

## The Knee: Top Trends in Training

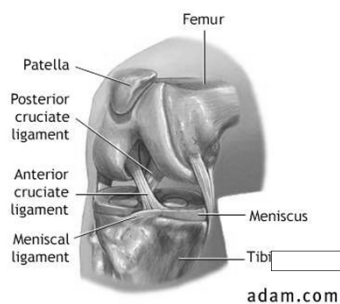


## REMINDER:

Obtain medical clearance and physician's release prior to beginning an exercise program for clients with medical or orthopedic concerns.

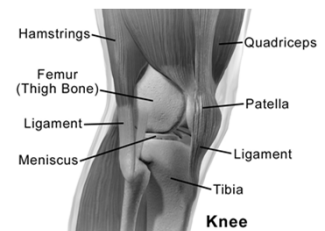
## Knee Anatomy & Mechanics

- Bones
  - Femur, tibia, fibula, patella
- Ligaments
  - Acl, pcl, lcl, mcl
- Meniscus



## Series Elastic Components

- Quadriceps
- Quad tendon
- Patella tendon
- IT band
- Gluteus medius/ maximus
- Hamstrings
- Gastrocnemius



## Range of Motion



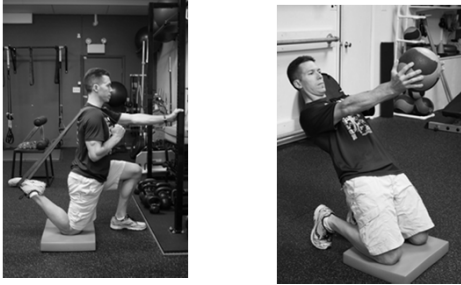
- Functional
  - 0° to 120° flexion
- Active/Passive
  - 0° to 135° flexion
  - 10° hyperextension is common

## Bulletproofing Your Knees

- Stretch quadriceps
- Do mobility and proprioception drills for ankles and hips
- Strengthen glutes, quads and hamstrings
- Learn to squat, lunge, jump, and run efficiently

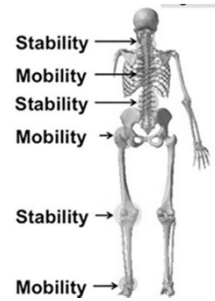


### Band Assisted Quad & IT Band Stretches



### Joint-by-Joint Approach

- Poor hip and/or ankle mobility increases the mobility demands on the knee



### Ankle Range of Motion

- 10-30° of Dorsiflexion w/ knee extended
- Assessment
  - Stand with foot 6” from wall
  - Without lifting heel attempt to touch the wall with the knee



### Hip Range of Motion

- Hip flexion
- Hip extension
- Hip external rotation
  - In flexion
  - In extension
- Hip internal rotation
  - In flexion
  - In extension



### Improving Dorsiflexion

- Self-myofascial or active release stretching
  - Plantar fascia
  - Gastroc/soleus
- Tools
  - Racket ball
  - Tennis ball
  - Golf ball



### Strengthen Dorsiflexion



### Strengthen the Glutes in all Planes of Motion



- Weak hip abductors & external rotators common in knee pain
- Use multi-vector and loading to optimize strength of the hip muscles

### Barbell Hip Thrust



- Arguably the best direct “glute” strengthening exercise

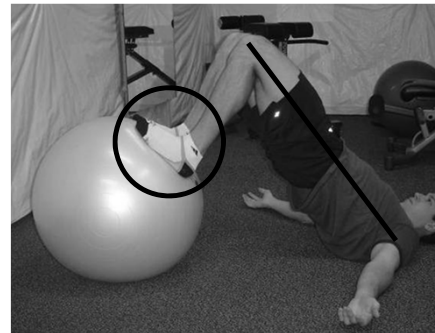
### Crab Walk with Elastic Ring

- Perform 1<sup>st</sup> as a side-step walk laterally
- Progress to linear walking
- Maintain foot, knee and hip alignment



### Swiss Ball Leg Curl:

Mimics actions that occur during gait



### Single Leg Eccentric Leg Curls



### Single Leg Reach / RDL



- Contra-lateral resistance encourages free limb/hip to maintain alignment
- ROM restricted by hip extension on free hip

### Nordic Hamstring Curl



- Begin with negatives
- Try single leg variations
- Use bands for assistance
- Use dbs, bands, weight vest for resistance
- Glute-hamstring bench

### Functional Exercises for Strong Knees

- Squats
- Lunges
- Step-ups
- Jump training



### Squat for Strong Knees

- A body weight squat below "parallel" is a great example of balanced strength & flexibility at the knee
- Depth for strength training and mobility are different
- Parallel squat under load is advisable



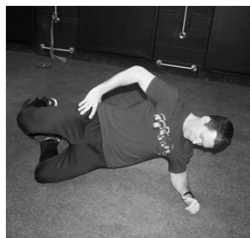
### Correcting Knee Position



- Center of the patella should track over the 2<sup>nd</sup> / 3<sup>rd</sup> toe with weight balanced evenly between ball of foot and heel
- Use RNT - reactive neuromuscular training techniques

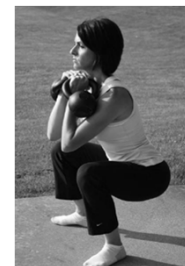
### Additional Tips for Squatting

- Descend slowly
  - Quick, forceful contraction of quads during descent can stress patellar tendon
- Glute activation drills before squats
- Hamstring curls before squats



### The Goblet Squat

- Can be performed with one dumbbell held under the chin
- Allows for more upright torso while learning the basic movement



### Sit to Box – Box Squat

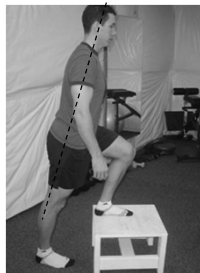


### Split Squat



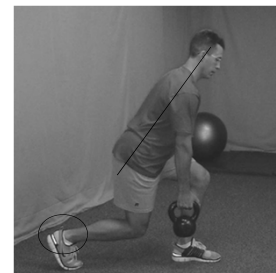
### Step Down – Facing Step

- Descend under control
- Avoid using the non-working limb to push-off
- Start with a 6-8 inch step height
- Avoid progressing to a high step too soon
  - Generates high PF compression forces



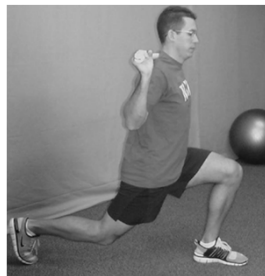
### Forward vs. Reverse Lunge

- Emphasis on the Glute
- Spine MUST remain neutral throughout
- Loads the front leg more effectively and prevents back-leg loading
- Front knee does not cross ball of the foot

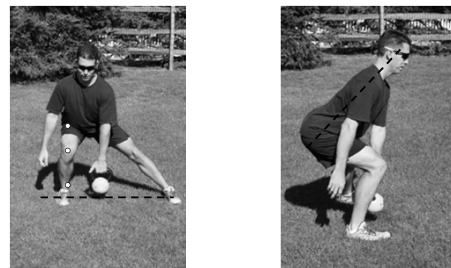


### Walking Lunge

- Back-loaded barbell, low bar position on traps
- Long stride with slight knee flexion on back leg, stretching the psoas & rectus femoris
  - Increases pre-stretch opposite hamstring/glute

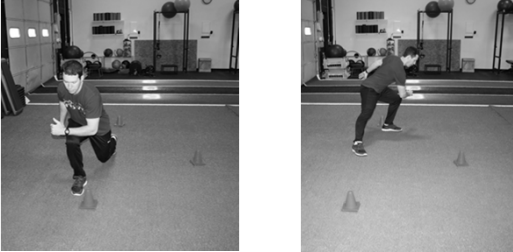


### Lateral Lunging



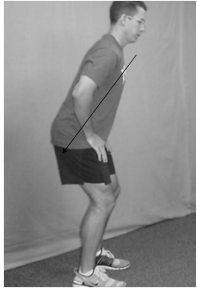
### The Clock Lunge

Try it with a ball toss, increase speed, hit a balloon




### Jumps & Landing Mechanics

- Implicated in most forms of knee pain and injury
- Teach client to land on ball of foot with chest directly above and back extended
- Immediately upon ground contact... "sit back" and drop to the heels
- Client should squat slightly to absorb the ground reaction forces




### Jump Training Basics

- Requires coordination
  - Sustain posture
  - Immediately flex knees after ground contact
  - Dynamic muscle control
  - Eccentric strength
- Flexibility
- Conditioning
  - Role of fatigue



### Training Change of Direction

- Forward to backward
- Side-to-side
- Forward-to-back, right to left
- Jump to run
  - Add directional change



### Multi-directional Resisted Agility Training



### Learn to Run Efficiently

- Run efficiently
  - Use gravity
    - Neutral spine
  - Land on the mid-foot
    - Front of the heel
  - 90-96 strides per min
  - Use the hamstrings
    - Pick up your foot

