

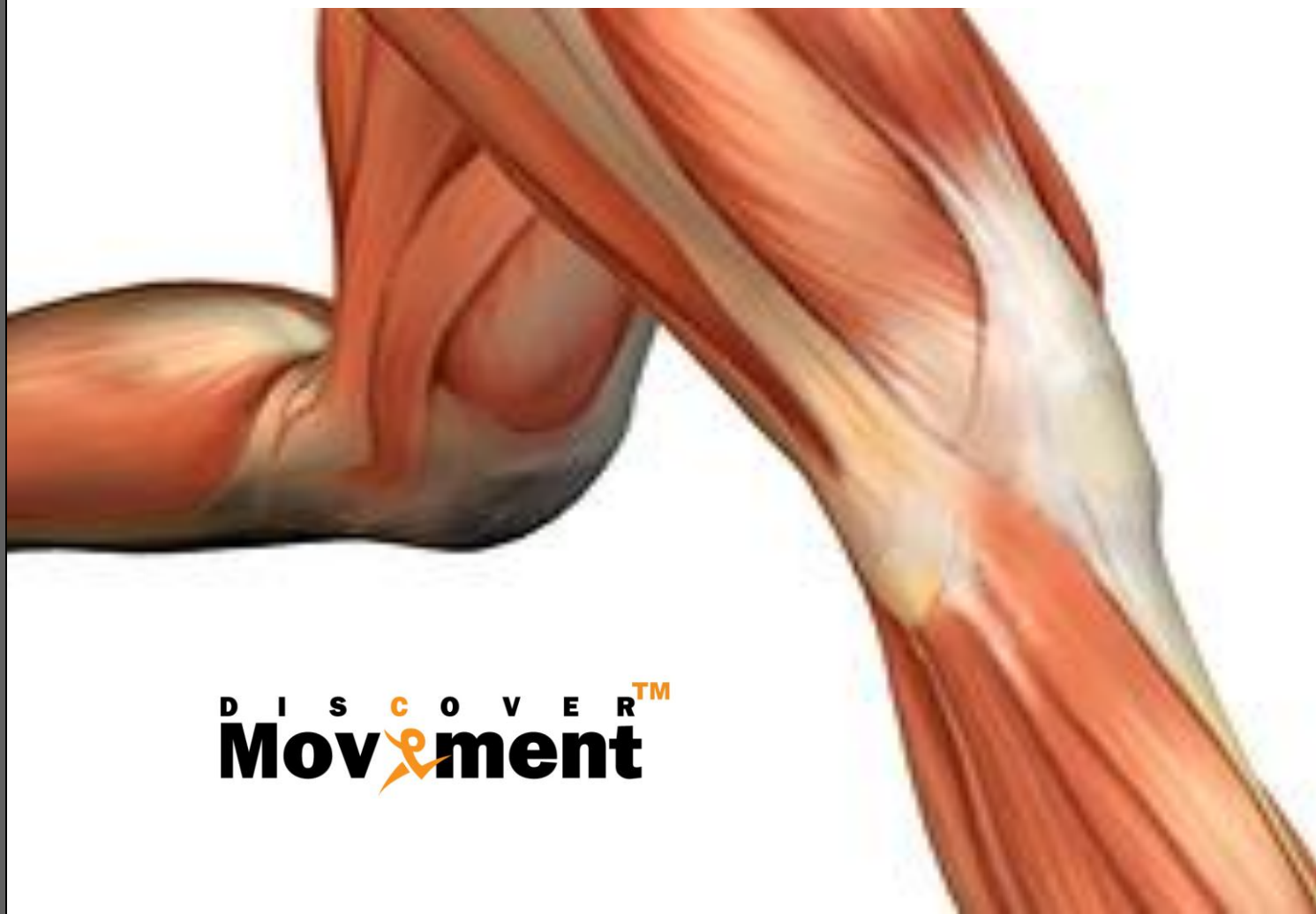


DISCOVER™
Movement



Knees 4 Speed

**Athletic Development & Injury Prevention
for
Young Female Athletes**



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Movement

DISCLAIMER

Discover Movement LLC assumes **NO LIABILITY** due to any actions undertaken as a result of reading this report.

CAUTION:

Always consult a physician before starting an exercise program.

Complete a thorough warm-up before embarking on your workout.

Always finish your workout with a cool-down session.

It is imperative that one follows proper progressions and does not rush into anything that they cannot do without control.

TRAINING SAFETY

Exercise in a pain-free fashion, if it hurts don't do it.

Move with deliberate control. Make all of your movements smooth and coordinated.

ABOUT THE AUTHOR

Tommi Paavola, M.S. C.S.C.S.



- Master's degree in Sport Sciences
- Certified Strength and Conditioning Coach by NSCA
- Youth Conditioning Specialist
- Master Trainer for the Finnish Coaching Association
- Created *Movement Skill Training Program* used by over 2000 coaches
- Developed the *368 –Training System for Optimal Athletic Development*

Dear Friend,

I am a conditioning coach and a personal trainer, but more importantly, I am a life-time student of my field of passion and someone who has always been fascinated by the dynamic miracle of human movement.

So much about our movement system is still unknown. However, new findings and breakthroughs have greatly improved our chances in creating better training systems and thus, better results in function and performance whether in Olympic arena or in the “backyard stadiums.”

The content of this manual has helped me tremendously in developing athleticism, improving acute/long-term performance and in decreasing injuries. My goal is that you would find these ideas, techniques and systems useful in creating the most optimal training environment for yourself or for your athletes.

I thank all my wise mentors for the ideas and also the actual applications used in this manual. Most, if not all, of the exercises in this manual as well as the theoretical concepts behind it, are inspired by my teachers and mentors. I want to thank especially Gary Gray, Todd Wright, Gray Cook and Thomas Myers for their extraordinary contribution to my understanding of movement.

Thank you very much your valuable time,

Tommi Paavola

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-Knees 4 Speed –Athletic Development & Injury Prevention-

1. Foreword to *Knees 4 Speed* –program by Tommi the Trainer

I have worked with young female athletes representing all types of sports for several years now. I have found out through experience that training a female athlete differs from training a male athlete in many ways. I have also come to truly appreciate the will power, the passion and the determination that I see in these young female athletes who strive for excellence in sports and in life, sometimes even through physical pain.

I hate seeing an athlete in pain or when their potential and abilities are compromised in any way. I have had physical pain enough myself to do everything in my power to prevent injuries. I am in the business of **prevention and optimal preparation**. For sure, I see a lot of athletes who already went through an injury and maybe a surgery and in that case my job, after physical therapy, is to prevent it from happening again. But even according to research a huge amount of non-contact injuries can be prevented. Maybe 50% of them and maybe even up to 88% based on some studies. Do you know how many ACL-injuries in female athletes there are per year in the US alone? 38 000. That is a big number, and on my behalf I will be happy if I can contribute to preventing some of them by preparing my athletes for the true demands of the sport.

In addition, it is not just about the knees. You will notice that the integrated approach of this program will extend much further than any one joint in the body. Athletic body is all about teamwork and strengthening one body part requires us to look at the whole body as one, thus contributing to the well-being and strength of the ankles, hips and lower back and upper body as well.

***Knees 4 Speed* is an athletic development program.** That means that while the injury prevention is taken into consideration in every exercise, the goal is to increase the performance potential of each athlete. After participating in the *Knees 4 Speed* –program the athlete should be running faster and jumping higher. She should also have more core stability, lower body strength, body awareness and power to perform her sport moves more optimally than before.

The higher the level of performance and fitness, the better resistance the athlete has against injuries. This does not mean just cardiovascular fitness or an ability to do thousand sit-ups but much more than that; it means primarily **the skill of movement and athleticism**. So, keep in mind that *Knees 4 Speed* is not a rehabilitation program. It really aims to elevate the acute as well as the long term physical performance and challenges athletes in a comprehensive and integrated way.

While *Knees 4 Speed* –program presents you a variety of exercises for your use in training, it is important to remember **that every individual is different, every team is different and every coach is different**. The coach or the trainer putting this program or a variation of it into practice needs to have an understanding and practical wisdom of how to safely and effectively implement the program for his or her athletes. *Knees 4 Speed* is a program that works for me personally and I have had great success with it. However, nothing can replace you as the coach on the field, on the court or in the gym keeping the athletes safe, evaluating their abilities, progressing the exercises properly and listening to the feed-back from the athletes. Please, take this program as a guideline and a system that you will responsibly apply according to the needs and abilities of the athletes who put their trust in you.

In strength,

Tommi ‘the Trainer’ Paavola

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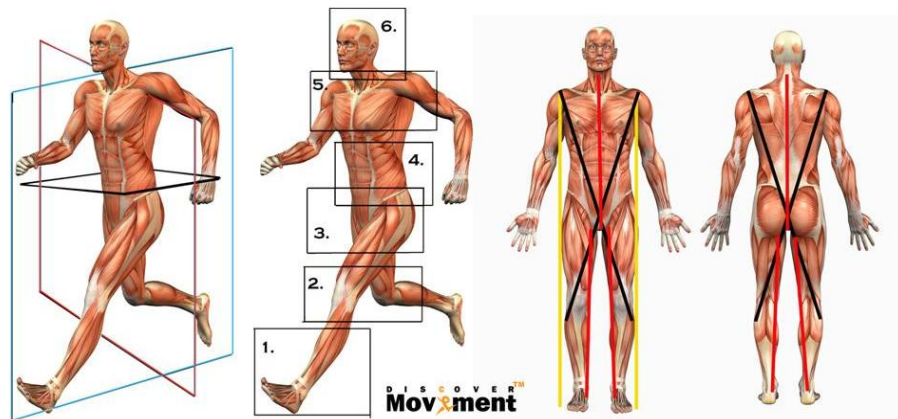
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2. 368 – Anatomical and biomechanical foundation for the *Knees 4 Speed*

In order to re-produce a great warm-up that really works, we need some sort of a system. Without a pattern or a system, all of exercises and programs will be random and we will never be able to predict the outcome of the conditioning reliably.

The Knees 4 Speed program aims to create the desired physiological adaptation as reliable as possible every time. Our simplified concept of human movement helps us in coaching and training systematically and comprehensively. This concept is called the **368**.

3 planes - 6 stations – 8 chains



The 368-system gives a simplified biomechanical idea of human anatomy in relation to integrated movement. Learning more than 700 muscles with their functions in relation to everyday training seems like an impossible task for most of us. That is why observing the body in the following way can be helpful:

3 PLANES: The movement occurs in three planes, sagittal, frontal and transverse. In lame terms this translates into forward/backward, side to side and rotational movement.

6 STATIONS: The human body can be described in six levels or stations:

1. Foot and ankle 2. Knee 3. Hip 4. Lumbar spine 5. Thoracic spine 6. Cervical spine (*1)

8 CHAINS: The muscles and fascial components together form functional units that translate movement throughout the body and are structurally connected making the whole body into “one big muscle”. These chains are the front chain, back chain, lateral chains on the sides and the diagonal chains in the front and in the back. (*2)




The 368-concept helps us in providing training stimulations that are A) Integrated B) Multi-directional and diverse as well as C) Ground-based and functional. These principles remind us that training and conditioning should take the true movement environment of the athlete into consideration. Knees 4 Speed program is mainly designed for the athletes that operate in a vertical body position using the ground in force production (running, jumping, change of direction etc.) and whose sports are influenced by the typical demands (gravity, ground reaction force, momentum) of our planet. This includes at least 90% of the sports but for example swimming would be an exception.

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-Knees 4 Speed –Athletic Development & Injury Prevention-

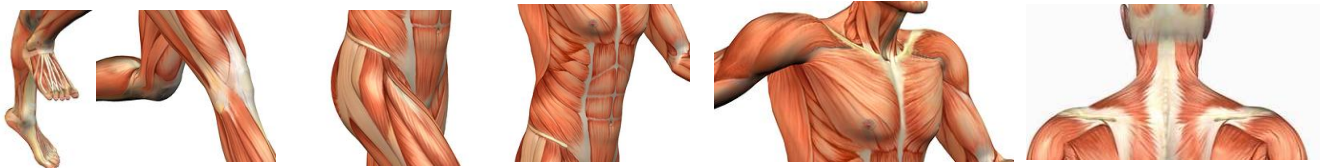
2.1 368 – Three planes of movement

Knees 4 Speed –program aims to enrich the athletic abilities from every direction and that is why most of the exercises have 3-dimensional component to them. It allows a more thorough and comprehensive training adaptation as all the sports involve multi-dimensional movement as well. Particularly the rotational plane (transverse plane) is often forgotten from the training programs. This is ironic as most sports are eventually made of rotation. Also the injuries, such as ACL-injuries in the knee, occur very often in transverse plane. Here is an example of how Knees 4 Speed takes all planes into consideration in training:

KNEES 4 SPEED – STABILITY AND ACTIVATION		
<p>A) Sagittal, forward</p>  <ol style="list-style-type: none">1. Balance on one leg2. Bend the supporting knee and hip3. Keep the reaching foot off ground	<p>B) Frontal, to the side</p>  <ol style="list-style-type: none">1. Balance on one leg2. Bend the supporting knee and hip3. Keep the reaching foot off ground	<p>C) Transverse, rotation</p>  <ol style="list-style-type: none">1. Balance on one leg2. Bend the supporting knee and hip3. Keep the reaching foot off ground

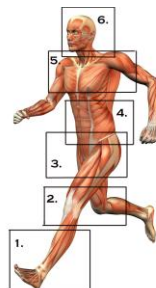
2.2 368 – Six anatomical stations

As it was mentioned before, the human movement machine consists of over 700 muscles. Do you by any chance know them all by name? Do you know where they attach and what their functions are? Can you explain what each muscle is responsible of when the foot hits the ground in running? My answer is No, No and No. It takes a bit of humility to admit that it is too complicated for me, but that is ok, we do not have to know it all. We can make it simpler for ourselves by dividing the body into six stations and by knowing what each of these stations require to function optimally, we have all the information we need. We need to remember that we are now dealing with the body that is actively, dynamically moving performing a task, not with the body that is lying motionless.



One of the most important tasks in regards to these six stations is to train them according to their supportive roles of each other. As stated by Gray Cook and Mike Boyle, each station has some characteristics in relation mobility and stability of the joint or station. The joint-by-joint concept can be described in the following way:

1. Foot/ankle: Mobility
2. Knee: Stability
3. Hip: Mobility
4. Lumbar Spine: Stability
5. Thoracic Spine: Mobility
6. Cervical Spine: Stability/Mobility



-Knees 4 Speed –Athletic Development & Injury Prevention-



2.3 368 – Eight myofascial chains

The eight myofascial or kinetic chains represent the integration, the team-work, within the body. It would be foolish to just focus on one body part thinking that the rest of the body does not matter. The body is connected in many ways, neurologically, vascularly but also myofascially. Fascia and other soft tissue components transfer information and force throughout the body. Thus, reducing force when the foot hits the ground and producing force for the re-acceleration takes the strength of the whole chain. That is why the chain is only as strong as the weakest link.

So, we cannot just strengthen the muscles around the knee to make the knee strong. We have to evaluate the function of the whole chain and make it all strong. For example, weakness in the extremities can be often solved by making the center of the body functionally strong, stable and powerful.



These are some of the examples of exercises that involve the whole chain. They develop athlete's ability to decelerate and re-accelerate during the change of direction in a game.

<p>A) Resisted stepping forward</p>  <ol style="list-style-type: none">1. Start in a bilateral stance2. Hold the handle with one arm3. Step forward with alternating leg reaching forward with the arm4. Push off the ground with the front foot to return to start stance	<p>A) Resisted stepping to the side</p>  <ol style="list-style-type: none">1. Start in a bilateral stance2. Hold the handle with two arms3. Step to the side performing a resisted rotation at the same time4. Return back to start and repeat
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As you can see Knees 4 Speed seriously attacks any weakness in the body and builds athleticism in a comprehensive way. The 368 –concept helps us not to get caught up too much in one plane, one direction, one body part or one exercise. It guides us into appreciation of the diversity and multi-directionality of the human movement. At the same time, all the exercises are hand-picked for the objective of building a strong and healthy movement foundation for a female athlete.

3. Motor and skill foundation for Knees 4 Speed

3.1 Motor foundation

So, what is the most important motor component of human performance? Flexibility? Strength? Speed? Power? Well, you guessed it, we need it all based on the needs of our bodies and also based on the demands of our sport. Some people need a bit more flexibility work whereas others require less stretching and more stability exercises. Everyone is different. However, everyone does need to develop all the components in order to perform better and to improve in long-term.

Knees 4 Speed follows the performance pyramid from the 368 –Training Systems for Optimal Athletic Development.

The foundation is laid with mobility and stability. Then we start building strength, coordination and agility on top of that. And finally the top of the pyramid is made of speed, power and the sport-specific skill.

The stronger and higher pyramid the better and wider the foundation must also be.







Knees 4 Speed –program emphasizes the foundational components of performance and movement. The program will take the athlete from the mobility work to stability and strength and finally after skill and mechanics finishing up with the coordination as the base for agility and speed.

3.2 Skill and mechanics

Running, jumping, landing and change of direction are all skills. Speed is a skill just as much as it is a genetic disposition. Knees 4 Speed focuses on teaching the essential skills of fundamental movement patterns such as squat and lunge and also the crucial skill of landing/planting the foot. The skills require concentrated effort with high quality repetitions. Do not get fooled into thinking that how well you do things does not matter. In regards to teaching and learning the mechanics of deceleration and landing the ‘how’ matters. Every repetition and detail counts either against you or for you. Keep your athletes mentally engaged in every exercise. Train the brain as much as the body!

Here is an example of what Knees 4 Speed –landing mechanics progression looks like:

A)Landing forward	B) Landing sideways	C)Landing backwards	D)Landing w/ rotation
			
<ol style="list-style-type: none">1.Start from an athletic stance2.Jump off the box forward3.Land smooth and controlled	<ol style="list-style-type: none">1.Start from an athletic stance2.Jump off the box sideways3.Land smooth and controlled	<ol style="list-style-type: none">1.Start from an athletic stance2.Jump off the box backwards3.Land smooth and controlled	<ol style="list-style-type: none">1.Start from an athletic stance2.Jump off the box w/rotation3.Land smooth and controlled

4. How and when to apply Knees 4 Speed –program

As a coach or an athlete you might be already thinking: “When and how am I going to be able to put this into practice?” Yes, the training schedule of an athlete is busy and the sport practice itself is obviously the main focus of the training. No panic, there are simple and practical ways to incorporate Knees 4 Speed into your training regimen. Here are some of our favorite methods.

4.1 Dynamic Warm-Up and Activation

Knees 4 Speed –program works very well as a dynamic warm-up and activation sequence. You might be surprised that your athletes are not only sweating but also more prepared to move and practice the sport on a higher level than after jogging around the court or after performing static stretches. This is great way to integrate Knees 4 Speed into training and conditioning.

Here is an example of a Knees 4 Speed –dynamic warm-up sequence. The strength training component has been left out in order to not fatigue the system too much prior to sport practice.

KNEES 4 SPEED –Dynamic Warm-Up & Activation	
1.Flexibility & Mobility	The 4-way stretch
2.Stability & Activation	ONG1-sequence
3.Jump & Land	3-D Box Jump & Land
4.Locomotion	3-D Shuffle –Carioca-Skip

4.2 Post-practice or post-game Training

Post-practice protocols for especially injury prevention purposes has been found effective. We already know that a lot of injuries occur during the latter part of the game or match. This is most likely due to the localized and systemic fatigue. If we improve both the mechanics of movement as well as muscle endurance for stabilizers and prime mover muscles, our bodies will be that much more resistant for those “fourth quarter” accidents.

It is a good idea to keep post-practice training focused and short. For example:

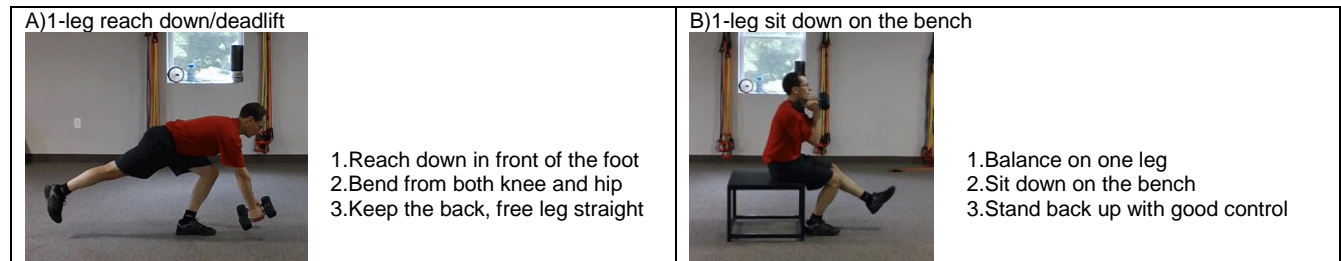
KNEES 4 SPEED –Dynamic Warm-Up & Activation	
1.Flexibility & Mobility	The 4-way stretch
2.Stability & Activation	3-D single leg arm reach
3.Jump & Land	Resisted mini band-walks

Post-game strength training sessions are also sometimes a good idea, especially if you want to give the team a day to rest and recover after the game or competition. A short and focused strength training session can be much more effective and allows them to get a longer regeneration before the next practice.

-Knees 4 Speed –Athletic Development & Injury Prevention-

4.3 Knees 4 Speed as a Strength and Conditioning –routine

Once the athlete knows the fundamental moves well and is able to increase the resistance without compromising the technique and mechanics, Knees 4 Speed can function as a true Strength and Conditioning routine. We can emphasize the vertical and horizontal strength exercises and build up on top of the fundamental movements such as squat, lunge and single leg patterns. However, it would be extremely important to incorporate the other components (flexibility, stability, locomotion etc.) to the routine as well in order to maintain a balanced athletic development progression.



Performing the entire Knees 4 Speed –sequence can be used a strength and conditioning sequence for athletes that have already built a solid base of cardiovascular and muscular endurance.

4.4 Off-season & Pre-season and In–season training

Our recommendation is to use Knees 4 Speed as a tool that can be modified for the demands and goals of each season. One of the main goals with any athletic development and injury prevention program would be that the athlete could start the competitive season in an optimal physical (and mental) state.

During the off-season athletes would be conditioned for example using the entire Knees 4 Speed – program. In the pre-season speed and power elements could be emphasized by performing the strength exercises in a more explosive manner and by using the locomotion drills in faster speeds and short distances. Competitive season application depends a lot on the game/match –schedule, but generally speaking the Active Warm-Up and Activation becomes one of the best tools to maintain and even improve on the Knees 4 Speed-exercises.

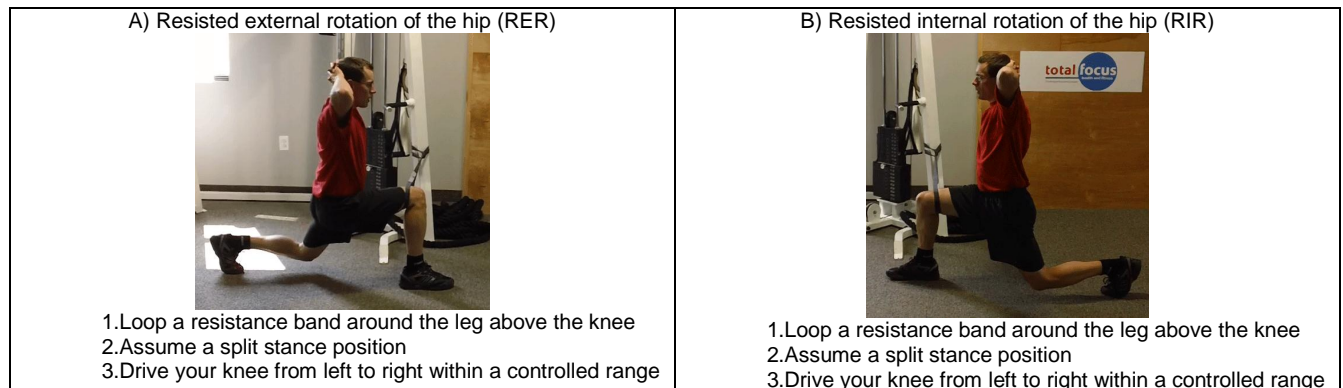
As you have learned the program can be used in many ways. The important thing is to fit Knees 4 Speed in the overall big picture and the plan so that the athletes are appropriately challenged in regards to training stimulation and the training adaptation. Remember that the workout is only as good as the athlete’s ability to recover from it. And on the other hand, the exercise must become continuously and progressively more challenging in order to see the results. Only the coach on the field or on the court is able to modify these variables successfully. That is where the wisdom, the art and the experience of coaching meet.

-Knees 4 Speed –Athletic Development & Injury Prevention-

5. The Knees 4 Speed –program and progression

The movements in the Knees 4 Speed –program are not complicated to perform or understand. But it is very important to execute each exercise correctly and to focus on improving the skills each time. Athletic development and injury prevention are more about the quality than the quantity of the movement. This basically means that the number of the repetitions should never become more important than the skill and the technique. Also, the used resistance should only increase as the control of the movement increases. And then again, the speed of the movement should come after an ability to perform the same exercise first slowly.

The program template will give you a short explanation of what the exercise is, how do you perform it and why do we do it in the first place. We have only given three cues per exercise knowing that too many instructions will only get athlete as well as the coach confused. Here is the example:



The picture might tell thousand words but what it comes to exercise technique the video probably gives even a better idea of the key points. The video of each exercise is provided for you through Discover Movement web page for members only at <http://www.discovermovement.com/k4s>

5.1 The equipment

The equipment used in the exercises is basic and affordable. Most of the equipment can be found in training facilities around the world. Here is the list of the exercise and training equipment used in Knees 4 Speed -program.

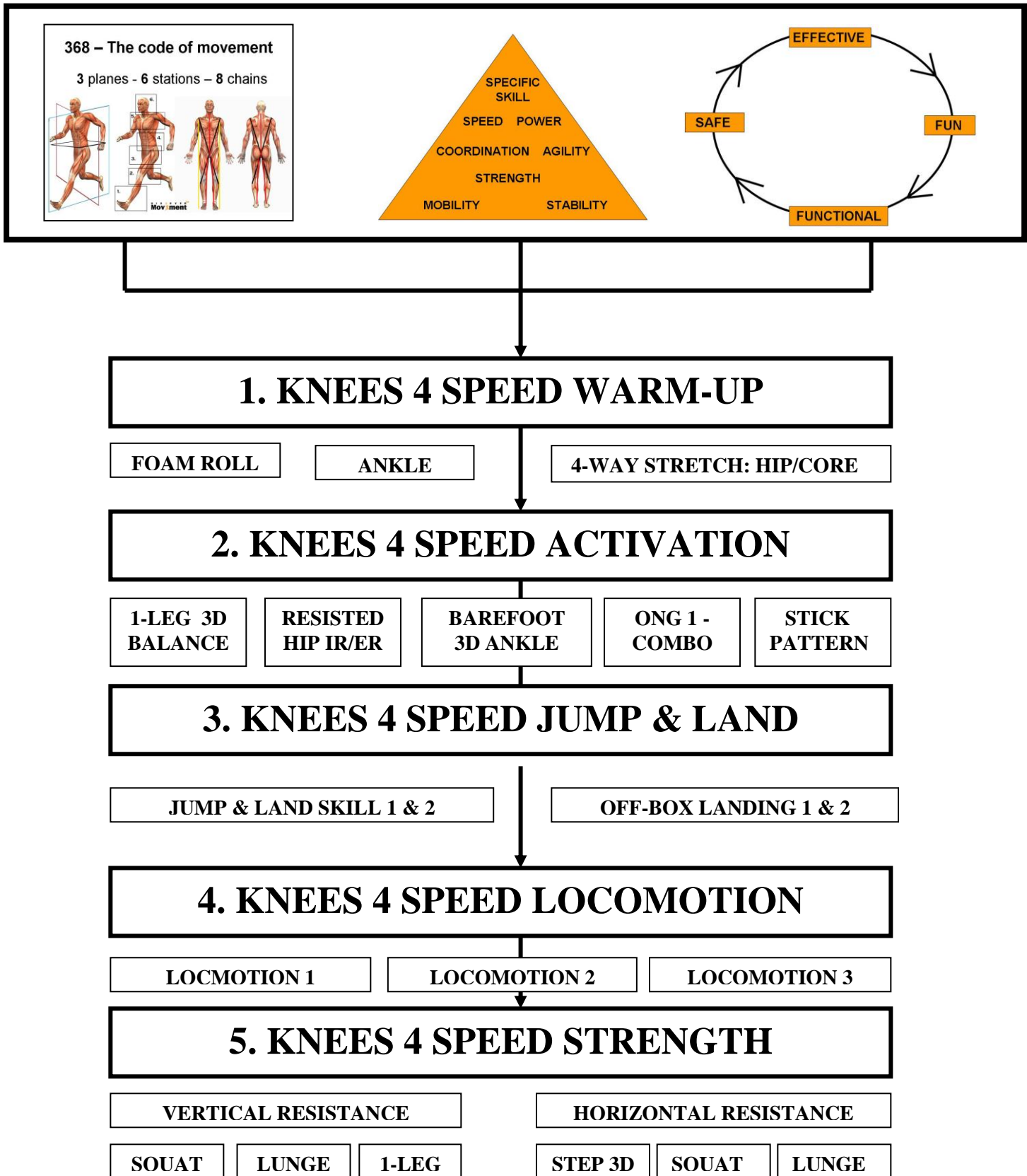


1. Foam roller
2. Super band 1 inch
3. Mini band (lateral resistor)
4. Dumbbells
5. Cable pulley (or resistance band)

(Go to <http://www.discovermovement.com/k4s> to learn more or to order equipment)

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5.2 Knees 4 Speed –progression



-Knees 4 Speed –Athletic Development & Injury Prevention-

A) Flexibility and Mobility

What? A combination of different flexibility exercise starting from myofascial release to dynamic flexibility movements.

Why? The goal is to provide the best possible foundation for building strength and stability by eliminating restrictions and tightness that might compromise the force production.

B) Stability and Activation

What? A sequence of on-ground and standing exercises

Why? The goal is to activate and strengthen the links in the chain ankle-knee-hip-mid section in order to promote multi-directional movement and to prevent knee injuries.

C) Jump & Land

What? Skill-based exercises that promote optimal landing mechanics.

Why? Teaching athletes to land correctly and to plant the foot correctly significantly improves the efficiency and safety of movement especially in terms of the knee-injury prevention.

D) Locomotion

What? A series of locomotion movement skills and patterns.

Why? Because coordination is one of the main elements of athleticism that promotes both to injury prevention as well as to skill and power of the sport –specific movements.

E) Vertical Strength

What? A combination of exercises that challenge the force production mainly in the vertical vector.

Why? Because the ability to decelerate and accelerate up and down movement is an essential part or running, jumping or change of direction.

F) Horizontal Strength

What? A combination of exercises that challenge the force production mainly in the horizontal vector.

Why? Because in addition to up and down movement, running, jumping, and change of direction also requires strength in the horizontal vector for example in the form of rotation of the body.

-Knees 4 Speed –Athletic Development & Injury Prevention-

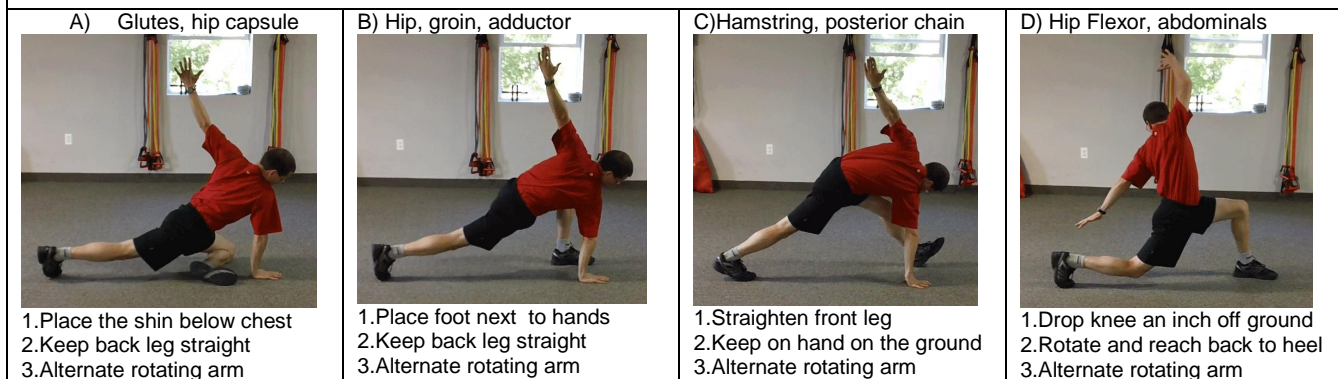
KNEES 4 SPEED – FLEXIBILITY AND MOBILITY



1. Self-myofascial release (Foam rolling)

Why? Foam rolling increases the blood circulation and metabolism in the muscle tissue and prepares the tissue for other exercises. After performing these five foam rolling techniques the mobility and flexibility exercises will be more effective due to myofascial release that foam rolling provides.

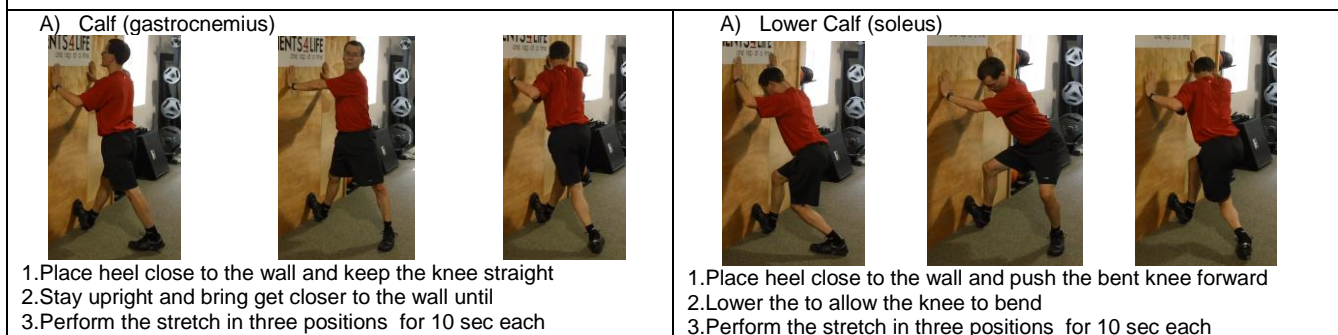
How? “Seek and destroy”. In other words, look for the sensitive areas in the muscle and hold the pressure over that spot for up to 30 seconds at a time. Breathe normally and allow the muscle to relax. Perform foam rolling for about 5 minutes a time regularly several times a week at least until you feel less ‘knots’ and adhesions in the muscle.



2. 4-way stretch with rotation

Why? To increase mobility in the hip region (glutes, adductors, thighs, hamstrings and hip flexors) in order to improve the stability, control and the movement of the knee

How? Read above and watch the video



3. 3-D calf stretch

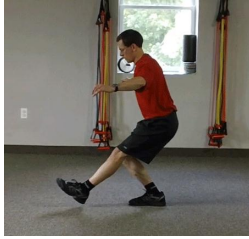
Why? To increase mobility in the foot and ankle region) in order to positively influence the stability, control and the movement of the knee

How? Read above and watch the video

-Knees 4 Speed –Athletic Development & Injury Prevention-

KNEES 4 SPEED – STABILITY AND ACTIVATION

A) Sagittal, forward



1. Balance on one leg
2. Bend the supporting knee and hip
3. Keep the reaching foot off ground

B) Frontal, to the side



1. Balance on one leg
2. Bend the supporting knee and hip
3. Keep the reaching foot off ground

C) Transverse, rotation



1. Balance on one leg
2. Bend the supporting knee and hip
3. Keep the reaching foot off ground

4.1-leg 3-D Reach

Why? Single leg reaches promote the dynamic flexibility and movement control of the foot and ankle.

How? Balance on one leg and reach out with the other keeping the reaching foot close to the ground.

A) Posterior chain



1. Start on your back one leg bent
2. Push through the heel to elevate hip
3. Create straight knee-hip-shoulder line

B) Lateral chain (f. ex gluteus medius)



1. Start from side plank position
2. Lift free leg up
3. Maintain the control of the hip/core

C) Front chain (abdominal wall, front hip)



1. Start from a plank position (legs wide)
2. Maintain stable hips/core
3. Alternate reaching arm

5. On-ground core and hip activation (ONG1-sequence)

Why? To activate and strengthen the hip and core region in order to promote stability. The goal is to enhance the ability to resist movement when required. Resisting flexion, adduction or rotation of the hip is essential for athletic movement just as much as assisting same movements.

How? Assume the described position and maintain the position, posture or movement for a given time.

A) Reach forward/down



1. Balance on one leg and reach with arm
2. Bend from both the knee and the hip
3. Alternate the reaching arm

B) Reach to the sides/down



1. Balance on one leg and reach with arm
2. Bend from both the knee and the hip
3. Alternate the reaching arm

C) Reach cross and down



1. Balance on one leg and reach with arm
2. Bend from both the knee and the hip
3. Alternate the reaching arm

6.3-D Single leg arm reach

Why? To create stability and control of the foot, knee and the hip in all planes of motion.

How? Balance on one leg and reach with alternating arm within the given plane of motion.

-Knees 4 Speed –Athletic Development & Injury Prevention-

KNEES 4 SPEED – STABILITY AND ACTIVATION

A) Resisted external rotation of the hip (RER)



1. Loop a resistance band around the leg above the knee
2. Assume a split stance position
3. Drive your knee from left to right within a controlled range

B) Resisted internal rotation of the hip (RIR)



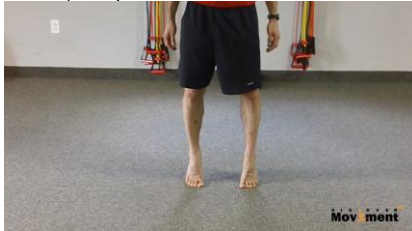
1. Loop a resistance band around the leg above the knee
2. Assume a split stance position
3. Drive your knee from left to right within a controlled range

7. Resisted internal/external rotation (IR/ER) of the hip

Why? To promote strength and active range of motion in external and internal rotation of the hip.

How? Use an elastic band to create resistance. Assume a split stance position and perform hip IR/ER.

A) Up'n down



1. Start in a shoulder width stance
2. Raise up on toes & lower back down
3. Maintain a tall posture & straight legs

B) Side to side



1. Start in a shoulder width stance
2. Shift weight between medial and lateral
3. Maintain a tall posture & straight legs

C) Circle pattern



1. Start in a shoulder width stance
2. Stay up & perform a circular motion
3. Maintain a tall posture & straight legs

8. Barefoot Ankle 3-D

Why? To strengthen and activate the muscles of the feet and ankles.

How? By keeping the heels off the ground, perform the movement in a given plane of motion.

A) Stick squat



1. Squat down parallel to the ground level
2. Keep the weight evenly on the whole foot
3. Maintain arms at shoulder height

B) Stick Lunge 3-D



1. Lunge to given four different directions*
2. Keep the weight evenly on the whole foot
3. Maintain arms at shoulder height

C) Stick 1-leg patterns



1. 1-leg balance reach out/sit down*
2. Keep the weight evenly on the whole foot
3. Maintain arms at shoulder height





9. Stick Squat, Lunge, 1-leg

Why? To improve mechanics, body awareness and the control during fundamental movement patterns.

How? Hold the stick on wrists arms shoulder height and perform a given movement without moving the stick.

-Knees 4 Speed –Athletic Development & Injury Prevention-


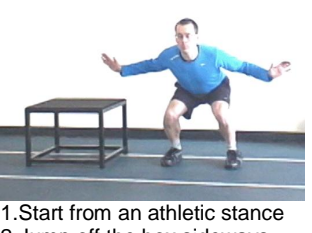


KNEES 4 SPEED – JUMP & LAND PROGRESSION A-D

<p align="center">A) Jump straight up</p>  <ol style="list-style-type: none"> 1. Start from an athletic stance 2. Jump straight up 3. Land smooth and controlled 	<p align="center">B) Jump forward and back</p>  <ol style="list-style-type: none"> 1. Start from an athletic stance 2. Jump a) forward b) back 3. Land smooth and controlled 	<p align="center">C) Jump sideways L/R</p>  <ol style="list-style-type: none"> 1. Start from an athletic stance 2. Jump a) left b) right 3. Land smooth and controlled 	<p align="center">D) Jump and Rotate 90-180°</p>  <ol style="list-style-type: none"> 1. Start from an athletic stance 2. Jump & rotate a) left b) right 3. Land smooth and controlled
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10 A) 3-D Jump & Land

Why? To practice the safest possible landing mechanics from jumps performed in different plans.

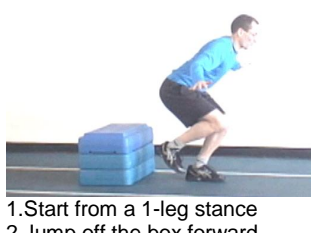
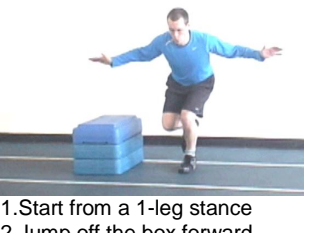


How? Start from an athletic stance and land in the same position making the ground contact controlled.

<p align="center">A) Landing forward</p>  <ol style="list-style-type: none"> 1. Start from an athletic stance 2. Jump off the box forward 3. Land smooth and controlled 	<p align="center">B) Landing sideways</p>  <ol style="list-style-type: none"> 1. Start from an athletic stance 2. Jump off the box sideways 3. Land smooth and controlled 	<p align="center">C) Landing backwards</p>  <ol style="list-style-type: none"> 1. Start from an athletic stance 2. Jump off the box backwards 3. Land smooth and controlled 	<p align="center">D) Landing w/ rotation</p>  <ol style="list-style-type: none"> 1. Start from an athletic stance 2. Jump off the box w/rotation 3. Land smooth and controlled
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10 B) 3-D Box Jump & Land

Why? To practice the safest possible landing mechanics from jumps performed in different plans.

How? Start from an athletic stance on the box and land in the same position making the landing controlled.

<p align="center">A) 1-leg landing forward</p>  <ol style="list-style-type: none"> 1. Start from a 1-leg stance 2. Jump off the box forward 3. Land smooth and controlled 	<p align="center">B) 1-leg landing sideways</p>  <ol style="list-style-type: none"> 1. Start from a 1-leg stance 2. Jump off the box forward 3. Land smooth and controlled 	<p align="center">C) 1-leg landing backward</p>  <ol style="list-style-type: none"> 1. Start from a 1-leg stance 2. Jump off the box forward 3. Land smooth and controlled 	<p align="center">D) 1-leg landing w/rotation</p>  <ol style="list-style-type: none"> 1. Start from a 1-leg stance 2. Jump off the box forward 3. Land smooth and controlled
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12. C) 3-D 1-leg Jump & Land + D) 1-leg Off-box Landing(in pictures)

Why? To practice the safest possible landing mechanics from jumps performed in different planes on one leg.

How? Start from an athletic stance and land in the same position making the landing smooth and stable.

-Knees 4 Speed –Athletic Development & Injury Prevention-




KNEES 4 SPEED – LOCOMOTION PROGRESSION A-C

<p>A)Run/sprint forward</p>  <ol style="list-style-type: none"> 1.Start from an athletic stance 2.Sprint forward with optimal technique 3.Keep arms close to the body 	<p>B)Run backwards/backpedal</p>  <ol style="list-style-type: none"> 1.Start from an athletic stance 2.Backpedal with optimal technique 3.Keep arms close to the body 	<p>C)Run sideways with crossover strides</p>  <ol style="list-style-type: none"> 1.Start from an athletic stance 2.Run sideways with cross-over strides 3.Swing arms as running forward
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11 A) 3-D Run

Why? To practice running mechanics and coordination and to transfer training effect to integrated locomotion.

How? Start from an athletic stance, perform a given movement pattern and finish in an athletic stance.

<p>A) Side shuffle</p>  <ol style="list-style-type: none"> 1.Start from an athletic stance 2.Shuffle sideways with optimal technique 3.Maintain arms up and back 	<p>B) Carioca</p>  <ol style="list-style-type: none"> 1.Start from an athletic stance 2.Carioca sideways with optimal technique 3.Counter rotate with the arms 	<p>C) Skip forward</p>  <ol style="list-style-type: none"> 1.Start from an athletic stance 2.Skip forward with optimal technique 3.Keep arms close to the body
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11 B) 3-D Shuffle – Carioca -Skip

Why? To practice various patterns and coordination and to transfer training effect to integrated locomotion.

How? Start from an athletic stance, perform a given movement pattern and finish in an athletic stance.

<p>A)Skip backwards</p>  <ol style="list-style-type: none"> 1.Start from an athletic stance 2.Skip with optimal technique 3.Keep arms close to the body 	<p>B)Skuffle (shuffle-skip –combination)</p>  <ol style="list-style-type: none"> 1.Start from an athletic stance 2.Skuffle sideways with optimal technique 3.Keep arms close to the body 	<p>C)Skippioca (carioca-skip -combination)</p>  <ol style="list-style-type: none"> 1.Start from an athletic stance 2.Skippioca forward with optimal technique 3.Counter rotate with the arms
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11 C) 3-D Skip – Skuffle -Skipioca

Why? To practice various patterns and coordination and to transfer training effect to integrated locomotion.

How? Start from an athletic stance, perform a given movement pattern and finish in an athletic stance.

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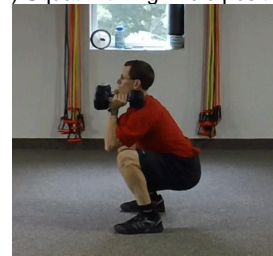
KNEES 4 SPEED – VERTICAL STRENGTH

A) Squat with low hold position



- 1.Start by standing & holding the dumbbells by the sides
- 2.Squat down pushing the hip back
- 3.Keep the back flat and the head up

B) Squat with high hold position



- 1.Start by standing & holding the dumbbells at shoulder height
- 2.Squat down pushing the hip back
- 3.Keep the back flat and the head up

16.Squat (dumbbell deadlift & front squat)

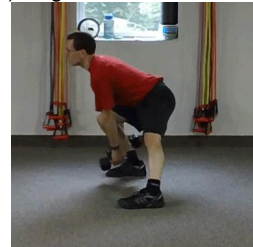
Why? To promote strength in the knee and hip flexion movements using vertical force production.

How? Use an elastic band to create resistance. Assume a split stance position and perform hip IR/ER.

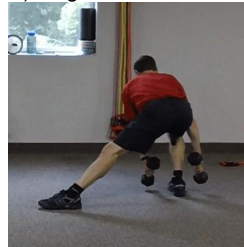
A)Lunge forward –low hold



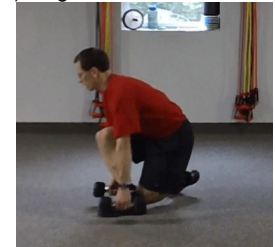
B)Lunge to side –low hold



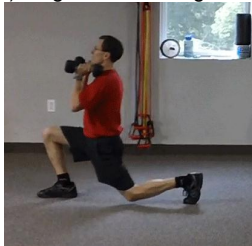
C)Lunge in rotation –low hold



D)Lunge cross –low hold



A)Lunge forward – high hold



- 1.Lunge forward
- 2.Drop the back knee low
- 3.Push back to starting position

B)Lunge to side –high hold



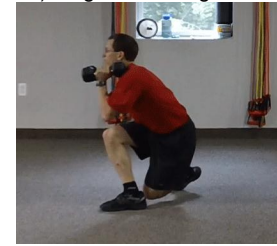
- 1.Lunge forward
- 2.Drop the back knee low
- 3.Push back to starting position

C)Lunge in rotation –high hold



- 1.Lunge forward
- 2.Drop the back knee low
- 3.Push back to starting position

D)Lunge cross –high hold



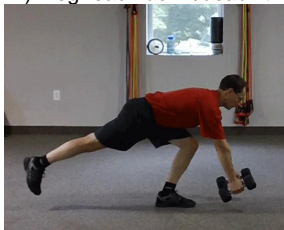
- 1.Lunge forward
- 2.Drop the back knee low
- 3.Push back to starting position

17. 3-D Lunge

Why? To improve strength in multi-directional step/lunge movement pattern.

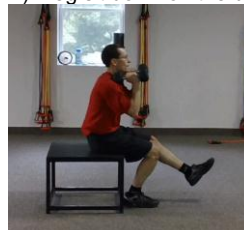
How? Hold the dumbbells and perform a controlled and technically sounds lunge in a given direction.

A)1-leg reach down/deadlift



- 1.Reach down in front of the foot
- 2.Bend from both knee and hip
- 3.Keep the back, free leg straight

B)1-leg sit down on the bench



- 1.Balance on one leg
- 2.Sit down on the bench
- 3.Stand back up with good control

12. 1-leg Reach Down & Sit down

Why? To develop strength that transfers into single leg performance and single leg/knee stability.

How? Balance on one leg and perform slow and controlled movements while holding the dumbbells.

-Knees 4 Speed –Athletic Development & Injury Prevention-

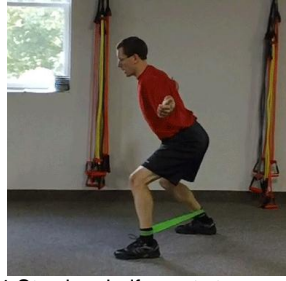
KNEES 4 SPEED – HORIZONTAL STRENGTH

A)Resisted side step



1. Stay in a half squat stance
2. Keep toes forward!!
3. Maintain tension in the band

B)Resisted diagonal step-forw



1. Stay in a half squat stance
2. Keep toes forward!!
3. Maintain tension in the band

C)Resisted diagonal step-back



1. Stay in a half squat stance
2. Keep toes forward!!
3. Maintain tension in the band

D)Resisted 'fencing' step



1. Stay in a half squat stance
2. Open the step 90°
3. Maintain tension in the band

18. Resisted miniband-walks

Why? To strengthen the muscles of the hip that assist the stability and function of the knee.

How? Place the band around the ankles. Maintain the tension in the band and move with slow and controlled steps in a given direction.

A)Resisted split squat



1. Start in split stance
2. Hold the handle with one arm
3. Lower the back knee down as you reach forward
4. Push back up to starting position

B) Unilateral resistance squat



1. Start in squat stance
2. Hold the handle with one arm
3. Squat down
4. Push back up to starting position

19. Squat with horizontal resistance

Why? To develop a) deceleration strength and b) unilateral strength for change of direction-performance.

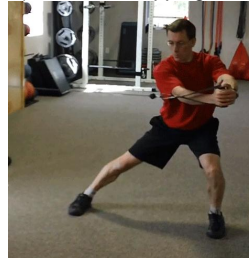
How? Move with deliberate control maintaining the posture and the correct alignment of the knee at all times.

A)Resisted stepping forward



1. Start in a bilateral stance
2. Hold the handle with one arm
3. Step forward with alternating leg reaching forward with the arm
4. Push off the ground with the front foot to return to start stance

A) Resisted stepping to the side



1. Start in a bilateral stance
2. Hold the handle with two arms
3. Step to the side performing a resisted rotation at the same time
4. Return back to start and repeat

20. Lunge/step with horizontal resistance

Why? To develop strength that transfers into single leg performance and single leg/knee stability.

How? Balance on one leg and perform slow and controlled movements while holding the dumbbells.

-Knees 4 Speed –Athletic Development & Injury Prevention-

6. Knees 4 Speed –programming; Suggested progression variables

GOAL/EXERCISE	REPETITIONS/SETS	RESISTANCE	INSTRUCTIONS
WARM-UP			
Light cardiovascular activity for 5 minutes			
FLEXIBILITY & MOBILITY			
1. Foam rolling	60 sec/muscle group/1	none	“Seek and destroy”
2. 4-way stretch	10 sec/stretch/1	none	hold each stretch for 10 s
3. 3-D Calf Stretch	10 sec/stretch /1	none	hold each stretch for 10 s
STABILITY & ACTIVATION			
4. 1-leg 3-D reach	5 reps/direction/1	bodyweight	slow, control, balance
5. ONG1-sequence	6 reps total/direction/1	bodyweight	slow, controlled
6. 3-D single leg arm reach.	5 reps/move/1	bodyweight	slow, control, balance
7. Resisted IR/ER of the hip	10-20 reps/side/1	resistance tubing	slow, knee moves L-R
8. Barefoot 3-D ankle	10/direction/1	bodyweight	slow, controlled
9. Stick squat, lunge, 1-leg	10 total of each (5+5)/1	bodyweight/stick	keep the stick balanced
JUMP & LAND PROGRESSION A-D			
10. A) 3-D Jump & Land	5 reps/direction/1-3	bodyweight	In athletic stance
10. B) 3-D Off Box Landing	5 reps direction/1-3	bodyweight	In athletic stance
10. C) 1-leg Jump & Land	5 reps/direction/1-3	bodyweight	1-leg athletic stance
10. D) 1-leg off-box Landing	5 reps/direction/1-3	bodyweight	1-leg athletic stance
LOCOMOTION PROGRESSION A-C			
11.A)Run 3-D	20 meters/move/2-6	bodyweight	80-90% of max speed
11.B)Skip-Shuffle-Carioca	20 meters/move/2-6	bodyweight	80% of the max speed
11.C)Skip-Skuffle-Skipioca	20 meters/move/2-6	bodyweight	80% of the max speed
VERTICAL STRENGTH			
12. Squat	10-12 reps/move/2	D.bells 50-60% max	Slowly down –faster up
13. 4-D Lunge	10 reps total/direction/2	D.bells 50-60% max	Slowly down –faster up
14. 1-leg strength patterns	12 reps total/move/2	D.bells 50-60% max	Slowly down –faster up
HORIZONTAL STRENGTH			
15. Mini band walk	10/direction/move/2	Medium resistance	Maintain tension in band
16. Squat – horizontal res.	10/side/move/2	Cable 50-60% max	Slowly down –faster up
17. Lunge –horizontal res.	10/side/move/2	Cable 50-60% max	Slowly down –faster up
COOL-DOWN			
Light cardiovascular activity for 5 minutes			

-Knees 4 Speed –Athletic Development & Injury Prevention-

7. Thank you Coach!

Thank you for your interest in the Knees 4 Speed –program. My guess is that you are a coach who not only has the optimal sport performance but also the health and happiness of your athletes on mind. You already know that long term athletic success requires balance within the body itself but also within the training environment that is surrounding the athlete. As a coach myself I have unlimited respect for you who serves with the wisdom, with the skill and with the experience just to see your athletes do well in sports and in life.

I hope that this manual will help you with your pursuit of safer and higher performance whether you are an athlete yourself or a dedicated coach helping others in reaching their true potential.

Be strong and courageous!

Sincerely,

Tommi Paavola

Discover Movement LLC.

www.discovermovement.com

PS: Please email me at tommi.paavola@discovermovement.com if you have any questions or feed-back.

-Knees 4 Speed –Athletic Development & Injury Prevention-

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