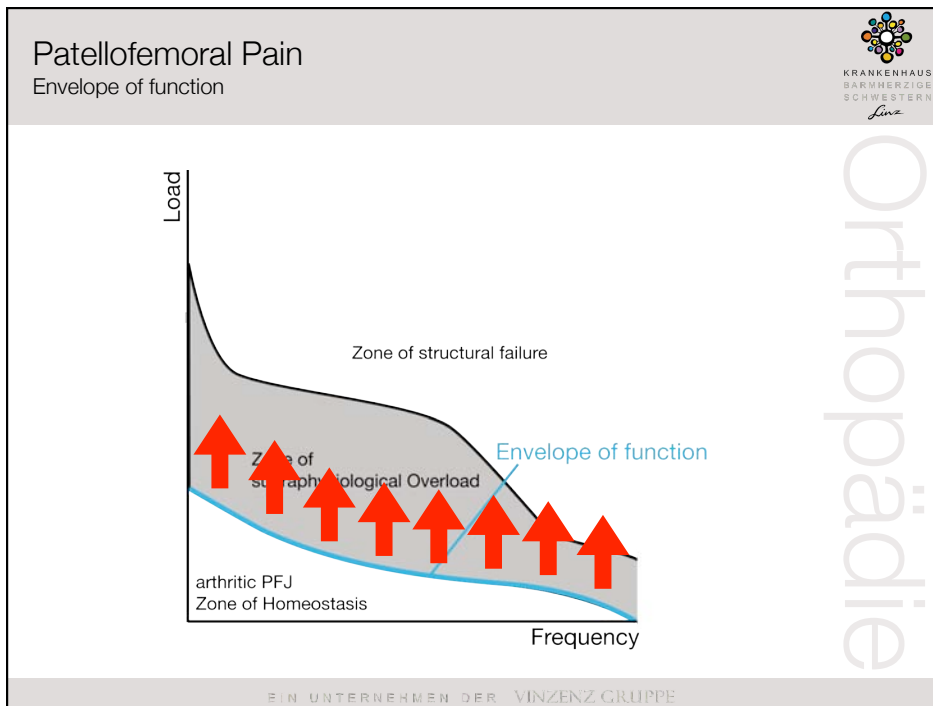
normal



lymphocyte infiltration

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## Patellofemoral Pain

### Functional Deficits

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- define the functional deficit!
- proximal approach
  - trunk stability
  - hip abductors
  - external rotators
- knee approach
  - internal rotation during midstance
  - extension deficit during gait
  - VMO atrophy
- distal approach
  - hyperpronation + tibial internal rotation



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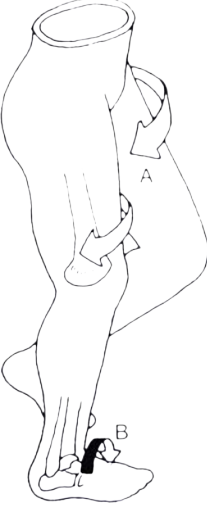
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## Patellofemoral Pain

### proximal approach Background

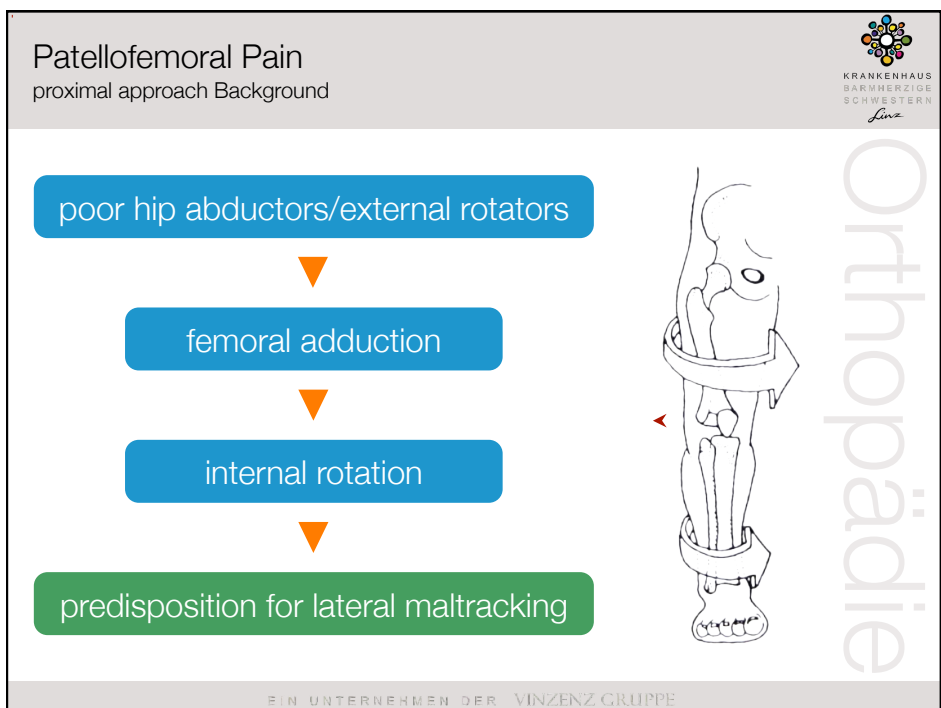
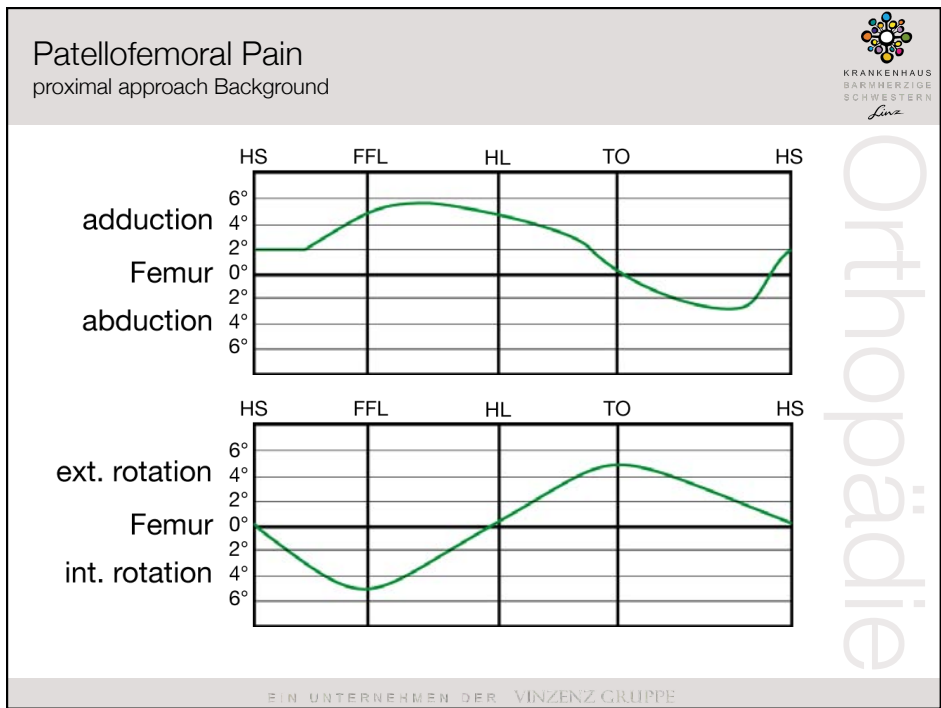
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- good function of **hip abductors** and **external rotators** essential for functional static control of leg during weightbearing
- deficits in trunk control:
  - may lead to loss of pelvic stability
  - decrease of rotatory hip control



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Patellofemoral Pain  
proximal approach Therapy

**The American Journal of Sports Medicine**

Earl, J. E., & Hoch, A. Z. (2011). A Proximal Strengthening Program Improves Pain, Function, and Biomechanics in Women With Patellofemoral Pain Syndrome.

**Phase I**  
improve volitional control of hip and core muscles

**Phase II**  
restore reflex contractions and perturbations

**Phase III**  
restore pattern generated movements

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proximal approach Therapy

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- sensomotoric principle:
- from easy to complex, from low functional to functional

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## Patellofemoral Pain

### knee approach Background

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- Bracing/McConnell Taping
- Goal: pain reduction during exercising/ADLs
- by reducing the soft tissue stress
- no evidence for improvement of patella tracking during weight bearing
- timing of vasti contraction improves (VMO+VL synchronized)



Cowan, S. M. (2006). Patellar taping does not change the amplitude of electromyographic activity of the vasti in a stair stepping task. *British journal of sports medicine*, 40(1), 30-34.

Derasari, A., Brindle, T. J., Alter, K. E., Alter, K. E., Sheehan, F. T., & Sheehan, F. T. (2010). McConnell Taping Shifts the Patella Inferiorly in Patients With Patellofemoral Pain: A Dynamic Magnetic Resonance Imaging Study. *Physical therapy*, 90(3), 411-419.

Aminaka, N., & Gribble, P. A. (2005). A systematic review of the effects of therapeutic taping on patellofemoral pain syndrome *Journal of athletic training*, 40(4), 341-351.

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## Patellofemoral Pain

### knee approach Background

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- VMO/VL Balancing
- evidence for neuromuscular imbalance VMO/VL
  - EMG activity: normally 1:1, patients with AKP 0,8:1
- VMO strengthening or VL weakening (Botox)
  - improvement significantly higher in Botox group (pain and function)
  - evidence for effectiveness of VMO training
  - neuromuscular reeducation should happen!



Singer, B. J., Singer, B. J., Silbert, P. L., Silbert, P. L., Song, S., Song, S., Dunne, J. W., et al. (2011). Treatment of refractory anterior knee pain using botulinum toxin type A (Dysport) injection to the distal vastus lateralis muscle: a randomised placebo controlled crossover trial. *British journal of sports medicine*, 45(8), 640-645.

Aminaka, N., & Gribble, P. A. (2005). A systematic review of the effects of therapeutic taping on patellofemoral pain syndrome *Journal of athletic training*, 40(4), 341-351.

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Patellofemoral Pain  
distal approach Background

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hyperpronation

tibial internal rotation

increase of functional Q-angle

predisposition for lateral maltracking

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distal approach Background

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HS FFL HL TO HS

supinated 8°  
subtalar 4°  
pronated 0°  
4°  
8°

HS FFL HL TO HS

ext. rotation 6°  
Tibia 4°  
0°  
int. rotation 2°  
4°  
6°


- kinematics of the foot parallel to tibial rotation
- hyper-/prolonged pronation causes higher/longer tibial internal rotation

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## Patellofemoral Pain


distal approach therapy



### The immediate effects of foot orthoses on functional performance in individuals with patellofemoral pain syndrome

C J Barton,<sup>1,2</sup> H B Menz,<sup>1</sup> K M Crossley<sup>3</sup>

- prefabricated foot orthoses provide significant improvement in pain and function
- hind foot 4° varus wedging and arch support
- the more effect the more pronation prior to treatment




Barton, C. J., Menz, H. B., & Crossley, K. M. (2011). The immediate effects of foot orthoses on functional performance in individuals with patellofemoral pain syndrome. *British journal of sports medicine*, 45(3), 193–197.

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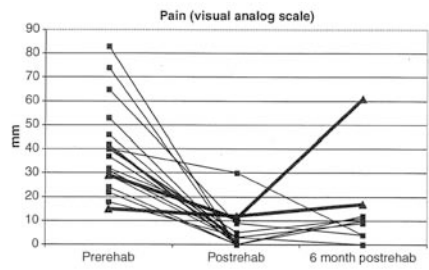
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## Patellofemoral Pain

Conclusion



- [results of conservative approach limited but not that bad](#)
- [early stage of OA ideal to improve functional deficits](#)
- [respect individual envelope of function](#)
- [realistic patient expectations needed](#)
- [end stage arthritis](#)
- [functional rehab program postop](#)



- [a home training programme sustains the patients individual responsibility and lowers the doctors accountability for the problem](#)

Earl, J. E., & Hoch, A. Z. (2011). A proximal strengthening program improves pain, function, and biomechanics in women with patellofemoral pain syndrome. *The American journal of sports medicine*, 39(1), 154–163

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Thanks for your attention



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