

# **HARMELING**

# **PHYSICAL THERAPY**

## *PREVENTING ACL INJURIES IN FEMALE ATHLETES*

Presented By:

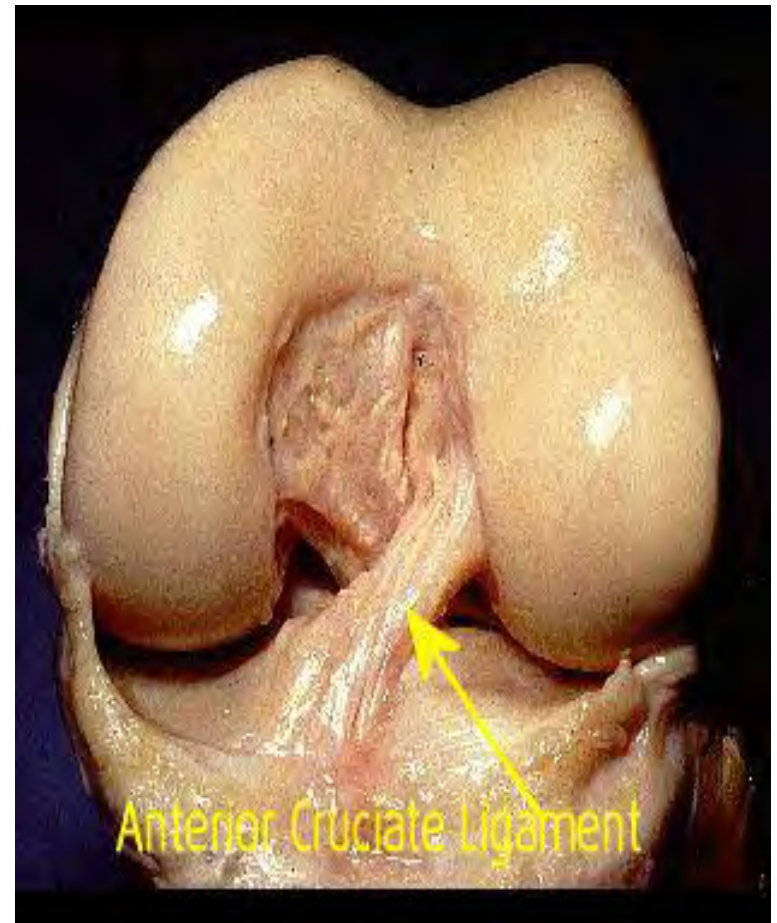
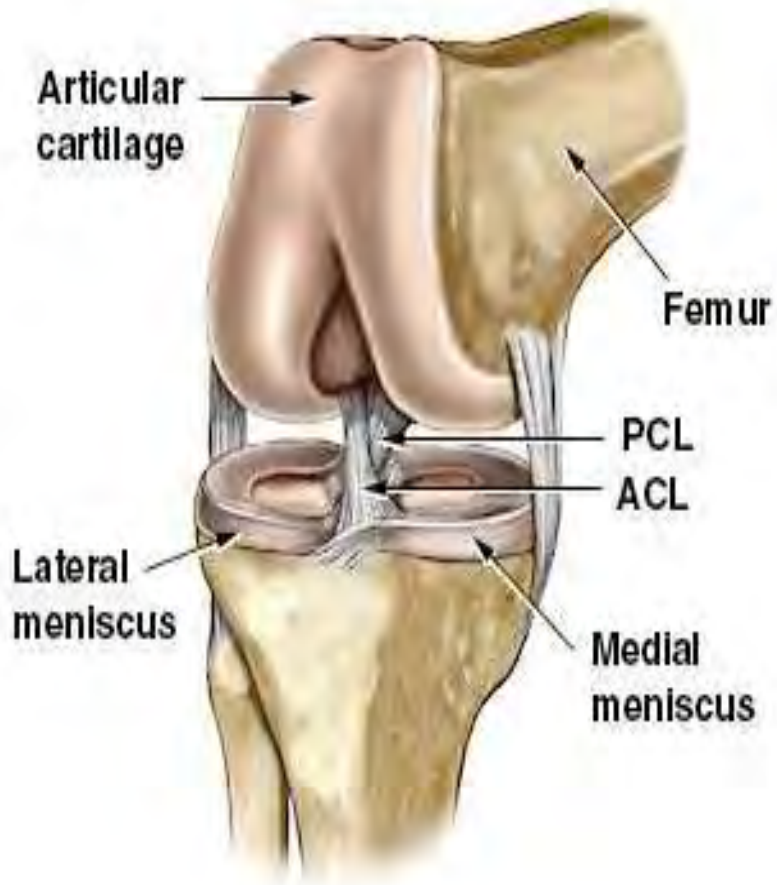
Peter Harmeling, MED, PT, SCS, ATC

Steve Nutter, MSPT, ATC, CSCS

Jim O'Brien, DPT

JUNE 25, 2009

# ANTERIOR CRUCIATE LIGAMENT



# GENERAL STATISTICS

- FEMALES ARE 4-6 X MORE LIKELY THAN MALES TO SUSTAIN AN INJURY TO THE ACL
  - TYPICAL PROCESS:  
TEAR / SURGERY / RETURN TO SPORT  
6 MONTHS TO 1 YEAR
- 10 X MORE LIKELY TO DEVELOP OA LATER IN LIFE AFTER AN ACL INJURY

# REASONS FEMALES ARE MORE AT RISK

ANATOMICAL DESIGN

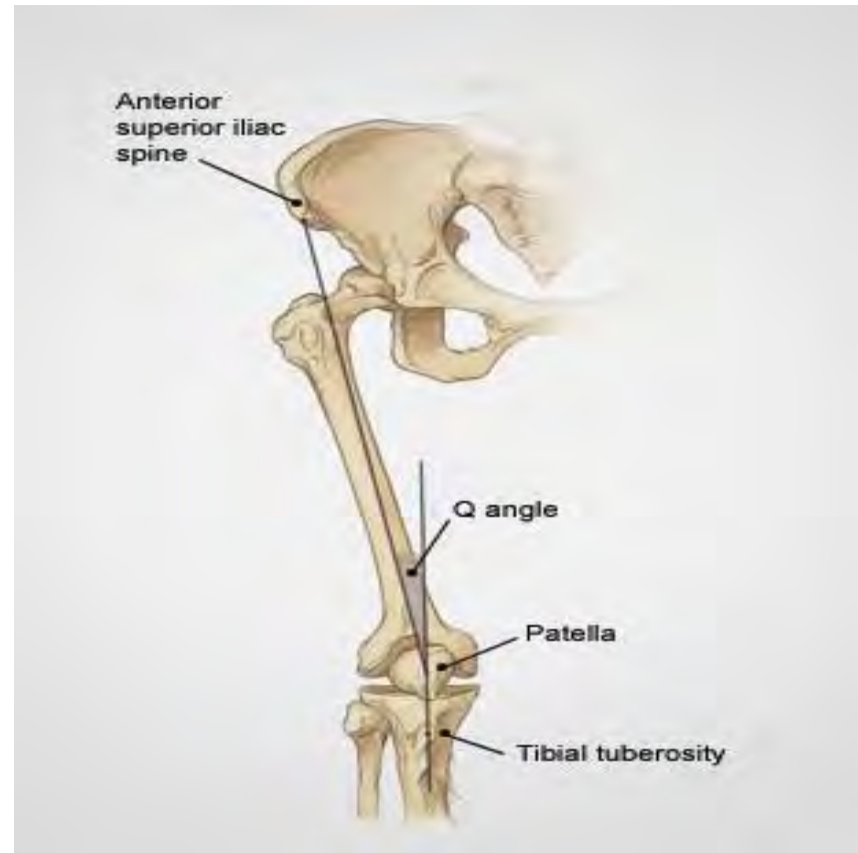
MUSCLE IMBALANCES

# FEMALE ANATOMICAL DESIGN

- WIDER PELVIS, INWARD KNEE ANGLE, PRODUCES MEDIAL STRESS

## RESULTS:

1. INCREASED MEDIAL KNEE MOTION DURING JUMPING / LANDING / CUTTING
2. DIFFICULTY REACTING TO MEDIAL KNEE MOTION
3. STIFFER / STRAIGHTER LANDINGS



# FEMALE ANATOMICAL DESIGN

WIDER PELVIS + INWARD KNEE ANGLE = MEDIAL STRESS AT KNEE

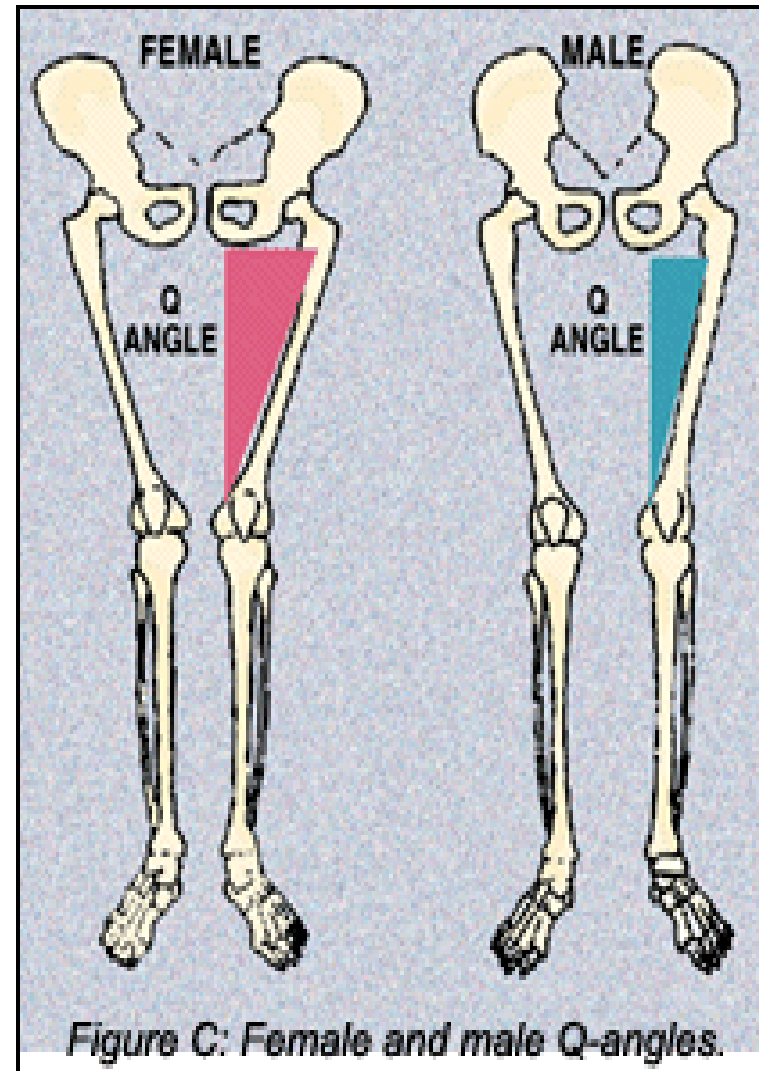


Figure C: Female and male Q-angles.

# STEP DOWN



# ***INCREASED MEDIAL STRESS***

***JUMPING***



***LANDING***





# *STIFF LANDING*



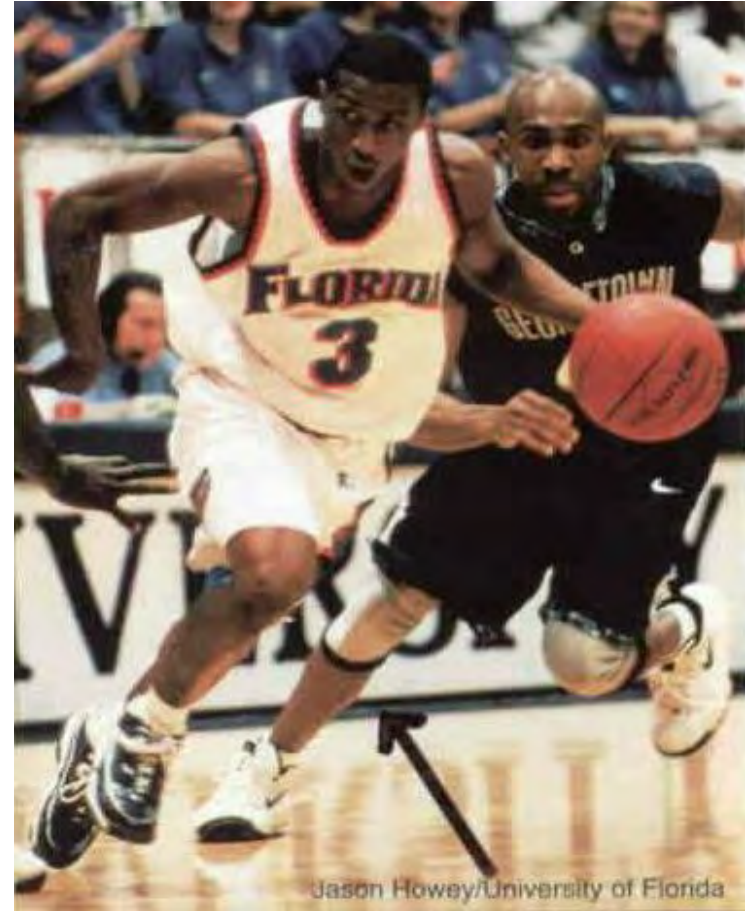
# *STIFF LANDING*



# *GOOD JUMP*



# GOOD VS BAD CUTTING



# GOOD VS BAD CUTTING



# MUSCLE IMBALANCE

## QUAD TO HAMSTRING RATIO

MALE 2:1 / FEMALE 5:1

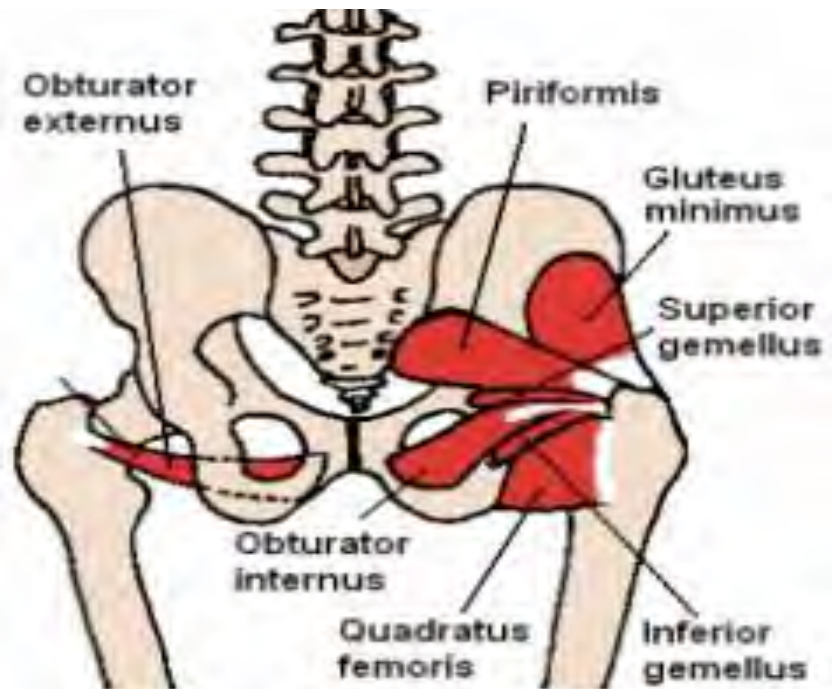
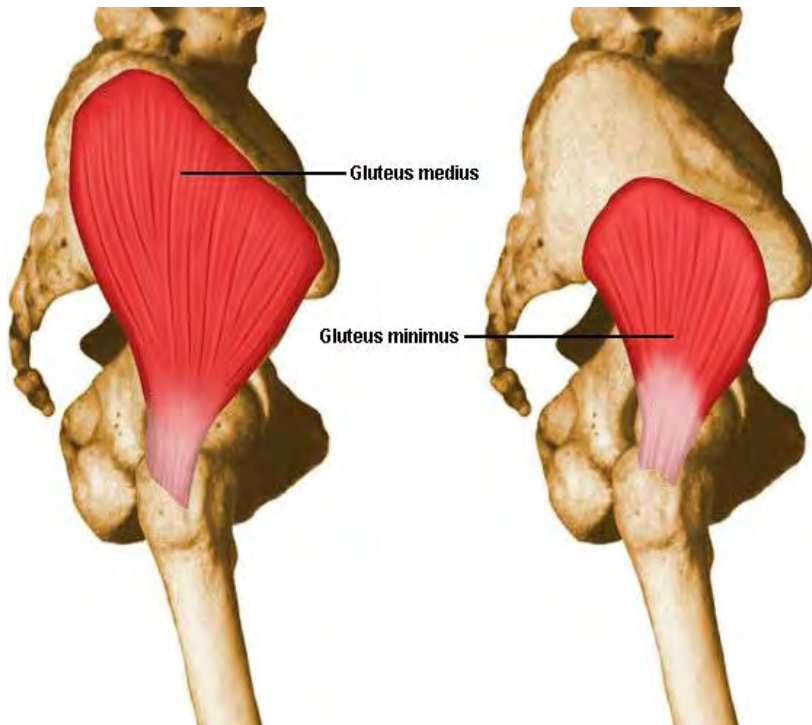


### LANDING

- 3X GREATER HS ACTIVITY IN MALES
- GREATER QUAD IN FEMALES

# MUSCLE IMBALANCE

## WEAK HIP ABDUCTORS AND DEEP ROTATORS



# MUSCLE IMBALANCE





# MUSCLE IMBALANCE



# TRAINING

- PROPER TECHNIQUE IS CRITICAL!!!!!!
  - DO NOT REINFORCE BAD HABITS
  - STOP IF FATIGUED
  - INCREASE **QUANTITY** (Reps / Intensity) WHILE MAINTAINING **QUALITY**

# TRAINING FEEDBACK

- VERBAL FROM COACHES  
“Knees Out”, “Soft Knees”, “Balls of Feet”

- VISUAL FEEDBACK  
Mirrors

# BASIC PROGRAM

## *WARM UP*

ALWAYS WARM THE BODY UP TO  
STRETCH....DON'T STRETCH TO  
WARM UP

# BASIC PROGRAM

## *KEY STRETCHES*

Hamstrings, Quads, Calfs, Hips

Should do 3 – 4 reps

Hold for 15 to 20 seconds

# STRETCHES

## Calf



## Hamstring



*3 – 4 x with 15 to 20 sec hold*

# STRETCHES

Quad



Hip Flexor



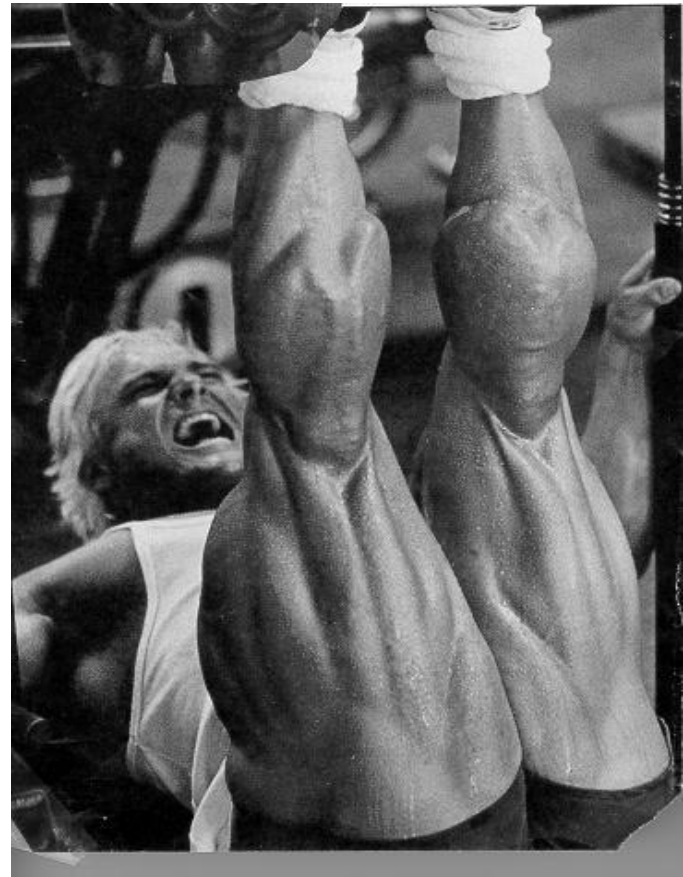
*3 – 4 x with 15 to 20 sec hold*

# BASIC PROGRAM

## KEY STRENGTHENING EXERCISES

### HAMSTRINGS:

Standing Curls,  
Machine,  
Ball / Bridge,  
Russian HS Curls





# STRENGTHENING

## Standing HS Curls



# STRENGTHENING

## HS Curl Machine



# STRENGTHENING

## HS Ball Curl Bridge



# STRENGTHENING

## Russian HS Curl



# BASIC PROGRAM

## KEY STRENGTHENING EXERCISES

### HIPS:

Side Leg Lifts

Ball Squats w/ Band

Sidelying “Clams”

# STRENGTHENING

## Side Leg Lifts



# STRENGTHENING

## Ball Squats w/ Band



# STRENGTHENING

## Sidelying CLAMS





# PLYOMETRIC TRAINING

## *ATHLETIC POSITION*

FEET SHOULDER WIDTH APART

HIPS / KNEES SOFTLY FLEXED

BALLS OF FEET

CHEST OVER KNEES

HEAD / EYES UP

# PLYOMETRIC TRAINING

## *ATHLETIC POSITION*



# PLYOMETRIC DRILLS

VERTICAL JUMPS

FRONT / BACK JUMPS

SIDE / SIDE JUMPS

BOX JUMPS / DROPS

SCISSOR JUMPS

SINGLE LEG JUMPS

IN PLACE / FRONT TO BACK / SIDE TO SIDE

# PLYOMETRIC DRILLS

VERTICAL JUMPS

FRONT / BACK JUMPS

SIDE / SIDE JUMPS



# PLYOMETRIC DRILLS

## BOX JUMPS FRONT VIEW



# PLYOMETRIC DRILLS

## *BOX JUMPS SIDE VIEW*



# PLYOMETRIC DRILLS

## *BOX DROPS*



# PLYOMETRIC DRILLS

## BOX DROPS





# PLYOMETRIC DRILLS

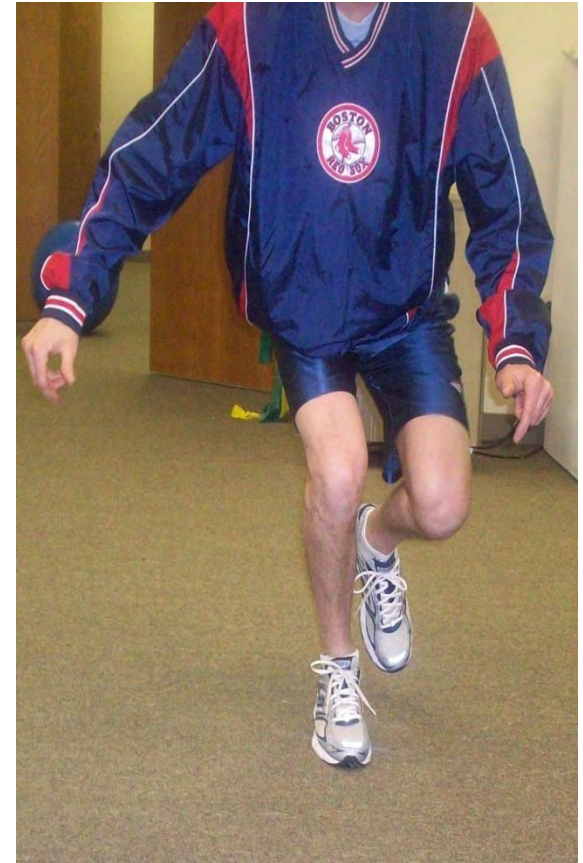
## SCISSOR JUMPS



# PLYOMETRIC DRILLS

## SINGLE LEG JUMPS

IN PLACE / FRONT TO BACK / SIDE TO SIDE



# AGILITY DRILLS

- FORWARD / BACKWARD SHUTTLE
  - DIAGONAL RUNS
- BOUNDING (HIGH KNEE DRILL)

# SUMMARY

- ACL INJURY > IN FEMALE ATHLETES
- NO SPORTS FOR 6 MONTHS TO 1 YEAR
  - TRAINING PROVEN TO MINIMIZE CHANCE OF INJURY
  - STRENGTHEN HAMS AND HIPS
  - PRACTICE...PRACTICE....PRACTICE
- FEEDBACK FROM COACHES / TRAINERS