



## PHYSICAL THERAPY PROTOCOLS

### AUTOLOGOUS CHONDROCYTE IMPLANTATION

#### Trochlea Rehabilitation Guidelines

##### I. PROTECTION PHASE (0-6 WEEKS)

<b>Goals:</b>	<b><i>Protection of healing tissue from load and shear forces</i></b> <b><i>Decrease pain and effusion</i></b> <b><i>Restoration of full passive knee extension</i></b> <b><i>Gradual improvement of knee flexion</i></b> <b><i>Regaining quadriceps control</i></b>
<b>Brace:</b>	Locked at 0 degrees during weight bearing activities Sleep in locked brace for 4 weeks
<b>Weight Bearing:</b>	Immediate toe-touch WB 25% body weight in brace locked in full extension 50% body weight Week 2 in brace 75% body weight Weeks 3-4 in brace
<b>Swelling/ Inflammation Control:</b>	Cryotherapy (Polar Care or ice pack) Elevation & ankle pumps
<b>Range of Motion:</b>	Immediate motion exercise Day 1-2 Full passive knee extension immediately Initiate CPM if ordered Day 1 for 8-12 hrs./day (0-60) For 2-3 weeks – progress ROM 5-10 degrees/day May continue CPM 6-8 hrs./day for 6-8 weeks Patellar and soft tissue mobilization (4-6x/day) Passive knee flexion ROM 2-3 times daily Passive knee flexion ROM goal is 90 degrees Weeks 2-3 Passive knee flexion ROM goal is 105 degrees by 3-4 weeks 125 degrees by Week 6 Stretch hamstrings, calf
<b>Strengthening Program:</b>	Ankle pump using rubber tubing Quad setting Straight leg raises (4 directions) Toe-calf raises Week 2 Stationary bicycle when ROM allows Biofeedback and EMS as needed Isometric leg press at Week 4 (multi-angle)

Initiate weight shifts Week 4  
Begin pool therapy for gait & exercises – Week 4

Functional Activities: Gradual return to daily activities  
If symptoms occur, reduce activities to reduce pain and inflammation  
Extended standing should be avoided

## II. TRANSITION PHASE (6-12 WEEKS)

**Goals:**

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

*Criteria to Progress to Phase II:*

- 1. Full passive knee extension*
- 2. Knee flexion to 115/120 degrees*
- 3. Minimal pain and swelling*
- 4. Voluntary quadriceps activity*

Brace: Discontinue brace at 6-8 weeks

Weight Bearing: Progress WB as tolerated  
Progress to FWB at 6-8 weeks  
Discontinue crutches at 6-8 weeks

Range of Motion: Gradual increase in ROM  
Maintain full passive knee extension  
Progress knee flexion to 120-125 degrees by Week 8  
Continue patellar mobilization and soft tissue mobilization, as needed  
Continue stretching program

Strengthening Exercises: Initiate mini-squats 0-45 degrees Week 8  
Closed kinetic chain exercises (leg press) Week 8  
Toe-calf raises Week [?]  
Open kinetic chain knee extension w/o resistance  
Begin knee extension 0-30 degrees then progress > angles.  
Stationary bicycle (gradually increase time)  
Balance and proprioception drills  
Initiate front and lateral step-ups  
Stairmaster at Week 12  
Continue use of biofeedback and EMS, PRN  
Continue use of pool for gait training and exercise

Functional Activities: As pain & swelling diminish, may gradually increase functional activities  
Gradually increase standing and walking

## III. REMODELING PHASE (13-32 WEEKS)

**Goals:** *Improve muscular strength and endurance*  
*Increase functional activities*

*Criteria to Progress to Phase III:*

1. Full ROM
2. Acceptable strength level
  - a. Hamstrings w/in 10-20% contralateral leg
  - b. Quadriceps w/in 20-30% of contralateral leg
3. Balance testing within 30% of contralateral leg
4. Able to bike for 30 minutes

Range of Motion: Patient should exhibit 125-135 degrees flexion

Exercises: Leg press (0-60 degrees; progress to 0-90 degrees)  
Bilateral squats (0-60 degrees)  
Unilateral step-ups progressing from 2" to 6"  
Forward lunges  
Walking program on treadmill  
Open kinetic chain knee extension (90-40 degrees) – progress 1 lb.  
every 10-14 days if no pain or crepitation – must monitor symptoms  
Bicycle  
Stairmaster  
Swimming  
Elliptical/Nordic Trak

Functional Activities: As patient improves, increase walking (distance, cadence, etc.)  
Light running toward end of phase – per physician

Maintenance Program: Initiate at 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

#### IV. MATURATION PHASE (8-15 MONTHS)

**Goals:** *Gradual return to full unrestricted functional activities*

*Criteria to Progress to Phase IV:*

- 1. Full non-painful ROM*
- 2. Strength within 80-90% of contralateral extremity*
- 3. Balance and/or stability within 75% of contralateral extremity*
- 4. No pain, inflammation or swelling*

Exercises:

Continue maintenance program progression 3-4x/wk  
Progress resistance as tolerated  
Emphasis on entire lower extremity strength & flex.  
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 program depending on patient variables

Functional Activities:

Patient may return to various sport activities as progression in rehabilitation and cartilage healing allows. Generally, low-impact sports such as skating, rollerblading and cycling are permitted at about 6 months. Higher impact sports such as jogging, running and aerobics may be performed at 8-9 months for small lesions, or 9-12 months for larger lesions. High impact sports such as tennis, basketball and baseball are allowed at 12-18 months.