

**ACI / DENOVO REHABILITATION PROTOCOL
Patellofemoral**

The intent of this protocol is to provide a general framework for ACI/DeNovo rehabilitation. Within this framework there are specific guidelines for activity progression which directly relate to tissue tolerance and directional preference of movement. MOSMI staff will provide special instructions in the case that specific individual restrictions exist. Please fax initial assessment and subsequent progress notes directly to MOSMI at 952-944-0460.

Phase I: Weeks 0-6 (Protection Phase)**GOALS:**

- Protect healing tissue from load and shear forces
- Regain quadriceps control
- Gradually improve knee flexion
- Restore full passive knee extension
- Decrease pain and effusion

BRACE:

- Locked at 0° during ambulation and weight-bearing activities
- Sleep in locked brace for 4 weeks unless in CPM

WEIGHTBEARING:

- Immediate partial weight-bearing in full extension, as tolerated
- 25% body weight with brace locked
- 50% body weight by week 2 in brace
- 75% body weight by weeks 3-4 in brace

ROM:

- Immediate motion exercise days 1-2
- Full passive knee extension immediately
- Initiate Continuous Passive Motion (CPM) day 1 for total of 8-12 hours/day (0° - 60°; if lesion > 6 cm² 0° - 40° for first 2-3 weeks)
- Progress CPM ROM as tolerated 5° - 10° per day
- May continue CPM for total of 6-8 hours per day for up to 6 weeks
- Patellar mobilization (4-6 times per day)
- Motion exercises throughout the day
- Passive knee flexion ROM 2-3 times daily
- Knee flexion ROM goal is 90° by 2-3 weeks
- Knee flexion ROM goal is 105° by 3-4 weeks and 120° by week 6
- Stretch hamstrings and calf

STRENGTHENING PROGRAM:

- Ankle pump using rubber tubing
- Quad setting
- Straight leg raises (4 directions)
- Toe-calf raises by week 2
- Stationary bicycle when ROM allows
- Biofeedback and electrical muscle stimulation, as needed
- Isometric leg press by week 4 (multi-angle)
- Initiate weight shifts by weeks 2-3
- May begin use of pool for gait training and exercise by week 4

FUNCTIONAL ACTIVITIES:

- Gradual return to daily activities
- If symptoms occur, reduce activities to reduce pain and inflammation
- Extended standing should be avoided
- Use caution with stair climbing

SWELLING CONTROL:

- Ice, elevation, compression, and edema modalities as needed to decrease swelling

CRITERIA to PROGRESS TO PHASE II:

- Full passive knee extension
- Minimum pain and swelling
- Knee flexion to 115° - 120°
- Voluntary quadriceps activity

PHASE II: Weeks 6-12 (Transition Phase)**GOALS:**

- Gradually increase ROM
- Gradually improve quadriceps strength/endurance
- Gradual increase in functional activities

BRACE:

- Discontinue brace by week 6

WEIGHTBEARING:

- Progress WB as tolerated
- Progress to full WB by 6-8 weeks
- Discontinue crutches by 6-8 weeks

ROM:

- Gradual increase in ROM
- Maintain full passive knee extension
- Progress knee flexion to 125° - 135° by week 8
- Continue patellar mobilization and soft tissue mobilization, as needed
- Continue stretching program

STRENGTHENING EXERCISES:

- Closed kinetic chain exercises (leg press 0-60) by week 8
- Initiate mini-squats 0° - 45° by week 8
- Toe-calf raises by week 6
- Open kinetic chain knee extension without resistance
- Begin knee extension 0-30 then progress to deeper angles
- Stationary bicycle (gradually increase time)
- Stair machine by week 12
- Balance and proprioception drills
- Initiate front and lateral step-ups by weeks 8-10
- Continue use of biofeedback and electrical muscle stimulation, as needed

FUNCTIONAL ACTIVITIES:

- As pain and swelling (symptoms) diminish, the patient may gradually increase.
- Gradually increase standing and walking

CRITERIA TO PROGRESS TO PHASE III:

- Full ROM
- Acceptable strength level
 - Hamstrings within 20% of contralateral leg
 - Quadriceps within 30% of contralateral leg
- Balance testing with 30% of contralateral leg
- Able to walk 1-2 miles or bike for 30 minutes

PHASE III: Weeks 12-32 (Remodeling Phase)

GOALS:

- Improve muscular strength and endurance
- Increase functional activities

ROM:

- Patient should exhibit 125° - 135° flexion

EXERCISE PROGRAM:

- Leg press (0° - 60°; progress to 0° - 90°)
- Bilateral squats (0° - 60°)
- Unilateral step-ups progressing from 2" to 6"
- Forward lunges
- Walking program on treadmill
- Open kinetic chain knee extension (90° - 40°) progress 1 lb every 2 weeks beginning week 20 if no pain or crepitation – must monitor symptoms
- Bicycle
- Stair machine
- Swimming
- Ski machine/Elliptical trainer

FUNCTIONAL ACTIVITIES:

- As patient improves, you may increase walking (distance, cadence, incline, etc)
- Light running can be initiated toward end of phase based on physician evaluation

MAINTENANCE PROGRAM:

- Initiate by weeks 16-20
- Bicycle – low resistance, increase time
- Progressive walking program
- Pool exercises for entire lower extremity
- Straight leg raises
- Leg press
- Wall squats
- Hip abduction / adduction
- Front lunges
- Step-ups
- Stretch quadriceps, hamstrings, calf

CRITERIA TO PROGRESS TO PHASE IV:

- Full non-painful ROM
- Strength within 80% - 90% of contralateral extremity
- Balance and/or stability within 75% - 80% of contralateral extremity
- Rehabilitation of functional activities causes no or minimal pain, inflammation or swelling

PHASE IV: Weeks 8-15 months (Maturation Phase)**GOALS:**

- Gradual return to full unrestricted functional activities

EXERCISES:

- Continue maintenance program progression 3-4 times/week
- Progress resistance as tolerated
- Emphasis on entire lower extremity strength and flexibility
- Progress agility and balance drills
- Progress walking program as tolerated
- Impact loading program should be specialized to the patient's demands
- No jumping or plyometric exercise until 12 months
- Progress sport programs depending on patient variables

FUNCTIONAL ACTIVITIES:

- Patient may return to various sport activities as progression in rehabilitation and cartilage healing allows.
- Generally, at 6 months the following are permitted:
 - Low-impact sports such as swimming, skating, in-line skating, and cycling
- 8 - 9 months for small lesion and 9-12 for larger lesions - the following may be performed:
 - High impact sports such as jogging, running, and aerobics may be performed
- 12-18 months
 - High impact pivoting sports such as tennis, basketball, football, baseball

Individual results may vary. Many patients are able to participate in sports with some limitations.