

# Knees

How to protect your knees when practicing Yoga



“Will I learn “enough” anatomy  
to help someone with an injury?”



# Overview

- **2 Movements** of the Knee\*
- **Bones and Ligaments** of the Knee
- **2 Muscle Groups** of the Knees
- **How to avoid injuries** of the Knee



# 2 Movements of the Knee\*



## THE KNEE IS A 'HINGE JOINT'

- Meaning it moves in 1 plane:
  - Flexion and Extension
- It can support a small amount of rotation as well
  - However, we can't really rotate our knee on our own

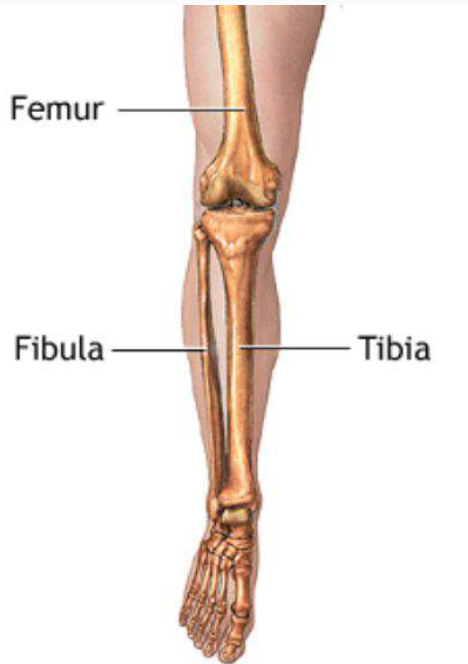
**Flexion**  
(Bend)



**Extension**  
(Straighten)



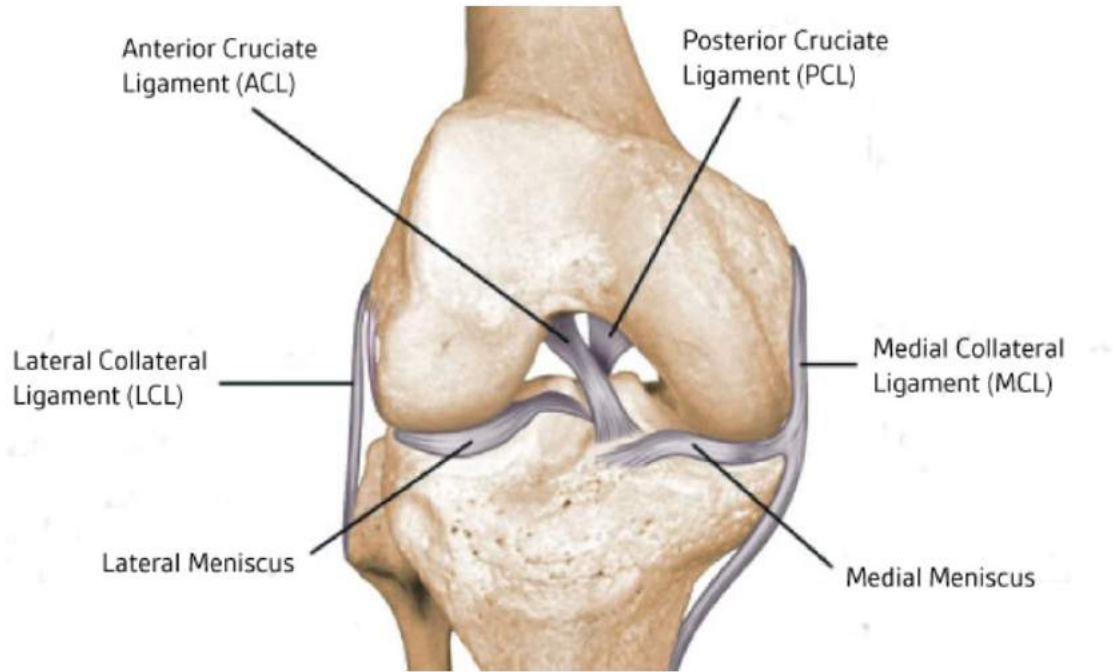
# Bones of the Knee



- **THIGH BONE = FEMUR**  
Biggest bone in your body
- **SHIN BONE = TIBIA**  
Weight bearing bone of your lower leg
- **Bone along the side of the shin = FIBULA**  
Assists with weight bearing and movement at the ankle



# Ligaments of Knee (Just for Fun)



- **ACL + PCL** = Inside joint
- **LCL + MCL** = Outside joint
- **MENISCUS'** = Is actually cartilage that acts as a cushion between the thigh bone and the shin bone



# 2 Muscle Groups of the Knee



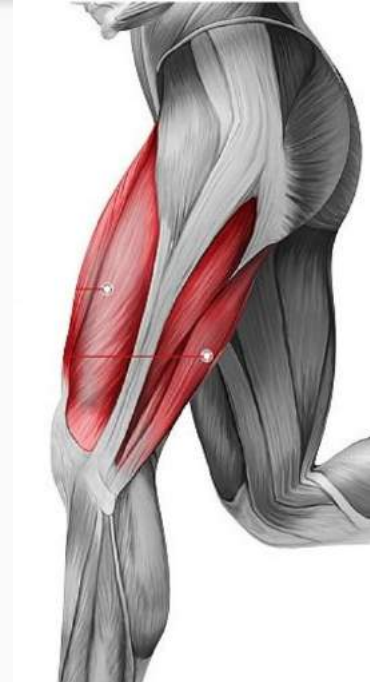
## **QUADRICEP MUSCLES**

Front of thigh



## **HAMSTRING MUSCLES**

Back of thigh



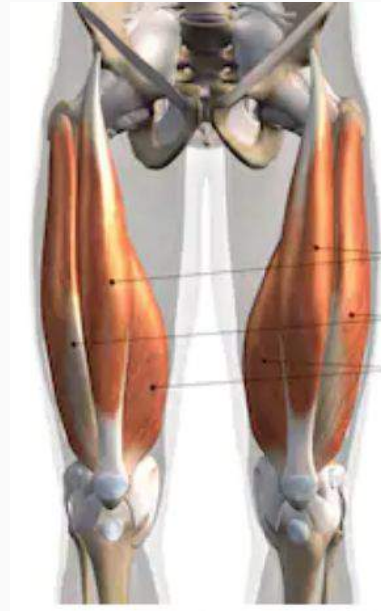
# 2 Muscle Groups of the Knee

## ✦ QUADRICEP MUSCLES

Front of thigh

✦ Hamstrings (Back of thigh) Muscles

Action = straightens the knees



Front View

\*Engage your thigh muscles

\*Straighten your knee

\*Lift your knee cap up

\*Press (down) through your feet

\*Micro-bend in the knee (while standing)





# 2 Muscle Groups of the Knee

✦ Quadriceps (Front of thigh) Muscles

✦ **HAMSTRING MUSCLES**  
Back of thigh

Action = bends the knees



Back View

*\*Bend (flex) the knee*

*\*Pull your heel towards your butt*

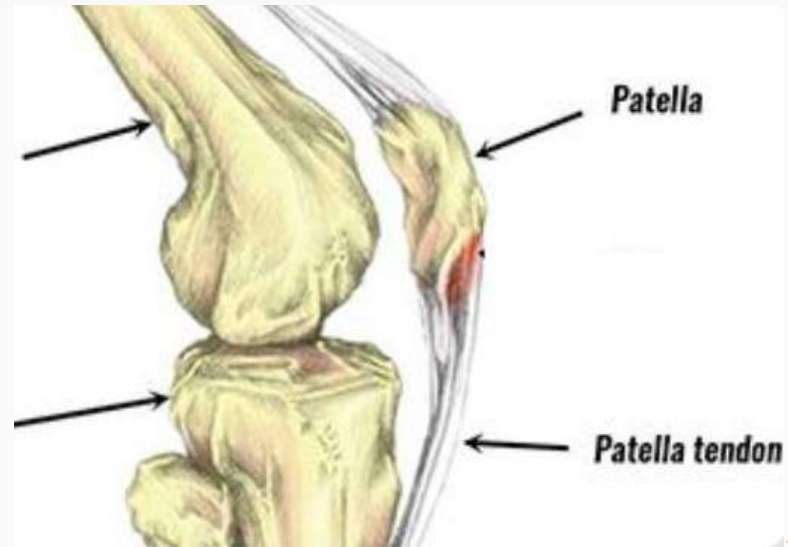
*\*Drive your knees forward and at the same time drag your heels back.*

*\*Push down through the heels*



# Knee Cap (Patella)

- “Floating” Bone
- Moves when the knee moves
- Purpose:
  - Protect the inner structures
  - Reduces friction (rubbing) when we straightening the knee



Side View



# Knee Cap (Patella)

- Completely surrounded by the Quadricep Muscles (front thigh)
- Quad muscles contract and pull the shin bone up
- The kneecap moves up with the contraction of the quads.



*Front View*



# How to Avoid Injuries in the Knee

- ✦ Maximum Straightening (**EXTENSION**) of the knee
- ✦ Maximum Twisting (**ROTATION**) of the knee
- ✦ Maximum Bending (**FLEXION**) of the knee



# Maximum Straightening (EXTENSION) of the knee

- **PROBLEM** = When we “lock Out” our knee
  - Body weight falls into the bones & ligaments
  - Can lead to unnecessary stress in the joint
  - It ‘feels’ easier to lock out, because muscles are relaxed (lacking active control)



# Maximum Straightening (EXTENSION) of the knee

- **SOLUTION** = Keep a “micro-bend” in the knee
  - The slight bend in the knees forces the quadriceps (front thigh muscles) to engage
  - Those engaged muscles support and stabilize the knee
  - **Mobility = Flexibility + Strength + Control**



# Maximum Twisting (ROTATION) of the knee

- **PROBLEM** = Excessive rotation in the knee
  - Rotation in the knee happens most often when we are trying to rotate the hip (externally)
  - We may be lacking flexibility in the hip rotation, so the knee compensates by helping with the rotation.



# Maximum Twisting (ROTATION) of the knee

- **SOLUTION** = Acceptance of limited rotation in the hips
  - Use a block (or bolster) under your hip to support the external rotation at the hip
  - Bend the knee more, so that the lower leg is less than 90 degrees, reducing the amount of external rotation (*not in picture*).
  - If at 90 degrees; flex the foot (dorsiflexion) to tighten the calf muscle which will support the knee





# Maximum Bending (FLEXION) of the knee

- **PROBLEM** = if you already have an injury (old or new), then maximum flexion is not your friend.
  - When the knees are fully bent, there is an increase in pressure within the joint. Meaning, there is less space.
  - Old injuries typically have some residual healing, or scar tissue at play, so extra space (support) is needed.



# Maximum Bending (FLEXION) of the knee

- **SOLUTION** = Support the knees with as many blocks (or bolsters) as you need to minimize the bend in the knee.
  - Ideally, we find the 'tender edge' in the knee, where you are bent as far as you can without pain.
  - Do a variation, or skip the pose entirely



# How to Avoid Injuries in the Knees

## To prevent a new injury:

- Avoid full extension “lock out” with micro-bend in the knee
- Avoid excessive rotation in the knee by supporting ER at the hip

## To protect someone with an old (or recent) injury:

- Avoid maximum bending (flexion) by using supporting blocks (or bolsters)

## What about “knees over toes”:

- It’s okay depending on where your center of balance is



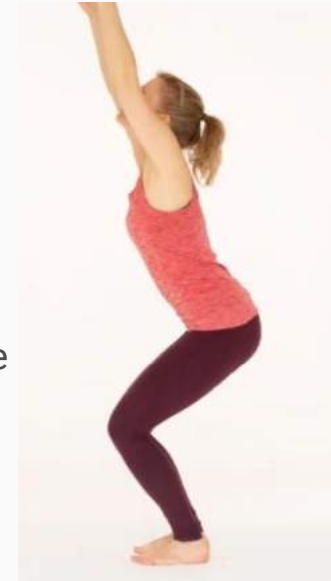
# Other Examples - Knees Over Toes



**QUESTION:**

**What is the position of the hips?**

Depending on whether the one or more of the hips are in External Rotation, will determine if the “knees over toes’ is safe or not...



# Other Examples - Knees Over Toes



# Other Examples - Knees Over Toes



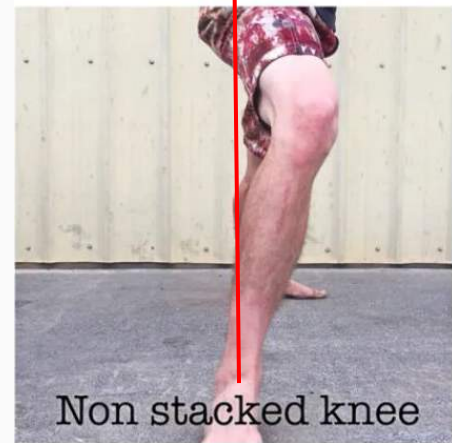
# Other Examples - Knees Over Toes



# Other Examples - Knee “Fall in”

## ANY STANDING EXTERNALLY ROTATED (HIP) POSES

- **Example:** Warrior II (Virabhadrasana II)
  - This misalignment adds unnecessary pressure in the knee.
  - If can't externally rotate the hip any further, then we can turn the back toes in to allow alignment of the knee.

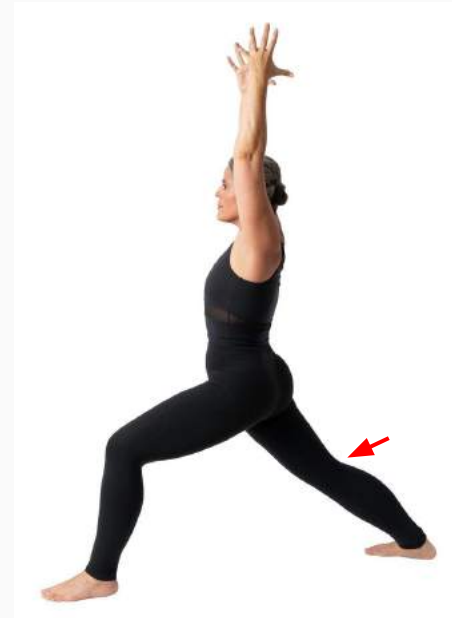




# Other Examples - Back Leg is Not Engaged

## ANY STANDING POSES WITH BACK LEG NOT STRONG

- **Example:** Warrior I (Virabhadrasana I)
  - A “soft” back leg is not fully supporting the knee. Adds unnecessary stress to the joint.
  - Start by pushing down through the back foot to engage your thigh muscles (quads). After the foot is established, then adjust the front leg, hips and upper body as needed.



# Review

- **2 Movements** of the Knee\*
- **Bones and Ligaments** of the Knee
- **2 Muscle Groups** of the Knees
- **How to avoid injuries** of the Knee



# Ankles

THEY'RE TOUGHER THAN YOU THINK!

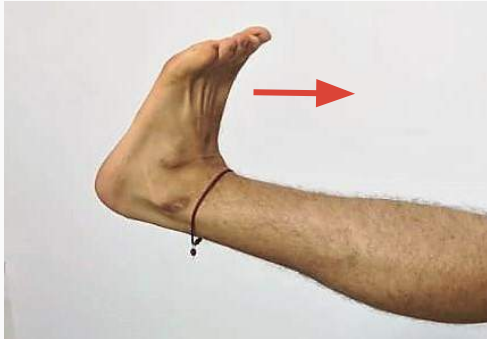


# Ankle Overview

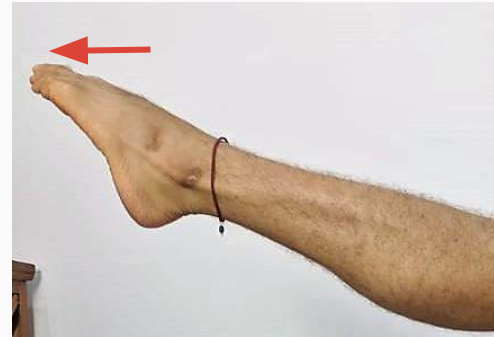
- **4 Movements** of the ankle
- **Bones, Ligaments and Muscles** of the ankle
- **How to keep your ankles stable**



# 4 Movements of the Ankle



**Dorsiflexion**  
(toes towards shins)



**Plantar Flexion**  
(pointed Toes)



# 4 Movements of the Ankle



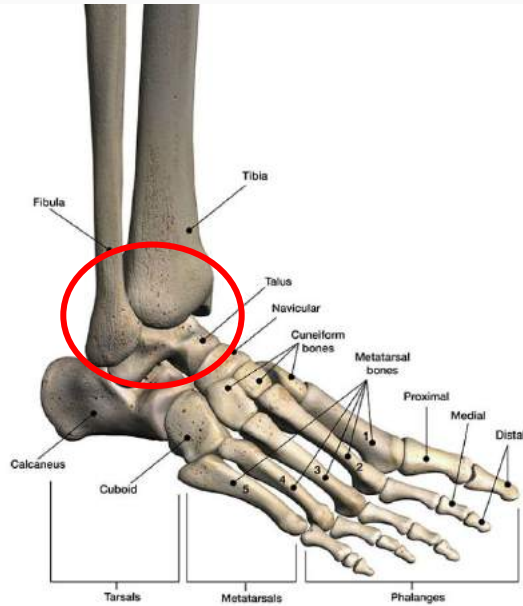
**Inversion**  
(toes inward)



**Eversion**  
(toes outward)



# Bones of the Ankle

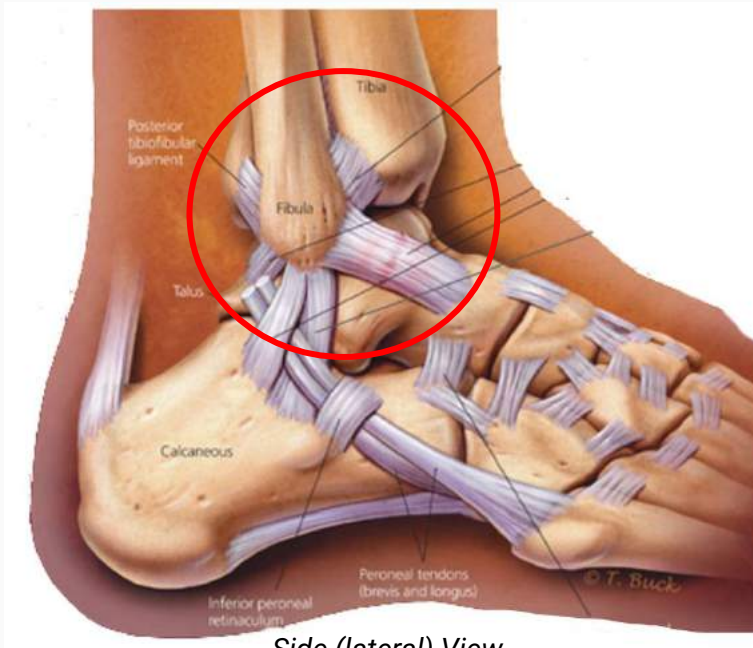


Side (lateral) View

- **SHIN BONE = TIBIA**  
Weight bearing bone of your lower leg
- **Bone along the outside = FIBULA**  
Assists with weight bearing and movement at the ankle
- 7 Ankle Bones + 17 Foot Bones



# Ligaments of the Ankle



Side (lateral) View

- Many bones = Many ligaments
- There are many joints connecting it all together.
- When one joint moves, they all shift slightly to accommodate movement.
- They work as a cohesive unit!





# Muscles Supporting the Ankles

- ✦ Almost all muscles that control the ankle are located on the back of the shin bone
- ✦ Also known as the **'calf muscles'**



# HOW TO KEEP THE ANKLES STRONG & STABLE

## Make them unstable!

The more we challenge our ankles to balance us, the more stable they will become.

Shifting your body weight (center of balance) to different locations will force those joints, ligaments and muscles to work together and build stability & control around your ankle joint.



# Ankle Overview

- **4 Movements** of the ankle
- Bones, Ligaments and Muscles of the ankle
- **How to keep your ankles stable**



*“Remember when  
you could refer to  
your knees as  
left and right?”*

*Instead of  
good and bad!”*

