Who Am I?

GINA GRAIN, BSc.KIN, NSCA CSCS, CES

-Canadian Olympian- Track Cycling
-BSc. Kinesiology
-NSCA Certified Strength and Conditioning Specialist and Certified Exercise Specialist (CES)
-Certified in Functional Movement Screen and Dynamic Neuromuscular Stability Training (DNS)
-Strength and Conditioning Coach 20 years
-Alpine Ski Racer when I was younger
-Currently work at Level 10 fitness; with BC Alpine Sports Science Director Andrew Lambert; and the Canadian Soccer Association

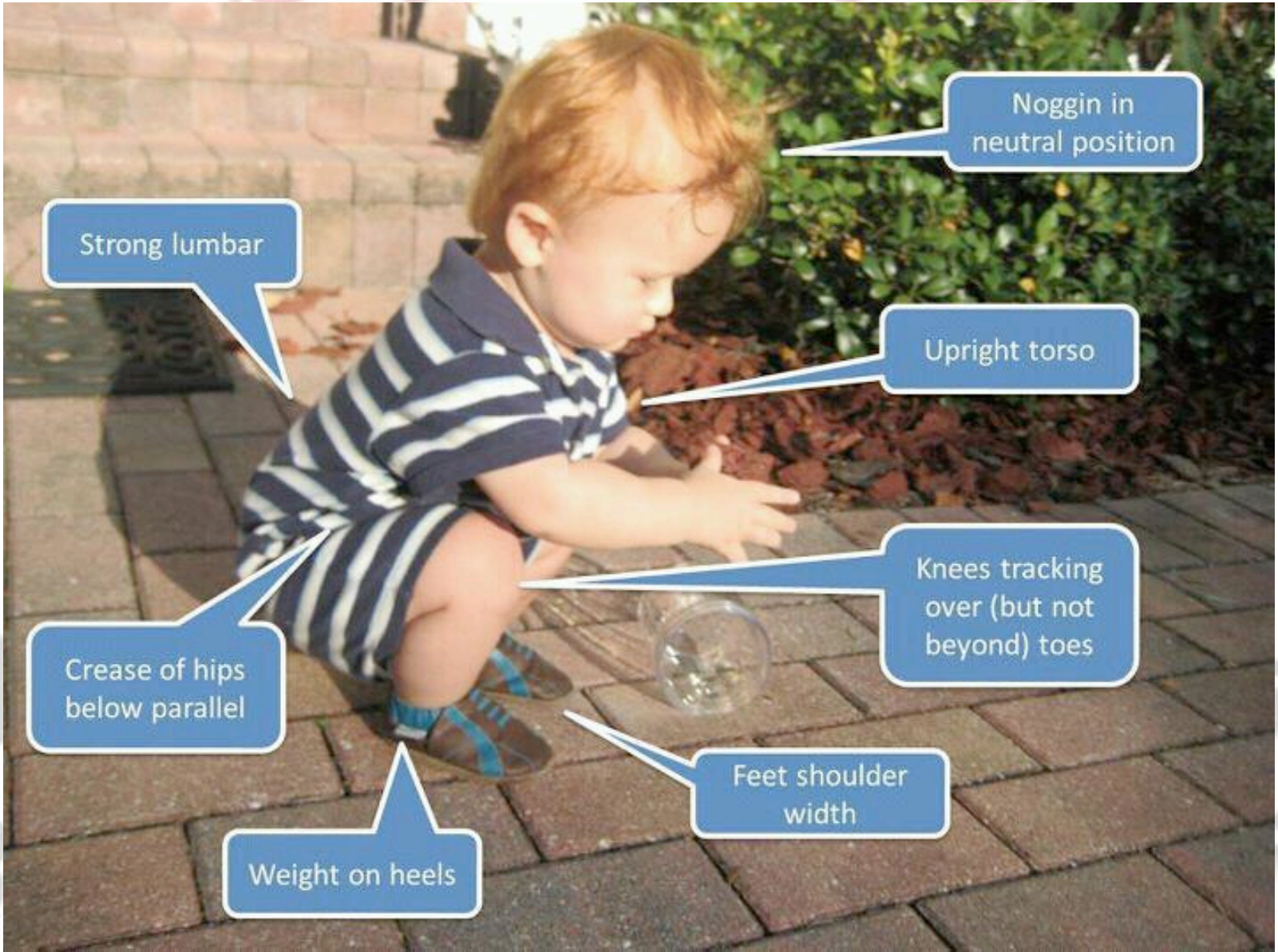
DRYLAND TRAINING

Long Term Athlete Development (LTAD)

- The concept of long term athlete development (LTAD) aims to ensure that from entry level, through development level and on to high performance level, the parent, coach and child **take the correct steps to optimize athletic potential**. This includes physiological, technical, tactical emotional and cognitive development.

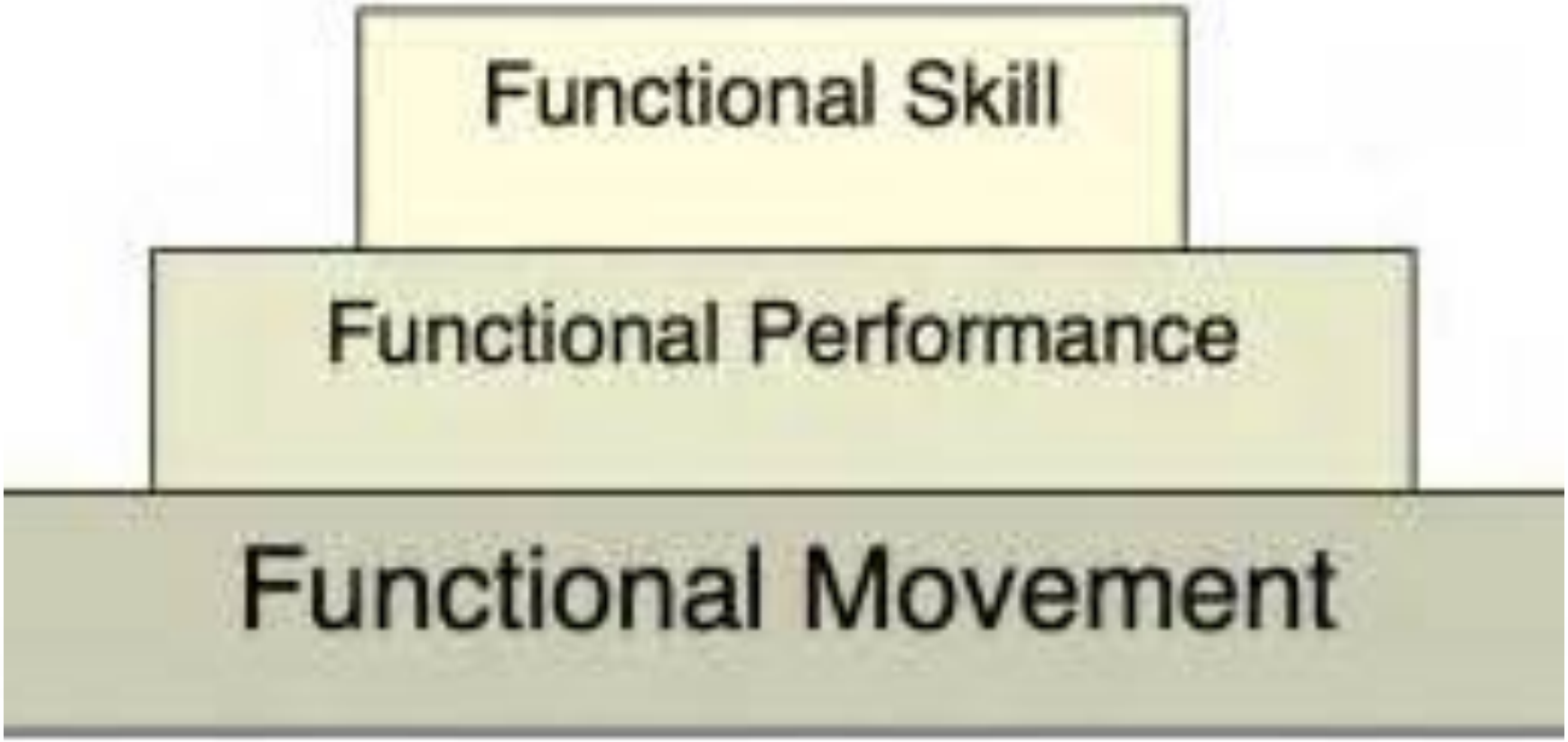
TRAIN HARDER!

Once upon a time…




"Excellence is doing ordinary things extraordinarily well."
~ John William Gardner
John William Gardner (1912 - 2002)

Analyzing Athletic Movement



Gray Cook's Optimal Performance Model

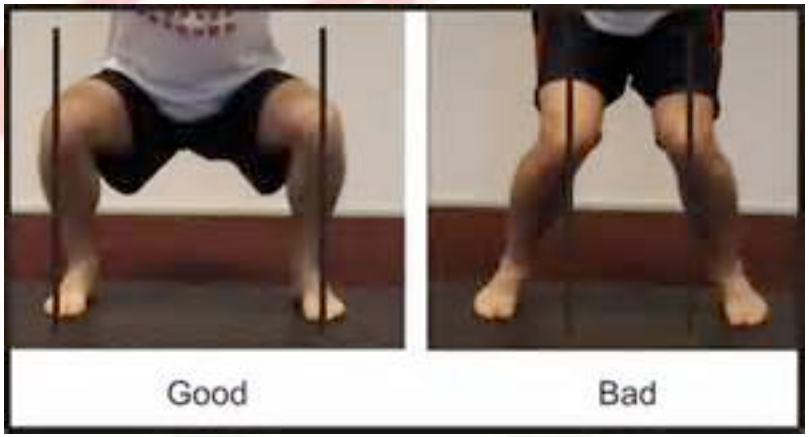
- The performance pyramid is the pyramid in which movement patterns, movement efficiency and sport skill are balanced and adequate.


- Doesn’t mean each level cannot be improved, but any improvement should not upset the balance and appearance of the pyramid

Coaches: Analyzing Athletic Movement

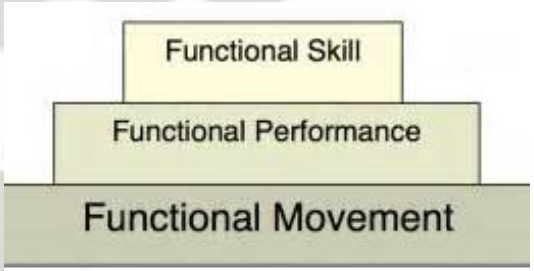
a.) Identifying Weak Links

- Dryland Training
- A good place to observe
- Energy Leaks



b.) Analyzing Movement

- Optimum Performance Pyramid



Identifying Weak Links

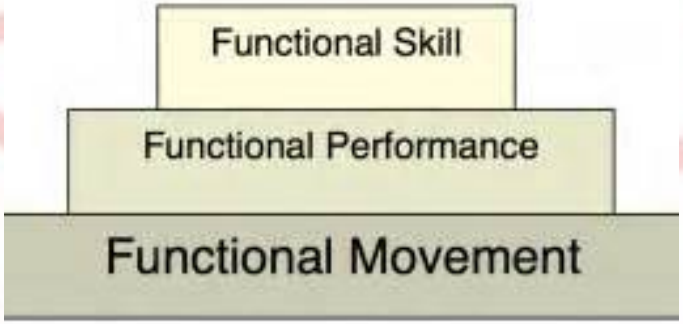
- Weak links can cause Energy Leaks (ex tight or weak hamstrings)
- Energy leaks occur when all of the energy generated to perform a certain task does not go into that task but may go to another part of the body placing greater stress on that part potentially leading to injury

Energy Leaks

- It is possible to perform well even when poor form is used but eventually the athlete will experience breakdown, inconsistency, fatigue, soreness, and eventually injury
- Poor form is easier, more familiar more comfortable and may even seem to take less energy

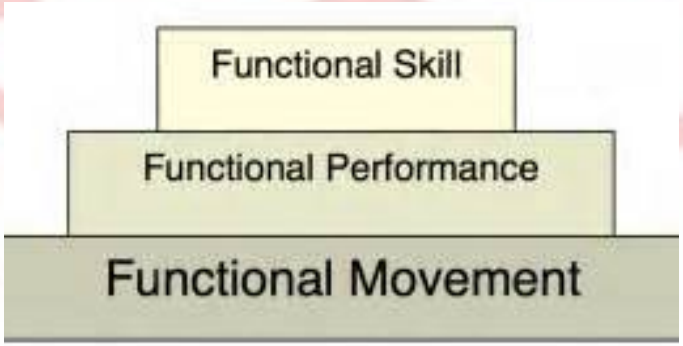
Why are Energy Leaks important?

1.) Functional Movement



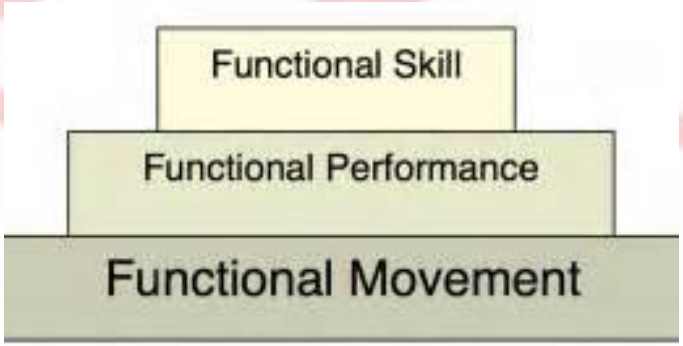
- Illustrates an athlete who has appropriate or optimal functional movement, explore full range of movement, demonstrate body control and movement awareness throughout numerous positions.

2.) Functional Performance



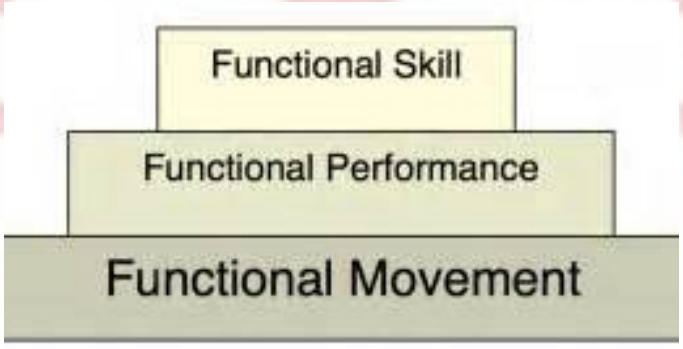
- Illustrates an athlete who has demonstrated a requisite amount of power, well co-ordinated linking movements

3.) Functional Skill



- Illustrates an average or optimal amount of sport specific skill

Functional Movement



Functional Movement= Mobility and Stability, the ability to move through functional movement patterns.

- What is the difference between Mobility and Flexibility?

- Flexibility- ability to elongate a muscle ex. When hamstrings are stretched during a forward bend

- Mobility- involves a muscle and a joint ex. Ability to keep heels flat, foot pointing forward while squatting past thighs parallel to ground

- Stability- ability to CONTROL force or movement

Has your athlete demonstrated functional movement?

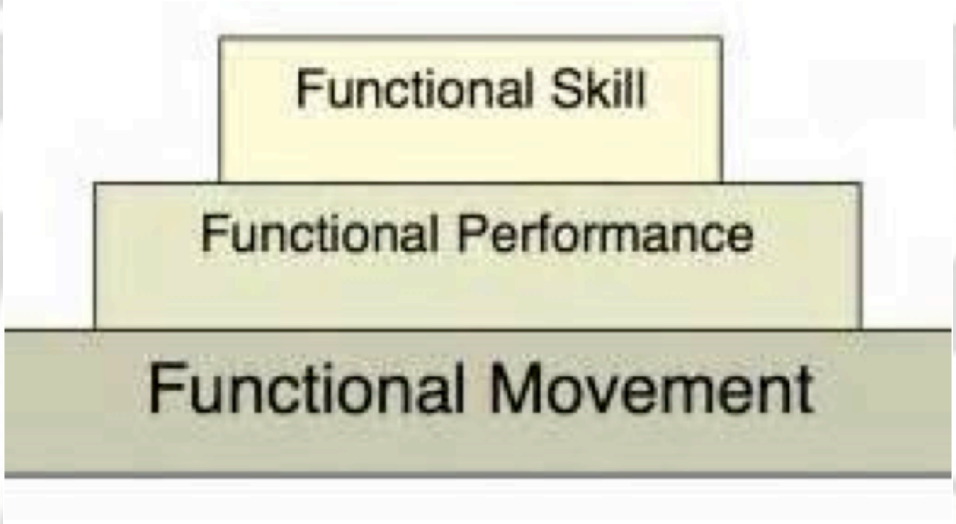
- If not sure refer onto professional (physio, strength and conditioning specialist, athletic therapist, kinesiologist etc)
- Ex. Functional Movement Screen- Assessing 7 basic movement patterns:

1. Squat
2. Step
3. Lunge
4. Reach
5. Leg Raise
6. Push-up for Trunk Control
7. Rotational Stability

Functional Performance…are we ready?!!

But remember…

Flexibility, Mobility and Stability (functional movement) should precede strength and endurance (functional performance)



Functional Performance

- Strength & Power, well co-ordinated linking movements

$$P = \frac{F \times D}{T}$$

Power / Force / Distance / Time

Dryland Training

DRYLAND TRAINING

- Get **assessed** at the start and end of the program (movement- FMS- and fitness assessments)
- Have someone **monitoring** your progress (either your club coach or a strength and conditioning coach).
- Follow a **progression** in volume and/or intensity.
- Work on your **technique** – fundamentals are very important
- Follow through with the program and WORK HARD at it. Improving fitness takes time and commitment. Your gains will be greater and your risk of injury will be reduced.

Warm up

- prepares you mentally and physically for your workout. *Reduce* the risk of injury in either in the gym or in your sport. Reduce, not prevent!

- Opportunity to work on some of your weaknesses – whether they are issues of stability or mobility, warm up allows you to mobilize certain joints while stabilizing other joints.

- Opportunity to 'groove' movement patterns. Work on more isolated, controlled movements to mobilize / stabilize certain joints and then progress to more dynamic movements (e.g a 'lunge' pattern). By increasing mobility and /or stability in particular joints that need improvement, we then see reduced compensation patterns in full body movements.

Components to a good warm up

1. An activity at the start to get blood flow going.
2. Rolling/Self Myofascial Release
3. Corrective
4. Activation Exercises
5. Controlled Dynamic Warm Up
6. Floor work
7. Athletic Dynamic
8. Power Preparation

Components to a good warm up

1. An activity at the start to get blood flow going. This may be biking, treadmill, jogging, running patterns or low intensity skipping for 5-10 mins.

Components to a good warm up

2. Rolling. Take 5 minutes to work on areas of tightness (self-myofascial release)

Components to a good warm up

3. Corrective exercises (if you have been prescribed these). These may be in the form of rolling, mobility or stability work.

Components to a good warm up

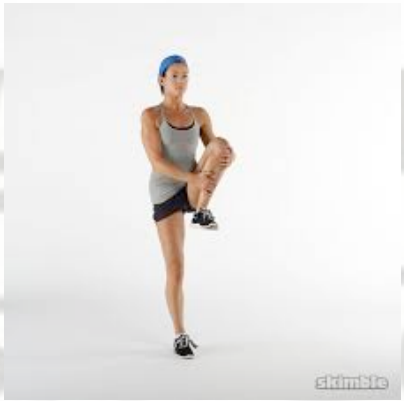
4.) Activation Exercises

Components to a good warm up

5.) Controlled dynamic. Athletes work through a series of closed-chain movements (lunge, squats, hip hinge, push).

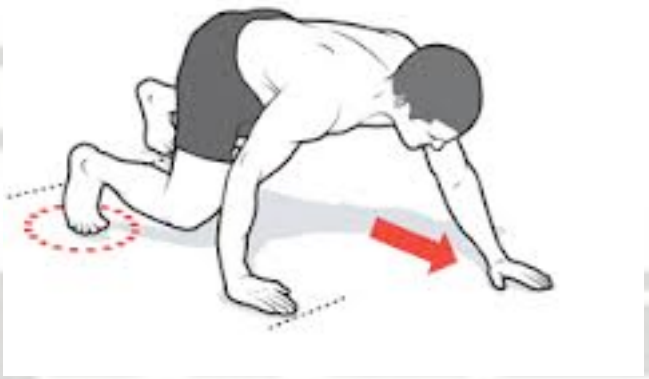






Components to a good warm up

6.) Floor work (rolling, planking, quadruped, crawling etc). Working joint-by-joint to mobilize.



Components to a good warm up

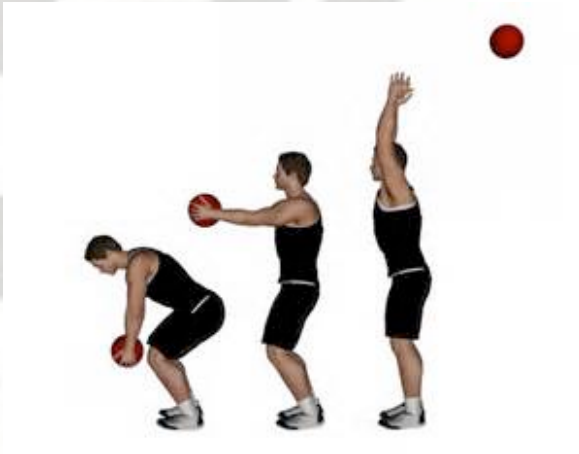
7.) Athletic dynamic. Running patterns/lateral drills (Carioca, lateral shuffles, shuffle & stick etc). In the phase, the velocity of movement is increased. This is a good place to work on Agility training.

Components to a good warm up

8.) Power Preparation. As the first part of the main training segment usually involves some sort of explosive/ Power movement (e.g. jumps, Olympic lifts) the final portion of the warm up should prepare you for this.

Ex. Drop Squats, MB toss

Kneeling Starts, Lying Starts



PRE-ACTIVITY PLAN

PRE-ACTIVITY PLAN

Upperbody Roll	Reps/Sets	Upperbody Stretch	Reps/Sets	Activation	Reps/Sets
Roll Lat	30sec	Band Lat Stretch	30sec	OH Squat w/band	20
Roll Pec w/ ball	30sec	Wall Pec Stretch	30sec		
Trigger Upper Back	30sec	**Wall Slides***	15		
Roll T-Spine	30sec				
Roll T-Spine Ext					
Hip Girdle Roll	Reps/Sets	**Hip Stretch**	Reps/Sets	**Activation**	Reps/Sets
Roll QL's	30sec	Kneeling HF Stretch	30sec	Wipers	8ea
Penetrator HF/AB		Band HF Mobs	30sec	Pen hold band ext. hip rot.	30
Trigger TFL		Hip Routine	x5ea	Glute Walks	10y
		Kneeling TFL Stretch		SB Hip Lifts w/band	
Lower Leg Roll	Reps/Sets	**Lower Leg Stretch**	Reps/Sets	**Activation**	Reps/Sets
Roll Quads	30sec	WB Calve Stretch | / \	30sec	SL RDL's w/twist & band?	15
Roll IT Band	30sec	Inner leg walkout pushup	8ea	Pole Squats/Sweeps	10
Roll Calves	30sec	Band Ham Stretch	30sec	Drop Squats	10
Roll Peroneals	30sec	Band Lat Ham Stretch	30sec		
Roll Hamstring	30sec	Band Med Ham Stretch	30sec		
Roll Foot					
		Comments			
		*shoulders down!!			

PRE-ACTIVITY PLAN

PRE-ACTIVITY PLAN

Movement Prep	Reps/Sets	Dynamic Flexibility	Reps/Sets	Stability Work	Reps/Sets
Lateral Push	20y/2	Walking Lunges	10y	Side Plank Leg Raise	1min ea
Backward Push	20y/2	Inchworms	10y	Hip Lift/Leg Lowering	15ea
Crossover Push	20y/2	Spidermans	10y	elbow to knee w/ball twists	10ea
Shuffle and Stick	20y/2	Lateral Lunges	10y	Bear Crawls	10y
Line Drills	20y/2	Walking Quad	10y	Kneeling Palof Press	x10/2
Hex Rail	20y/2	Hamstring Scoops	10y	Split Cable Chops	x10/2
Crossover Push	20y/2	Leg Swings	10ea	MB Circuit	x10ea
		Hurdle Drills	10ea	Plank chest openers	x5-10ea
				Power Plank	

Power Prep	Reps/Sets	Pre-Hab	Reps/Sets	Comments	
Kneeling Starts	5ea	Eccentric Hams	x10/2	focus on right knee not collapsing	
Depth Drops	x5/2	Mid/Low Trap Activation		with kneeling starts	
Hurdle Hops	x5/2			focus on the push off and landing	
Power Skips	20y/2			of shuffle and stick	
MB Vert Throws	6				

2.) Workout Structure

1.) Plyometrics-Landing/Jumping Mechanics

Attention to detail First thing when fresh

Plyometrics- Landing/Jumping Mechanics

2 Foot Broad Jumps

- Feet should be shoulder width/hip width apart
- Be sure to use arms to help accelerate body during jump
- Land softly by ensuring knees bend to lower impact forces
- Knees must always track with toes; do not let knees dip inward.

- Start with single jumps resetting before each consecutive jump
- Once technique is sound try putting a couple jumps together
- Remember, as difficulty increases impact forces also increase so be sure to maintain proper technique

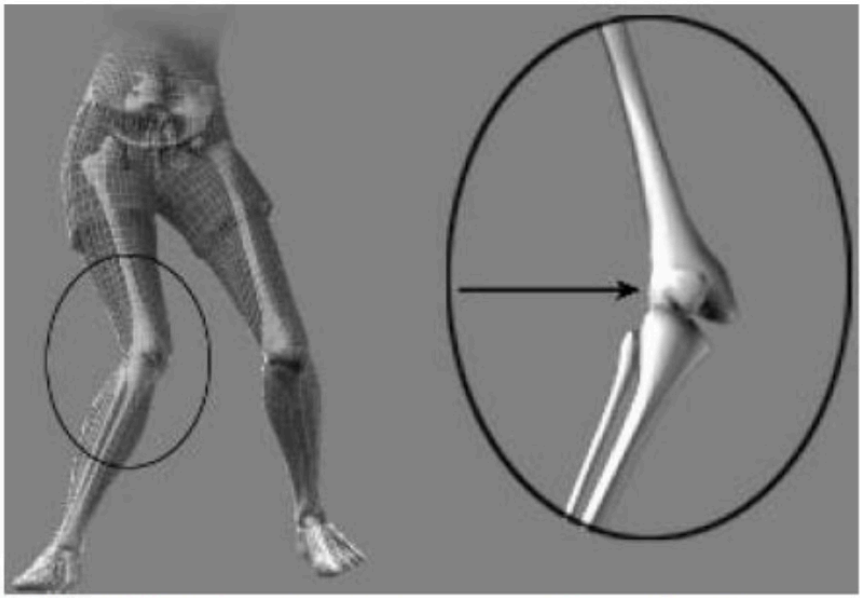


Figure 3. Example of dynamic lower extremity valgus, a combination of motions and rotations at all 3 lower extremity joints, potentially including hip adduction and internal rotation, knee abduction, tibial external rotation and anterior translation, and ankle eversion.

Plyometrics- Landing/Jumping Mechanics

- Train how you race!!

Landing/Jumping Plyometrics

Landing Technique:

Week 1	Drop Squats	Glute Band Squat & ext. rotation x10ea	Partner Band YTW's
Week 2	Small Box Step off Landing	Glute Band quicks	Partner Band YTW's
Week 3	Small Box Step off Landing and hop/stick	Glute band diagonal quicks	
Week 4	Medium Box Step off Landing	SB tap with partner	Inv. Pull Ups
Week 5	Medium Box Step off Landing and hop to Medium Box	SL SB tap with partner	Inv. Pull Ups
Week 6	Big Box Step off Land and hop to big box		

PROGRESSIONS:

- SINGLE LEG DROPS
- SINGLE LEG HOPS/LANDING
- CHANGE OF DIRECTION
- ETC…

2.) Power

$$P = \frac{F \times D}{T}$$

Power / Force / Distance / Time

Power Progressions

Week 1: x8ea	Ball Drop Squats	Shuffle & Stick hold 3sec
Week 2: 4x5	SA DB Snatch	Shuffle & Stick w/RDL
Week 3: 5x5	SA DB Snatch	Shuffle & Stick w/RDL and Hip twist
Week 4: 4x5	BB Thrusters	Shuffle & Stick turn and land
Week 5: 4x5	BB Thrusters & OH push to split stance	Shuffle & Stick and hop
Week 6: 4x5	Hang Clean Technique	Shuffle & Stick, hop and sprint

3.) Strength and Endurance

- Movement patterns vs Muscle Groups
  - Push
    - Bench Press Variations, Shoulder Press Variations, Parallel Bar Dips, etc
  - Pull
    - Lat Pulldowns, Seated Rows, Bent Over Rows, Pull Ups, Chin Ups, etc
  - Squat
    - Front, Back, Overhead, Split, Lunge, Step Ups, etc
  - Deadlift
    - Barbell, Romanian, Trap Bar, etc

REMEMBER!

- Not all athletes can do all of those exercises! Go back to functional movement patterns-can the athlete get in the right position, never mind load them. If unsure → refer on.
- Specific Loads and Progressions. Unsure? →Refer on!

Strength and Endurance

Example of gym setting or limited equipment available:

Week 1: 3x12	Off Load Lunge	Stairs 2 at at time x3	Push up to SA "T"	Active Recovery: T-spine twists
Week 2: 3x10	SL Box Lowers	Stairs 2 at a time x4	Push Up to Side Plank Star	
Week 3: 3x10	DB Bulg. Split Squats	Stair Hops DL	DB Bridge SA CP	
Week 4: 3x8	DB Bulg. Split Squats	Stair Hops SL	DB SB Chest Press	
Week 5: 3x8	BB Bulg. Split Squats	Stair Hops Lateral	DB Bench Chest Press	
Week 6: 4x8	BB Bulg. Split Squats	Lat land front	DB Chest Press	

Load and progression

Strength and Endurance

Week 1: 3x12	Valslide 3way	Partner Band Rows	Partner Shadowing 15sec each
Week 2: 3x10	DB Wt'd Lateral Lunge	Renegade Row	
Week 3: 3x10	DB Wt'd Lat/Rev Lunge	Tripod Row	
Week 4: 3x8	DB Wt'd Rev Lunge w/ Lunge Quicks x5ea	DB SA BO Row	
Week 5: 3x8	BB Rev Lunge	DB DA BO Row	
Week 6: 4x8	BB Rev Lunge	BB BO Row	

*can use Med Balls and bands

Auxillary Exercises

- Exercises that are not the main “core” strength exercises like squats, deadlift, bench
- Dependant on need/weakness of individual athlete (Exercise Prescription).
- Ex. Lat pull down (can be with bands)
- Single Arm, Double Arm Chest Press (Standing, kneeling, ½ kneeling, sitting) can be done with bands
- Cable or band “Lawnmowers”/Chops

Stability Work/Prehab

Week 1	Triple Threat	Back Extensions	Valslide Hamtrings
Week 2	Firehydrants	Slow Plank turns	Hamstring Fallouts
Week 3	Elbow to Knee rolling	Dolphin Kicks	SL Hamstring Curls SB
Week 4	Band Partner Twists	Power Plank	MB Hamstring Quicks
Week 5	Dowel fight	Side Plank leg lift	Hamsring Fallouts
Week 6			

Cardiovascular Training

- Demands of the sport:
- XC Ski-
- Snowshoe
- Alpine Ski

Figure 1. Cardiovascular Responses and Adaptations to Endurance Training

Source: Joyner and Coyle 2008; Pavlik et al. 2010.

ENERGY SYSTEMS

- Anaerobic- Short duration, high intensity activities, which last from mere seconds to up to about 2 minutes. Strength, speed and power.

- Aerobic- Aerobic literally means "relating to, involving, or requiring free oxygen". light-to-moderate intensity activities that are sufficiently supported by aerobic metabolism can be performed for extended periods of time.

Cardiovascular Training: HIIT (High Intensity Interval Training)

HIIT Program Development

Duration

- Work Interval- 5 seconds to 8 minutes
- Power Athletes: shorter intervals of 5 to 30 seconds
- Endurance Athletes: 30 seconds to 8 minutes

Intensity

- 80% to >100% of VO2 max or Maximal Aerobic Power (MAP)

Rest Interval

- Passive recovery (little movement) or,
- More common active recovery of 50% to 70% of MAP or VO2

Work : Rest Interval

- 1:1 ex. 30" work followed by 30" recovery
- 1:2 ex 30 " work followed by 1 min recovery
- the ratio is designed to challenge a specific energy system

(Kubukeli, Noakes and Dennis 2002)

Cardiovascular Training: HIIT (High Intensity Interval Training)

Sample Running Programs:

- Track or 0% Treadmill incline
- 4x 800m 90% Max HR. Time each 800 m. Can be modified 200m to 1000m

Treadmill or outside Sprints

- 3 sets of 10-15 x 20sec max sprint/ 10sec light jog walk or nothing . 4min easy jog between sets

Treadmill- 5% grade at 3mi/hr

- 6-8x (1min at 5-6.5 mi/hr with 2min in between each 1min at 3mi/ hr)
- Warm up and Cool down with 10 min easy jogging.

Cardiovascular Training: HIIT (High Intensity Interval Training)

<u>Sample Cycling Programs</u>:

Max Lactate Steady State

- Ride for the highest workload that you can sustain for 20-50min
- Warm up and cool down with 10min easy riding

Stepwise Endurance

- 10min at 50% HR max
- 10min at 60% HR max
- 10min at 70% HR max
- 10min at 60% HR max
- 10min at 50% HR max
- Warm up and cool down with 10min easy riding

Mixed Pace Endurance

- 10min at 50% HR max
- 5min at 70% HR max
- 15min at 60% HR max
- 10min at 75% HR max
- 5min at 50% HR max
- Warm up and cool down with 10min easy riding

Max Aerobic Power Intervals

- Warm up 10 min
- 4 min intervals @ 90-95% MAP
- 3 mins recovery in btw
- 4 sets
- Cool down 15 min spin zone 1

Anaerobic Power Intervals

- 6-8x 30sec ALL out x6-8. Full recovery between efforts.

Dryland Training Summary

- "Toolbox" of exercises for each athlete
- Time to work on "housekeeping" → injury prevention, getting the most out of the workout
- Analyzing movement
- Developing Strength and Power and Conditioning for sport