

**ACI / DENOVO REHABILITATION PROTOCOL  
Femoral Condyle**

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
- Decrease pain and effusion
- Gradually improve knee flexion
- Restore full passive knee extension
- Regain quadriceps control

**BRACE:**

- Locked at 0° during weight-bearing activities
- Sleep in locked brace for 2-4 weeks

**WEIGHTBEARING:**

- Non-weight bearing for 1-2 weeks
- Toe-touch weight-bearing week 6
- Partial weight-bearing (approx. ¼ body weight) at weeks 6-8

**ROM:**

- Motion exercise 6-8 hours post-operative
- Full passive knee extension immediately
- Initiate Continuous Passive Motion (CPM) day 1 for total of 8-12 hours/day (0°-40°) for 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 1-2 weeks
- Knee flexion ROM goal is 105° by 3-4 weeks and 120° by week 5-6
- Stretch hamstrings and calf

**STRENGTHENING PROGRAM:**

- Ankle pump using rubber tubing
- Quad setting
- Multi-angle isometrics (co-contractions Q/H)
- Active knee extension 90° - 40° (no resistance)
- Straight leg raises (4 directions)
- Stationary bicycle when ROM allows
- Biofeedback and electrical muscle stimulation, as needed
- Isometric leg press by week 4 (multi-angle)
- May begin use of pool for gait training and exercises 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

**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 100°
- 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 post-operative brace by week 6
- Consider unloading knee brace

**WEIGHTBEARING:**

- Progress WB as tolerated
- Progress to full WB by 8-9 weeks
- Discontinue crutches by 8-9 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:**

- Initiate weight shifts week 6
- Initiate mini-squats 0° - 45° by week 8
- Closed kinetic chain exercises (leg press)
- Toe-calf raises by week 8
- Open kinetic chain knee extension progress 1 lb/week
- Stationary bicycle, low resistance (gradually increase time)
- Treadmill walking program by weeks 10-12
- Balance and proprioception drills
- Initiate front and lateral step-ups and wall squats by weeks 8-10
- Continue use of biofeedback and electrical muscle stimulation, as needed
- Continue use of pool for gait training and exercise

**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 12-26 (Maturation Phase)****GOALS:**

- Improve muscular strength and endurance
- Increase functional activities

**ROM:**

- Patient should exhibit 125° - 135° flexion

**EXERCISE PROGRAM:**

- Leg press (0° - 90°)
- Bilateral squats (0° - 60°)
- Unilateral step-ups progressing from 2" to 8"
- Forward lunges
- Walking program
- Open kinetic chain knee extension (0° - 90°)
- Bicycle
- Stair machine
- Swimming
- Ski machine/Elliptical trainer

**FUNCTIONAL ACTIVITIES:**

- As patient improves, increase walking (distance, cadence, incline, etc)

**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 26-52 (Function Activities Phase)****GOALS:**

- Gradual return to full unrestricted 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
- Impact loading program should be specialized to the patient's demands
- 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.