Knee Osteoarthritis

Scan this QR Code to access a detailed video that enhances the information in this handout. It includes explanations for all the various treatments for knee osteoarthritis.

What is osteoarthritis?

Osteoarthritis is caused by the progressive loss of articular cartilage. Cartilage helps protect our bones and creates a smooth frictionless environment. Loss of cartilage results in grinding of the bones which leads to pain and inflammation. Osteoarthritis is a progressive disease that cannot be cured or reversed.

How does osteoarthritis occur?

Risk factors for osteoarthritis include age, genetics, trauma, injury, repetitive high impact activities, and metabolic factors such as high blood pressure, elevated blood sugar, excess body fat, increased triglycerides, and high cholesterol.

Chronic inflammation weakens articular cartilage resulting in joint dysfunction. Damage to cartilage leads to the release of harmful enzymes and proteins which further degrades cartilage in a self perpetuating cycle. The ultimate result is stiffness, reduced mobility, swelling, and pain.

How is osteoarthritis treated?

Treatment of osteoarthritis should focus on prevention.

1. Exercise therapy is critical to decreasing pain and improving function. Aerobic exercise such as walking or stationary bike helps increase the production of lubrication in the joint. This helps the joint move smoothly.
    a. **Aerobic exercise should be done at least 30 minutes daily.**
2. Resistance training and rehabilitation exercises strengthen the muscles around the leg to help improve stability and to take pressure off the joint.
    a. Strength training should be done at least 2-3 times a week.
3. Focus on healthy nutrition by limiting added sugars and ultra-processed foods.
4. Managing body weight reduces stress on the joints and decreases inflammation.
5. Injections decrease pain, improve function, and may slow arthritis progression.

Knee Osteoarthritis Rehabilitation Exercises

Consistent strengthening exercises can decrease pain and improve function. Perform the following program **2-3 times per week**. As you get stronger, apply progressive overload by gradually increasing the weights, sets, and/or repetitions.

Active Warm Up

- March in place - Alternate lifting each knee towards your chest. 15 per leg.
- Leg swings - Swing one leg forward and backward. 10 to 15 per leg.
- Butt kicks - Stand tall and kick the heel towards the glutes. 10 to 15 per leg.

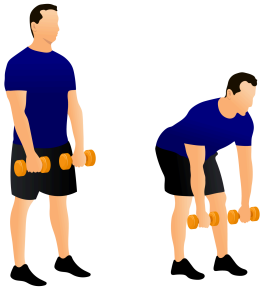
Squats (with or without dumbbells)

- Objective: strengthen the quadriceps, hamstrings, glutes, and calves
- Stand shoulder width apart. Lower until your thighs are parallel to the floor. Start with a chair squat or a half squat if you have pain.
- Perform 3 sets of 10 repetitions.

Reverse Lunge (with or without dumbbells)

- Objective: strengthen quadriceps, hamstrings, and glutes
- Begin standing, then step one leg back into a lunge position. The back knee should hover just above the ground while keeping the torso upright. Push through the front foot to return to the starting position.
- Perform 3 sets of 10 repetitions on each side.

Romanian Deadlift (with or without dumbbells)



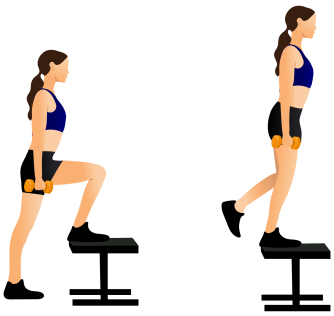
- Objective: strengthen the hamstrings, glutes, and lower back
- Stand holding dumbbells, slightly bend your knees, and hinge at the hips. Keep the back straight. Lower until you feel a stretch in your hamstrings, then drive through the hips to stand back up.
- Perform 3 sets of 10 repetitions.

Calf raise (with or without dumbbells)

- Objective: strengthen the calves which help with knee flexion and stability
- Stand with feet shoulder-width apart, and raise your heels as high as possible, keeping the body upright and engaging the calves. Hold briefly at the top, then slowly lower the heels back to the ground.
- Perform 3 sets of 10 repetitions.

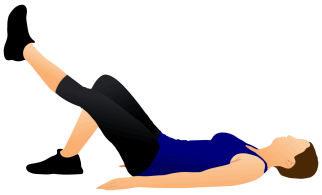
Step Ups (with or without dumbbells)

- Objective: strengthen lower extremity muscles, improves balance and stability, addresses imbalances between legs
- Stand in front of a sturdy low platform. Step up with one foot, followed by the other leg. Then step back down, leading with the first foot. To further challenge yourself, increase the step height or perform the exercise while holding weights.
- Perform 3 sets of 10 repetitions on each side.



Straight Leg Raise

- Objective: strengthen the quadriceps and hip flexors
- Lie on your back with knees bent. Straighten one leg and lift it to a 45-degree angle. Hold briefly, then lower it back down.
- Perform 3 sets of 10 repetitions on each side.



Glute Hip Bridge

- Objective: strengthen gluteus maximus, hamstrings, pelvis, torso
- Lie on your back with knees bent. Lift your hips to form a straight line from shoulders to knees, squeeze your glutes, hold briefly, then lower back down.
- Perform 3 sets of 10 repetitions.

Side Lying Clamshell

- Objective: strengthen pelvic and gluteal muscles
- Lie on your side with both your hips and knees bent. Keep your feet together. Raise the top knee as high as possible without moving your hips or pelvis. Pause at the top, where you feel maximum engagement in your glutes, and then lower back down.
- Perform 3 sets of 10 repetitions on each side.

Side Lying Leg Raise

- Objective: strengthen hip abductors
- Lie on your side with your legs straight. Raise the upper leg while maintaining a straight line with your body. Lft it to about 45 degrees, hold it briefly at the top, then gently lower back down.
- Perform 3 sets of 10 repetitions on each side.

Standing Quadriceps Stretch

- Objective: increase mobility of the quadriceps muscle
- Stand on the unaffected leg. Bend the knee of your injured leg bringing your heel towards the glutes. Grasp the ankle with your hand. You should feel a stretch along your thigh muscle.
- Hold this for 30 seconds, repeat on the other side.

Standing Calf Stretch

- Objective: alleviate tension in the calves to improve mobility
- Face a wall and step your unaffected foot forward, keeping your back leg straight. Lean forward towards the wall until you feel a stretch in the calf of your back leg.
- Hold this for 30 seconds, repeat on the other side.

Standing IT Band Stretch

- Objective: improve flexibility along the outer thigh and hip
- Stand on the affected leg and cross your other leg in front of it. Gently allow the hip of the affected leg to drop outwards away from your body. Lean your upper body slightly towards the opposite side to increase the stretch. You should feel a stretch along the hip and side of the affected leg.
- Hold this for 30 seconds, repeat on the other side.

Sitting Hamstring Stretch

- Objective: improve flexibility of the hamstrings
- Straighten out the affected leg and bend your other leg inwards. Hinge forward at the hips and reach towards the toes. Try to keep the leg as straight as possible.
- Hold this for 30 seconds, repeat on the other side.

Lying Figure 4 Stretch

- Objective: stretch the piriformis and gluteal muscles
- While lying on your back, lift one foot and put the ankle over your other thigh, just above the knee, forming a figure 4 shape with your legs. Clasp your hands behind your thigh and gently pull it toward your chest. You should feel a stretch in your hip and in the glutes.
- Hold this for 30 seconds, repeat on the other side.

Patient Education - Knee Osteoarthritis

Knee Injections

Platelet rich plasma injection
- Utilizes your own blood cells, platelets, and growth factors for pain relief.
- Effective in ~80-90% of people with improvements lasting up to 1 year.
- Protects cartilage and may slow down the progression of osteoarthritis.
- Significantly better outcomes than hyaluronic acid and corticosteroid injections.
- Not covered by insurance, considered a self pay procedure.

Hyaluronic acid injection (gel shots)
- Naturally occuring substance in the body and provides lubrication to joints.
- Has anti-inflammatory properties and can protect cartilage.
- Effective in ~70% of people with improvements lasting up to 6 months.
- Covered by most insurances including medicare, requires prior authorization.

Corticosteroid injection
- Fast pain relief but short term, lasting about 6-8 weeks. No long term benefits.
- Can cause damage to and weaken cartilage, making arthritis worse over time.
- Covered by insurance. Use sparingly due to side effects.

Stem cells (Bone Marrow, Adipose Derived, Umbilical Cord)
- Current studies suggest these treatments contain little to no live stem cells
- Should be considered growth factor injections rather than ‘stem cell’ injections
- Have not been shown to outperform PRP injections
- Not covered by insurances and are very expensive

Supplements:

Recommend purchasing supplements that are either NSF or USP certified.
The best available clinical trial evidence suggests the following:

High effect size in reducing symptoms:
- Turmeric & Curcumin 1000mg daily
- Boswellia Serrata extract 100mg daily, increase to 250mg daily as needed

Low to moderate effect size in reducing symptoms:
- Glucosamine 1500mg & Chondroitin 800-1200mg daily (must be taken together)
- Omega-3 & fish oil

Low effect size in reducing symptoms:
- Vitamin D 2000 IU daily

Insufficient evidence:
- Type 2 Collagen

Knee Osteoarthritis Treatments

Knee Osteoarthritis Treatment	Short term pain benefits	Mid to Long term pain benefits	Impact on Arthritis Progression	Risk of MAJOR side effects	Cost of Treatment	Dr Peng's Recommendation
Weight Management	Mild	High	Decreases	None	None	Highest
Exercise Therapy	Mild	High	Decreases	None	None	Highest
Anti-Inflammatory Diet	Mild	Mild - Moderate	May decrease	None	Minimal	Highest
Platelet Rich Plasma	Mild - Moderate	High	May decrease	None	$$	Moderate
Turmeric / Boswellia	Mild	Mild	None	None	Minimal	Low - Moderate
Hyaluronic Acid	Mild - Moderate	Moderate	None	Very low	$ - $$	Low
Trigger Point Injection	Mild - Moderate	Mild	None	None	$	Use as needed
Knee Braces	Mild	None	None	None	Minimal	Use as needed
Topical NSAIDs / Capsaicin	Mild	None	None	None	Minimal	Use as needed
Topical CBD	Mild	None	None	None	Minimal	Use as needed
Tylenol	Mild	None	None	Very low	Minimal	Use as needed
Oral NSAIDs	Mild	None	None	Low - Moderate	Minimal	Use sparingly
Corticosteroid Injection	Moderate	None	Increases	Low	$	Limit use
Knee replacement	Poor	High	N/A	Moderate	$$$$	Personal decision
Genicular Treatment	Mild - Moderate	None	None	None	$$	Consider prior to arthroplasty
Dextrose Prolotherapy	Mild - Moderate	None	None	None	$$	Consider prior to arthroplasty
Red Light Therapy (PBM)	Mild	None	None	None	$ - $$	Insufficient evidence
Opioids	Mild	None	None	High	Minimal	Not recommended
Knee arthroscopy	Mild	Mild	May Increase	Low - Moderate	$$$	Not recommended
Bone Marrow Stem Cells	Insufficient evidence	Insufficient evidence	Insufficient evidence	Low	$$$$	Not recommended
Adipose Tissue Stem Cells	Insufficient evidence	Insufficient evidence	Insufficient evidence	Low	$$$$	Not recommended
Umbilical Cord Stem Cells	Insufficient evidence	Insufficient evidence	Insufficient evidence	Low	$$$$	Not recommended