AUTOLOGOUS CHONDROCYTE TRANSPLANTATION PT PROTOCOL
Stage 1 – Proliferative Phase (0–6 weeks)

Patellar and/or Trochlear Defect

**PRIMARY GOALS**
DO NOT OVERLOAD GRAFT
INCREASE TIBIOFEMORAL AND PATELLOFEMORAL MOBILITY
RESTORE QUADRICEPS CONTROL

**BRACE**
- DonJoy Hinge knee brace for ambulation (locked) and at night.
- Out of brace for CPM.
- No brace, but towel/pillow behind heel when lying down.

**PRECAUTIONS**
- If tubercle osteotomy: touch-down weightbearing (locked brace).
- If no osteotomy: Full weightbearing in full extension (locked brace).

**ROM**
- Gentle AROM flexion as tolerated 3x/day. Only PROM extension allowed.
- Dangle knee over edge of bed 5x/day to achieve 90°.
- CPM >= 6–8 hours daily. 0–40° only, do not advance.
- Minimum 90° flexion by 3 weeks, 110° by 6 weeks, and full ROM by 12 weeks post-op.

**THEREX**
- Quad sets, leg curl/heel slides, hip abduction. SLR with brace locked if no osteotomy.
- Stationary bicycle with no resistance once 90° knee flexion obtained (>4 weeks).

**THERAPY**
- Gentle multi-directional patella mobilization immediately after surgery.
- Cryotherapy and compression stockings/TEDS for swelling and pain control.
- E-stim for VMO/quadriceps muscle re-education/ biofeedback encouraged early after surgery if needed.
- Gentle massage/deep friction to hamstring insertions, suprapatellar quadriceps, medial/lateral gutters, and infrapatellar fat pad region at 2–3 weeks post-op.
- Pool therapy recommended at 2–3 weeks post-op to enhance motion.
**COMMENTS**

* Avoid active open-chain extension and repetitive knee flexion 40–70˚ due to increased patellofemoral contact forces.
* Contact MD if ROM is not achieved within 20˚ of goal.
* No progression of this protocol until cleared by MD at 6 weeks post-op.
* No leg presses/squats.
AUTOLOGOUS CHONDROCYTE TRANSPLANTATION PT PROTOCOL
Stage 2 – Transitional Phase (7–12 weeks)

Patellar and/or Trochlear Defect

PRIMARY GOALS
DO NOT OVERLOAD GRAFT
INCREASE TIBIOFEMORAL AND PATELLOFEMORAL MOBILITY
RESTORE QUADRICEPS CONTROL

**BRACE**
* Hinged knee brace may be discontinued once independent SLR achieved.

**GAIT**
* Full weightbearing as tolerated.

**ROM**
* Gentle A/AAROM flexion and extension permitted.
* Progress towards full ROM by 12 weeks.

**THEREX**
* Stationary bicycling without resistance for short intervals (5 min 2–3x/day) as tolerated.
* Strengthening of quadriceps, hamstrings, and hip abductors/extensors using elastic band isometrics and closed-chain terminal knee extension 0–40° only.
* Backward treadmill walking with safety bars recommended for reduced patellofemoral compressive forces.
* Pool exercise using kickboard allowed–flutter/straight leg scissor kick only (no whip kick).
* No open-chain strengthening permitted until 6 months after surgery.
* No closed-chain leg press or squatting.

**THERAPY**
* Gentle multi-directional patella mobilization.
* Cryotherapy and compression stockings/TEDS for swelling and pain control.
* E-stim for VMO/quadriceps muscle re-education/ biofeedback encouraged.
* Gentle massage/deep friction to hamstring insertions, suprapatellar quadriceps, medial/lateral gutters, and infrapatellar fat pad region.
* Pool therapy recommended to enhance motion.

**COMMENTS**
* Activity level should be modified if increased pain, catching, or swelling occurs.
* Progression of activity may resume once comfort level returns.
* No progression of this protocol until by MD at 12 weeks post-op.
AUTOLOGOUS CHONDROCYTE TRANSPLANTATION PT PROTOCOL
Stage 3 – Remodeling Phase (13+ weeks)

Patellar and/or Trochlear Defect

PRIMARY GOALS
DO NOT OVERLOAD GRAFT
INCREASE TIBIOFEMORAL AND PATELLOFEMORAL MOBILITY
RESTORE QUADRICEPS CONTROL

<table>
<thead>
<tr>
<th>BRACE</th>
<th>* None.</th>
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<tr>
<td>GAIT</td>
<td>* Full weightbearing as tolerated.</td>
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<tr>
<td>ROM</td>
<td>* Progress towards full ROM equal to contralateral side.</td>
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| THEREX| *Stationary bicycling with very slow resistance as tolerated.  
|       | * Treadmill forward/retro-walking, Nordic Track and elliptical machine.  
|       | * Pool exercise – flutter/straight leg scissor kick and running in water permitted.  
|       | * Continue gentle closed-chain LE strengthening through functional range – terminal knee extension 0–40˚ and 120–70˚ extension from flexed position.  
|       | * Full active flexion with resistance permitted.  
|       | * Open-chain terminal extension with resistance not permitted. |
| THERAPY| * Multi-directional patella mobilization as needed.  
|      | * Cryotherapy and compression stockings/TEDS as needed.  
|      | * E-stim for VMO/quadriceps muscle re-education/ biofeedback as needed. |
| COMMENTS | * Activity level should be modified if increased pain, catching, or swelling occurs.  
|          | * Avoid activity/exercises with excessive patellofemoral compressive forces.  
|          | * Swelling is common in patella transplants up to 9 months after transplantation.  
|          | * No running or jumping permitted until 9–12 months after surgery.  
|          | * Continued improvement in comfort occurs 2–3 years before maximal outcome is achieved. |