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Pain, Practice and Performance:
The Knee

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FILEX THE FITNESS INDUSTRY CONVENTION

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- Knee & Patellofemoral Joint Mechanism
- Ligaments
- Meniscus, Fat Pad, Bursae, Tendons

- **Gluteus Medius & Minimus – Abduction of Hip and Stabilisation of Pelvis**
  - Extremely important in walking
  - If NOT Working properly or weak:
    - compensation of over use of TFL / over-stabilsation of hip adductors
    - Short stride length
  - Running – increased problems;
    - loss of hip stabilization, lateral Rotators compromised
  - Sport: landing and balancing

- **6 Hip Lateral Rotators:**
  - Piriformis, Obturator Externus & Internus, Gemellus Superior & Inferior, Quadratus Femoris
  - Extremely important again in walking and standing
  - If not working properly or weak;
    - External and internal rotation of thigh
    - increase stress on knee joint compartments
    - increase chance of knee damage under load or when twisting.
    - PFPS an ITB problems
    - Reduced activation of VMO
  - Running and all impact activities– increased problems
  - Linked with Gluteus Med/Min in leg alignment
    - can't activate if not switched on!

- **Gluteus Maximus – Hip Extension**
  - Most effective when thigh is flexed and force is necessary
  - <u>Generally inactive during walking</u>
  - If not working properly or weak
    - Short stride length
  - Implications for 'toning the butt'
  - ITB connections / tightness
  - Sprinting, Hills, Running Stairs

- **Quadriceps & VMO – Hip Flexion and Knee Extension, Stabilisation of Patella**
  - Used in climbing, running, jumping, kicking, rising from a seat
  - If not working properly or weak:
    - Patellofemoral pain, Patella tracking problems
    - Muscle imbalance
    - General knee strength loss, Loss of extension = 'Quads lag'

- **Hamstrings – Prime Hip Extensor**
  - Antagonist of Quadriceps, Ability is dependent on which joint is fixed
  - Hip and Knee flexion – walking and running, Eccentric Knee flexion
  - If not working properly or weak
    - Short stride length/reduce ROM
    - Weakness vs Tightness
    - Muscle imbalance
    - Joint translation / internal structure injury
  - Implications for Lumbar spine and Neural problems
  - Candidate for Overuse with Sprinting, Hills, Running Stairs

- **ITB**
  - Tightness due to MUSCLE tightness or muscle weakness
  - TFL, GM/m, Gmax / Main part not attached to bone = able to move anterior/posterior on thigh
  - Pronation
  - Lateral epicondyle friction

Knee Pain and Knee Injuries

- Patellofemoral Pain Syndrome
- Patella Tracking Problems
- Bursitis / Fat Pad Impingement
- ITB Friction Syndrome
- Patella Dislocation
- Patella Tendonitis / Tendonosis
- Meniscal Tears / Arthroscopy
- ACL Tears / Reconstructive Surgery
- Arthritis / Total Knee Replacement

Why Do We Test Our Clients?

- **to assess;**
  - ROM and flexibility
  - strength and weakness
  - presence of pain
  - movement and muscle dysfunction
- **which assists in;**
  - preventing injury
  - helping clients with pain
  - helping clients with past and current injuries
  - improving program design and implementation
  - improving outcomes in training and sport

PT Testing

Standing Posture / Observation
Lumbar ROM / QL-Hamstring flexibility
CORE activation and Breathing control
Single Leg Stance and Squat
Full Squat Technique
Lunging Control
Dorsiflexion (Knee to Wall)
Static and Dynamic Pronation
Hip Muscle Flexibility
Quadriceps and Hip Flexor Flexibility
Walking / Running Assessment

Common Problem Exercises

Jogging / Running
X-Trainer
Pump Class Squats
Heavy Squats
Lunges
Step Ups
Leg Extension
Hamstring Curls

What's Going Wrong?

- pain inhibition
- injury to surrounding tissues
- ligament instability and tracking problems
- biofeedback and muscle shutdown / deactivation
- muscle and connective tissue tightness
- general muscle weakness or non-development
- incoordination and poor muscle awareness
- poor lumbar spine-hip dissociation / core stability
- global muscle dominance and imbalance
- poor posture, sedentary lifestyles, computer workstation

Closed Kinetic Chain Exercises

- The foot (for leg movement) is fixed and cannot move. The body then moves relative to the feet;
- Make compressive forces, while open-chain ones make shearing forces;
- Are nearer to activities of daily living;
- Work multiple muscle groups simultaneously rather than concentrating on just one, as many open-chain exercises do

Knee, Hip & Leg
Rehabilitation Exercises Level 1 and 2

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Please Note:

- Make sure you activate your 'core' and control your breathing as instructed, and do not 'breath hold' during the exercises.
- If exercises become painful, reduce the intensity and/or frequency. If pain continues, stop your exercises and consult your Physiotherapist as soon as possible.

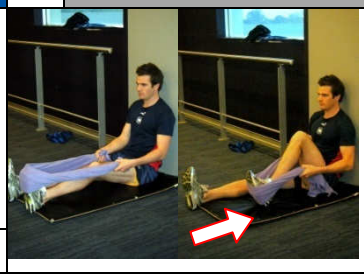
1 ROM / ISOMETRIC QUAD

Flexion / Extension: Use towel or belt to drag heel to buttock. Only go to stiffness, not into pain. Straighten knee for extension and squeeze front of thigh.

Quad Squeezes: Straighten knee, contracting quads pushing the back of your knee down towards the bed and moving your toes towards you. Hold for 5-10 seconds

Special Instructions:

Flexion / Extension



Quad Squeezes

Rep/Set/Comment

2 STATIC QUADRICEPS

In supported lying, place rolled up towel underneath lower thigh. Push the back of your thigh down onto towel and clench front of thigh lifting your heel of floor and toes towards you. Hold for 5-10 seconds

Leg Raise: Rotate leg out 30º, Slowly lift leg straight. Hold 2 sec and slowly lower under control without arching back.

Special Instructions:

Level 1 (Extension)

Level 2 (Leg Raise)

Rep/Set/Comment

3 ISOMETRIC GLUTEALS

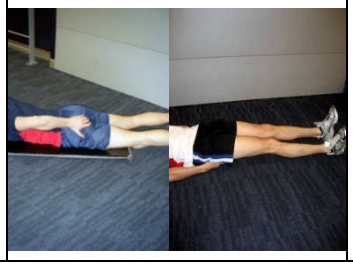
Heel Push: One hand on VMO muscle, other on buttock. Press heel gently into floor, feel for activation of both muscles. Squeeze buttock to assist activation.

Level 2: Prone and/or Supine. Hand on buttock to get biofeedback. Aim for strong contraction under your hand.

Special Instructions:

Level 1 (Heel Push)

Level 2



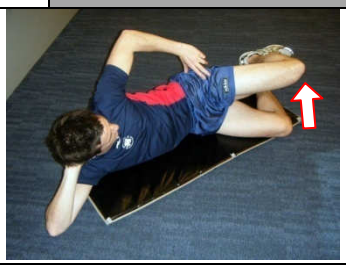
Rep/Set/Comment

4 CLAMS

Keep knees bent and ankles together. Keep pelvis still (Don't rock pelvis). Place thumb in buttock as instructed and squeeze buttock region to raise knee / separate knee. Hold 1 sec and gently lower.

Special Instructions:
Do it with legs straight to advance
Avoid using front of hip and thigh to lift leg

Level 1



Level 2

Rep/Set/Comment

5 GLUT BRIDGES

Knees and feet hip-width apart, keeping tension on double-band. Keep lower back in neutral, and squeeze glutes to raise pelvis. Gently relax glutes and roll spine back down to lower.

Special Instructions:
"Balance a Glass of Water on tummy"

Level 1

Level 2

Rep/Set/Comment

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6 HIP EXTENSION

Support head with forearm, other hand on buttock. Slowly squeeze glut to lift knee off the floor concentrating on gluteals contraction. To advance use straight leg

Level 2: Keep pelvis still. Slowly extend your hip with knee bent, using glut squeeze

Special Instructions:
Don't arch lower back – keep abdominals drawn in

Level 1

Level 2

Rep/Set/Comment

7 SINGLE LEG STEP DOWN

Maintain a level pelvis and keep knee inline with middle of foot at all times. Squat backwards, bending at hip and knee. Keep lower back in neutral and don't put weight onto back leg. Keep balancing on one leg and reset pelvis level at each repetition

Special Instructions:
Watch for excessive knee bend and don't drop pelvis down or reach back with leg

Level 1

Level 2

Rep/Set/Comment

***Use BOSU to Advance for both Levels**

8 PHYSIO LUNGES

Keep back in neutral and pivot forward at hip. Your lower leg angle should be the same as your back angle. Lunge forward onto front leg 80% / back leg 20% weight rule. Keeping knee inline and not past toes. Push up through the buttock.

Special Instructions:
Use hands on VMO and glut to give biofeedback

Level 1

Level 2

Rep/Set/Comment

9 SWISS BALL SQUATS

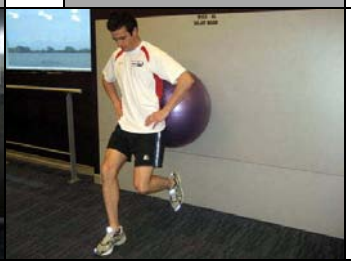
Keep back in neutral on ball. Keep tension on band – don't let knee roll inwards. Squat down, bending at hip and knee, keep back against ball at all times. Keep knees in line with middle of foot.

Single Leg: As above ensure back remains on ball and don't let knee shear forwards

Special Instructions:

Level 1

Level 2 (Single Leg)



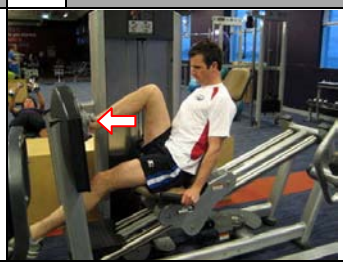
10 SINGLE LEG PRESS

ONLY USE CLOSED KINETIC CHAIN HORIZONTAL MACHINE
Keep knee in line with middle of foot and push through gluteals and thigh, don't arch lower back Keep weight even through heel and ball of foot. Don't lock knee straight

Special Instructions:
Use hand on VMO to give biofeedback and watch for wobbling of knee

Level 1 (Mid Range)

Level 2 (Full Range)



11 FREE SQUATS

Feet shoulder width apart, even weight through feet. Keep tension on band and keep lower back in neutral position throughout movement. Breathe in on way down and out on way up. Knees should be in-line with middle of f foot.

Special Instructions:
Be careful getting on BOSU

Level 1

Level 2

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Knee, Hip & Leg
Rehabilitation Exercises Level 3 and 4

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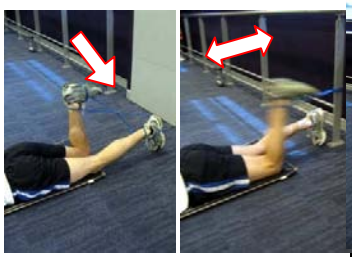
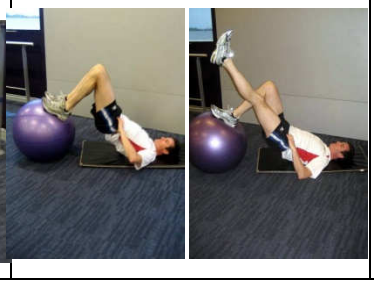
Please Note:

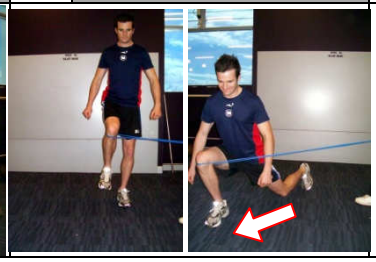
- Make sure you activate your 'core' and control your breathing as instructed, and do not 'breath hold' during the exercises.
- If exercises become painful, reduce the intensity and/or frequency. If pain continues, stop your exercises and consult your Physiotherapist as soon as possible.

1	ADVANCED GLUT BRIDGES	Level 3	Level 4	Rep/Set/Comment
Knees and feet hip-width apart, keeping tension on double-band. Keep lower back in neutral, and squeeze Glutes to raise pelvis. Extend your leg from this position and don't let pelvis drop; keep level. Gently relax glutes and roll spine back down to lower.				
Special Instructions:				

2	SINGLE LEG DEAD LIFT	Level 3	Level 4 (Band & Bosu)	Rep/Set/Comment
Keeping lower back straight, slowly lean forward pivoting/bending at hips. Keep knee in same slightly bent position through movement. Squeeze glutes to return to upright position. Don't arch lower back. Use Bar, Dumbell or Medicine Ball as weight				
Special Instructions:				

3	HAMSTRINGS	Level 3 (Prone Lying)	Level 4 (Ball Curls)	Rep/Set/Comment
Eccentric Extension: Raise 2 legs, lower one leg and then hold and slowly other leg. **Patter Kicks:** Rapid movements in mid range, pulling heel towards buttock. Build up speed but under control at all times. **Ball Curls:** As for Bridges above then pull ball into buttock with heels.				
Special Instructions: Advance ball curls to one leg – watch for cramping				

4	BOX STEP UPS	Level 3	Level 4 (Band)	Rep/Set/Comment
Lean forward at hip joint to keep weight 80% on front leg keeping back straight. Try not to push off with back leg. Don't let knee roll inwards and not forward past foot. Use Glutes on step up, keeping pelvis level. Don't lock knee into extension at top.				
Special Instructions: Increase height of box to advance and /or hold dumbells				

5	ADVANCED PHYSIO LUNGES	Level 3 (Band & Bosu)	Level 4 (Dynamic)	Rep/Set/Comment
Keep back in neutral and pivot forward at hip. Your lower leg angle should be the same as your back angle. Lunge forward onto front leg 80% / back leg 20% weight rule. Keeping knee inline and not past toes. Push up through the buttock.				
Special Instructions: Lunge on angle for Level 4. Do ½ range Superset to advance and/or dumbbells				

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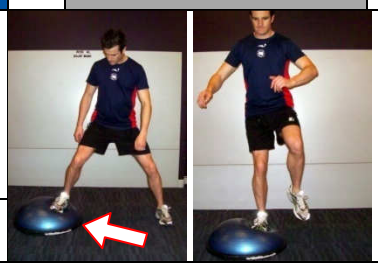
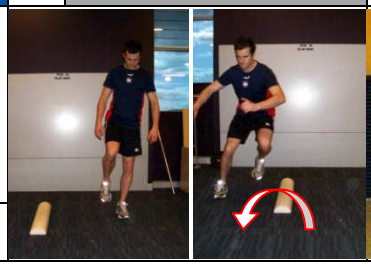
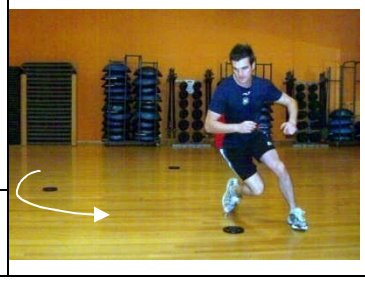
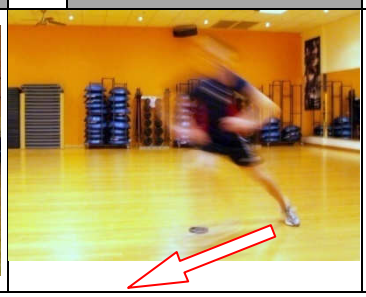
6	FRONT SQUAT		Level 3		Level 4	Rep/Set/Comment
Keep arms horizontal to keep bar stable and level. Breathe in on the way down, keeping lower back in neutral and spine the same angle as shins. Don't go past 90º at knees unless instructed. Breathe out on the way up, using Glutes and quads. Don't move forward onto toes						
Special Instructions: Careful with getting onto BOSU						

7	BOSU SIDE STEPS		Level 3 (Step ons)		Level 4 (Hops)	Rep/Set/Comment
BOSU flat side down and make sure it doesn't slip on floor. Step onto BOSU sideways (laterally). Aim for ¾ up on the BOSU. Bend knee and squat through movement to step up and step off. Don't lock knee into extension. Land on floor with soft impact						
Special Instructions: Put BOSU against wall if it slips						

8	IMPACT SIDE STEPS		Level 3 (Lateral)		Level 4 (Zig Zag)	Rep/Set/Comment
Lateral: Side step over a foam roller or box. Bend hip and knee on landing and take off. Do one at a time then progress to multiple **Zig Zag:** As above but add in forward movement to the side step by side stepping over a line of central cones covering a distance 10-20m.						
Special Instructions: Keep you lower back in neutral						

9	CHANGE DIRECTION		Level 3 (Jog)		Level 4 (Run)	
Jog: Set up cones in a zigzag layout approx 5-6m apart over 30m. Start with jog (40-60% of full pace) ensuring full plant of foot at point of change and change 45º. **Run:** Increase zigzag distance to 10m and dummy step to push off and accelerate into sprint at each change.						
Special Instructions: Don't TWIST on knee. Plant foot facing forward not outward.						

X	CUSTOM SPECIFIC					
For sporting players add a ball/upper body skill/racquet to items Increase speed, height and intensity **Be careful not to increase impact if not required**						
Special Instructions:						

TRAINING DIARY

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY

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Further Information

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