

# OSCELL REHABILITATION FOLLOWING AUTOLOGOUS CHONDROCYTE IMPLANTATION TO FEMORAL CONDYLE

**Patient Details:**

**Co-morbidity:**

*Note to Therapist:*

- \*This is a guide to progression, not an exhaustive list of rehabilitation and does not replace clinical reasoning.
- \*Treat any soft tissue symptoms on their merit.
- \*Objective Tests can be used as an indication for progression.
- \*Special Instruction(s) includes specific post-operative advice for the individual patient based on their surgeon's recommendation (as applicable). This will be completed on discharge or follow-up clinic appointments.

PHASE & OBJECTIVE INDICATION FOR PROGRESSION	RANGE OF MOVEMENT	ACTUAL ACTIVITY LEVEL	ADVISED WtBear STATUS	ACTUAL WtBear STATUS	STRENGTHENING	GOALS	OBJECTIVE TEST	SPECIAL INSTRUCTION
<b>PHASE 1</b> <b>Post operative</b> <u><i>In-patient</i></u> <b>Post-Op</b> <b>0 – 6 hours</b>	Rest in full extension splint.		Non-weight bearing.		Circulatory Exercises.	Allow early cell adherence.		
<b>PHASE 2</b> <b>Proliferation/</b> <b>Protective</b> <u><i>6hours – Day 3</i></u>	Continuous passive movement machine.  0°-40° (as comfort allows), for 4-12 hours per day.		20 to 40% body weight  = .....kg		Low resistance isometric exercises.  Multi-angle Q and H contractions, including early proprioceptive exercises.  OKC exercises 60° - 75°, no resistance, concentric and eccentric work.  Maintenance exercises for rest of body.  Passive patella mobilisations.	Restore full passive extension.  Prevent adhesions.  Aid joint nutrition.  Pain relief.  Reduce deconditioning.  Improve confidence.  Restore function for discharge home.	PROM  Independent gait with the use of crutches.  Weight-bearing status as a % of body weight.	

<p><b>From discharge home</b></p> <p><b>PROM = 0°-40°</b></p> <p><b>Independent with the use of crutches.</b></p>	<p>Continue to progress range of movement as symptoms allow.</p>				<p>Gentle use of exercise bike or pedal set at home with no resistance and no limit to range, but do not force a full revolution.</p> <p>Either high seat or sitting behind pedal set.</p> <p><i>Up to 20 mins, twice daily. To be progressed gradually.</i></p>	<p>Improve range of movement.</p> <p>Restoration of kinematics.</p> <p>Increase function.</p>	<p>Weight-bearing status as a % of body weight.</p>	
<p><b>From Week 3</b></p> <p><b>Weight-bear &gt;30% body weight.</b></p>			<p>30 to 60% body weight</p> <p>=.....kg</p>		<p>Progress weight-bearing as indicated.</p> <p>Active exercises against gravity.</p>	<p>Improve range of movement.</p>	<p>PROM</p> <p>Weight-bearing status as a % of body weight.</p>	
<p><b>From Week 4</b></p> <p><b>Weight-bear &gt;40% body weight</b></p> <p><b>Full passive extension</b></p>			<p>40 to 100% body weight</p> <p>=.....kg</p>		<p>Progress weight-bearing as indicated.</p> <p>Add low resistance to active exercises.</p> <p>Vary speed of contractions.</p> <p>Low resistance stationary cycling.</p> <p>CKC exercises (as weight bearing allows).</p> <p>Hydrotherapy.</p>	<p>Increase strength and proprioception.</p> <p>Improve CV and muscle endurance.</p> <p>Physiological benefits gained from exercise.</p>	<p>AROM</p> <p>SLR</p>	
<p><b>From Week 5</b></p> <p><b>Full active extension</b></p> <p><b>SLR ≤10° lag</b></p>						<p>Increased loading to stimulate cartilage formation, without disturbing primitive repair tissue.</p>	<p>Weight-bearing status as a % of body weight.</p>	

<b>PHASE 3</b> <b>Transitional/</b> <b>Loading</b>	<i>From Week 6</i> <b>SLR with no lag.</b> <b>Weight-bear 100% body weight.</b>	MINS CYCLING ACHIEVED=  DISTANCE WALKING=	Full weight-bearing gait re-education. Gait with predictable changes in direction. Prone auto-over press F → develop into Q stretch. Gymball and Theraband work. Lower body active exercise [exception of through range OKC Q] → resis/reps/sets/speed. Muscle balance exercises as appropriate. Core stability exercises as appropriate. Flexibility exercises as appropriate. Correct muscle balance as indicated.	As transitional stage of repair is reached beneficial loading is increased.  Promote independent function.  Improve stability and movement control.	Independent gait with no aids. AROM
<i>From Week 7</i>		<b>Driving if can perform emergency stop. You are advised to contact your insurance company.</b>			
<i>From Week 9</i> <b>Normal symmetrical gait.</b> <b>AROM = Full E - ≥100° F</b>			Step-ups (for/back/sideways/over) → height/reps/speed. PWB (parallel bars) jumps, hops, leaps → control technique/speed/reps. Leg Press/Squats → resis/reps/sets/speed. Proprioception → single leg stance/ wobble boards/ Trampoline/ crash mats/etc. Rowing → dist./speed/resis. X-Trainer → dist./speed/resis.	Increase dynamic stability and balance.  Promote neuromuscular responses.	Single leg stance Clam Planks

<p><b>PHASE 4</b> <b>Strengthening</b></p>	<p><i>From Month 3</i></p> <p><b>Single leg stance ≥80% parity.</b></p> <p><b>Clams 10 reps with 10 sec hold ideal control [L] &amp; [R].</b></p> <p><b>Directional planks 30 sec hold ideal control.</b></p>	<p>MINS CYCLING ACHIEVED=  DISTANCE WALKING=</p>	<p>Through range OKC exercises.</p> <p>Train strength and endurance 3 – 4 x per week.</p> <p>Train strength and endurance on separate days.</p> <p>Have a minimum of 24 hours between strength days.</p> <p><b>Strength:</b></p> <p>10 – 20 min CV warm-up (exception of jogging/running).</p> <p>Choose a load 1 – 12 RM.</p> <p>Choose numbers of sets and rest time between sets.</p> <p>Alternate upper/lower body exercises within session.</p> <p>Moderate to fast speed under control.</p> <p>Vary load/set/rest between sessions.</p> <p>Adjust if necessary based on symptoms.</p> <p><b>Endurance:</b></p> <p>Gradually progress toward ≥45 min continuous CV exercise (exception of jogging/running).</p> <p>Choose a load 15 – 20 RM.</p> <p>Choose numbers of sets and rest time between sets.</p> <p>Alternate upper/lower body exercises within session.</p> <p>Moderate to fast speed under control.</p> <p>Vary load/set/rest between sessions.</p> <p>Adjust if necessary based on symptoms.</p> <p>Add FWB double footed plyometrics control technique/speed/reps.</p>	<p>Improve strength, power and endurance.</p> <p>Continue to improve neuromuscular performance.</p> <p>Varied exercises to prevent staleness.</p> <p>Prevent over-training.</p>	<p>Single leg squat 60°</p> <p>Jumps in place</p> <p>5 RM</p>
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	<p><i>From Month 6</i></p> <p>Single leg squat 60°, 5 sec hold with good alignment.</p> <p>5 simultaneous jumps in place with good alignment.</p> <p>5RM ≥80% parity.</p>			<p>Progress to single footed plyometrics as dictated by control.</p> <p>Introduce jogging when Q strength and control is adequate.</p> <p>Advance dynamic proprioceptive exercises e.g. volleying football, throwing, catching, racket and ball while balancing on trampette.</p> <p>Swimming including breaststroke.</p> <p>Independent cycling outdoors.</p>	<p>Improve dynamic function.</p>	<p>Hop for distance.</p> <p>Vertical Jump</p>	
	<p><i>From Month 8</i></p> <p>Hop for distance ≥80% parity.</p>			<p>Running outdoors.</p>	<p>Increasing load and functional activities to aid remodeling.</p> <p>Increase confidence.</p>	<p>As indicated for individuals sporting or functional goals.</p>	
PHASE 5 Remodel/ Function	<p><i>From Month 9</i></p>			<p>Add agility drills when sufficient control and confidence is achieved e.g. twist/turn/pivot/cut/accelerate/decelerate/direction.</p> <p>Progress from predictable agility to unpredictable.</p> <p>Perturbation training e.g. therapist randomly nudges patient off balance during a single leg throw-catch drill.</p>	<p>Injury prevention.</p>		
	<p><i>From Month 12</i></p> <p>All tests ≥80% parity.</p>			<p>Earliest return to contact sport.</p>	<p>Normal function will encourage continued remodeling.</p>		

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**KEY:**  
**CKC** Closed kinetic chain  
**CV** Cardiovascular  
**FWB** Full weight bearing  
**H** Hamstrings  
**[L]** Left  
**OKC** Open kinetic chain  
**Q** Quadriceps  
**[R]** Right  
**RM** Repetition maximum

**PATIENT ACTIVITY**  
**DIARY**

**PLEASE RECORD**  
**PATIENT'S WEIGHT**  
**.....KG**

Bailey AK, Minshull C, Richardson J, Gleeson NP. Improvement of outcomes with non-concurrent strength and cardio-vascular-endurance rehabilitation conditioning after ACI surgery to the knee. *Journal of Sports Rehabilitation*. 2014;23:235-243.

Ebert JR, Fallon M, Zheng MH, Wood DJ, Ackland TR. A randomised trial comparing accelerated and traditional approaches to postoperative weightbearing rehabilitation after matrix-induced autologous chondrocyte implantation: findings at 5 years. *Am J Sports Med*. 2013;2;40(7):1527-37

**PLEASE RECORD ACTUAL ACTIVITY LEVELS AND WB STATUS WHERE APPLICABLE AND BRING THIS DIARY WITH YOU WHEN YOU ATTEND EACH CLINIC APPOINTMENT**

**Special Notes:**