

TRIPHASIC TRAINING

**A High School Strength
And Conditioning Manual**

3.0



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Why write this Manual:

We have written this manual to ensure every coach out there the opportunity to implement quality training programs for each of their teams. [All Works in Blue are Hyperlinked](#)

What this Manual is:

This manual incorporates all of the training methods used with our athletes in an annual cycle. These training blocks provide each athlete with the qualities necessary to maximize performance. Successful athletic performances require the optimization of many qualities, including rate of force development, an aerobic base system, and of course max strength. Rate of force development is vital in athletics. During maximal velocity contractions, as seen in competition, there is not enough time for maximal muscular force to be reached. This means athletes must have the goal of producing the most force possible in the time allowed during competition. The aerobic base is improved through the proper use of conditioning methods throughout the year. Adaptations to this system are vital for recovery in repeat-effort sports, which includes all team sports. Maximal strength is the most common method of training used and does have its place in improving performance, however, it is important to realize improvements in this quality do not always transfer to sport's success.

Through the use of [triphasic training](#), which is the realization that every dynamic movement includes an eccentric, isometric, and concentric aspect and trains each of these individually, we will lay out the annual cycle of training using the block periodization method. Block periodization relies on the residual effects of training, or the amount of time a quality remains at a heightened level after the cessation of training. This model, and the understanding of residual effects, allows multiple peaking throughout the competition period by training qualities in a specific order. The modified, undulated model is also used throughout training to allow continued adaptations to the desired qualities. All of these training aspects will be covered in greater detail throughout this Manual.

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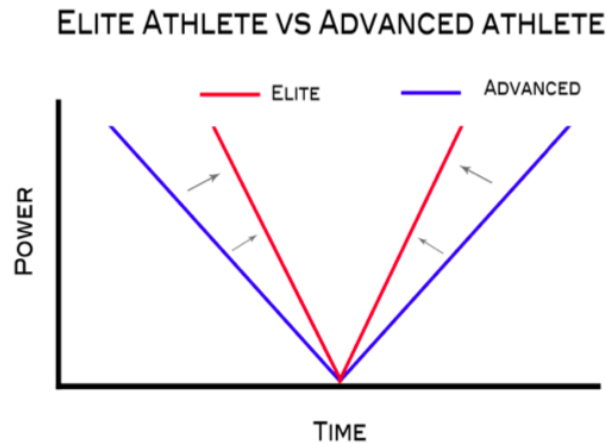
The Conditioning – Page 126 – 0 to 15 minutes – depending on time of year.

2.1 Triphasic Training - The Difference

Many traditional training methods teach athletes how to expel energy; little time and effort are spent teaching them to absorb it. That is the entire point of the Triphasic method—learning how to eccentrically and isometrically absorb energy before applying it in explosive dynamic movements. Athletes aren't powerlifters. They must be strong, but only to the extent that it can benefit them in their sport. Every dynamic human movement has a limited amount of time in which the mover can produce as much force as possible. Ben was a world-class thrower because he could generate more explosive strength (defined as maximal force in minimal time) in the time it took to throw a shot.

Most training methods focus on the development of explosive strength by emphasizing the concentric phase of dynamic movement. My epiphany in 2003 was that we were approaching the development of force from the wrong angle. The key to improved force production, and thus sport performance, doesn't lie in the concentric phase. To develop explosive strength, you must train the eccentric and isometric phases of dynamic movements at a level equal to that of the concentric phase.

Look at the figure below. Imagine the graph as depicting the same athlete at different times during his or her development. The lines are the same athlete, but one shows the results of an athlete developed using triphasic training and the other in the early stages of development. Your new goal as a strength and conditioning coach or athlete is to narrow that V as much as possible.



2.2 Eccentric

An eccentric action can be defined as when the muscle attachments closest and farthest from the center of the body (proximal and distal) move in opposite directions. This is often referred to as the lengthening, or yielding, phase, since the muscle is stretched due to a load placed on it.

Now, read this next part very carefully. Every dynamic movement begins with an eccentric muscle action. For example, when you jump, your hips perform a slight dip, eccentrically lengthening the quads and glutes before takeoff. This countermovement is critical to power production. The eccentric phase sets in motion a series of events that pre-load the muscle, thus storing energy to be used in an explosive, concentric and dynamic movement.

When you train the eccentric phase, two physiological processes contribute to force development. One is the most powerful human reflex in the body—the stretch reflex. The other, whose force producing abilities depend on the stretch reflex, is a close second in terms of force production. It is called the stretch-shortening cycle (SSC). (Although it's important to understand these processes, they are outside the scope of this article. For now, just accept the fact that they're important.)

Let's go back to the "V" from Part 1 of this series so you can see exactly what I'm talking about. When you look at the graph below, you begin to see the correlation between the eccentric and concentric phases. The steeper the eccentric line is coming into the bottom of the "V," the steeper the concentric line is leaving the bottom of the "V." The greater the velocity of

stretching during the eccentric contraction, the greater the storage of elastic energy. The athlete who can handle higher levels of force through an increased stretch reflex will be able to apply more force concentrically and be able to jump higher or use more power in other explosive movements.

To safely maximize eccentric adaptation, I have derived a few rules, which, when followed, yield the best results for athletes performing eccentric training.

1. Due to the intense stress placed on an athlete by eccentric training, its application should be limited to large, compound exercises.

When an athlete is first exposed to eccentric training, his or her physiological system will likely only be able to handle one compound exercise per workout. The exercise should be performed early in the workout while the nervous system is fresh.

2. Never perform slow eccentrics with loads greater than 85 percent of an athlete's one-rep max.

This rule is based on my own risk versus reward analysis. To me, the risk is far too great to have an athlete use weight close to, at or above his one-rep max for an extended period of time. I've seen torn pecs and quads, blown backs and injured shoulders. At the end of the day, you can get the same physiological adaptation using lighter loads for longer times with half the risk.

3. Always use a spotter when performing slow eccentrics.

You must remember that when performing eccentric training, the body is being maximally fatigued. As you can see in Table 3.2, as the load decreases, eccentric time increases. The resulting increase in time under tension means an athlete's muscular system could give out at any point during the lift, so proper spotting is crucial.

4. Always finish an eccentric focused lift with an explosive, concentric movement.

The most important aspect of performance—one that you're constantly trying to improve—is the nervous system. Every jump, cut and throw begins with an eccentric lengthening of the muscle and ends with an explosive concentric contraction. The bar will not necessarily move fast, especially when you use heavy eccentric loads, but the intent to accelerate the bar,

changing over from an eccentric to a concentric signaling pattern, must be firmly emphasized with every rep.

TABLE 3.2: ECCENTRIC LOADING PARAMETERS AND THEIR RESPECTIVE MESOCYCLE				
LOAD	TOTAL TIME OF ECCENTRIC (SECONDS)	REP RANGE	SETS	MESOCYCLE
85%	5-6 (ASSISTED)	1-2	1-2	ABOVE 80%
80%	5-6 (ASSISTED)	2-3	2-3	
75%	6-8	3-4	3-4	80-55%
70%	6-8	4-5	4-5	
65%	6-8	5-6	5-6	
60%	6-8	5-6	5-6	
55% AND BELOW	ECCENTRICS NOT IMPLEMENTED WITH THESE LOADS			BELOW 55%

Example Exercises with Eccentric Means and Coaching Points

Back Squat - Eccentric

1. Set up with the bar on the back of the shoulders.
2. Keeping the chest up and the back flat, sit back as if to a chair.
3. Descend into the bottom of the squat in the prescribed time.
4. Once the time has been reached, explosively fire up back to the start.

Front Squat - Eccentric

1. Set up with the bar on the front of the shoulders.
2. Keeping the chest and elbows up and the back flat, sit back as if to a chair.
3. Descend into the bottom of the squat in the prescribed time.
4. Once the time has been reached, explosively fire up back to the start.

RDL - Eccentric

1. Grab the bar just outside of the thighs with the feet shoulder width apart.
2. Keeping the back flat and the chest up, bend the knees slightly.
3. Allow the bar to slide down the thighs for the prescribed time.
4. Once the time has been reached, explosively fire up back to the start.

Bench Press - Eccentric

1. While laying on your back, grab the bar one thumb length away from the knurling.
2. Unrack the bar, keep the shoulders pulled back, and pull the bar into the chest.
3. Lower the bar in the prescribed time until it touches the chest.
4. Once the time has been reached, explosively fire up back to the start.

DB Shoulder Press -Eccentric

1. Begin standing with a dumbbell in each hand, palms facing each other.
2. Press the dumbbells up explosively to begin the exercise.
3. Lower the dumbbells back to the shoulders in the prescribed time.
4. Once the time has been reached, explosively fire up back to the start.

2.3 Isometric

Isometric actions are ones in which the muscle attachments closest and furthest from the center of the body (proximal and distal) remain at a constant length. You reach the isometric phase when the force you're exerting equals the force of the load.

Because the isometric phase is actually a contraction, it's trainable just like every other muscle action. Same as the eccentric phase, the isometric phase has two neurological processes that need to be trained to maximize the force transfer from the eccentric to concentric contractions. When muscles need to increase their level of force production, like they do when they decelerate and stop an eccentric contraction, they have two options:

Motor unit recruitment: Increase the number of muscles fibers that fire.

Rate coding: Increase the rate at which each fiber fires, which increases muscular tension.

Again, these physiological processes are outside the scope of this article. Just understand they are important to developing force. When you look at Figure 1, this becomes apparent. At some point on the graph, both lines have a transition point—a point where the line changes from a negative, eccentric slope to a positive, concentric one. That exact point is where the isometric contraction takes place. It is not like the eccentric phase, which has an entire line you can see and follow. Yet this single point is hugely important, because it acts as the springboard that launches the force from the stretch reflex and stretch-shortening cycle into the concentric contraction. The harder the stop, the better the total force recoil and the more explosive the action.

Specific attention to isometric training will result in improved force and power outputs for an athlete. Improving the qualities of the nervous system in this regard allows for high amounts of

energy to be absorbed, diverting maximal energy from the eccentric directly to the concentric with little to no loss of energy. This enables an athlete to maximize the power of both the stretch reflex and the stretch-shortening cycle. Add these to a strong, concentric contraction, which we will learn about in the next part of this series, and you'll feel like you're jumping off a trampoline instead of out of a sand pit.

Perform high-load isometrics at the beginning of your workout. Isometric contractions aren't as neurally taxing as eccentric training. As a result, lightened-load isometrics can, and should, be used throughout the entire workout. When I say "lightened," I mean assistance lifts—exercises that use lighter loads compared to large compound movements, such as Lunges or Closed-Grip Bench.

Stay safe and get the best results by following four rules during your isometric work.

1) Hit the ground like a brick.

When performing a resisted-load isometric, move through the eccentric portion quickly, pulling the bar down before trying to instantly stop its momentum. You *must* hit the isometric like a brick hitting a pavement floor—no give whatsoever!

2) Squeeze your muscles.

Squeeze your muscles as you hit the isometric contraction. For example, if you're performing a Back Squat, squat down to where you will be performing the isometric contraction during your sets. Once you have squatted down, squeeze your legs and glutes as hard as possible for several seconds. Once you experience what the isometric contraction feels like, you can begin your work sets.

3) Always use a spotter.

During triphasic training, your body will be reach maximum fatigue. Since your muscles could give out at any time, it is crucial that you use proper spotting.

4) Always finish an isometric-focused lift with an explosive, concentric movement.

By incorporating an explosive movement at the end of your lift, you're training your nervous system.

TABLE 3.4: RESISTED ISOMETRIC LOADING PARAMETERS AND THEIR RESPECTIVE MESOCYCLE				
LOAD	TOTAL TIME OF ISOMETRIC (SECONDS)	REP RANGE	SETS	MESOCYCLE
85%	3-4 (ASSISTED; HELP UP)	1-2	4-5	ABOVE 80%
80%	3-4 (ASSISTED; HELP UP)	2-3	4-5	
75%	4-5	3-4	3-4	55-80%
70%	4-5	4-5	3-4	
65%	4-5	5-6	3-4	
60%	4-5	5-6	3-4	
55% AND BELOW	ISOMETRICS NOT IMPLEMENTED WITH THESE LOADS DURING THIS TRAINING CYCLE			BELOW 55%

Example Exercises with Isometric Means and Coaching Points

Back Squat - Isometric

1. Set up with the bar on the back of the shoulders, keeping the chest up and the back flat.
2. Sit back and descend into the bottom of the squat rapidly.
3. Once in the bottom, become a statue and pause for the prescribed time.
4. Once the time has been reached, explosively fire up back to the start.

Front Squat - Isometric

1. Set up with the bar on the front of the shoulders, keeping the chest up and the back flat.
2. Sit back and descend into the bottom of the squat rapidly.
3. Once in the bottom, become a statue and pause for the prescribed time.
4. Once the time has been reached, explosively fire up back to the start.

RDL - Isometric

1. Grab the bar just outside of the thighs with the feet shoulder width apart.
2. Keeping the back flat and the chest up, lower the bar rapidly along the thighs.
3. Once the bar passes the knees, become a statue and pause for the prescribed time.
4. Once the time has been reached, explosively fire up back to the start.

Bench Press - Isometric

1. While laying on your back, grab the bar one thumb length away from the knurling.
2. Unrack the bar and pull it rapidly toward the chest.
3. Right before the bar hits the chest, stop it completely and pause.
4. Once the time has been reached, explosively fire up back to the start.

**TABLE 3.8: EXAMPLE EXERCISES WITH
LIGHTENED LOAD RESISTED ISOMETRIC MEANS
(ASSISTANCE, PERFORMED THROUGHOUT WORKOUT)**

EXERCISE	COACHING POINTS
<u>DB WALKING LUNGE-ISOMETRIC</u>	<ol style="list-style-type: none"> 1. Holding a pair of dumbbells, take a moderate step forward. 2. Keeping the chest up and the back flat, descend into the bottom of the lunge. 3. Lower yourself until the back knee is just above the ground and pause. 4. Once the time has been reached, explosively fire through and step forward.
<u>INCLINE DB BENCH</u>	<ol style="list-style-type: none"> 1. Holding a dumbbell in each hand, set up on an inclined bench. 2. Beginning the dumbbells near the shoulders, pause for the prescribed time. 3. Be sure to keep the chest up, the lower back arched, and the eyes toward the ceiling. 4. Once the time has been reached, explosively fire up and back to the start.
<u>DB RDL</u>	<ol style="list-style-type: none"> 1. Holding a pair of dumbbells, begin with the arms just along the thighs. 2. Keep the chest up, the back flat, and the knees slightly bent. 3. Lower the dumbbells along the thighs rapidly until just below the knees and pause. 4. Once the time has been reached, explosively fire up and back to the start.
<u>DB ROW - ISOMETRIC</u>	<ol style="list-style-type: none"> 1. Hold one dumbbell in the hand and use the other to stabilize the body on a bench. 2. Keeping the back flat, pull the dumbbell rapidly into the ribs. 3. Allow the dumbbell to return slightly toward the ground and pause. 4. Once the time has been reached, explosively fire up and back to the start.
<u>BENCH PRESS REACTIVE DROP PAUSE TOSS</u>	<ol style="list-style-type: none"> 1. While laying on your back, grab the bar one thumb length away from the knurling. 2. With a spotter, rapidly drop the bar until it is just about to hit the chest. 3. Pause with the bar right above the chest. 4. Once the time has been reached, explosively throw the bar as high as possible.

2.4 Reactive

The concentric phase of the triphasic training model is the sexy part of dynamic muscle action. It's the rock star that gets all the attention. You never walk into a gym and ask someone, "How much can you eccentrically lower to your chest?" You walk up and ask, "How much do you Bench?" You're asking how much weight they can concentrically lift by pushing it off their chest.

The concentric phase is the measuring stick used to evaluate all athletic performance. How much can you lift? How far can you jump? How fast can you run? These are all performance measures based on force output measured in the concentric phase. Specifically as it relates to dynamic movement, the concentric phase is the measure of an athlete's rate of force development (RFD).

In any dynamic movement, the combined force of the stretch reflex and stretch-shortening cycle aids the RFD. Recall from the earlier segments that the amount of potential energy stored within the musculoskeletal structure depends on the preceding eccentric and isometric contractions. When we understand how the concentric phase works in conjunction with these phases, we see why the concentric phase is imperative for maximizing explosive strength, RFD and performance. Would Nolan Ryan have been as intimidating without his fastball? Would Walter Payton have been as great if he couldn't cut? The answer: an emphatic "No!" An athlete who can quickly build and absorb energy is ineffective if he cannot use that energy concentrically to rapidly produce force.

The true importance of training the concentric phase is the synchronization of the entire triphasic muscle action—maximizing the energy transfer from the preceding eccentric and isometric phases into a unified, explosive and dynamic movement. For the purpose of simplicity, we are going to package these mechanisms into two categories—inhibition/disinhibition and synchronization.

Inhibition/Disinhibition

In every muscular action, there is an agonist and an antagonist, an inhibitor and a disinhibitor. For our purposes here, all you need to understand is that while the agonist is concentrically

contracting (shortening) to produce force, the antagonist is eccentrically contracting (lengthening). The purpose of the eccentric contraction is to try to decelerate the speed and force of the concentric contraction to protect the joints and ensure that the antagonist muscle doesn't tear from rapid stretching. Training the concentric phase to perform explosive dynamic movements improves intermuscular coordination, allowing for the inhibition of the antagonist muscle and resulting in maximal RFD. Put another way, by training the concentric phase, you're also training the inhibition of the antagonist.

Synchronization

There's no question that an athlete who can generate more explosive force in less time has a decisive advantage. However, the advantage only goes to athletes who can unleash that power in a manner that gives them a performance edge. Nolan Ryan could touch 100 mph on the radar gun consistently, but that's not what made him a Hall of Fame pitcher. The ability to place those 100 mph fastballs wherever the catcher put his glove is what made him Ryan the most feared pitcher of his era.

As an example, compare the Hang Clean to a Romanian Deadlift and Shrug. A novice athlete can quickly learn to perform a proper Romanian Deadlift and Shrug. It is a slow, controlled movement that allows time for the athlete's neuromuscular system to interpret, process and execute the movement. On the other hand, teaching the Hang Clean can be a long and arduous process, even though it's similar to the RDL and Shrug. In the case of the Hang Clean, decreasing the weight and increasing the speed of the exercise overloads the athlete's neuromuscular system.

The point is that like the eccentric and isometric phases of a dynamic movement, the concentric phase is a learned and trainable skill. An athlete can learn to concentrically perform a Back Squat in a few minutes. It's intuitive since it's a neuromuscular action that is performed on a daily basis. However, teaching an athlete to move a bar like a shot out of a cannon takes time and a great deal of concentric-focused training.

How to Apply Concentric Training

This is fairly simple and straightforward—train fast! Concentric training will look very familiar to most, because it's the predominant form of stress used in training. However, it only looks similar on paper. An athlete training concentrically after first building a solid foundation of eccentric and isometric strength will be able to move loads at much higher velocities.

TABLE 3.10: CONCENTRIC LOADING PARAMETERS AND THEIR RESPECTIVE MESOCYCLE				
LOAD	TOTAL TIME OF CONCENTRIC	REP RANGE	SETS	MESOCYCLE
97.5%	REACTIVE	1	1–2	ABOVE 80%
95%	REACTIVE	1	2–3	
90%	REACTIVE	1–2	3–4	
85%	REACTIVE	1–2	3–4	
80%	REACTIVE	1–3	4–5	
75%	REACTIVE	1–3	4–5	55–80%
70%	REACTIVE	2–3	4–6	
65%	REACTIVE	3	4–6	
60%	REACTIVE	3	4–6	
55%	REACTIVE	3	4–6	BELOW 55%
50%	REACTIVE	3	4–6	
45%	REACTIVE	3	4–6	
40%	REACTIVE	4	4–6	
35%	REACTIVE	4	4–6	
30%	REACTIVE	4	4–6	

**TABLE 3.11: EXAMPLE EXERCISES WITH
REACTIVE CONCENTRIC MEANS**

EXERCISE	COACHING POINTS
<u>BACK SQUAT - REACTIVE</u>	<ol style="list-style-type: none"> 1. Set up with the bar on the back of the shoulders. 2. Keeping the chest up and the back flat, pull yourself down into the bottom of the squat. 3. Once in the bottom, explosively fire out as fast as possible. 4. Repeat for the desired number of repetitions.
<u>SINGLE LEG DB FRONT SQUAT - REACTIVE</u>	<ol style="list-style-type: none"> 1. Holding a pair of dumbbells on the shoulders, keep the chest up and the back flat. 2. One leg should be elevated to the rear. 3. Using the front leg, pull rapidly into the bottom of the squat. 4. Once in the bottom, explosively fire out and repeat for the desired repetitions.
<u>RDL - REACTIVE</u>	<ol style="list-style-type: none"> 1. Grab the bar just outside of the thighs with the feet shoulder width apart. 2. Keeping the chest up and the back flat, lower the bar along the thighs rapidly. 3. Once the bar hits the bottom position, explosively fire up and return to the start. 4. Repeat for the prescribed repetitions.
<u>BENCH PRESS - REACTIVE</u>	<ol style="list-style-type: none"> 1. While laying on your back, grab the bar one thumb length away from the knurling. 2. Using the upper back, pull the bar rapidly into the chest. 3. Once the bar touches the chest, explosively throw it as hard as possible. 4. Repeat for the prescribed repetitions.

TABLE 4.5: PROGRESSIVE LOADING SCHEME			
WEEK	MONDAY LOADING (MEDIUM INTENSITY)	WEDNESDAY LOADING (HIGH INTENSITY)	FRIDAY LOADING (LOW INTENSITY)
1	82.5% 1-2 REPS, 4-5 SETS	87.5% 1 REP, 3-4 SETS	75% 4-5 REPS, 4-5 SETS
2	85% 1-2 REPS, 4-5 SETS	90% 1 REP, 3-4 SETS	77.5% 3-5 REPS, 4-5 SETS
3	87.5% 1-2 REPS, 4-5 SETS	92.5% 1 REP, 3-4 SETS	80% 3-4 REPS, 4-5 SETS

TABLE 4.9: MONDAY TRIPHASIC LOADING PARAMETERS					
BLOCK	INTENSITY	LOAD	TEMPO	REPS	SETS
BLOCK 1 (ECCENTRIC)	MEDIUM INTENSITY	82-87%	6:0:0:0	1-3	2-4
BLOCK 2 (ISOMETRIC)		82-87%	0:3:0:0	1-3	3-5
BLOCK 3 (CONCENTRIC)		82-87%	0:0:0:0	2-4	3-4

TABLE 4.8: MONDAY LOADING (MEDIUM INTENSITY)				
7 1RM	MAXIMUM REPS POSSIBLE	HIGH QUALITY REPS (STRENGTH)	SETS (OFF-SEASON)	SETS (IN-SEASON)
97.5%	1-2			
95 %	2			
92.5%	2-3			
90%	3-4			
87.5%	4	1	3-4	2-3
85%	4-5	1-2	4-5	2-3
82.5%	5	1-2	4-5	2-3
80%	5-6			
77.5%	6-7			
75%	7 - 8			

TABLE 4.11: WEDNESDAY LOADING (HIGH INTENSITY)				
7 1RM	MAXIMUM REPS POSSIBLE	HIGH QUALITY REPS (STRENGTH)	SETS (OFF-SEASON)	SETS (IN-SEASON)
97.5%	1-2	1	1-2	1-2
95 %	2	1	2-3	1-2
92.5%	2-3	1	3-4	1-2
90%	3-4	1	3-4	2-3
87.5%	4			
85%	4-5			
82.5%	5			
80%	5-6			
77.5%	6-7			
75%	7-8			

TABLE 4.12: WEDNESDAY TRIPHASIC LOADING PARAMETERS					
BLOCK	INTENSITY	LOAD	TEMPO	REPS	SETS
BLOCK 1 (ECCENTRIC)	HIGH INTENSITY	90-97%	REACTIVE 0:0:0:0	1	1-4
BLOCK 2 (ISOMETRIC)		90-97%	REACTIVE 0:0:0:0	1	1-4
BLOCK 3 (CONCENTRIC)		90-97%	REACTIVE 0:0:0:0	1	1-4

TABLE 4.13: FRIDAY LOADING (LOW INTENSITY)				
7 1RM	MAXIMUM REPS POSSIBLE	HIGH QUALITY REPS (VOLUME)	SETS (OFF-SEASON)	SETS (IN-SEASON)
95 %	2			
92.5%	2-3			
90%	3-4			
87.5%	4			
85%	4-5			
82.5%	5			
80%	5-6	3-4	4-5	IN-SEASON VOLUME COMES FROM PRACTICE
77.5%	6-7	3-4	4-5	
75%	7-8	4-5	4-5	

TABLE 4.19: ABOVE 80 PERCENT THREE-DAY VERSUS FOUR-DAY MODEL							
TRAINING WEEK:		DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
THREE-DAY MODEL	FOCUS	TOTAL BODY	OFF	TOTAL BODY	OFF	TOTAL BODY	OFF
	LOAD	82-87%		90-97%		75-80%	
	MEANS APPLIED	TRIPHASIC		DYNAMIC		TRIPHASIC	
FOUR-DAY MODEL	FOCUS	LOWER BODY	UPPER BODY	OFF	LOWER BODY	UPPER BODY	OFF
	LOAD	82-87%	82-87%		90-97%	90-97%	
	MEANS APPLIED	TRIPHASIC			DYNAMIC		

TABLE 4.21: ABOVE 80 PERCENT THREE-DAY VERSUS FIVE-DAY MODEL							
TRAINING WEEK:		DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
THREE-DAY MODEL	FOCUS	TOTAL BODY	OFF	TOTAL BODY	OFF	TOTAL BODY	OFF
	LOAD	82-87%		90-97%		75-80%	
	MEANS APPLIED	TRIPHASIC		DYNAMIC		TRIPHASIC	
FIVE-DAY MODEL	FOCUS	LOWER BODY	UPPER BODY	LOWER BODY	UPPER BODY	TOTAL BODY	OFF
	LOAD	82-87%	82-87%	90-97%	90-97%	75-80%	
	MEANS APPLIED	TRIPHASIC		DYNAMIC		TRIPHASIC	

TABLE 4.23: ABOVE 80 PERCENT THREE-DAY VERSUS SIX-DAY MODEL							
TRAINING WEEK:		DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
THREE-DAY MODEL	FOCUS	TOTAL BODY	OFF	TOTAL BODY	OFF	TOTAL BODY	OFF
	LOAD	82-87%		90-97%		75-80%	
	MEANS APPLIED	TRIPHASIC		DYNAMIC		TRIPHASIC	
SIX-DAY MODEL	FOCUS	LOWER BODY	UPPER BODY	LOWER BODY	UPPER BODY	LOWER BODY	UPPER BODY
	LOAD	82-87%	82-87%	90-97%	90-97%	75-80%	75-80%
	MEANS APPLIED	TRIPHASIC		DYNAMIC		TRIPHASIC	

TABLE 4.2											
MONDAY LOADING (MEDIUM INTENSITY)			WEDNESDAY LOADING (HIGH INTENSITY)			FRIDAY LOADING (HIGH VOLUME)					
7 1-RM	MAXIMUM REPS POSSIBLE	HIGH QUALITY REPS (STRENGTH)	SETS (OFF- SEASON)	SETS (IN- SEASON)	HIGH QUALITY REPS (STRENGTH)	SETS (OFF- SEASON)	SETS (IN- SEASON)	HIGH QUALITY REPS (VOLUME)	SETS (OFF- SEASON)	SETS (IN- SEASON)	
97.5%	1 - 2				1	1 - 2	1 - 2				
95 %	2				1	2 - 3	1 - 2				
92.5%	2 - 3				1	3 - 4	1 - 2				
90%	3 - 4				1	3 - 4	2 - 3				
87.50%	4	1	3 - 4	2 - 3							
85%	4 - 5	1 - 2	4 - 5	2 - 3							
82.5%	5	1 - 2	4 - 5	2 - 3							
80%	5 - 6										
77.5%	6 - 7							3 - 4	4 - 5	IN-SEASON VOLUME COMES FROM PRACTICE	
75%	7 - 8							3 - 4	4 - 5		

This table displays my three-day loading variables of the above 80 percent undulated mesocycle. The column on the far left displays the percentage load of the athlete's 1RM with the maximal number of repetitions possible listed in the column to the right. The reps and sets within each training day indicate the number of both that can be performed while maintaining the quality of work at a high level for the athlete. A couple things to notice—the rep ranges stay the same regardless of whether the athlete is in in-season or off-season training and the number of sets used for in-season training are fewer than off-season training. This is due to the high work demands and the added stress of practice and games during the season. Also, look at Friday, Sets (in-season). During the season, all the volume work comes from practice and games. Don't train volume in-season! You'll overtrain your athletes.

An Exmple of a 5 day Conditioning protocol that can be used, however if conditioning 5 days, don't use the whole workouts provided below.

TRAINING DAY	CONDITIOING GOAL	SPECIAL INSTRUCTIONS	EXAMPLE OF WORKOUTS
DAY 1	Short Sprints (High Quality Speed)	Sprints under 10 seconds Full recovery: rest 90-120 seconds	Alactic High Quality Workout
			Flying 60s
			16 week short sprint workouts
			Cone agility
DAY 2	Long Sprints or Short Sprints w/ Reduced Rest (Speed Conditioning)	Sprints over 15 seconds Or Sprints under 10 recovery under 20 seconds	
			High Quality Lactic Anaerobic Power Training Builder
			Metabolic Injury Prevention Runs
DAY 3	Short Sprints (High Quality Speed)	Sprints under 10 seconds Full recovery: rest 90-120 seconds	Alactic High Quality Workout
			Flying 60s
			16 week short sprint workouts
			Cone agility
DAY 4	Short Sprints (Anaerobic Conditioning)	Sprints under 10 seconds Limit recovery: 45-60 seconds	Work Capacity Alactic Anaerobic Training Builder
			Flying 60s
			16 week short sprint workouts
			Cone agility
DAY 5	Longer Sprints or Continuous Running (Oxidative Conditioning)	This day is purely work capacity	Aerobic Work Capacity Training Builder
			Metabolic Injury Prevention Runs
			Bike Conditioning
			TrashBall

TABLE 4.1: EXAMPLE QUALITY REPS OVER QUANTITY							
PARAMETERS:	SET 1	SET 2	SET 3	SET 4	SET 5	TOTAL REPS	NUMBER OF QUALITY REPS
3x5 AT 80%	5 REPS	5 REPS	5 REPS			15	4-5
5x3 AT 80%	3 REPS	3 REPS	3 REPS	3 REPS	3 REPS	15	13-14

Basic Undulated Method of Yearly Training

Month of Training	<u>Month 1</u>	<u>Month 2</u>			<u>Month 3</u>			<u>Month 4</u>			<u>Month 5</u>		
Focus of Loading	Work Capacity	Below 80% of Max lift			Above 80% of Max lift			Below 80% of Max lift			Between 50% - 25% of Max lift		
Weekly loading within month	High Volume Low Weight	Day 1 65%	Day 2 80%	Day 3 55%	Day 1 85%	Day 2 92%	Day 3 80%	Day 1 65%	Day 2 80%	Day 3 55%	Day 1 40%	Day 2 50%	Day 3 25%
Duration of Month	3 to 6 Weeks	3 to 4 Weeks			3 to 4 Weeks			3 to 4 Weeks			3 to 4 Weeks		
Focus	Get in Shape	Speed Strength			Strength			Speed Strength			High Velocity Peaking for Sport		

Above 80 Progressive loading for Strength	Loading Day 1 Sub Max Effort Day	Loading Day 2 Max Strength Day	Loading Day 3 Higher Volume Day
Week 4	85% 1-2 Reps, 4-5 sets	92.5% 1 Rep, 3-4 sets	80% 3-4 Reps, 4-5 sets
Week 3	82.5% 1-2 Reps, 4-5 sets	90% 1 Rep, 3-4 sets	77.5% 3-5 Reps, 4-5 sets
Week 2	80% 1-2 Reps, 4-5 sets	87.5% 1 Rep, 3-4 sets	75% 4-5 Reps, 4-5 sets
Week 1	77.5% 1-3 Reps, 4-5 sets	85% 1-2 Reps, 4-5 sets	72.5% 4-5 Reps, 4-5 sets

The Follow Graph is a basic overview of a loading model use for various time and training focus.

Weekly Rep Schemes in Undulated model	Day 1 of the Week	Day 2 of the Week	Day 3 of the week
Strength Method - Above 80 Percent of Percent of Max Lift	2 -3 Reps per Set – Load used is 82.5%-87.5% of Max lift	1 Rep Per Set - Load used is 90%-97.5% of Max lift	3-5 Reps Per Set - Load used is 75%-80% of Max lift
Speed Strength – load is Between 55%-80%	3-4 Reps Per Set – Load used is 65%-72.5% of Max lift	1-2 Reps Per Sets – Load used is 80%-75% of Max lift	3-6 Reps Per Sets – Load used is 55%-65% of Max lift
High Velocity Peaking Method	5-8 Rep Per Set – Load used is 40% of Max lift	4-6 Rep Per Set – Load used is 50% of Max lift	6-8 Rep Per Set – Load used is 25% of Max lift
Other Methods used on Shifted Undulated model			
Bodybuilding Method	8-10 Reps Per Set - Load used is 77%-70% of Max lift	6 -8 Reps Per Set - Load used is 80% -75% of Max lift	10-12 Reps Per Set Load used is 70% -60% of Max lift
Strength Speed Method - Load Between 65– 90 percent of Max Lift	3-5 Reps Per Set – Load used is 72.5%-77.5% of Max lift	1-3 Reps Per Set - Load used is 85%-90% of Max lift	4-5 Reps Per Set - Load used is 65%-70% of Max lift

3.1 Applying Triphasic Training Methods to Olympic lifting

The means of applying Triphasic Training, from eccentric, to isometric, to reactive can be applied to any lift, even the Olympic movements, if a coach so desires. These exercises can be undulated for time in the same manner that any other lift utilized in the triphasic program can be, depending on a coach's goals and their athlete's needs.

The eccentric phase will require the movement to be started from the top of the hang position, as a lift starting from the floor would not allow any eccentric action to be completed. It is important that the athletes maintain a proper position throughout the eccentric portion of the exercise to allow for maximal power output. After the timed eccentric has reached the desired range of motion, which will usually be around the mid-shin area, an explosive pull and/or catch will be used to finish the movement.

The isometric phase will be completed with a pause held at the bottom of the movement. If a pull from the floor is the ultimate goal, the isometric would be completed with the plates hovering just off the ground while the athlete maintains a proper position. If a hang clean is the end goal movement, the isometric would be held anywhere from the top of the knee to the mid-shin area, depending on the athlete's lower limb lengths. It is vital that the athlete maintains a proper position and does not allow the weight of the bar to pull them out of a strong position. It is important to note that the isometric should be held for at least 3 seconds to ensure the stretch-shortening cycle is not being used during the lift, so potential energy dissipates. The movement will always be finished with a pull and/or catch depending on the coach's programming position. If general strength is a main goal of this training, an isometric hold could also be completed at the bottom of the front squat, but this training will not improve the power production of the pull in the Olympic lift. Olympic lifting is already a sport in its own regard, so it is important to remember that we are training athlete's to improve performance on the field, not improve lifting.

The reactive phase will be the completion of the entire Olympic movement. If a hang clean/pull is used, the stretch-shortening cycle will play a large role in energy production for the lift. The improvements made throughout the eccentric and isometric phases will be made very apparent during this phase. Power clean/pull will not cause the SSC to be used as there is no eccentric portion of the exercise. This is not to say the power clean cannot be used effectively in a training program. Starting strength increases due to the isometric phase will allow for a stronger pull from a stopped position, leading to increased power outputs.

A contrast method can be used with either the hang or power clean throughout the implementation of Triphasic Training. Two types of contrast methods can be used during training. The first includes a single plyometric, such as a box jump, with the chosen Olympic movement, the second option is the French contrast method. The French contrast method should be paired with the heavy sets to improve the utilization of the SSC and the RFD of athletes. This will consist of 3 sets of jumps, a body weight movement such as hurdle hops, a weighted movement such as weighted squat jumps, and finally an accelerated movement such as accelerated plyo jumps can be used to complete the French contrast training method. This training increases the transfer of training with speeds at (body weight), just below (weighted), and just above (accelerated) game speeds seen in competition.

The addition of the triphasic training method to the Olympic lifts will improve explosive power through the enhancement of the SSC, as well as increasing the rate of force development, when the French contrast method is included. These performance variables will immediately improve power outputs of athletes while also improving their efficiency of movement.

It is important to remember that this training is intended for athletes, not Olympic weight lifters. Few athletes reach the technical proficiency of true Olympic weight lifters, and as coaches we must keep in mind that the perfection of the movement is not the ultimate goal. The ultimate goal is to improve the power and the efficiency of each athlete. With this in mind straps will be allowed to be used during training as this can improve the ability to train.

Below is a template of a 6 week triphasic block showing the utilization of an Olympic movement paired with the French contrast method. The second chart shows the undulated model used in triphasic training with percentage ranges as well as rep and tempo options.

Triphasic Olympic Lift Progression						
Phase	Eccentric		Isometric		Reactive	
Week	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Main Movement	Hang Clean		Hang Clean		Hang Clean	
Motion	Slow count down to mid-shin		Isometric hold around mid-shin (at least 3 sec)		Full Hang Clean	
French Contrast	Hurdle Hop		Hurdle Hop		Hurdle Hop	
	Wt. Pause Squat Jump		Wt. Pause Squat Jump		Wt. Squat Jump	
	Acc. Pause Squat Jump		Acc. Pause Squat Jump		Acc. Squat Jump	

Undulated Model for Olympic Lifts Using Timed Sets						
Day	Monday		Wednesday		Friday	
Method	Eccentric/Isometric		Reactive		Eccentric/Isometric	
Intensity	82-87%		92%+		75-80%	
Set Time	:07	(:03)	Reactive		:10	(:05)
Reps	x1	x2	x2-3	x2-3	x1	x2

Composite Schemes for load and Reps for Main Lifts Back Squat, Bench, Olympics

	Maximum Reps in one Set (Rarely done)	Reps For High Quality Strength	Sets of High Quality Reps (use Column to left) off-season	Sets of High Quality Reps (use 2 Columns to left) in-season	Sets of High Volume for day 3 Training in undulated
97.5%	1-2 Reps	1 Repetition	1 - 2 Sets	1 - 2 Sets	
95 %	2 Reps	1 Repetition	2 - 3 Sets	1 - 2 Sets	
92.5%	2-3 Reps	1 Repetition	3 - 4 Sets	1 - 2 Sets	
90%	3-4 Reps	1 Repetition	3 - 4 Sets	2 - 3 Sets	
87. %	4 Reps	1 Repetition	3 - 4 Sets	2 - 3 Sets	
85%	4-5 Reps	1-2 Repetitions	4 - 5 Sets	2 - 3 Sets	
82.5%	5 Reps	1-2 Repetitions	4 - 5 Sets	2 - 3 Sets	
80%	5-6 Reps	1-2 Repetitions	4 - 5 Sets	2 - 3 Sets	3-4 Reps, 4-5 sets
77.5%	6-7 Reps	1-3 Repetitions	4 - 5 Sets	2 - 3 Sets	3-4 Reps, 4-5 sets
75%	7-8 Reps	1-3 Repetitions	4 - 5 Sets	3 - 4 Sets	4-5 Reps, 4-5 sets
72.5%	8-9 Reps	2-3 Repetitions	4 - 5 Sets	3 - 4 Sets	4-5 Reps, 4-5 sets
70 %	9-10 Reps	2-3 Repetitions	4 - 6 Sets	3 - 4 Sets	5-6 Reps, 4-5 sets
67.5%	11-12 Reps	2-3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-7 Reps, 4-5 sets
65%	13- 14 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
62.5%	14-15 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
60%	15-16 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
57.5%	17-18 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
55%	19-20 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
52.5%	20-21 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
50%	22-24 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets

4.1 Warm Up

The Start

The purpose of a dynamic warm-up is to get your body moving in ways comparable with the demands of your specific sport. While your body gets moving, the temperature inside your body and muscles is elevated and the heart begins to pump more blood throughout the body.

The Further

Dynamic jogging is used first in the dynamic warm-up process to increase blood flow. This is followed by dynamic walking movements. Dynamic warm-up movements are then completed to wrap up the warm-up.

The Where

You can complete your dynamic warm-up in any space. The dynamic warm-up can be completed in small locker room, hallways, weight rooms, and even stadiums.

Side note - Complete the dynamic warm-ups with no shoes on. This will help your balance and kinesthetic awareness, which will aid in injury prevention.

The Length

The duration of your warm up should be between 5 and 15 minutes in duration and should include all types of movements. Examples of these are shown below and range from jogging, walking, standing, and other movements.

Dynamic jogging - The dynamic jogging part of your warm-up should be a continuous activity. Some coaches will go down and back, which is fine and works well if they have appropriate space at their disposal. However if you have, for example, a long hallway, a coach can put two cones down the hallway. The athletes will then perform the dynamic jogging around the cones in a continuous fashion while they complete the dynamic exercises I call out. Be sure both sides are completed for lateral movements such as shuffling and carioca.

The following are examples of jogging dynamic warm-ups

<u>JOGGING FORWARD</u>	<u>GALLOP RT LEG BACKWARD</u>
<u>JOGGING BACKWARD</u>	<u>GALLOP LT LEG BACKWARD</u>
<u>CARIOCA LEFT</u>	<u>JOGGING FORWARD</u> Toes Pointed In
<u>CARIOCA RIGHT</u>	<u>SKIP W\ FLARED KNEES (BWD)</u>
<u>SKIPPING (FWD)</u>	<u>JOG HI KNEE X-OVER (FWD)</u>
<u>SKIPPING (BWD)</u>	<u>LATERAL STRAIGHT LEG SKIPS LT</u>
<u>JOG W\ CROSSOVER STEP (FWD)</u>	<u>CARIOCA QUICK STEP</u>
<u>CHERRY PICKERS</u>	<u>Jogging FORWARD</u> Toes Pointed Out
<u>SHUFFLE (X-ARM SWING) RT</u>	<u>SKIP W\ STAIGHT LEGS FWD</u>
<u>JOGGING BACKWARD THROW PUNCHES</u>	<u>SKIP W\ KICK (FWD)</u>
<u>High Knee Carioca</u>	<u>Jogging Backwards</u> Toes Pointed In
<u>JOGGING FORWARD ARM CIRCLE</u>	<u>FOOT FIRE</u>
<u>GALLOP RT LEG FORWARD</u>	<u>JOGGING Backward</u> Toes Pointed Out
<u>GALLOP LT LEG FORWARD</u>	<u>C SERIES RT</u>
<u>JOG W\ HIGH KNEES (FWD)</u>	<u>C SERIES LT</u>

Dynamic walking - the dynamic walking warm-up will progress to larger, slower movements. These movements provide increased mobility training for your athletes and will further assist in injury prevention.

Dynamic movements - after the walking dynamic warm-up, dynamic movements will be added to finish the warm-up process. These dynamic movements will progress to various joint specific and injury prevention movements that can be used for an entire body warm-up. This aspect of the warm-up may be done lying on the ground, sitting and standing.

The following are examples are for dynamic warm-up movements

<p>5 PNF Both Legs Inside & Outside</p> <p>WALKING BAREFEET</p> <p>5 PNF Leg Flares</p> <p>Walking on inside of feet</p> <p>Standing Arm Circle Side–</p> <p>WALKING FORWARD ON OUTSIDE OF FEET</p> <p>STANDING ARM CIRCLES FRONT</p> <p>WALKING FORWARD ON TOES</p> <p>STANDING ARM CIRCLES OVER HEAD</p> <p>WALKING BACKWARD ON INSIDE OF FEET</p> <p>PUSH AWAY</p> <p>WALKING BACKWARD ON OUTSIDE OF FEET</p> <p>TRUNK TWISTS REINDEER</p> <p>WALKING BACKWARD ON TOES</p> <p>NECK ROLLS</p> <p>FRANKS</p> <p>NECK SLIDES - FORWARD & BACKWARD</p> <p>WALKING BEND ANKLE GRAB</p> <p>HOUR GLASS</p> <p>HIGH KNEE PULLS WITH F8 SHAKE</p> <p>SHOULDER SLIDES LATERAL</p> <p>FIGURE 4 SIT WALKS</p> <p>MESSIER SQUATS</p> <p>Walking Lunge</p> <p>ANKLE ROLLS</p> <p>KNEE ROLLS 4 EACH WAY</p> <p>Lateral Lunge W/ ANKLE TILTS</p>	<p>LATERAL CROSSOVERLUNGE</p> <p>FIGHTER SHOULDER ROLLS</p> <p>Spiderman Crawl</p> <p>Toe to Mouth Supine</p> <p>Lying Leg Twist</p> <p>Bent Leg Hip Rotation</p> <p>DNS Get Up</p> <p>Hurdler Twist Both Legs In</p> <p>Quadruped Shifts</p> <p>Baby Crawling Stage One</p> <p>Baby Crawling Stage Two</p> <p>Elbow to Instep with T-spine Rotation</p> <p>Bent Over Interlocked Arm Circles</p> <p>Interlocked Front Arm Circles</p> <p>Interlocked Over Head Arm Circles</p> <p>Thumb Look Aways to Right</p> <p>Thumb Look Aways Left</p> <p>Marching Slow</p> <p>Gallop Forward</p> <p>Carioca Quick Step</p> <p>Cat Cow</p> <p>Donkey Kick</p> <p>Hip Circles</p> <p>Quadruped Shifts</p> <p>Quadruped Forward Leg Circles</p> <p>Quadruped Backward Leg Circles</p> <p>Quadruped Out Hip Lift</p>
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<u>STRAIGHT LEG FIGURE 8 4 EACH</u>	<u>Laying Knee Ups fronts</u>
<u>VISION SHIFT TRAINING HI & LOW</u>	<u>Scorpion</u>
<u>FORWARD CROSSOVER WALKING LUNGE</u>	<u>Push Up Stretch</u>
<u>WITH TWIST</u>	<u>Push Up Stretch With Twist</u>
<u>LUMBAR ROLLS</u>	<u>Toe Pikes</u>
<u>Duck Walk</u>	<u>Spread Eagle</u>
<u>X-BEHIND</u>	<u>Laying Knee Ups</u>
<u>SHUFFLE W\ Drag Foot</u>	<u>Bent Leg Hip Rotation</u>
<u>NECK SLIDES</u>	<u>Dynamic Butterfly</u>
<u>SHUFFLE W\ DRAG FOOT LT</u>	<u>Knee To Chest and Roll</u>
<u>CHEST SINKS</u>	<u>Laying Leg Over</u>
<u>LATERAL SHIFTING</u>	<u>Inverted Bike</u>
<u>TRUNK ROLLS</u>	<u>Laying Up and Over</u>
<u>WALKING BACKWARD REACHES</u>	<u>Inverted Leg Swings</u>
<u>LEG SWINGS FOR-BACKWARD</u>	<u>Laying Straight Leg Kicks</u>
<u>STRAIGHT LEG TOE TOUCH WALK</u>	<u>Lying Leg Twist</u>
<u>Hip Swing</u>	<u>Laying Leg Circles</u>
<u>REVERSE FLARE LUNGE PALMS TO CEILING</u>	<u>Hurdler Twist</u>
<u>SQUATTING INTERNAL ROTATION</u>	<u>Hamstring Up and Over</u>
<u>FRANKENSTEIN WITH SKIP</u>	<u>Hurdler Twist Both Legs In</u>
<u>TOE ROLLS</u>	
<u>SINGLE LEG "T" RDL</u>	
<u>REINDEER ELBOW CIRCLES</u>	
<u>LATERAL CROSSOVER LUNGE</u>	
<u>FIGHTER SHOULDER ROLLS</u>	

4.2 Various Types and Kinds of Warm Up

The [Dynamic hurdle warm-up](#) can be placed into your warm-up to increase hip mobility for your athletes.

The [Neurological Reprogramming Dynamic warm-up](#) should be completed before a sport skill learning session, a speed development training, a pre-rehab session, and after a chiropractic and/or manual therapy treatment. These movements should be placed into youth sport dynamic warm-ups daily to encourage proper motor learning patterns.

The [In Place Dynamic warm-up](#) Can be completed in a locker room or other small spaces such as hallways with limited space so your athletes get a proper warm-up when facilities are not readily available.

The [Ground Dynamic warm-up](#) Can be also be completed in a locker room or another tight spaces such as hallways with limited space so your athletes get a proper warm-up when facilities are not readily available.

The [Youth Specific Dynamic Warm-Up](#) was created for younger generations and is a specific warm-up for the development of youth athletes.

Many athlete dynamic warm-ups involve vision training, kinesthetic awareness, mobility training, balance training, and many other performance preparation movements. These movements are vital to achieve proper training and the development of elite athletes.

5.1 Agility Drills

Agility Drill Speed Development Program

Agility and speed development should be done post warm-up.

The following is a list of cone drills that can be used for speed development. A coach can reach the desired adaptations when work to rest ratios are set appropriately. The ability to stop movement, and then begin movement again in a different direction are vital for many sports. Agility drills are one of the most effective methods for developing change of direction abilities. Many coaches have fallen under the belief that agility ladder training helps with change of direction, but when the actions and movements used during agility ladder training are viewed, you can clearly see that these movements do not mimic what happens in sport. All drill examples that you see below are cutting with a single foot. A coach must remember to train the right and left sides of the body equally during change of direction training, which ensures symmetry for each athlete.

List of Agility Drills

[**Xlathlete 7 Seconds Agility Speed Development Protocol**](#)

[**Xlathlete 5 Seconds Agility Speed Development Protocol**](#)

[**Xlathlete 3 Seconds Agility Speed Development Protocol**](#)

[**Xlathlete 7 Seconds Take To The Field Agility Drills**](#)

[**Xlathlete 5 Seconds Take To The Field Agility Drills**](#)

[**Xlathlete 3 Seconds Take To The Field Agility Drills**](#)

[**Various Xlathlete Cone Drills**](#)

[**Composite List of Various xlathlete Cone Drills**](#)

Agility Drills for Speed Development

When the goal of agility training is speed development, then the most advantageous time to complete these drills would be directly after the warm-up period, but before going into the weight room or any other type of workout. This is the time where athletes have the greatest ability to adapt, as they will have the greatest ability to complete high quality training.

Personally, I recommend and prefer coaches to complete cone agility drills everyday athletes train because this aspect is so important to sport. The key to developing maximal speed is completing each agility drill at maximal speed and intensity, and then allow full rest times. Full rest times between each repetition allow athletes to repeat high-quality drills of maximal speed, while also improving change of direction.

Pro-Shuttle Comparison- Pre and Post [Triphasic Training](#)

Pre Triphasic training with change of direction strength needed from Triphasic Training Methods

Signs that Triphasic training is needed

- 1) High hips
- 2) Reaching for cone
- 3) Slow turns

Example of [Bad Pro-shuttle](#) –Pre Triphasic Training

Example of [Bad Pro-shuttle End View](#) –Pre Triphasic Training

Post Triphasic training – notice change of direction strength increased to develop speed

Correct form (Optimal triphasic action)

- 1) Low to the ground
- 2) Hips sink to cone
- 3) Explode out of turn

Example of [Good Pro-shuttle](#) –Post Triphasic Training

Example of [Good Pro-shuttle End View](#) – Post Triphasic Training

5.2 Speed Drills for Top End Speed Development

[Flying 60's Speed Development](#)

[Flying 90's Speed Development](#)

Rest Time for Speed Development

The suggested rest time between each 3 second cone agility drill for speed development and quickness is between 30 to 45 second. Once again, this long rest time is given to ensure your athletes are fully recovered between each repetition. An athlete's full recovery is required if top end speed is being attempted to be trained as full recovery is the only way high-quality repetitions can be continually completed.

A brief article on Speed and Rest - [Quickness, Agility and Speed Development](#)

The following article explains, in depth, how to properly implement various agility and speed development drills into your program. It also continues to justify the importance of giving athletes full rest times between repetitions in top end speed development training.

Below is a separate article that emphasizes the importance of giving each athlete full rest times in order to cause an adaptation to maximal speed. It can also be viewed by clicking this link:

[Speed and Skill Optimization - A Proposal for a New Practice Paradigm](#)

5.3 Speed and Skill Optimization - A Proposal for a New Practice Paradigm

By Cal Dietz and Jonathon Janz

Introduction

It is often said that the best coaches of any sport know precisely when to push their athletes and when to take their foot off the throttle. Exceptions aside, high-level coaches do not simply grind their athletes into the ground each and every practice session, creating a practice culture that overemphasizes sacrifice and grunt labor to the detriment of skill acquisition and the enhancement of speed. Due to the influence of Hollywood movies featuring caricatures of nearly-sadistic football coaches, or the annual idle chat among aging alumni under Friday night lights remembering when “coach ran them till’ they bled or puked,” the vast majority of the public have formed the opinion that hard work, and hard work alone, is the key to sporting success. If the kids do not win, they simply didn’t work hard enough. They’re too soft. They’re too coddled. They’re not committed to doing what it takes to win.

Nothing could be further from the truth.

In reality, high-level sport coaching is a delicate balance of art and science. The human body has finite parameters within which coaches and trainers must work. It only responds and adapts to certain forms and quantities of stress which must be carefully prescribed, monitored, and periodically reassessed. A coach who simply seeks to make his athletes exhausted during each and every practice is a coach lacking all understanding of human physiology and of the nature of sport itself. For sport is not merely a matter of strategy and tactical decision making, but also a matter of skill acquisition and performance. In our experience, many coaches generally understand the former, but almost entirely lack knowledge of the latter. They simply do not understand that all sports and sporting activities are skills, and that in order to elicit optimal performance in their athletes, coaches need to refocus their efforts on effectively improving sport skill performance. Furthermore, speed development is largely lost on many coaches as well, and the ideal means of improving speed is actually linked directly to the enhancement of

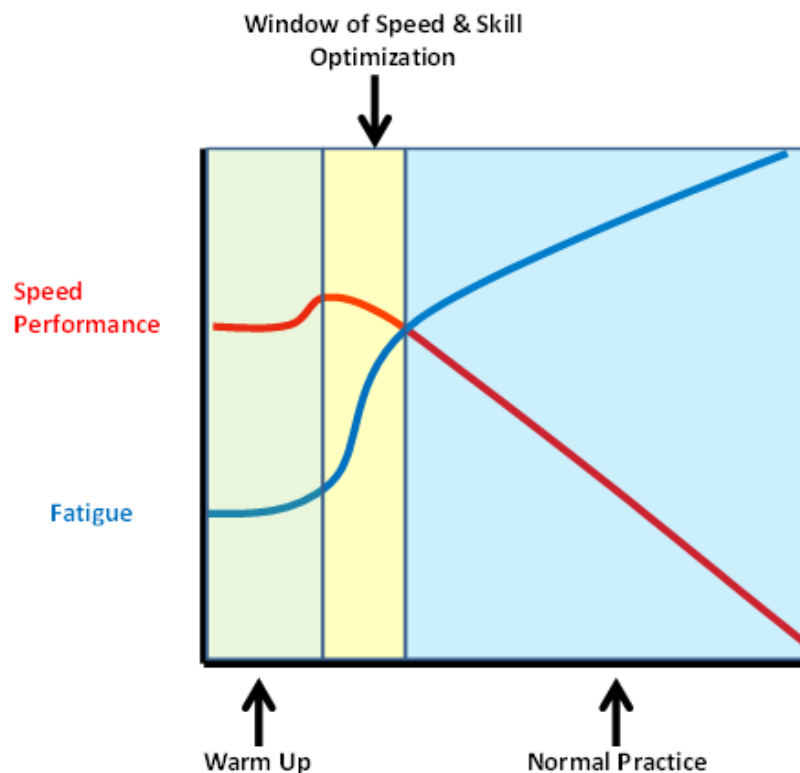
skill performance. There is a small window of time during practice where improvements in both qualities can realistically be made. Outside of this window, gains in speed and skill performance are all but non-existent. The purpose of this essay is to explain how to take advantage of this limited period of practice time where important sport skills can be taught and improved upon, and speed can be developed to levels previously unattained.

The Speed and Skill Training Window

High-level coaches know that the best time to teach a new sporting movement, refine previously-learned skills, or train explosive speed is near the beginning of practice just after the warm-up activities. The reasons why this is so are manifold and largely beyond the scope of this essay. However, it can be pointed out that efforts aimed at skill acquisition and explosive speed enhancement are most effectively performed toward the beginning of a practice session when the athletes have the least amount of fatigue in their neuromuscular systems.[1] When athletes are fresh, particularly when they have been given ample rest from the previous practice session or competition, they are best able to learn and master complex motor skills and withstand the sufficient levels of highly-specific stress required to elicit adaptations in speed performance, especially regarding high-load speed strength. To be frank, a tired athlete is no better than an old dog when it comes to learning new tricks. It is not that his spirit is unwilling, but rather the simple fact that his very physiology limits his ability to learn new skills and achieve higher performance levels of speed when fatigued. Skills are simply outward signs of one's neuromuscular proficiency. When an athlete is rested and ready, he is able to perform the necessary skills with ease and certain mastery that is beautiful to behold. But when an athlete is tired, those same skills become deformed and a mere shadow of their former glory. Elite world champions can be seen to suffer skill performance deficits when they are fatigued. How much more detriment is suffered by young athletes and beginners who have not yet fully mastered the necessary skills for sporting success? Likewise, exhausted athletes never move particularly fast anywhere other than to sit down. A slow and tired athlete cannot achieve the necessary level of speed-specific stress in order to stimulate his body to adapt and improve his speed performance. He will be nothing more than a slow athlete performing slow movements, which

is the antithesis of speed training. A coach that attempts to improve sporting skills and speed performance with fatigued athletes is wasting everybody's time.

Figure 1. *Relationship between Speed Performance, Fatigue, and Portions of Practice*



Optimal Speed Development

For the vast majority of sport, speed is a critical component of success. Teams or individuals may utilize similar strategies and may even possess nearly-identical levels of strength and work capacity, yet one will prevail over the other because of a decisive speed advantage. It is certainly not the only factor in sporting success, but nonetheless it would be foolish for coaches not to address it. The question is how to do so during the limited amount of practice time available. Without delving into the important, yet dense, biomechanical aspects of acceleration, maximum speed, direction change, or even-more-technical discussion of specific sporting movements such as skating, there are many rather general and simple things coaches can do during practice to address the issue of optimal speed development. The key to doing it correctly is to focus on that window of opportunity during practice when speed (and skill)

training can realistically take place. It is important for coaches to understand that this window is not simply the best option among many during practice – it is the only option during practice. A coach cannot hope to improve speed and skill performance outside of a small period of time at the beginning of practice. Human physiology has dictated the terms, and coaches risk precious time and needless injury when fighting against the way the body was built to function.

In order for an athlete to become faster, he must train fast. Now, that incredibly simple statement may seem rather obvious at first, but the truth of the matter is that most coaches have their athletes perform sprints and other workouts at the end of practice, when the only performance quality being improved is work capacity, and even that may be doubtful. In order to force the human body, particularly the neuromuscular system, to build the necessary structures and systems to produce high levels of speed, that body must be subjected to conditions where such levels of speed performance are required. In other words, if a coach wants to train his athletes to be faster, they must be made to move as fast as they possibly can on a regular basis. Only then will their bodies be forced to adapt in response to this new stress. If this still does not seem clear, think about how athletes are trained to become stronger. An individual is given the task of lifting heavy weights on a consistent basis, forcing his body to create new structures and systems (in this case, added muscle size and more efficient neural pathways), in order to cope with the new demand. The result is that the athlete is stronger than he was before. The same holds true for speed. In order to become fast, one must move very fast on a consistent basis.

Most coaches know enough not to prescribe the heaviest weights at the end of a workout session for the simple reason that the athletes will no longer be able to lift them and will be at an increased risk of injury. Heavy weights are needed to stress the athlete, but he must be able to lift them, and do so safely, if he has any hope of forcing his body to adapt and become stronger. Likewise, an athlete cannot achieve the necessary levels of speed required to force his body to adapt and become faster at the end of practice, and any attempts to do so will greatly

increase the odds of catastrophic injury. Again, human physiology has dictated the terms and a wise coach will learn to work within those given parameters.

The start of the window of optimal speed development lies at the beginning of practice just after the warm up. How long that window lasts depends on the athlete's performance. After a finite number of high-quality repetitions, the athletes will begin to slow down. Once slower movement is electronically or even visibly-detected, athletes will no longer be achieving the necessary level of speed performance to stimulate adaptation. Many or even most of the athletes will not be necessarily winded at this point, and may even want to continue. However, any further attempts at improving speed performance will be the equivalent of beating a dead horse. It is simply no longer possible during that practice session. The coach should switch over to other normal practice methods at that point. It is a critical error on the part of coaches to make exhaustion the marker of quality with regard to most forms of training. That may be adequate for improving work capacity, but certainly not speed. The stimulation and fatigue of high-performance neuromuscular systems is the goal, not systemic and general fatigue. Again, a well-trained athlete may not even really notice the moment his structures and systems that govern high-speed performance have fatigued beyond the point of effective trainability. The coach must be confident in his abilities and knowledge of the human body to know when enough is enough.

There are several basic guidelines a coach can follow to maximize the effectiveness of speed training during this small window of time at the beginning of practice. First, it is recommended that you choose a sport-appropriate [agility drill](#) or some form of sport-specific, acceleration-focused drill that lasts between three and eight seconds in total. Perhaps it is prescribing the first five steps of a sprint, fast break, or breakaway in hockey, or maybe it is an agility drill involving a few rapid changes of direction on a football or baseball field. Whatever you choose it is important to make sure that the drill is done with maximum effort and does not last too long. Once the athlete has become visibly slower and has fatigued the neuromuscular system, any further attempts will no longer contribute toward speed development. This is precisely why rest intervals are not merely a good idea, they are required. For a drill lasting five seconds, rest

intervals of 50 to 75 seconds should be prescribed in order to allow for optimum recovery of the physiological systems responsible for short term, high speed movements. The optimal number of repetitions performed by the athletes will vary from team to team and from individual to individual based upon how rapidly or slowly they fatigue and begin to slow, but in general six to eight repetitions of a five-second drill is sufficient for speed development for the vast majority of athletes. For the most part, any speed and/or agility drill will work as long as it is performed with maximum effort and is specific to whatever sport the athletes are engaged in. If a coach decides his team needs more top-end speed, he could prescribe “[flying 60s](#)” or “[flying 90s](#).” Likewise, if the athletes need to improve their ability to accelerate, particularly when changing direction, then a sport-specific [agility drill](#) may provide the necessary stimulation to force performance gains. In order to ease the transition from speed training to normal sport practice, a coach may choose to add a sport implement or specific movement to the end of the final repetition of the drill. For example, a basketball coach may have his athletes receive a pass and take a jump shot at the end of a high-speed drill. By doing so, a coach can help his athletes see the connection between speed and the very same skills necessary for success in their sport. However, there is a limit to how sport- specific a speed drill should be, and using sporting implements such as hockey sticks and basketballs too often can actually slow down the athletes, who instead of focusing on maximum speed performance, begin to worry about how they are handling a puck, football, or basketball. As a result, the athletes are unable to achieve the necessary level of speed to stimulate adaptation and improvement. This defeats the purpose of the drill. It is best to have the athletes remain as focused as possible on maximum effort and speed during the drill, and only toss in a ball or other implement on the last repetition before the rest interval or the transition to normal practice.

Table 1. Guidelines for Duration, Rest Intervals, and Repetitions

Duration of the Drill	Rest Period	Repetition Guidelines
3 seconds	50 to 75 seconds	8 -12
5 seconds	75 to 90 seconds	6 - 8
7 or 8 seconds	90 to 120 seconds	4 - 6

Optimal Skill Development

As stated above, in order to elicit positive in speed and skill performance, both must be trained during that period of time when the athletes are at their neuromuscular and biochemical peak. At first glance, however, it may appear that speed and skill training cannot occur simultaneously, and that time must be added to practice to accommodate both which may preclude other practice activities. In addition, having to choose one form of training over the other, or putting one prior to the other, presents a conundrum. Coaches do not want to sacrifice skill for speed, or vice versa. In reality, both speed and skill development can take place at the same time, during the same window of practice time, without detriment to either. A clever coach will utilize the rest intervals between each repetition of a speed enhancement drill as an opportunity to train a specific skill. This allows for the athlete to remain active during his rest interval, accentuating recovery by boosting venous return among other things, and to make most of his practice time. Using basketball as an example, a coach could prescribe 10 repetitions of a 3-second agility drill with 60 seconds of rest, during which time his athletes perform a low-intensity ball-handling or shooting drill with maximum focus on improving the skill task. Once the athletes begin to slow in their speed drill, or begin to mishandle the ball or miss shots, it is time to move on to other practice activities. In hockey, the athletes could skate with maximum effort and speed through a pattern on the ice for 5 seconds and then work on stickhandling drills during the prescribed rest interval 75 to 90 seconds. By keeping the athletes in a constant state of high-performance, both with regard to speed and skill performance, and by utilizing the optimum period of time at the beginning of practice where each athlete is at his

peak level of readiness for such tasks, a coach can greatly improve the likelihood of his athletes becoming faster and more skilled at the same time. The speed and skill development session comes to an end once the athletes begin to slow down (as measured electronically or visually) and their skill performance begins to suffer (as measured by results).

Installing a Speed and Skill Enhancement Session into a Practice Plan

A normal practice plan typically includes a general-to-specific warm-up to allow the athletes to become engaged in the sport both physically and mentally. In general, warm-up activities consist of some dynamic jogging and walking movements and possibly some dynamic ground exercises as well. Immediately following the warm-up, and prior to other practice activities, coaches should perform eight to twelve minutes of focused and intense speed and skill development using the information above as a guide. Decisions regarding the specific drills to be used are at the discretion of the coach and the specific performance qualities he believes his athletes need to improve upon. During the actual drill, the first athlete (perhaps a captain or veteran member of the team) will perform the activity with maximum effort. Immediately upon completion, he would proceed to a designated area where a very-specific skill, intrinsic to the sport itself, will be performed during the rest interval. If the coach has successfully divided up the team into groups who begin their warm-up at staggered times, or perhaps has set up several of the same stations of the same drill (with other coaches monitoring progress), the first athlete to complete both the speed and skill drills will be properly-rested and ready to perform the second repetition of the speed enhancement drill. Depending on the classification of the athletes a coach is working with (beginner vs. elite veteran), or their present state of preparedness (off-season vs. in-season), the rest interval can be shortened or extended.

Differentiating Speed and Skill Training from Work Capacity Training

It is important to note, once again, that speed and skill training place an entirely different stress on the human body than work capacity training. In other words, the athlete will look and feel very different when training the former as opposed to the latter. Nearly everyone knows what work capacity training looks and feels like. One does not have to work in athletics to know that an athlete seeking to improve his work capacity will perform long intervals of exercise,

numerous repetitions, and appear sluggish, move slowly, and feel very tired when the training is complete. The physiological effects of speed and skill training on the athlete are such that he may not appear winded in the slightest, and may even be eager to continue training with the thought that he has not “done enough” to force his body to adapt. Indeed, many coaches will feel hesitant to stop a drill when skill or speed performance dips the slightest bit, but stop they must! Once speed and skill training begins to resemble work capacity training, one is no longer improving speed or skill and may even be hindering its development. The fact remains that improvement in speed and skill can only become manifest when the athlete is operating at peak neuromuscular and physiological efficiency. He must be fresh and moving as fast as he can in order to yield the desired results. Work capacity training is important as well, and a successful coach knows that he must include it in the training of his athletes. But the best time for such training is at the end of practice, when the athlete can finally empty all of his energy reserves and push his body to its endurance limits, knowing that he will have food and a lengthy rest at the finish line.

5.4 Number of Repetitions for Speed Development

The charts below can be used as guidance when determining the number of repetitions as well as the proper rest times for speed development. The quality of the drill will begin to decrease as athletes are trained beyond these parameters, as athletes will not be fully recovered. This will lead to improving work capacity of the athletes, rather than top end speed.

Level 1 Athlete – A high school or youth that are just beginning their training or are out of shape.

Duration of Drill	Repetitions	Rest
3 Seconds	6 to 8 Reps	30 to 45 Seconds
5 Seconds	5 to 7 Reps	45 to 75 Seconds
7 Seconds	4 to 6 Reps	70 to 110 Seconds

Level 2 Athlete - Any athlete with some training experience working to continue improving.

Duration of Drill	Repetitions	Rest
3 Seconds	8 to 10 Reps	30 to 45 Seconds
5 Seconds	7 to 9 Reps	45 to 75 Seconds
7 Seconds	5 to 7 Reps	70 to 110 Seconds

Level 3 athlete - Advanced and well-conditioned high school athlete.

Duration of Drill	Repetitions	Rest
3 Seconds	10 to 12 Reps	30 to 45 Seconds
5 Seconds	9 to 12 Reps	45 to 75 Seconds
7 Seconds	6 to 8 Reps	70 to 110 Seconds

Administration of Drills

An effective way to set up cone agility drills for a large number of athletes is to first, select the number of drills you want to run, making sure athletes are trained to their left and right. Then, once the drills are set up in the field or the gym have athletes start at each station. This will allow you to have as many athletes completing the drills as possible and will optimize your time. Athletes will each go through their respective stations when the coach gives the start signal. As an athlete finishes the drill they will walk to the next station and wait for their turn, it is important to set the drills up so that athletes are getting proper work to rest ratios.

Coaching points

These cone agility drills never finish where they started or have athletes work back from where they came from, this allows multiple athletes to complete the drill at the same time without a chance of collision. One of the most effective methods for speed development or conditioning is to set your agility drills up next to each other, with one starting line three yards behind the other. This adds a competitive component between the two athletes and allows them to chase each other going through the different drills. Just be sure that the athletes are always competing in these drills in a safe manner that will not lead to any unnecessary injuries.

Articles related to speed and agility training.

[Neural Perplexity](#) - This article is a Training drill, not a speed development method. this can be done during rest period in between your speed and agility drills.

5.5 Transferring Force and Improving Performance through the Foot and Ankle Complex

Over many years of coaching I have witnessed athletes who have made tremendous gains in knee and hip flexion and explosiveness in their training, yet this training time and advancement never seem to transfer into training results for testing. Then one day about 8 years ago I was able to spot the main reason why all this newly developed athletic potential and speed did not transfer over into testing. The question arose with several athletes I made much stronger in the knee and hip joint, along with explosion from those various joints. However, in testing the athletes' 10 and 20-yard dash we didn't see the results that we anticipated based on their gains everywhere else in the weight room and/or vertical jump. When we tested one particular athlete we saw no advancements in the 10 and 20 yd dash, which was a huge concern and misunderstanding on my part. I realized at this point that I must dig into this to its fullest extent.

As I reviewed the tape of the athlete running the starts in the 10 and 20 I was able to spot something that was of key importance. The original reason I was video taping was to rectify some technical flaws that could improve the 10 and 20 times, but since this athlete was a hockey player, just by practicing the skill he got much better. Anyone that has ever trained a hockey athlete for running realizes how poor the technique often is when they start coming right out of the season. What I saw on this day was that as the athlete's foot struck the ground on the second step I saw that the heel lost 2-3 inches from the point when the toes hit the ground. When I say "lost" I mean there was a reversal of direction of the center of mass in the body and the heel thus, became closer to the ground. This indicated a loss of power being, incapable of helping the athlete run faster.

I then reversed the tape and looked at the first step and the same thing was happening with the athletes out of the initial start. I realized what had taken place: I made the hip and knee joint much more powerful and stronger, but the ankle joint (being a hockey player) couldn't absorb the force from the knee and hip. It was as if all the athletes had been running their times on sand. Since I made the hip and knee stronger the ankle, the weak link in the chain, was unable to absorb the force that dampened the stiffness qualities and those particular testing results By

addressing the ankle complex weaknesses that existed to absorb the force and power we were able to within one week make the ankle complex strong enough to withstand the foot striking the ground.

This can often be seen in a number of populations. The aforementioned example of hockey players is obvious because they spend most of the season in the boot. Basketball players are often suspect because their ankles become weakened in the season due to the excessive taping and braces that they wear. I've seen throwers(shotput and/or discus) have this coming across the ring as they change directions. This technique flaw often happens when they start to spin and transfer across the rear of the ring to the front of the ring. You will see their ankle give and at that point many gains can be made in speed and quickness in the ankle and foot.

One must have a full understanding of the foot/ankle complex and its functions many athletes demonstrate dysfunctional patterns in the said area. Hopefully you have a good medical staff that can manipulate the foot (Or are willing to learn if they can't) to better transfer this force into the ground such that performance improves. Fortunately, I have been able to learn a number of techniques to help manipulate the foot so that it functions better. Without functioning correctly you will never get the entire benefits of the training program.

Let's first look at the basic functions of the ankle foot as it's used in sport. As the foot strikes the ground, whether during acceleration or at top speed, near the small toes as it tries to find the ground. What then occurs is a transfer of forces from the small toes over to the big toe at push off. The transference is utilizing the size and strength of the big toe in running; this action must be used in all movements in training. So keep in mind that in every possible action you must use a few key coaching points/actions with your athletes:

1. Focus on pushing through the big toe

You will see a huge improvement in their jumping ability if you add this one component to your jumping/plyometric programs. Also, in any weight lifting movement that applies extension of all three joints (at a slow or high speed) this also must be implemented to transfer weight room performance to the field. So, in your cleans, cue the athletes to push through the big toe at the top of the pull. This is not recommended for Olympic weight lifters; however, for sports performance it would be highly recommended. The walking lunge is another example of how

this should be implemented. As an athlete would push and finish off the movement at the top, all the forces must be transferred off the foot to the big toe to strengthen it and emphasize its mobility and strength at the range of motion.

2. Calf raises for sport training should be done explosively with a knee bend.

That knee bend must be timed with the extension of the foot at the top when completing the exercise. The feet sometimes misfire on the timing at the beginning of sporting movements, but remember it is an absolute necessity to transfer all the actions on the joint to the sporting field. Bodybuilders would not want to implement this. Athletes should execute this exercise at the end of the a training cycle in the last 4-6 weeks. Just completing heavy loads without the knee bend would be fine, but keep in mind you must always finish with the explosive knee bend calf raises, being sure to push through the big toe at the top.

No matter what sport you play, if it involves movement with the legs, you must constantly coach the athletes up on these finer points of foot function. Essentially, what happens is they're losing all the potential power from the main two joints of explosion and not transferring it onto the speed on the field. I've seen too many athletes underutilize their potential and have a simple biomechanical problem that can't be transferred over because of one joint in the kinetic chain in applying power and force to the ground. You lose so much potential.

Having your squatting potential transfer to the sporting field to optimize results:

Many athletes and/or coaches use an Olympic or powerlifting style squat when they are performing front and back squats when training for sport. Let's keep in mind that these are all excellent exercises in gaining strength for athletes to become faster and more explosive. Please keep in mind that I use these various techniques throughout the year, but you can't get the greatest sport results by not changing up these methods once your athletes have become strong enough. When making this statement one must realize that you can't keep squatting heavier and heavier and have performance keep improving. This has never been the case with any athlete that I've seen. You must have a level of strength that is high enough to perform the task at hand. Once the strength has been developed one must use more sports specific methods to transfer the gains made from the Olympic and power-lifting squat over to the field.

This is where the “sport back squat” comes into play. The sport back squat essentially is taking your wider stance squat and moving the feet of the athlete to a very narrow position (shoulder width or slightly within/outside based on size). The reason for this is that during the majority of performances the athlete completes the feet will be in this position. To facilitate the transfer and strength gains from the Olympic and power lifting style back squat, the last 4 to 6 weeks of training (potentially longer during the in season) would use the sport back squat to get the most specific position of your feet when squatting. Some things change in this particular style of squat, especially with athletes that have a long thigh bone; they will not be able to go as deep as before as in the Olympic or power lifting style back squat. Keep in mind when you switch from the Olympic or power lifting style back squat to the sport back squat that you most likely won't have your athletes go as deep for biomechanical reasons. So realizing that your athletes won't go as deep you must increase the glute and hamstring work in your programming because you will not be utilizing the hamstring and glutes as much as you would in the deeper Olympic and power squats.

Many people often ask, “Well is not squatting deep the ideal thing for my athletes?” I would say unless they are going into some type of squatting competition not to worry about it because in sport they rarely ever get into that deep of a position; also, they will not lose much strength in regard to squatting during the transition time utilizing the sport back squat, which again should be the last 4 to 6 weeks of your training cycles to get optimal transfer of sports performance. Dr. Bondarchuck rarely ever squatted his athletes that deep because they never went into those deep positions in their throwing movements. He felt that squatting at the angles that they would compete at was optimal and got the best results. His results speak for themselves, being arguably the greatest coach in the history of the summer games. Just remember when utilizing the sport back squat, one can also come up with some very specific glute and hamstring exercises to help your athletes transfer into their sporting event.

5.6 The Implementation of Running Technique Work in Ground Based Competition in Triphasic Training

Coaches that have implemented Triphasic Training in the past, or those currently applying its means understand the high stress placed upon their training athletes. In many cases stressors experienced in Triphasic Training reach such levels that the addition of high-intensity running technique training, such as acceleration, max velocity, or change of direction is not possible without potentially causing overtraining. The proper addition of these sprinting technique programs leads to improved force production, efficiency of movement, and reduction of injury during sprinting, which results in improved performance in ground based performance sports. All coaches understand “speed kills,” but the proper addition of these running programs has not yet been addressed in regards to Triphasic Training.

The aim of this article is to provide examples and ideas of how to implement these speed technique programs successfully without causing an overtraining effect on athletes. Touches, or ground contacts, are the typical method to measure intensity of a running program. Keeping the number of touches within the desired stress range for each day is imperative to improving performance without causing overtraining. The nature of the design of Triphasic Training allows for some very interesting applications of these speed technique training methods, specifically within the French Contrast method and the undulated block model.

The French Contrast method utilizes training velocities right at, slightly faster, and slightly slower than the speeds seen in competition. Typically plyometric movements such as hurdle hops, accelerated band jumps, and weighted squat jumps are used, respectively, to fulfill the requirements of this velocity based training method. As touches in sprinting are also considered plyometric in nature, they can be applied within the training day to not only increase stress specificity, but also reduce the likelihood of injury due to over prescribing high-intensity movements. Movements programmed during the French Contrast block of training have the ability to be made specific to the desired technique improvements of the running phase being trained.

Before the specifics of this training can be discussed, it is important each coach knows and understands the training principles being used to train each of these three running qualities. Each of these qualities, acceleration, max velocity, and change of direction, must be trained in a specific manner as each requires a different set of skills athletes must learn.

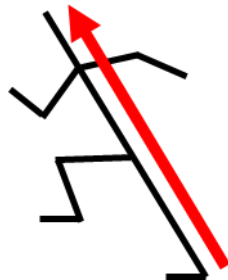
Three Phases of Running in Athletics

Acceleration training is ultimately based around the ability to maintain a forward angle while keeping the hips from falling behind. This position, which is displayed in the graphic below, will look like a falling plank, with the body in a straight line from the extended back leg up through the hips to the neutral position head. By keeping the hips in proper position, power and transfer of force is optimized throughout the kinetic chain used in sprinting by allowing maximal knee drive to be achieved. Knee drive action during sprinting should work in a piston motion with the

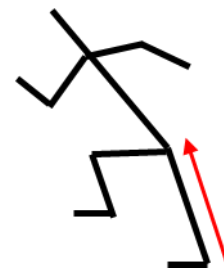
ball of the foot striking behind the hip at full extension. An understanding of simple biomechanics shows by striking the ground behind the hip, the athlete is propelled forward while the acceleration angle is maintained. Training of acceleration is associated typically with 10 yard bursts and is highly related to starting strength of the athlete. These short distance bursts are used to ensure acceleration is the only quality being focused on during the session. As an athlete improves their ability to transfer force into the ground, an appropriate angle can be maintained which maximizes the acceleration phase of running

As described in the acceleration paragraph above, the ability to transfer high amounts of force into the ground allows the hips to be locked into a good position while “falling” forward into an acceleration angle. This angle training is crucial to maximizing knee drive, and thus increasing ground reaction forces. When the hips “break” force is lost by the increased needed vertical output to maintain the position. This leads to less force production and less distance being covered with each step. Elite sprinters can accelerate with a greater angle because they have learned the skill of applying more force to support that angle. A coach must be careful when coaching this angle specific training that the hip positioning of an athlete is not “breaking”. If the hips are breaking the athlete does not currently have the force producing capabilities to support running at that angle.

Proper positioning with “hips locked in”



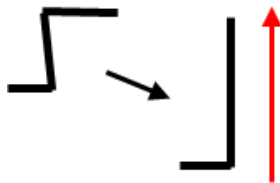
Improper position with “hips breaking”



Maximal velocity training is the ability to maintain proper posture and technique once the acceleration phase has been successfully completed. The ability of the foot to strike directly beneath the hip is of utmost importance to ensuring minimal breaking force is applied through the ground. Throughout technique work shin angle can be used to determine much of the force application direction. It is important that coaches realize the amount of time spent for most team sports in maximal velocity running is relatively small compared to the time spent in the acceleration and change of direction phases of running. Even though this skill is not used often it is important to not overlook the importance of its training. Teaching an athlete how to properly cycle while maintaining an upright posture and strike directly below the hip has the potential to make the difference on an explosive play in any game. Maximal speed is dictated not only by ground reaction forces, but by the ability to produce that force rapidly. It is important to realize speed and rate of force development are both learned qualities and must be trained appropriately to see the desired improvements in maximal speed.

An example of cycling the leg through to ensure foot strike is below the hip can be seen below. The understanding of shin angle and its correlation to force application direction is vital to cueing athletes through these first two phases of running.

Correct Technique: Less braking force is applied due to proper cycling of leg, leads to propulsion forward.



Incorrect Technique: Braking force is applied due to poor cycling of leg, leads to more deceleration.



Change of direction training is improving the ability of athletes to decelerate, or absorb force as they come to a stop, and then reapply that absorbed force in the desired direction, all while utilizing safe mechanics to reduce the likelihood of injury. The eccentric method of training will work in conjunction to improve this ability as no athlete can produce what they cannot absorb in regards to force. Even with this specific training block in the weight room, it is important the skill of absorbing force is applied to the specific means each sport requires. These specific means can range from sprinting and changing direction, shuffling, cross-over running, etc. Ultimately the ability to control your body and the forces while decelerating, and then redirecting those forces through the use of proper edge work of the foot in the desired direction will determine the success of this ability in sport.

The French Contrast Method and the Three Phases of Running

The ability for these three phases of running to be applied in a smooth continuum throughout competition impacts athletic success directly. This ability can be clearly seen in almost any athletic movement or play. An athlete begins their movement (acceleration), must adjust according to the play of the opponent of play (change of direction), and, if a clear opportunity presents itself, must be able to open things up and run at full speed (maximum velocity). As a

performance coach, the knowledge that each of these running qualities requires a separate set of skills leads to the understanding that they will all require different training methods to be improved. As explained above, the implementation of these specific skills in a high-velocity setting, while ensuring athletes avoid being overtrained should be the goal of all coaches. The French Contrast method allows for each of these running skills to be trained without the additional stress of separate training sessions.

The angle of acceleration and the ability to keep the hips “locked in” once that angle is achieved is the deciding factor in maximizing the accelerative abilities of each athlete. The ability to train using angle specific exercises just at, slightly faster, and slightly slower than the velocities seen in competition will lead to increased transfer of training in sport.

The ability to produce force rapidly becomes increasingly important as running velocity increases. This is due to ground contact times being dramatically reduced, particularly in elite sprinters. It is for this reason reactivity is focused on when this quality is being trained. The ability to produce high levels of force in the brief amount of time the foot is in contact with the ground is the ultimate determinant of maximal velocity running.

Absorbing high levels of force and the redirecting that force is imperative for improved change of direction in athletics. The proper use of edges is another vastly important skill in the application of force while changing directions in a high-velocity setting. The implementation of edge work and lateral movements can be incorporated within the French Contrast method to maximize this running based performance quality.

The chart below shows potential methods that can be applied to the three running phases found in athletics while maintaining the potentiating effects of the French Contrast method

French Contrast Method Based on Running Quality			
Velocity	Acceleration	Max Velocity	Change of Direction
Same Velocity	Hurdle Hops for Distance	Hurdle Hops for Distance	Lateral Hurdle Hops
Lower Velocity	Sled Resisted Starts	Resisted Treadmill Run	Band Resisted Shuffle
Higher Velocity	Accelerated Band Bounds	Accelerated Partner Sprints	Accelerated Lateral Band Bounds

Implementation of Training Based on the Weekly Modified Undulated Model

The implementation of these high-intensity stressors must not only coincide with the volume needed for quality adaptation, but must also match the stress and times of training based on the

modified undulated training system used in Triphasic Training. It is not only important these rules are followed closely, but that technique specific training is completed while athletes are fresh. For an article explaining the reasoning for the tactics on the optimization of skill learning [click here](#). The example program shown in this article is based on a five day training model. Coaches must understand this is simply one example that we have implemented and that there are many ways to go about programming these running days into training. Training must always revolve around the needs of the team and the athletes being trained.

Monday – Acceleration day

Acceleration is a highly technical learned skill in running, for this reason the training of this quality is implemented early in the training week, while athletes are fresh and skill learning is optimal. It is also important to ensure quality of reps takes priority over quantity. Coaches can ensure the quality of each rep is high by allowing full recovery between the completed repetitions. The means of this acceleration quality can be trained within the French Contrast method as explained above. This not only increases specificity of the applied stressors, but also improves potentiation of the movement while also avoiding overtraining possibilities. As described above, the goal of acceleration training is to teach the “hips through” position while maintaining a proper acceleration angle. The knee drive in a piston fashion is also of critical importance as this allows the athlete to continually maintain balance and cover ground while the angle is maintained. Coaches should keep in mind the steeper the angle, the stronger the kinetic chain must be to maintain proper hip position. The exercises shown in the French Contrast method above are designed and utilized to specifically improve the desired qualities leading to improvements in the acceleration running phase.

Tuesday – C.O.D. Conditioning for Recovery

After the higher-intensity, quality, skill learning day required by acceleration training, it is important to ensure athletes are not over stimulated on concurrent days in regards to technique work. To ensure athletes are prepared for the next skill learning training, which will occur within the Thursday training session, a lower-intensity training session can be used to improve recovery from the previous day. The targeted quality of training will be change of direction and it will be completed after the lift. Different movement patterns can be used such as shuffling, carioca, cross-over running, back pedaling, etc. to accentuate the edge work involved in transferring force applied while changing directions. Although this method is completed with a generally lower-intensity, the cutting mechanics used when changing direction must remain constant with those used in high-velocity settings. This will prevent bad habits to be formed and reduce the likelihood of injury. A basic example of this training can be seen in [Metabolic Injury Prevention Running](#). However, the times of each rep can be manipulated to match the specific time of Tuesday training.

Wednesday – High Intensity Continuous Training (HICT)

This training quality is a relatively new method that incorporates both anaerobic and aerobic qualities. HICT is completed after the Wednesday training session and functions, in this model, to enhance recovery after the high-intensity training day. This method of training can be completed while coinciding with the modified undulated training model as shorter, but intense, training times applied within the day as HICT incorporates short burst movements and then rest times of 3 seconds. HICT improves blood flow to tissue while also utilizing the high-threshold, type II, explosive muscle fibers that conventional aerobic training will not recruit. Clearly the use of this training can enhance recovery while preventing the explosive muscle fibers from becoming more aerobic in nature.

Thursday – Acceleration, Max Velocity, or C.O.D. High-Intensity Day

Training completed on a Thursday is very similar to that of the Monday session. Exercises specific to the desired quality will be completed during the French Contrast method to increase potentiation. Quality of each repetition is important again, but the set-up of Triphasic, through the use of small, active recovery methods between high-intensity exercises, allows for high-quality repetitions to be completed. The decision of which quality to be trained completely relies on the needs of the team, or individual athlete if you have the staff to support that specificity of training. The training of the qualities could also progress based on the block method. Acceleration could be trained early in the process as it is dictated by strength, with maximal velocity being trained in the later blocks as it relies much more on the reactive ability of the athlete. Change of direction can also be implemented on this day in a high-intensity manner if a coach deems necessary. We personally implement this training quality on Friday.

Friday – C.O.D. Volume Day

As stated above, we have implemented a change of direction day on Friday's in a volume based manner. This method, along with the rest of the week, is set up to work along with the modified undulated training style used within Triphasic Training. It is important to continue to train proper deceleration patterns to maximally reduce potential injuries. Work on this day can be measured using heart rate monitors and should be completed around 70% of maximal heart rate of each individual. This not only allows volume of training to be accumulated but also adds stress to the athlete prior to the weekend recovery period.

The chart below shows just one possible tactic used to implement the training methods as described in the previous paragraphs. A performance coach must remember the purpose of each training quality within each training day and the timing of occurrence for the optimization of skill development.

Weekly Training Based on Modified Undulated Block Model					
	Monday	Tuesday	Wednesday	Thursday	Friday
Intensity/Volume	Moderate/Moderate	Moderate/Moderate	High/Low	High/Low	Low/High
Quality Trained	Acceleration	Change of Direction	High-Intensity Continuous Training	Acceleration/Max Velocity/Change of Direction	Change of Direction
Timing of Training	Applied within French Contrast	Post-lift	Post-lift	Applied within French Contrast	Post-lift
Purpose of Training	Skill Learning High-Intensity	Recovery Method	Recovery Method	Skill Learning High-Intensity	Increased Volume of Training Moderate-Intensity

Progression of Movements through the use of the Block Training Method

With the weekly set up of running shown above based on the modified undulated model, the final aspect a coach must consider is long term progression of exercises, with the ultimate goal of leading to increased performance. The ability to improve transfer of training, through the use of specific velocity based training protocols, becomes of increased importance as the competition approaches. Coaches familiar with the block training method used throughout Triphasic Training understand training is based on the residuals of each performance parameter. Strength of a movement is trained first within the above 80% block, then the same movement is trained within the range of 55 to 80% to maximize power, with the final block being completed training the same movement patterns but at an intensity of below 55% to increase specificity of training. The idea of training just faster, just at, and just slower than the speeds seen in the athletic event should be considered not only in the French Contrast method, but throughout the entire peaking block to continue to increase transfer of training, which leads to improvements in performance.

Progression Based on Block Training			
Block Parameters	Quality Trained		
	Acceleration	Maximal Velocity	Change of Direction
Above 80%	Lighter sleds for technique to start Increase weight to maximize strength	Resisted treadmill running	Resisted lateral training
55-80%	Lighten sled load to increase velocity of training	Flying 40's maintaining proper technique	Decreased resistance lateral training
Below 55%	Unloaded starts for mastery of acceleration technique	Overspeed training with partner	Unloaded lateral training with reactive response

Understand these programs are designed for the collegiate level athletes we, as performance coaches, deal with on a daily basis. These are not designed specifically from world-class speed coaches dealing with elite track and field athletes. All coaches must realize these training plans can be adjusted to fit the specific needs of each group of athletes being trained. These adjustments allow great variability in training all based around the compatible tactics utilized to optimize training and performance between the weight room and running technique requirements needed in athletics.

6.1 The Workout

[Click Here To download a complete 32 week Strength Program](#) used by many high school strength coaches. Place your athletes name and one rep max into the sheet in order to individualize the workout to each athlete.

- If you are having trouble downloading, use a different web browser or click here then under “file” select “Download” [32 Week Strength Program](#)

This program is designed to increase any athlete’s abilities in the weight room, which when periodized correctly will transfer to their sporting event. This training will increase strength, power, and rate of force development. These are all necessary to increase the performance and efficiency of your athletes.

6.1 Maxing Out Without Burning Out

How to calculate an athlete's max 365 days a year

Coaches always want to know exactly where their athletes are at, weight wise, and the progress that they are making. Being able to quantify results with actual data not only motivates the athlete to continue to push himself/herself in the weight room but also validates the methods and practices of the coach. Despite the need and benefits of having up to date numbers for an athlete's 1RM coaches are often hesitant to take the time to perform 1RM testing. Whether it be out of concern for injury to the athlete, interference with normal lifting schedule or excessively taxing the nervous system, coaches tend to shy away from max testing other than once per year.

But what if there was a way for a coach to test an athlete's max that could be added safely and effectively to any workout? One that does not tax the athlete's nervous system. This would enable the coach to make adjustments almost instantly to an athlete's workout, enabling them to maximize gains in a short amount of time. To do this, all the coach has to do is add on additional set to the end of the warm-up at 80% of the current 1RM the day they want to test, or adjust, the athlete's max.

A normal and effective warm-up protocol for the bench press may look something like this:

- 1 x 5reps @ 55% 1RM
- 1 x 3reps @ 70% 1RM
- 1 x 1reps @ 80% 1RM

This allows the athlete to quickly stimulate the central nervous system and activate the large, high-threshold motor units without stimulating fatigue. Now, let's say that it is the first day of a new microcycle and a coach wants to test his athletes to see if their bench numbers need to be

increased for the upcoming phase. To do this the coach would have an athlete perform one set at 80% of their 1RM for 3-reps. For example:

- 1 x 5reps @ 55% 1RM
- 1 x 3reps @ 70% 1RM
- 1 x 3reps @ 80% 1RM (Test Set)

Closely observing the athlete perform the lift by watching the speed of the bar and the level of exertion the athlete exhibits the coach can estimate how many reps the athlete could have actually performed. If the athlete performed the set with ease, maintaining speed throughout the concentric portion of the lift, the coach may infer that the athlete could have performed 5, 6 or more repetitions, in which case the athlete's max has increased. If the athlete performs the repetitions but appears to struggle or the bar moves at a slow, steady pace, then their max is likely unchanged and should remain the same.

It should be noted that the athlete does not need to perform all three reps in the testing set. As a coach becomes more proficient at observing the athlete, he/she will be able to estimate the total number of reps that can be performed at a given weight by watching only one or two repetitions. This is beneficial because it diminishes the stress placed on the athlete even further, taking less energy away from their work sets. For example:

- 1 x 5reps @ 55% 1RM
- 1 x 3reps @ 70% 1RM
- 1 x 1-3reps @ 80% 1RM (Test Set)

After the testing set is completed the athlete can proceed with the rest of the scheduled workout with no adverse effects to performance. Once the coach estimates the number of repetitions the athlete could have performed that number can be plugged into the “[Rep Max Calculator](#)” or

http://www.xlathlete.com/view_formula.jsp?formula_id=18&browse_sport_id=0 to calculate the athletes new 1RM.

Being able to watch, evaluate, and change an athlete's max within the outlines of a lifting schedule gives a coach a decisive advantage. It ensures that the athletes are using the correct weights and percentages to maximally tax their system at all times. The biggest factor in dictating progress in the weight room is intensity. If an athlete has adapted to something where the stimulus no longer has a high enough intensity to elicit change, then the athlete will plateau. Being able to continually change and accurately measure an athlete's 1RM enables a coach to maintain the right intensity and make gains 365 days a year.

6.3 An Example Programs

[Click here to Download a Successful `` Week Football Program that your able to put in athletes maxes and print sheet off](#)

Another Sample Workout - Day One

Day 1	Week 1		Week 2		Notes
	Reps	Load	Reps	Load	
Back Squat	5	45	55	1	warm up
pair w/					
Back Squat	3	60	65	1	warm up
pair w/					
Back Squat	1	80	80	1	warm up
Back Squat	3	80	85	4	
pair w/					
Hurdle Hop	4			4	height
pair w/					
Squat Jump With Weight	4			4	
Lunge Hops	3			4	each leg
pair w/					
Hip Flexor Prone Contralateral	6			4	
pair w/					
Cuban Press Incline FB	6			4	
Bench Press	5	45	55	1	warm up
pair w/					
Bench Press	3	60	65	1	warm up
pair w/					
Bench Press	1	80	80	1	warm up
Bench Press	3	80	85	4	
pair w/					
Med Ball Pass One Arm	4			4	
pair w/					
Push Up Drop	6			4	
DB BO Row	5	30	30	3	
pair w/					
DB Step Up	8	10	10	3	
pair w/					
DB Shoulder Press	6	15	20	3	
Glute Ham Hyper	5			3	
pair w/					
Zottman Curls	8			3	
pair w/					
Anterior Tibialis Band	6			3	

Day Two – Sample

Day 2	Week 1			Week 2	
	Reps	Load		Sets	Notes
Back Squat	5,3	50	65	1,1	warm up
pair w/					
Back Squat	1	80	80	1	warm up
pair w/					
Back Squat	1	90	95	5	1:30 rest
Bench Press	5	45	55	1	warm up
pair w/					
Bench Press	3	60	65	1	warm up
pair w/					
Bench Press	1	80	80	1	warm up
Bench Press	1,1	90	90	4	0:0:0:20
pair w/					
Bench Adduction	4			4	
pair w/					
DB SL Calf Raise	10	15	15	4	
Glute Bar Lift	6	75	80	3	
pair w/					
Infraspinatus	6			3	
pair w/					
Pull Up	6	50	50	3	
DB Walking Lunge	6	30	30	3	each leg
pair w/					
Cobra	10			3	
pair w/					
DB Curl To Press	6	15	15	3	
DB Incline Bench	6	25	25	3	
pair w/					
DB RDL	6	25	25	3	
pair w/					
GH Over Head Sit Up	6			3	

Day Three – Sample

Day 3	Week 1			Week 2	
	Reps	Load		Sets	Notes
Front Squat	5	35	45	1	warm up
pair w/					
Front Squat	3	45	50	1	warm up
pair w/					
Front Squat	1	60	65	1	warm up
Front Squat	3	60	65	4	
pair w/					
SL Hurdle Hop	4			4	
pair w/					
Speed Skater For Distance	4			4	
Bench Abduction	6			4	
pair w/					
Face Band Pull Apart	8			4	
pair w/					
Figure 8 Lateral Supine	8			4	
DB Bench	4	25	30	4	
pair w/					
Reactive Bench Toss	4			4	
pair w/					
DB SL Calf Raise	12	15	15	4	
DB Walking Lunge	8	20	25	3	each leg
pair w/					
Alt V Up	8			3	each side
pair w/					
Ankle Pops	12			3	
Seated Row	6	30	35	3	
pair w/					
Ankle Band Work	8			3	
pair w/					
DB Side Lat Raise	8	5	10	3	
SL Glute Bar Lift	8	25	30	3	
pair w/					
DB Curl to Arnold	8	10	10	3	
pair w/					
Anterior Tibialis Band	8			3	

6.4 Videos for high school Triphasic training concepts

Below are examples that will allow a further understanding of the Triphasic Training Method in regards to its use in high school athletics.

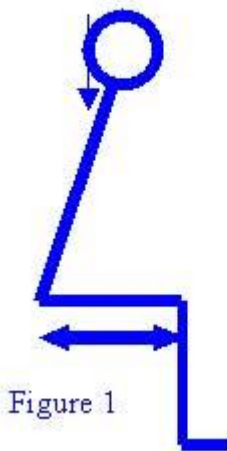
[Triphasic Training for High School Athletes](#)

[Triphasic Training for High School Athletes 3 Day Template Video](#)

7.1 Coaching The Squat For Taller Athletes

When teaching young athletes to squat, coaches need to remember that squatting is not a “cookie-cutter” exercise. Not everyone’s squatting form is going to look the same. This is especially true of taller athletes, or athletes with long thighs (femurs). Figure 1 depicts an athlete of average height with proportional femurs performing a squat. Such an image is often seen accompanying typical textbook-style descriptions of proper squatting form.

However, when training taller athletes, a coach must recognize the inherent biomechanical disadvantage that a taller athlete experiences when squatting compared to the efforts of shorter athletes.

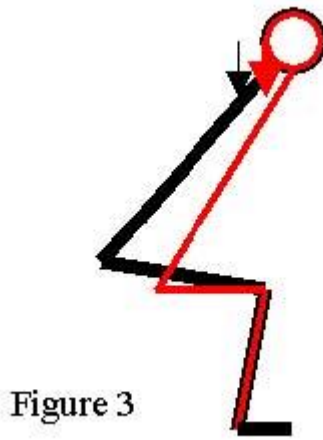


This must be accounted for.

Figure 1: Average-Sized Athlete Squatting

When an athlete performs a squat, there is a great amount of torque about the knee and hip joints. When an athlete has a long thigh (femur), there is considerably more torque about the knee joint when compared to shorter athletes. To counteract that increased amount of torque, it has been said that the athlete should incline the trunk (or bend farther forward) in order to bring the center of gravity closer to the knee joint, thus reducing torque. However, to safely incline the trunk, and athlete must position the bar further down his or her back, which will put

more stress upon the hip joints and hip extensors while lessening the stress on the knee joints. This scenario is depicted in Figure 2.



In order to safely squat an athlete with long thighs, the coach must tell the athlete to spread out his or her feet. This will not actually shorten the length of the thigh, but will help the athlete keep his or her center of gravity closer to the knee joint while performing a safe and effective squat. Being able to squat correctly will allow the athlete to increase the torque about the hip joint and less about the knee joint, thus shifting the stress to the glutes and hip extensors.

If an athlete uses a wide stance when squatting, special attention must be paid to the feet as well as how the knees move during the exercise. As a result of utilizing a wide squatting stance, an athlete will tend to place more weight on the medial side of his or her foot, which may cause the knees to move inward. Coaches need to be aware of this, and must correct this error when it appears (by encouraging the athlete to keep his or her knees in line with their legs).

In theory this may seem like a good idea. In practice, however, an athlete who does not possess a strong enough back to lift the weight in such a manner may set him or herself up for injury. The stress applied to the back when the torso is more inclined is much greater than that which is applied to a straighter or more-upright torso. So if this is the case with your athlete, what is the solution?

Squatting with a wide stance will help provide a biomechanical advantage for taller athletes by reducing torque about the knee joints. This has the added benefit of allowing the athlete to more easily reach a parallel squatting depth. Figure 3 helps to illustrate this important point. The picture shows one athlete utilizing two different squatting stances. The figure in black shows this athlete squatting with a more traditional and narrower stance. The same athlete is shown using a wider squatting stance in red. The wider stance allows the athlete to obtain a lower squatting depth than a more traditional and narrower stance.

7.2 Using Cluster Sets

Using cluster sets in training is an excellent way to stress an athlete, especially during phases of considerably intense loading. A cluster set allows for more repetitions to be made at a weight that an athlete would not normally be able to lift two or more times in succession. This type of set requires a short amount of rest to be taken between repetitions in order to restore or partially-restore the short-term energy systems used to produce bursts of highly intense movement (as seen when performing near-maximal lifts in the Back Squat or Snatch). The use of maximum or near-maximum loads stress the systems responsible for neuromuscular coordination, in which the recruitment of faster and larger motor units is increased, rate-coding increases, and the synchronization of motor unit activity becomes optimal for maximum force output. It is therefore beneficial for athletes looking to improve their overall strength levels to train with weights at or near their maximum. However, it can be difficult to perform several repetitions with this type of load in succession, which is where the use of cluster sets becomes warranted.

By including 10 to 30 seconds of rest between repetitions to take place, each repetition is accomplished with maximum or near-maximum energy on the part of the athlete, as opposed to a decreasing amount of energy with each repetition of a continuous set (performing each repetition one-after another without rest in between). This ensures that the athlete is performing more maximum or near-maximum efforts per workout, which may ultimately allow for a greater improvement to take place. The bar should be returned to the floor or rack when resting.

Support for Cluster Sets

In a study by Haff et al, average barbell velocity in the clean pull was significantly higher in the sets which utilized a cluster format, with 30 seconds of recovery between repetitions at both 90% and 120% of maximum than sets performed with a more traditional set-up (each repetition

performed continuously without rest in between). Acute fatigue in the neuromuscular system becomes noticeable when a decrease in force production occurs. The cluster set, with its built-in recovery time in between repetitions, allows for some of the replenishment of phosphocreatine (PCr) energy stores, which are utilized for short and intense movements such as maximal lifts. Traditional set design depletes these stores and does not allow for recovery, leading to lactate production. This reduction in PCr stores and accompanied increases in lactate results in the decrease of muscle force production.

If training with maximum or near-maximum loads is to have the desired effect of improving strength, some rest between repetitions should be implemented in order to ensure that more of these repetitions take place. The more work (or repetitions) that an athlete can perform with these intense loads, the better his or her force producing capabilities may become. Even with as little as 15 seconds of recovery, an individual can perform at near maximum force production capacity. A cluster set allows the athlete to perform greater amounts of work while not experiencing the fatigue and lowered force output normally associated with traditional sets.

Examples

When programming for a particularly intense training session, a coach may decide to use cluster sets in place of more traditional set design. For a workout including the Snatch at 90% of maximum, a coach could use a traditional set format, and prescribe five sets of two repetitions:
 $6 \times 2 @ 90\% = 12 \text{ repetitions at } 90\%$

If the coach wanted to use cluster sets instead, with one-to-two repetitions performed followed by 30 seconds of rest (bar on floor, no hands on bar), the set may appear as follows:

$6 \times (2+2) @ 90\% = 24 \text{ repetitions at } 90\%$ or $6 \times (1+1+1+1) @ 90\% = 24 \text{ repetitions at } 90\%$

The cluster sets could be designated in the program by use of a tempo. In the case of the examples provided the tempo would read:

0:0:0:30

('0' representing the lift phase, catch, and recovery phase of the lift, and the '30' representing how much rest in between reps)

By utilizing cluster sets, the coach can schedule twice the amount of repetitions per set without risking the athlete becoming too fatigued and diminishing his or her force output capacity. The athlete benefits from training with high loads for more repetitions than what could be achieved using traditional set design.

References

Haff, G.G., Whitley, A., McCoy, L.B., O'Bryant, H.S., Kilgore, J.L., Haff, E.E., Pierce, K., & Stone, M.H. (2003). Effects of different set configurations on barbell velocity and displacement during a clean pull. *Journal of Strength and Conditioning Research*, 17 (1). 95-103.

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7.3 Managing the Workout

To manage hundreds of athletes at different levels of training, review the **XLathlete Simple Software Program**. This software allows unlimited programming options.

[Download Sample Versions with some Restrictions Here](#) - If having trouble downloading use different web browser.

[Download Tutorial for the Software Here](#) - If having trouble downloading use different web browser.

[Review the 5 Different Options of Software](#)

**TABLE 3.10: CONCENTRIC LOADING
PARAMETERS AND THEIR RESPECTIVE MESOCYCLE**

LOAD	TOTAL TIME OF CONCENTRIC	REP RANGE	SETS	MESOCYCLE
97.5%	REACTIVE	1	1-2	ABOVE 80%
95%	REACTIVE	1	2-3	
90%	REACTIVE	1-2	3-4	
85%	REACTIVE	1-2	3-4	
80%	REACTIVE	1-3	4-5	
75%	REACTIVE	1-3	4-5	55-80%
70%	REACTIVE	2-3	4-6	
65%	REACTIVE	3	4-6	
60%	REACTIVE	3	4-6	
55%	REACTIVE	3	4-6	BELOW 55%
50%	REACTIVE	3	4-6	
45%	REACTIVE	3	4-6	
40%	REACTIVE	4	4-6	
35%	REACTIVE	4	4-6	
30%	REACTIVE	4	4-6	

7. 4 Plyometric

Plyometric training is used consistently throughout Triphasic Training and is the optimal method to improve explosiveness in your athletes. This style of training is the most comparable to a sporting action in regards to the speed of the movement. This plyometric training, in combination with other triphasic methods, leads to a more powerful, efficient athlete.

The Following are key Plyometric for high school athletes that can handle them

Box Jump

Alternate leg Bounding

Power Step Up

Russian Plyo Box

Speed Skater For Distance

Squat Jump

Squat Jump Pause

More Advanced Plyometrics

Lunge Drop Isometrics With lunge Jump

Box Drop Reactive Lunge Jump

Broad Jump

Broad Jump Multiple

Depth Jump

Drop Rebound Box Jump

Hurdle Hop

Lunge Box Drop

7.4.2 Accelerated/Assisted Plyometric Programming Considerations

Approximately nine years ago, I was fortunate to come across a motion analysis system that our mechanical engineering department possessed. This device contained nine cameras placed systematically such that it could detect a multitude of human movements and joint angles to find out what was really going on in sport. While utilizing this system, I analyzed a number of athletes in the weight room and on the field with this elite camera system. To be clear, I couldn't set these cameras up myself. Our strength and conditioning staff had to have biomedical engineering students assemble the entire system in order to run these tests and analyze various movements.

One day while analyzing the data, I began to realize that during the second and third step in running and skating, I couldn't mimic the speed qualities that took place during those steps in the weight room by using conventional plyometric exercises. At that point it dawned on me to unload the human body while it did those jumping movements to mimic the speed at which the second, third, fourth, and fifth step in skating and running took place. Keep in mind, I usually use double leg plyometrics with this particular accelerated method because of the speed involved in the extension of the hips and knees. I realize that many strength coaches think single leg plyometrics are more sport-specific because sports are played mainly on one leg. This is an opinion I can't disagree with. However, what I will disagree with is that a single leg plyometric, as shown by this motion analysis machine, is so much slower in producing forces that it doesn't mimic what is taking place in sports. In real life, single leg plyometrics are beneficial in teaching the human body to be more explosive for the same reason that double leg plyometrics teach a constant load (body weight) to accelerate faster. With double leg plyometrics, it must be noted that because the weight per limb is distributed, there is a higher potential for developing speed because of the shorter amortization phase, and thus, a more explosive rebound.

Most coaches are incorrect in their programming because they place single leg plyometrics after double leg plyometrics. They believe this to be the logical training progression because the

single leg requires more strength. Within a block scheme, the programming of plyometric jumps should look like this:

1. Single leg plyometrics
2. Double leg plyometrics
3. Single leg accelerated plyometrics
4. Double leg accelerated plyometrics

Right there you have four blocks of training utilizing the natural progression of least sport `specific to most sport-specific for peaking an athlete. Single leg plyometrics should be viewed more as a strength plyometric whereas double leg plyometrics develop speed. In closing, when using the accelerated plyometrics, one must keep in mind that to get the speed and explosive qualities to transfer to the sporting field, you must provide movements that mimic speed and joint angles of what is taking place in the sport you're training.

Below are two various sample of considerations for just Accelerated band jumps

Accelerated Jump Series		
<u>Accelerated Band Jump</u>	<u>Accelerated Band Jump pause</u>	<u>Accelerated Band Jump Reactive</u>
<u>Split Band Jump</u>	<u>Split Band Jump w/ pause</u>	<u>Split Band Jump Reactive</u>
Block 1 – 2 to 3 Weeks	Block 2 – 2 to 3 Weeks	Block 3– 2 to 3 Weeks

- Block 1 [Accelerated Band Split Lunge Pause Jump](#)
- Block 2 [Accelerated Band Split Lunge Jump](#)
- Block 3 [Accelerated Band Split Lunge Jump Reactive](#)
- Block 4 [Accelerated Band Squat Jump Pause](#)
- Block 5 [Accelerated Band Squat Jump](#)
- Block 6 [Accelerated Band Squat Jump Reactive](#)

7.4.3 Other Considerations

Other guidelines and considerations for plyometric training can be viewed through the links below.

[Plyometric Guidelines](#)

[Total Body Shock Plyometric Workout](#)

[Upper body Plyometric Program](#)

8.0 Neck Training

By: Brett Bueker

Introduction

Just about every kid that buckles up the shoulder pads and snaps on the helmet and chin strap, dreams of playing in the NFL someday. They dream of throwing the game winning touchdown pass to win the Super Bowl. They dream of catching the game winning touchdown pass in front of 80,000 screaming fans. They dream of kicking the game winning kick as time expires on the clock. They spend countless hours playing backyard football, drawing up plays in the dirt, wearing their favorite player's jerseys, mimicking those game-like situations with their buddies. The days of backyard football evolves into flag football and pee-wee football leagues. The young aspiring players are continuously taught and reinforced with the proper techniques of tackling, blocking, throwing, catching, route running, and ball carrying. As they progress into the high school and collegiate level, they are taught various offensive and defensive schemes and how to gameplan against opposing offenses and defenses.

What quality makes a football player great? It may not necessarily be talent or God-given ability. Arguably, one of the most important qualities of a successful football player is his ability to think. The ability to think is the first and most important step in a successful play. One must be able to think, process that thought, react to that thought, and move kinesthetically in space to perform a successful play. If a player can do this extraordinarily well (along with having some athletic talent/size/speed), he may get a shot at achieving that childhood dream of playing in the NFL.

What part of the body enables a player to think, process, and react to perform a successful play? The brain. All of the higher cognitive processing abilities we naturally possess occur in the brain and down into the spinal column. In addition to the teaching of proper mechanics and techniques of football related movement patterns, we must teach the proper methods of protecting the brain and spinal cord. We must develop a shield of armor for physical contact. In fact, one of the most important and helpful things we can do as coaches for

a player in any sort of contact sport, is off the field: neck, jaw, mandible, trap, and shoulder girdle training.

Think of the head, neck, trap, and shoulder girdle as a tree. A tree has strong roots holding the trunk and branches in place so it can withstand the physical punishments of nature. If a tree does not have strong roots and a strong trunk, the tree will break and/or collapse. Just as a tree has roots, so does the neck. The trapezius, upper back muscles, and entire shoulder girdle act as the roots to the neck, head, and brain. The neck and jaw musculature is the trunk of the tree. The head is the most important branch bearing fruit (cognitive thinking). We must have strong and stable roots (traps, upper back, shoulder girdle) to ensure we have a stable foundation. We also must have a strong trunk (neck, jaw musculature) to help absorb and the outside physical forces. Having these critical pieces will help stabilize and anchor the head and brain, hopefully decreasing the concussion/neck injury rate.

In lieu of all of the recent lawsuits presented by the NFL Players Association regarding concussions and brain damage of current and former players, neck training will most likely become a required part of each strength and conditioning program in the near future.

“Playing Football is Like Getting into 30-50 Car Accidents Within a 3-Hour Period”

-Mark Watts

According to the ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing) Inc., there is an estimated 4 to 5 million reported cases of concussions each year. FOUR to FIVE MILLION. The scary fact is that number is probably even higher due to many cases of concussions going unreported each year due to lack of proper diagnosis and/or no baseline and follow up testing. ImPACT also states the prevalence of concussions in middle school age kids is on the rise as well. An NCAA study shows that football has the highest prevalence rate of concussions in all contact sports. An increase in middle school age concussion rates and football having the highest prevalence rate in all sports is a double edged sword. This is a lawsuit waiting to happen. Neck training needs to be addressed, just as the proper techniques of

tackling, to these youngsters. If this paragraph has not been an eye opener to the importance of preventative measures of concussions, you need to re-evaluate your priorities.

Here at Iowa State, we try to stay up to date with all of the newest and effective methods of training our athletes. Neck, jaw, trap, upper back, and shoulder girdle training has been a staple in our program since Coach Yancy McKnight and Coach Clayton Oyster arrived in the winter of 2009. Our number one goal as a strength staff is to help our players stay healthy so they can perform to their fullest potential out on the football field. We feel neck training has such an important role in protecting our players on the field, such that every strength and conditioning workout conducted with the football team at Iowa State targets neck training in some form or fashion. To help hammer home the importance of neck training in our strength and conditioning program under Coach McKnight, our newly constructed sports performance center is equipped with ten 5-way neck machines located in the center of our room. The 5-way neck machines are equipped with 14 different pin settings to help target all angles, working various musculature of the neck up into the head and jaw. It allows us to work neck flexion, extension, and lateral flexion. The 5-way neck machine is also equipped with handles to perform a shrug while seated on the machine. This machine alone allows us to perform 5 different (actually a lot more by changing the pin settings) methods of neck training: 1) Flexion 2) Extension 3) Lateral-right 4) Lateral-left 5) Shrug.

The Roots

There are multiple ways to train the roots of the neck, a.k.a. the traps, upper back musculature, and shoulder girdle. Any form of shoulder/scapular elevation (shrugging) will help strengthen the trapezius muscles. This can be accomplished by any variation of the following:

- BB Shrug (various grips)
- BB Overhead Shrug (various grips)
- Trap Bar Shrug
- BB Mountain Shrug (upright row to navel, shrug up, retrace shrug, retrace upright row to starting position)

- DB Shrug (with any double or single arm combination, neck extension or lateral flexion)
- Band Shrug (with any double or single arm combination, neck extension or lateral flexion)
- 5-Way Neck Machine Shrug
- DB Inverted Supported Shrug

Trap training is not just limited to shrugging exercises. Many different Olympic movements involving triple extension and shoulder/scapular elevation also produce great trap training. Some may argue that these Olympic style movements involving triple extension and shoulder/scapular elevation will in fact have a greater training effect on the traps because a much larger weight is being lifted with greater force production stimulating more motor units/pathways in the trap area. If you are pressed for time on trap training, keep your Olympic movements in your program because they are a greater “bang for your buck” exercise (involving a larger number of joints and larger muscle groups). These Olympic movements will help with force and power transfer to your specific sport due to the triple extension. The Olympic movements that require shoulder, scapular elevation include:

- Barbell Power Clean (catch or pull, from various scoop/box heights)
- Dumbbell Power Clean (seated or standing, catch or pull)
- Trap Bar Clean Pull (various scoop/box heights)
- Barbell Snatch (catch or pull, from various scoop/box heights)
- Barbell Hang Snatch
- Dumbbell Single Arm Snatch (pull or catch)
- Dumbbell Single Arm Hang Snatch (pull or catch)
- Hang Clean (catch or pull)
- Barbell Dead Lift (various grips/heights)
- Trap Bar Dead Lift (various heights)

Working down deeper into the ground is the upper back root of the neck tree. The upper back musculature is worked by any scapular retraction and/or scapular depression movement. Your muscles are continuous with the rest of your body. By strengthening the musculature of the upper back, your scapula can be set into the proper anatomical position, which will set your trapezius in the proper anatomical position, which will set your neck musculature in the proper anatomical position, which in turn helps maintain proper and safe anatomical head posture. To help set your upper back into proper anatomical positioning, be sure to balance the amount of pushing and pulling exercises throughout the week. By having too many pushing exercises, you will put yourself in position where your shoulders are rolled forward (thoracic kyphosis), putting additional, unwanted stress on the neck. If there is any imbalance throughout the week, error on the side of more pulling movements, so at least your shoulders are pulled back into the proper position. Many different exercises can be implemented to strengthen the upper back musculature:

- Band Retraction
- Mini Band Pull Apart
- Mini Band Overhead Rainbow
- Band/Rope Face Pull
- TRX High Row
- Barbell Bent Row (various grips)
- Dumbbell Bent Row
- DB Single Arm Row
- BB/TRX Inverted Row
- Pull Ups (various grips)
- Lat Pull Down
- Cable Low Row
- Landmine Single Arm Row

The third root of the neck tree is the shoulder girdle. It is important to maintain symmetry within the shoulder girdle to help maintain proper anatomical position. Once again,

everything is connected. When doing various pressing movements such as bench press, incline press, and dips, your anterior deltoid acts as a synergist muscle group to the pectoralis (chest) to help stabilize the shoulder girdle and assist in the pressing movement. So you get lots of anterior deltoid work without even knowing it. Be sure to balance out the shoulder girdle by working the posterior deltoid, teres major, and infraspinatus. Many pulling movements will help strengthen the shoulder girdle and are better “bang for your buck” exercises. Exercises that help strengthen the shoulder girdle include:

- Band Retraction
- Mini Band Pull Apart
- Mini Band Overhead Rainbow
- Band/Rope Face Pull
- TRX High Row (+ Rotation)
- I/Y/T/A/W/L Raise (Dumbbell/TRX/Plate)
- Dumbbell Lateral Raise (Bent/Standing)
- Dumbbell Front Raise (or any variation)
- BB Bradford Press
- DB Arnold Press
- Shoulder Box
- Cuban Press
- Internal/External Rotation

The Trunk

In addition to developing strong roots, we must also develop a strong shield of armor for the trunk of our tree. A football player must be able to absorb the contact forces of repeated physical collision. We must try and strengthen the different neck musculatures to achieve this wanted stabilization of the head and brain. Mark Watts, strength coach and director of education at EliteFTS, breaks down neck musculature movements into eight different categories:

1. Flexion (head forward, chin down)
2. Extension (head backward, chin up)
3. Lateral Flexion (tilting head to side)
4. Protrusion (head & chin forward)
5. Retraction (head & chin backward)
6. Tilt (chin upward)
7. Nod (chin to chest)
8. Rotation (turning head)

Movements in these different planes need to be addressed and implemented into the strength and conditioning programs to help protect your athletes against concussions. Now you may not have room to program all eight of these movements into a mesocycle, so assess your athletes and pick and choose the ones you feel like to need to address. Then you can switch it up the following mesocycle. Don't have time to complete neck training within your workout? Bad excuse. Find time. If you are in a pinch for time with the 8-hour rule, try implementing neck training into your pre-activity preparation (warm-up), pair neck with various movements within your workout as a superset, or at the end of the workout as a group as part of a "cool down". If keeping athletes healthy and injury-free is your number one goal as a strength coach (as it should be), neck training will be a priority to you and your staff.

Whether an athlete is being introduced to neck exercises or they have been training neck for years, proper technique and time under tension during the movements will produce some of the best results. Why time under tension? First of all, increasing the time under tension during a movement slows the athletes down. They are forced to work through a full range of motion and fight through the sticking point in the strength-curve of a muscle. This allows for better technique of the movement. Time under tension also allows for greater motor unit recruitment and development in that particular area of movement. We want the extrinsic and intrinsic musculature and stabilizers of the neck to be activated. Time under tension will force the agonist, synergist, and antagonist muscle groups to act in accordance to one another. We want to increase the size, strength, and stabilization of the neck musculature to absorb the

outside forces acting against the athlete. We want size, girth, and hypertrophy. An important point here: start light then progress to heavier loads as strength levels increase, and always aim for perfect technique.

Not having an adequate abundance of neck machines, or not having the budget to purchase equipment to train the neck is a poor excuse not to implement neck training. Many movements can be done with no equipment at all, or using pre-existing equipment in your facility. Various implements/methods used to train the neck include, but are not limited to:

- 4-Way Neck Machines
- Bands
- Plates
- Physioballs/Medicine Balls
- Manual Resistance
- Bridging

Now let's take a look at various movements we can perform with each of these implements/methods.

4-Way Neck Machines

Flexion



Start



Finish

- Starting position-sit up tall, spine neutral. Flex head forward, chin down to chest. Control back to starting position.

Extension



Start



Finish

- Starting position-sit up tall, spine neutral. Extend head backward, chin up. Control back to starting position.

Lateral Flexion



Start



Finish

- Starting position-sit up tall, spine neutral. Tilt head to side, ear to chest, shoulders as level as possible. Control back to starting position.

Protrusion



Finish



Start

- Starting position-sit up tall, spine neutral. Protrude head and chin forward and straight out. Control back to starting position.

Retraction



Start



Finish

- Starting position-sit up tall, spine neutral. Retract head and chin backward and straight out. Control back to starting position.

Bands

Protrusion-Option 1



Start



Finish

- Starting position-lay on bench, shoulder blades retracted. Band on forehead. Protrude head and chin forward and straight up to ceiling. Control back to starting position.

Protrusion-Option 2



Start



Finish

- Starting position-ly on bench, shoulder blades retracted. Band on forehead. Protrude head and chin forward and straight up to ceiling. Control back to starting position.

Retraction



Start



Finish

- Starting position-seated on bench, shoulder blades retracted. Band underneath feet & around back of head. Extend arms straight out from shoulders. Retract head and chin backwards. Control back to starting position.

Extension



Start



Finish

- Starting position-seated on bench, shoulder blades retracted. Band underneath feet & around back of head. Extend arms straight out from shoulders. Extend head backward, chin up. Control back to starting position.
-

Chin Tuck



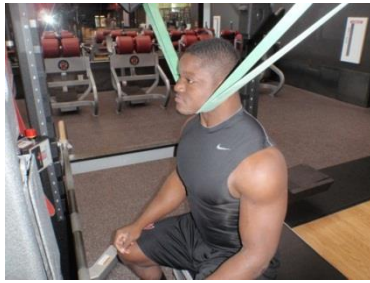
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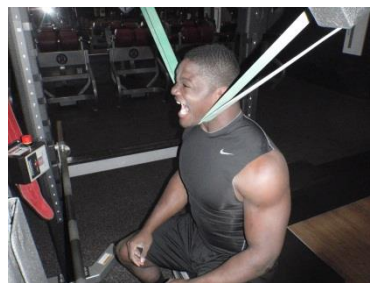
Finish

- Starting position-seated on box or kneeling on ground. Shoulder blades retracted. Band hooked around J-hooks of squatting height or higher, shoulder blades retracted. Band underneath chin in neutral position. Nod chin down to chest. Control back to starting position.

Jaw Open



Start



Finish

- Starting position-seated on box or kneeling on ground. Shoulder blades retracted. Band hooked around J-hooks of squatting height or higher, shoulder blades retracted. Band underneath chin in neutral position. Open jaw as wide as possible, keeping head neutral. Control back to starting position.

Plates

Flexion



Start



Finish

- Starting position-lying on bench. Shoulder blades retracted. Hole of plate on forehead. Head off end of bench in neutral position. Flex head forward chin to chest. Control back to starting position.

Towel Extension



Start



Finish

- Starting position-standing up tall. Shoulder blades retracted. Towel looped through plate. Bite towel. Chin to chest. Extend head backward, chin up. Control back to starting position.

Physioball/Medicine Ball

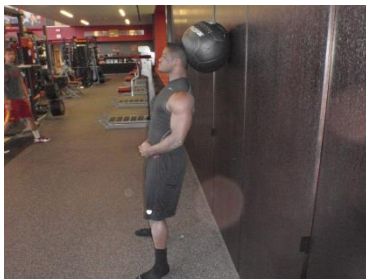
Front Flexion-Iso Hold



Start/Finish

- Starting position-feet under hips. Slight knee and hip bend. Retract shoulder blades. Place physioball/medicine ball on forehead, holding against wall. Flex head forward and chin down to chest as far as possible and hold. Ease out of position when completed.

Extension-Iso Hold



Start/Finish

- Starting position- feet under hips. Slight knee and hip bend. Retract shoulder blades. Place physioball/medicine ball on back of head, holding against wall. Extend head backward and chin up as far as possible and hold. Ease out of position when completed.

Lateral Flexion-Iso Hold



Start/Finish

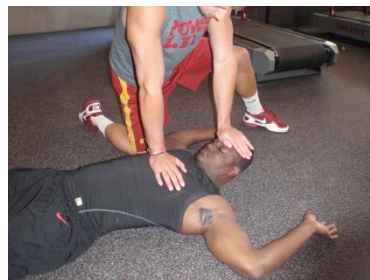
- Starting position- feet under hips. Slight knee and hip bend. Retract shoulder blades. Place physioball/medicine ball just above ear on side of head, holding against wall. Tilt head to side, ear to chest as far as possible and hold. Keep shoulders level. Ease out of position when completed.

Manual Resistance

Partner Supine Field Goal



Start



Finish

- Starting position- laying on back. Legs extended. Arms at 90° on ground in a field goal position. Retract shoulder blades. Flex head forward and chin up to chest. Partner places

one hand on chest, and one hand on forehead. Both arms locked out. Resist partner's flexion up, and apply pressure on the way back to starting position. Movement is performed in a controlled manner by both partners.

Partner Supine Field Goal Protrusion



Start



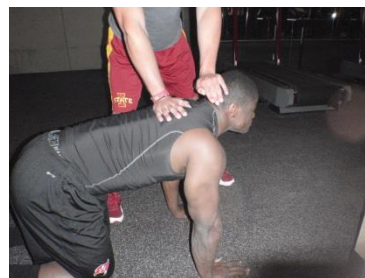
Finish

- Starting position-laying on back. Legs extended. Arms at 90° on ground in a field goal position. Retract shoulder blades. Protrude head and chin straight up to ceiling. Partner places one hand on chest, and one hand on forehead. Both arms locked out. Resist partner's protrusion up, and apply pressure on the way back to starting position. Movement is performed in a controlled manner by both partners.

Partner Quadriped Extension



Start



Finish

- Starting position-quadriped position. Hand under shoulders (arms locked), knees under hips. Retract shoulder blades, trunk tight. Begin with chin down to chest. Extend head backward and chin up. Avoid lumbar extension. Control back to starting position. Partner places one hand on upper back, and one hand on back of head. Both arms locked out. Resist partner's extension up, and apply pressure back to starting position. Movement is performed in a controlled manner by both partners.

Partner Lateral Flexion Iso Hold

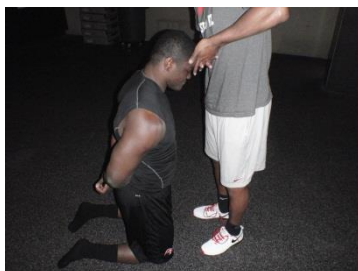


Start/Finish

- Starting position-feet under hips. Slight knee and hip bend. Retract shoulder blades. Maintain an upright and neutral position while pressure is applied. Keep shoulders level. Ease out of position when completed. Partner places hand just above ear, arm locked out. Apply as much pressure as needed to maintain proper position. Movement is performed in a controlled manner by both partners.

Bridging

Partner Forward Flexion Bridge



Start



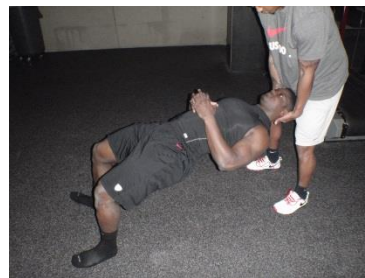
Finish

- Starting position-on knees with hands behind back. Retract shoulder blades. Partner will be in a bent knee, flexed hip position with hands interlocked. Place interlocked hands on forehead. Must be ready to hold up body weight of partner, so get locked in. Guy going will maintain a tight trunk and maintain neutral position as you are lowered into bridge position. Go down as far as possible. Think of flexing head forward and chin down to chest. Working angle will vary from guy to guy. Guy going place hands on ground and ease out when time is up.

Partner Extension Hip Bridge



Start



Finish

- Starting position-sitting on butt, heels tight to butt. Retract shoulder blades. Partner will be in a bent knee, flexed hip position with hands interlocked. Place interlocked hands on back of head. Must be ready to hold up body weight of partner, so get locked in. Guy going will lift hips up as high as possible, driving mid-foot to heel, thinking of extending head backward and chin up to maintain a neutral position. Guy going place hands on ground and ease out when time is up.

Neck Bridge on Bench



Start



Finish

- Starting position-sitting on butt, heels tight to butt. Retract shoulder blades. Place back of head on bench. Lift hips up as high as possible, driving mid-foot to heel, thinking of extending head backward and chin up to maintain a neutral position. Place hands on ground and ease out when time is up.

As you can see, many variations exist of training the trunk of our tree: the neck. There should be no excuse of not having the equipment to implement various forms on neck training into your strength and conditioning program. If your number one goal as a strength coach is to keep your athletes injury free (as it should be), training some form or fashion of the tree (shoulder girdle, upper back, traps, and neck) should be included every single training session. Explain to your athletes the importance of neck training. Get them to buy in. You are doing them a favor to help cut down the risk of getting a concussion, or even worse, sustaining a neck injury that could lead to paralysis. Do your part as a strength coach to help keep your athletes from becoming a concussion/neck related injury statistic.

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9.0 Core Training workout

Typical “core training” is not over emphasized in the triphasic model simply because the core is already receiving all of the stress it needs during the single leg movements. As coaches we must realize the abs seen when doing sit-ups and other “core training” is not mimicking what a sporting event requires of our athletes. We are trying to improve the deep, supporting muscles of the core and prefer to have functionality over looks any day.

[Core Training Workouts](#)

[Core Training Exercises without Equipment](#)

[Core Training Exercises with Equipment](#)

10.0 Proper Breathing for Sports Recovery

An often overlooked component of many programs is restoration and recovery. Coaches attempt to manipulate variables in their workouts, changing intensities, volume, and exercises in order to cause adaptation. However, a training program is most effective if the athlete is able to recover from and adapt to the previous stress/workout. There are numerous techniques used to aid in restoration—recovery baths, contrast showers, proper nutrition, stretching, massage, and recovery rollers. This article will cover a technique seldom employed and even less commonly programmed—breathing.

Slow, deep, breathing has been shown to induce a calming effect on the body, decreasing everything from blood pressure to stress. Deep voluntary belly breathing also has been shown to shift the nervous system from sympathetic dominance to parasympathetic dominance (Jerath et al. 2006). What does this mean for your athletes? It means faster recovery by starting the digestive process sooner, creating stronger and faster athletes while responding better to future stress.

The neural response to training is well documented with an excitatory effect occurring in response to a stressor. Therefore, the key to recovery is being able to switch as soon as possible from the catabolic state brought on by training into a more anabolic state (Chen et al. 2011). The faster an athlete can go from an excited state to a calm one, the more capable he will be recovering from the workout.

This will not only readjust the breathing pattern but also help to decompress the spine. Every breath out should feel the body relax more and more, such that the spine feels longer and the athlete feels zero tension.

11.0 Aerobic Energy System Training

[Drill Sheets: Conditioning In Detail](#)

The program in the article below can be used to increase the work capacity of your athletes, while also decreasing the likelihood of injury. It can also be viewed at the following link:

[Metabolic Running for Injury Prevention](#)

12.2 General Physical Preparedness (GPP) Block 1

General Physical Preparedness (GPP) for Repeated Sprint Ability Sports - such as , Football Soccer, Basketball , Hockey, Baseball and many more.

Block 1 - Two to Three Weeks

Complete any of the following Methods for the Aerobic General Physical Preparedness Block Training

Try a Different browser if the files doesn't download.

[Contralateral Aerobic Circuit](#) Complete 3 times a week -

[5 Minute Isometric Training Block](#) Complete 2 to 3 times a week.

Another option for and advanced strength athlete to build fitness

[Aerobic Strength Endurance EDT](#) - Complete 2 to 3 times a week

The Purpose in this block is to keep Heart rate in aerobic training zone.

12.3 General Physical Preparedness (GPP) Block 2

General Physical Preparedness (GPP) Block 2 for Repeated Sprint Ability Sports - such as , Football Soccer, Basketball , Hockey, Baseball and many more.

Block 2 - Two to Three Weeks

Local Lactate and Global Aerobic - Completing 5 to 6 workouts per week for this phase

Try a Different browser if the files doesn't download.

[30 Second Isometric and Oscillatory Method](#) - Complete 3 Times a week

[EDT Training Method](#) - Complete 2 to 3 Times a week in between above workouts.

Any conditioning methods used during this time need to be 30 seconds in length

12.4 General Physical Preparedness (GPP) Block 3

General Physical Preparedness (GPP) Block 3 for Repeated Sprint Ability Sports - such as , Football Soccer, Basketball , Hockey, Baseball and many more.

Block 3 - Two to Three Weeks

Try a Different browser if the files doesn't download.

[Advance 10 Second Circuit Method](#) - Complete any of the two workouts 3 days a week.

[Extreme Myelination Circuit](#) - complete this workout only twice a week.

Any conditioning methods used during this time need to be 10 seconds in length.

12.5 Triphasic Training Metabolic Injury Prevention Running

Aerobic training lays the foundation upon which all other methods of training are built. If this base aerobic training is ignored, specific, high-intensity training cannot be supported in later training cycles because an athlete will not achieve maximal benefits from the high-intensity work. “Metabolic Injury Prevention Running” enhances an athlete’s aerobic abilities, which is the main objective in the aerobic training cycle, while simultaneously working to reduce injuries to soft-tissue areas of the hip, groin, knee, and ankle. The reduction of injuries should be viewed as the primary goal of any coach and should be consistently and actively pursued. Metabolic injury prevention running focuses on both the reduction of injuries and training of the cardiovascular system, while keeping impact intensities minimal. Impact intensities can be kept relatively low in this aerobic training method due to the focus on movements that use the stabilizing muscles of the hip and groin area, such as shuffling and carioca. The activation and utilization of the stabilizer muscles leads to movement efficiency being reduced significantly when compared to running or sprinting in a straight line, while these commonly underused and injury prone muscles are strengthened and thus, less prone to injury. This method also can be used to prepare elite athletes for pre-season training camps or the competition season. The same movements are utilized as in the base endurance model, just at maximal intensities. This increased intensity further drives adaptations of the cardiovascular system while also continuing to reduce injury likelihood to the small, stabilizer muscles due to training muscle functioning and timing at high, game speed velocities. This high-intensity training prepares athletes with optimal conditioning levels and the increased ability to compete in their training camps.



Sport Performance Pyramid

Base Aerobic Training Aspects

Metabolic injury prevention running is used to drive extremely high levels of aerobic, cardiovascular fitness, which is the foundation upon which all other strength and conditioning abilities are built. This method of training allows for low-impact, high-intensity training by activating stabilizing muscles, particularly those of the hip and groin area. These stabilizer muscles are trained with the completion of non-typical running methods such as shuffling, carioca, and cross-over running. These methods of locomotion cause the body to work at a decreased level of efficiency which causes an elevation of the heart rate. It is important to note that the intensity will appear low at the start of this training piece as the athlete is moving at considerably lower speeds than when sprinting. The use of the commonly inactive and undertrained stabilizer muscles and movement patterns that cause the body to be less efficient than normal will lead to heart rate elevation to an aerobic training zone of 140-150 bpm. This heart rate elevation can be manipulated based on the needs of intensity. The intensity can range from as low as 110 bpm up to the lactate threshold of each individual athlete, which ensures that aerobic intensities are kept and trained. The intensity to reach this training zone will typically fall between the 30 and 60% effort range for athletes. The low impact intensities allow this aerobic training method to be completed barefoot. This aerobic

training method leads to an increase in work capacity which lays the foundation for future, high-intensity training that will be completed in later stages of the block periodization method.

Injury Resistance Aspects

The activation and then training of the stabilizing muscles of the hip and groin lead to increased functioning at higher levels of work, which reduce injury patterns. This is accomplished by training these underused and weak links of the kinetic chain in planes in which they are not typically trained. These stabilizing muscles are commonly the victims of soft-tissue injuries in the lower body simply because they are not strong enough to continue to support the increased strength of the primary movers. As a strength coach and an athlete, it is easy to train the primary movers, such as the glutes, quads, and hamstrings, due to their direct correlation with improved lower body strength and maximal speed. However, the mentality that “an athlete is only as strong as their weakest link” must be remembered at all times. If an athlete has the ability to squat an enormous amount of weight but has not taken the time to strengthen the stabilizing muscles, they will not be able to perform maximally and will deal with soft-tissue, stabilizer muscle injuries. These injuries, although minor in nature, will hinder their performance until the true issue is addressed. This issue is addressed head on with this metabolic injury prevention running method. The low impact intensities allow this aerobic training method to be completed barefoot. Training barefoot leads to increased strength in the plantar and dorsiflexors of the foot, while also strengthening the muscles of the lower leg. This develops and trains the foot to properly absorb impact and prevents shin splints and foot fractures. Barefoot training used in this lower-intensity training continues to contribute to injury prevention by improving strength levels in the commonly weak and underused muscles.

Game Speed Training

As the competition phase approaches and specificity of exercise selection is high, metabolic injury prevention running can be used to peak athletes before the rigors of their long, demanding season. The stabilizer muscles of the hip, groin, knee, and ankle are continually

improved through the same movement patterns as described above, but they are now completed at maximum intensities. These high intensities will drive extremely high levels of cardiovascular fitness, even higher levels of cardiovascular fitness than sprinting, when distance and intensity are compared, as the body is continuing to move using inefficient movements. This game speed training using the methods of metabolic injury prevention running can be implemented during the final four to five weeks prior to the start of camp or the season and can be individualized based on position to increase specificity. Adaptations from this high-intensity method can be seen in as little as two weeks if an athlete is properly trained throughout the rest of the off-season, meaning they have had adequate aerobic training, as well as high-intensity training. The more specific movements made to the position and/or movements that will be completed in competition, the greater the benefits will be in injury reduction. This increased specificity leads to training the commonly underused and injury prone stabilizer muscles in the same planes they will be required to be used in competition.

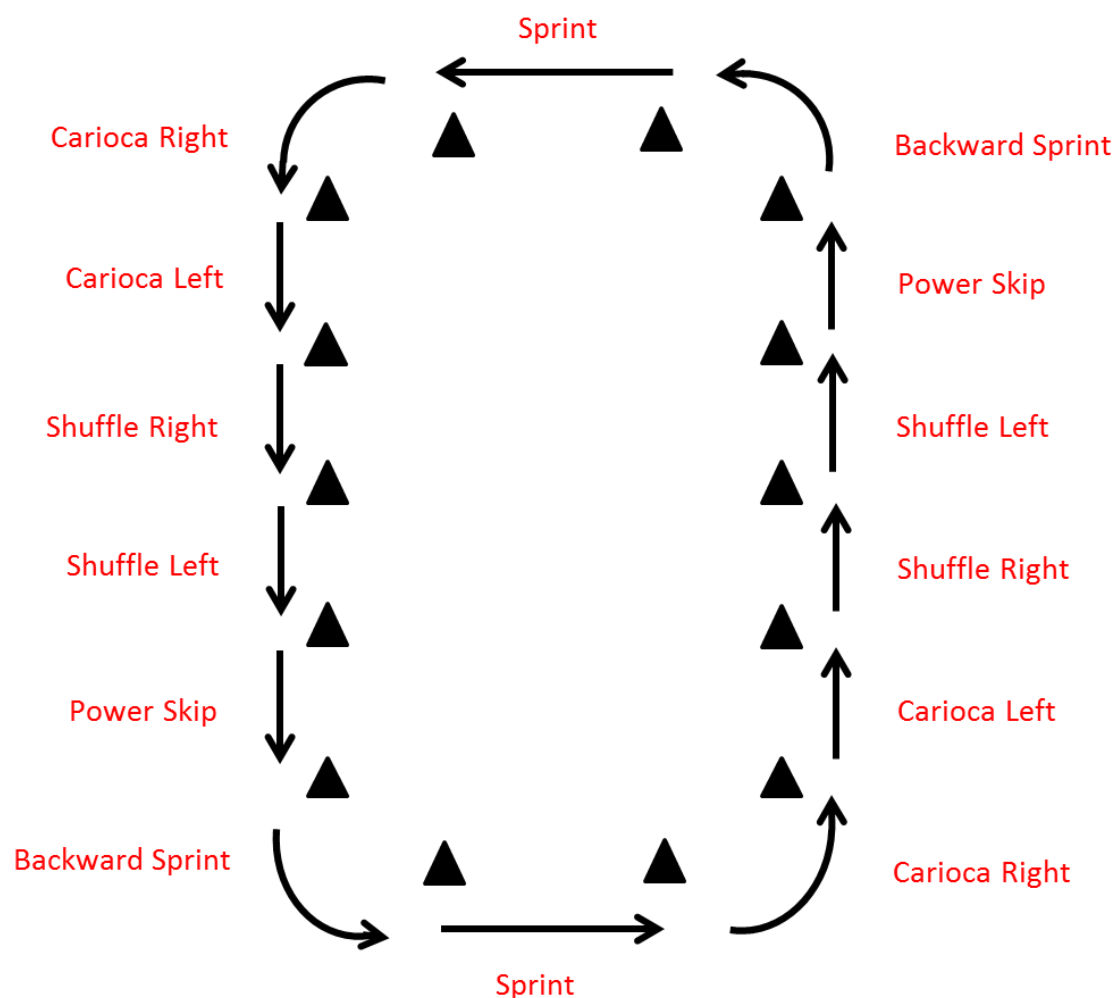
Example Program

The keys of metabolic injury prevention running are the cardiovascular response and the strengthening of the stabilization muscles of the hip, groin, knee, and ankle. The target heart rate zone of this specific aerobic conditioning piece lies within 140-150 bpm. The first phase of metabolic injury prevention running includes three laps of low intensity, continuous jogging. The pace of jogging should give a heart rate response of about 110 bpm, which is an extremely low intensity. After the three laps are completed, the different running techniques such as shuffling, carioca, and backpedaling are implemented at the same pace as the low intensity jogging was completed. The inefficiency of the body through these movements will amplify the intensity and spike the heart rate into the goal aerobic heart rate zone of 140-150 bpm while keeping impact intensities low enough to train barefoot, thus strengthening the muscles of the ankle and foot. The intensity of these movements can be manipulated slightly as needed in order to attain a heart rate within this aerobic training zone. It is important to reiterate the

speed of these movements does not need to be increased from the slow jogging since the heart rate will increase due to the movements being used in this method.

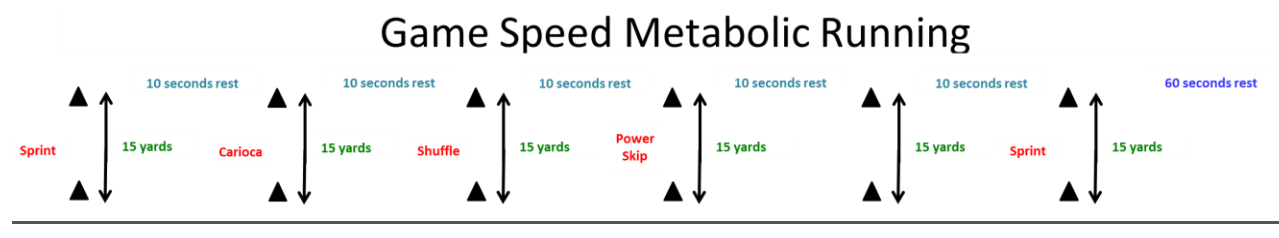
The example below shows how the five exercises used in this metabolic injury prevention running can be cycled through continuously. The cones can be set up anywhere between 20 and 50 yards apart. The key to this exercise is ensuring the lactate threshold of the athlete is not reached which is why an intensity of 140-150 bpm is set as the goal heart rate range. This method of training can be used with any set-up, even just two cones. This example falls in line with the use of metabolic injury prevention running around a concourse of an arena.

Aerobic Base Injury Prevention Running



Game speed training with the metabolic injury prevention running method uses the same movements as above, just at maximal intensities. This high-intensity training method strengthens the stabilizer muscles and trains proper timing and firing rate of the stabilizers to prevent injury during competition. During game speed training, different positions can go through different movements, which increase specificity of training prior to the competition period. It should be noted this training should be completed with shoes on due to the high impact intensities.

The example of game speed training below shows the progression through this phase of training. Repetitions at this point of training can be completed based on time or distance, depending on how training is set up for that specific day. The same movements will be used during this progression, but will be completed at maximum velocities. The distance or time of each rep, rest time between reps and between sets, and the number of sets completed can all be determined based on each athlete's individual needs to prepare them for a successful camp and/or season. In the example below, a single set is shown with the distance set of 15 yards from each other (30 yards there and back), 10 seconds of rest between each rep, with 60 seconds rest allowed after each set. The example shown is one of the more difficult programs of metabolic injury prevention running, as it uses minimal rest times between repetitions as well as between sets.



Set (Rotate Between each Movement):

Sprint

Carioca

Shuffle

Power Skip

Backward Sprint

Sprint

Distance There and Back (Choose One):

20 yards

25 yards

30 yards

35 yards

40 yards

Rest Time Between Reps (Choose One):

10 seconds

15 seconds

20 seconds

25 seconds

30 seconds

Rest Time Between Sets (Choose One):

60 seconds

90 seconds

120 seconds

150 seconds

The off-season can be broken into 3 phases of conditioning training as follows.

Phase 1 – Off-Season Program – Figure 1

During this phase, base running and training are completed. This is the phase in which metabolic injury prevention running will be completed. This first phase of training typically lasts between 2 and 4 weeks, with the goal of creating a solid foundation of training which will allow more intense training as the off-season progresses. Metabolic injury prevention running can be completed between 2 and 3 times per week due to its low impact intensities and overall lower intensity on the body.

Phase 2 – Off-Season

Phase 2 consists of sport specific speed development and includes the qualities of acceleration, top end speed, and change of directions. The majority of the time within this phase will be spent completing as many sport specific drills as possible. This intermediate phase will last between 4 and 8 weeks to allow optimal development, with high quality work being the goal of each repetition.

Phase 3 Off-Season – Figure 2

This final phase of the off-season periodization consists of game speed conditioning. This will be completed 2 to 3 weeks prior to the beginning of training camp or the season. This phase is used as the final peaking method to prepare athletes for camp or an athlete's season. It will offer optimal conditioning and injury prevention using maximal intensities. It should be performed at least twice a week, if not three times, when no other conditioning methods are being utilized. However, if speed development of athletes is still required, this quality can be trained throughout the week.

Below are more examples of aerobic conditioning circuits that can be used to increase the work capacity of your athletes.

[Game Conditioning w/Field](#)

[Game Conditioning w/Gym](#)

[Simple Dumbbell Conditioning Circuit](#)

[Pool Workout](#)

[4 Week Run Program for Mile Time Improvement](#)

[Tabata Intervals for Sport](#)

[TV Workout Circuit](#)

[Plate Workout for Sport 1](#)

[Isometric Conditioning Circuit for Sport](#)

[Isometric Conditioning Circuit 2 for Sport](#)

[Super Endurance General Workout for Sport](#)

[Seated Upper body Circuit](#)

[Gpp Ultimate Single lift workout for Sport](#)

[General Work Capacity Day 1](#)

[General Work Capacity Day 2](#)

[General Work Capacity Day 3](#)

[Coaches Choice Adaptability Circuit](#)

[8 Week Conditioning Plan](#) - this Eight Week conditioning consists of a complete program involving running. It may be incorporated into your existing training, or used as a separate training device in an off-season program.

[Stadium step workouts](#) can be done as a leg workout for conditioning or after a workout to finish up with work capacity training. The difference between these stadium step workouts and others is the fact that these require that athletes NOT to run up the steps. Instead, athletes are required to walk the steps. While running the steps is certainly a different type of workout that can be implemented, the conditioning workouts in this example focus on walking to reduce the impact forces on joints, while increasing the work capacity and leg strength simultaneously.

12.6 Adaptability Circuits

The premise of [adaptability training](#) is exactly what its name implies. The body is incredible at adapting to the stress (exercise) that is loaded on it. In a 5-minute interval, an athlete might do 12-15 sets of 5 reps of each. That is 60 reps of each exercise instead of a more traditional 3x10 or 4x8 workouts. So because the volume has been increased, the body has to adapt to the given stress. As the body adapts to the stress, the athletes are able and capable of handling more intense training without getting hurt. The results are amazing! This is a phenomenal tool to use within a training cycle or at the beginning of a training cycle. When you complete this training of 3 to 4 weeks you should return to general strength training program.

[Adaptability Training](#)

This is a unique type of training that will challenge you to push yourself to another level. Adaptability training is something that you would complete 3 days a week and not longer than 3 or 4 weeks in a row. You will notice that instead of sets and reps, you are given a time frame to lift as many reps and sets as possible in the given time depending on the level you choose.

You can pick a weight that you could perform 15 to 20 reps with maximum effort. After you have picked the weights on the prescribed exercises you are ready to begin that exercise cycle. Select 2 exercises, opposite to each other. An Example would be to start with DB Incline and complete 5 repetitions then quickly go to the Lat Pull Down and complete 5 additional repetitions. Then without rest complete the set again and again for the amount of time on the workout sheet, the time will depend on the level of difficulty you choose. Try to keep the same weight during the exercise sets. Mark off the number of the sets in the box numbered 1-30 after completing the last exercise in each set. Complete as many as possible in this sequence until the time is completed. Then follow the prescribed rest and go on to the next groups of exercise. Print a new sheet every workout to keep track of the sets on a weekly basis. Each week or workout you should increase the sets or increase the weight. Keep your weights the

same throughout the complete cycle for that day, but feel free to try to increase weight and perform the same number of sets in the next workout. Only use this training method 3 to 4 weeks for optimal results.

The premise of adaptability training is exactly what it's name sounds like. The body is incredible at adapting to the stress (Exercise) that is loaded on it. In a 5 minute interval, you might do 12-15 sets of 5 reps of each. That's 60 reps of each instead of a more traditional 3x10 or 4x8 workouts. So because the volume has been increased, the body has to adapt to the given stress. As the body adapts to the stress, the athletes are able and capable of handling more intense training without getting hurt. The results are amazing! This is a phenomenal tool to use within a training cycle or at the beginning of a training cycle. When you complete this training of 3 to 4 weeks you should return to general strength training program.

When going through an adaptability program, remember that you need to keep correct form every set. This is important as you start to get tired towards the end of your time frame. Also, make sure that you start each set as quickly as possible and do not use any rest between the sets. There is time to rest at the end of the time interval.

The most beneficial times of the year to complete this type of training would be as the first 3 or 4 weeks of their post season workouts. The other time would be the 3 or 4 weeks of just prior to the start of the season. Choose the level that best fits your training age and download a Adaptability sheet from xlathlete Drill sheet section.

12.7 Team game Conditioning

Using a conditioning game is an awesome way to train athletes in a fun, yet intense manner. Both of these activities benefit from involving competition, which pushes the athletes harder, as well as elements of fun that keep conditioning fun. Modify directions as needed.

[Russian Basketball](#)

12.8 Trashball

Overview Trashball is a training game that can be used to improve performance in a number of physical qualities. Coaches can train many athletes at the same time in a fun and competitive atmosphere. Some of the primary fitness aspects trained by playing trashball include running and jumping abilities, hand-eye coordination, game strategy, general physical condition, and the ability to see plays develop.

What You Need

- 1.) Ball – Any type will do
- 2.) Two Clean Trash Cans
- 3.) Cones
- 4.) Two Teams
- 5.) Gymnasium or Field

How Trashball Is Played The objective of trashball is to have your team score by shooting/throwing a ball into a basket (a clean trash can works well) that is surrounded by cones, while not letting the opposing team score in your basket. Players are not allowed to enter the ring of cones in order to throw the ball into the basket, and the area of the cones can be expanded or contracted based upon the skill level of the participants. Each team has their own basket to score in, located on either end of a field or gym. You can choose to have the athletes bounce the ball (with dribbling rules similar to basketball), run with the ball, or pass the ball only (as in Ultimate Frisbee). If the ball or athlete goes out of bounds, then possession of the ball changes. Depending on the rules described later, possession can also change for other reasons. Team can play with any number of athletes on the gym or field, and this can change with size of the playing surface. Keep in mind that too many athletes will slow the number of good possessions and reduce the speed of the game.

It is much more effective to have two smaller games going on at once than one larger game that moves more slowly.

Key Rules For Fast-Paced Version the rules can be adjusted for your needs, but if you are looking for a more fast-paced version, you can add the following rules.

You can choose to not allow the ball to touch the playing surface at any time. This way, the athletes must run or pass the ball down the gym or field. If the ball hits the ground, possession is turned over to the opposing team. If the offensive player is touched by a defender while possessing the ball, the ball is also turned over at that point.

You can also choose to limit the number of steps an athlete can take while carrying the ball to between three and five. This increases the amount of passing and speed/agility of running. If you are using this particular rule, however, you may want to eliminate the touch-turnover rule as described above. Have fun!

13.1 [Safe Core Training Series No Equipment](#)

The following workouts are very safe core Training methods for any level.

Workout 1 – Level 1

1. [Bird Dog Alternating](#)
2. [Prone Forearm Bridge](#) – Both Sides
3. [Modified Side Plank](#) – Both Sides
4. [Supine Elbow Bridge](#)

Workout 2 – Level 1

1. [Bird Dog](#) – Both Sides
2. [Plank Single Leg](#) – Both Sides
3. [Modified Side Plank with Leg Raise](#) – Both Sides
4. [Supine Elbow Bridge](#)

Workout 3 – Level 2

1. [Bird Dog Alternating](#)
2. [Plank Single Leg](#) – Both Sides
3. [Modified Side Plank with Leg Raise](#) – Both Sides
4. [Supine Elbow Bridge](#)

Workout 4 – Level 2

1. [Bird Dog](#) – Both Sides
2. [Plank Single Leg](#) – Both Sides
3. [Side Plank Leg Raise Hold](#) – Both Sides
4. [Supine Elbow Bridge](#)

Workout 5 – Level 2

1. [Bird Dog Alternating](#)
2. [Forward Backward Walking Plank](#) – Both Sides
3. [Side Bridge](#) – Both Sides
- 4 [Reverse Plank with Leg Raise](#) – Both Sides

Workout 6– Level 2

1. [Bird Dog](#)– Both Sides
2. [Forward Walking Plank](#)
3. [Side Bridge Leg Circle](#) – Both Sides
- 4.[Reverse Plank with Leg Raise](#)

Workout 7– Level 3

1. [Bird Dog](#) – Both Sides
2. [Forward Backward Walking Plank](#)
3. [Rotational Side Plank](#) – Both Sides
4. [Reverse Plank with Leg Raise](#) – Both Sides

Workout 8– Level 3

1. [Bird Dog Alternating](#)
2. [Inch Worm](#)
3. [Rotational Side Plank](#) – Both Sides
4. [Reverse Plank with Leg Raise](#) – Both Sides

Guidelines for Core Workouts

Sets - 1 to 4 sets

Rest After each Exercise - 10, 20, 30, 45, 60

Length of Exercise - 20 to 90 seconds

Rest after Sets - 30, 60, 90, or 120 seconds

13.2 Hip Strengthening Exercises Series

Complete Each Block for 2 to 3 weeks and Perform 2 to 3 times each Week. Weak hips are often mistaken for a weak core.

Block 1 - Eccentric Hip Series - Perform 2-3 Sets x 3-5 Reps – **3 sec count down each rep**

Partner Bench Abduction Eccentric - Complete Each Side - Rest 20 to 30 Seconds

Partner Bench Adduction Eccentric - Complete Each Side - Rest 20 to 30 Seconds

Partner Single Leg Glute Bench Lift Eccentric - Each Side - Rest 20 to 30 Seconds

Partner Hip Flexor Prone Eccentric - Complete Each Side - Rest 20 to 30 Seconds

Isometric Hip Series - Perform 2-3 sets x 3-5 Reps – **3 sec hold each rep**

Partner Bench Abduction Isometric - Complete Each Side - Rest 20 to 30 Seconds

Partner Bench Adduction Isometric - Complete Each Side - Rest 20 to 30 Seconds

Partner Single Leg Glute Bench Lift Isometric - Each Side - Rest 20 to 30 Seconds

Partner Hip Flexor Prone Isometric - Complete Each Side - Rest 20 to 30 Seconds

Concentric Hip Series - Perform 2-3 Sets x 8-12 Reps

Bench Abduction - Complete Each Side - Rest 20 to 30 Seconds

Bench Adduction - Complete Each Side - Rest 20 to 30 Seconds

Single Leg Glute Bench Lift - Complete Each Side - Rest 20 to 30 Seconds

Hip Flexor Prone - Complete Each Side - Rest 20 to 30 Seconds

14.0 Post -Workout

Post-workout stretching can be used to improve recovery of your athletes and assist to prepare them for the next training session. Refer to the links below for ideas to use to increase the flexibility of your athletes.

[Post Workout Stretching](#)

[Simple post workout mobility Cool Down](#)

[Post Workout Recovery for Sports](#)

[Restorative Show](#)

15.1 Recovery Protocols After Heavy Loading of the Posterior Chain

Inversion is a recovery method that helps by decompressing the spinal column and elongating the spinal discs. There is also some evidence that it can help with CNS recovery by decreasing the amount of time it takes an athlete to return to a parasympathetic state. This proves to be especially important during phases of intense, heavy, posterior chain loading. The following protocols can be performed on either an inversion table or a glute ham machine. In all cases, the key points are to make sure you relax your mouth and tongue, and focus on taking deep belly breaths in through your nose and out through your mouth. This method was first brought to my attention by Dr. Michael Yessis.

1) Used for spinal de-loading. (Total time = 5min)

- 5 minutes of continuous inversion

2) Used for CNS recovery. (Total time = 7—9min)

- 1 minute inverted
- 30 to 60 upright
- 1 minute inverted
- 30 to 60 upright
- 1 minute inverted
- 30 to 60 upright
- 1 minute inverted
- 30 to 60 upright
- 1 minute inverted

3) Used for CNS recovery. (Total time = 7—9min)

- 1 minute Glute ham hang
- 30 to 60 seconds Laying Wall Shakes
- 1 minute Glute ham hang
- 30 to 60 seconds Laying Wall Shakes
- 1 minute Glute ham hang
- 30 to 60 seconds Laying Wall Shakes
- 1 minute Glute ham hang
- 30 to 60 seconds Laying Wall Shakes
- 1 minute Glute ham hang

16.1 Specific Prehab

[Prehab workouts](#) are extremely important in preparing the body for the intensity of practice and competition. These drill sheets focus on the smaller muscle groups that are designed to help stabilize the larger muscle groups, especially during dynamic movements such as throwing. The body is designed in a way that ensures that the smaller muscles will always tire first. The point of prehab exercise is to keep those smaller muscles as intact and strong as possible. They are essentially the body's weakest link. If an athlete has been injured in the past, he or she can use these prehab workouts to help prevent further injury for that specific body area.

Specific Areas:

[Ankle Prehab](#)

[Shin Splint Prehab](#)

[Groin Prehab](#)

[Hip Flexor Prehab](#)

[Knee Prehab](#)

[Shoulder Prehab Circuits](#)

[Shoulder YTWL Prehab Circuit](#)

[Forearm Circuit for Sport](#)

[Lower Back Prehab](#)

16.2 Injury to lower body limb perform the workouts below 5 days a week.

[Seated Upper body Circuit](#)

[Super Endurance Leg Injured for Sport](#)

[Non Spinal Loading Leg Workout](#)

[XL Athlete Suspension Training Workout 3](#)

[XL Athlete Suspension Training Workout 2](#)

[XL Athlete Suspension Training Workout 1](#)

17.1 Conditioning

It is important that we as coaches understand the difference between speed work and conditioning. Speed development drills, as discussed in an earlier section of this book, utilize full rest times to allow each repetition to be completed at a maximal, or near maximal speeds. Conditioning, however, is used to prepare athletes for the rigors of competition, which rarely allow full rest. Conditioning drills should simulate and prepare athletes for the next phase, whether it be a new training block, camp, or the competition season. Conditioning can be completed using many different methods and does not always have to consist of running. A high tempo lift or interval training can also be used as conditioning tools. It is important to note that if conditioning is a desired adaptation, it should be completed at the end of a training session. Conditioning is completed at this time to ensure skill adaptation is not compromised. Conditioning should be completed at only certain times of the year depending on the goals of the phase your athletes are in.

Always keep in mind that too much Conditioning on a weekly or daily model , can decrease strength gains.

17.1.1 Post Practice Training Methods

An Example of a 5 day Conditioning protocol that can be used, however if conditioning 5 days don't use the whole workouts provided below.

TRAINING DAY	CONDITIONING GOAL	SPECIAL INSTRUCTIONS	EXAMPLE OF WORKOUTS
DAY 1	Short Sprints (High Quality Speed)	Sprints under 10 seconds Full recovery: rest 90-120 seconds	Alactic High Quality Workout
			Flying 60s
			16 week short sprint workouts
			Cone agility
DAY 2	Long Sprints or Short Sprints w/ Reduced Rest (Speed Conditioning)	Sprints over 15 seconds or Sprints under 10 recovery under 20 seconds	
			High Quality Lactic Anaerobic Power Training Builder
			Metabolic Injury Prevention Runs
DAY 3	Short Sprints (High Quality Speed)	Sprints under 10 seconds Full recovery: rest 90-120 seconds	Alactic High Quality Workout
			Flying 60s
			16 week short sprint workouts
			Cone agility
DAY 4	Short Sprints (Anaerobic Conditioning)	Sprints under 10 seconds Limites recovery: 45-60 seconds	Work Capacity Alactic Anaerobic Training Builder
			Flying 60s
			16 week short sprint workouts
			Cone agility
DAY 5	Longer Sprints or Continuous Running (Oxidative Conditioning)	This day is purely work capacity	Aerobic Work Capacity Training Builder
			Metabolic Injury Prevention Runs
			Bike Conditioning
			TrashBall

An Example of a 3 day Conditioning Protocol

TRAINING DAY	CONDITIONING GOAL	SPECIAL INSTRUCTIONS	EXAMPLE OF WORKOUTS
DAY 1	Short Sprints (High Quality Speed)	Sprints under 10 seconds Full recovery: rest 90-120 seconds	Alactic High Quality Workout
			Flying 60s
			16 week short sprint workouts
			Cone agility
DAY 2	Short Sprints (High Quality Speed)	Sprints under 10 seconds Full recovery: rest 90-120 seconds	Alactic High Quality Workout
			Flying 60s
			16 week short sprint workouts
			Cone agility
DAY 3	Longer Sprints or Continuous Running (Oxidative Conditioning)	This day is purely work capacity	Aerobic Work Capacity Training Builder
			Metabolic Injury Prevention Runs
			Bike Conditioning
			TrashBall

An Example of a 4 day Conditioning Protocol

TRAINING DAY	CONDITIOING GOAL	SPECIAL INSTRUCTIONS	EXAMPLE OF WORKOUTS
DAY 1	Short Sprints (High Quality Speed)	Sprints under 10 seconds Full recovery: rest 90- 120 seconds	Alactic High Quality Workout
			Flying 60s
			16 week short sprint workouts
			Cone agility
DAY 2	Long Sprints or Short Sprints w/ Reduced Rest (Speed Conditioning)	Sprints over 15 seconds or	Alactic High Quality Workout
			Flying 60s
		Sprints under 10 recovery under 20 seconds	16 week short sprint workouts
DAY 3	Short Sprints (Anaerobic Conditioning)	Sprints under 10 seconds Limites recovery: 45-60 seconds	Work Capacity Alactic Anaerobic Training Builder
			Flying 60s
			16 week short sprint workouts
			Cone agility
DAY 4	Longer Sprints or Continuous Running (Oxidative Conditioning)	This day is purely work capacity	Aerobic Work Capacity Training Builder
			Metabolic Injury Prevention Runs
			Bike Conditioning
			TrashBall

Example [Eight Week Conditioning Plan](#)

Conditioning games are a great way to train athletes in a fun, yet intense manner. These games involve increasing work capacity, while also adding the competitive factor. Any time competition is involved any true athlete will immediately begin to work and push that much harder. These games allow for this while also keeping the element of fun for the athletes.

[Russian Basketball](#) and [Trash Ball](#)

17.2 Super Endurance Workouts

[Super Endurance Workouts](#), which are similar to the Adaptability Circuits described earlier, are designed to improve an athlete's work capacity. These workouts are easy to implement, and are very effective. They can be implemented at the beginning of a training cycle in order to prepare each athlete for the high intensity aspects of training. The workouts completed in this cycle are intended to keep each athlete's work capacity at a high level.

17.3 Tabata Intervals

[Tabata Intervals](#) are an excellent way to train athletes in a simplistic and efficient manner. Through short and very intense bursts of exercise, athletes will significantly improve both aerobic and anaerobic systems simultaneously. This will improve performance, as well as recovery in both novice and elite athletes.

[Strip Sets For Sport](#)

[Rope Workout Sheets](#)

[Big arm Circuit for Sport](#)

18.1 Block Periodization & Annual Plan

Block periodization is used in the Triphasic model as it allows all qualities of sport to be peaked simultaneously based on residual effects. Residual effects are based on how long it takes before a quality, or adaptation, begins to have a detraining effect. Aerobic qualities and max strength have the longest residual effects, while the nervous system and max speed have the shortest residuals. For this reason Aerobic adaptations are improved early in the training phase, followed by max strength. This leaves speed techniques to be trained and improved closer to the desired peaking time, usually camp or the first game in a team sport. This also causes the training to progress to a more specific method as the competition time approaches, which increases the transfer of training to the actual sporting event.

TRIPHASIC FOOTBALL ANNUAL PLAN																																																				
Football	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Aerobic																																																				
High-Intensity																																																				
Peaking																																																				
Competition																																																				

Various Graphs For Guidelines in Training Programs

TABLE 5.1											
MONDAY LOADING (MEDIUM INTENSITY)			WEDNESDAY LOADING (HIGH INTENSITY)				FRIDAY LOADING (HIGH VOLUME)				
7 1-RM	MAXIMUM REPS POSSIBLE	HIGH QUALITY REPS (STRENGTH)	SETS (OFF- SEASON)	SETS (IN- SEASON)	HIGH QUALITY REPS (STRENGTH)	SETS (OFF- SEASON)	SETS (IN- SEASON)	HIGH QUALITY REPS (VOLUME)	SETS (OFF- SEASON)	SETS (IN- SEASON)	
80%	5 - 6				1 - 2	4 - 5	2 - 3				
77.5%	6 - 7				1 - 3	4 - 5	2 - 3				
75%	7 - 8				1 - 3	4 - 5	3 - 4				
72.5%	8 - 9				2 - 3	4 - 5	3 - 4				
70%	9 - 10	2 - 3	4 - 6	3 - 4							
67.5%	11 - 12	2 - 3	4 - 6	3 - 5							
65%	13 - 14	3	4 - 6	3 - 5							
62.5%	14 - 15	3	4 - 6	3 - 5				5 - 8	4 - 6		
60%	15 - 16							5 - 8	4 - 6	IN-SEASON VOLUME	
57.5%	17 - 18							5 - 8	4 - 6	COMES FROM PRACTICE	
55%	19 - 20							5 - 8	4 - 6		

This table displays my three-day loading variables of 55–80 percent undulated mesocycle. The column on the far left displays the percentage load of the athlete's 1RM with the maximum number of repetitions possible listed in the column to the right. The reps and sets within each training day indicate the number of each that can be performed while maintaining a high quality of work for the athlete. A few things to notice—the rep ranges stay the same regardless of whether the athlete is in-season or in off-season training, the number of sets used for in-season training are fewer than with off-season training because of the high work demands and added stress of practices and games during the season, and all the volume work comes from practices and games (see Friday/Sets (In-Season)). Don't train volume in-season. You'll overtrain your athletes.

TABLE 4.25: ABOVE 80 PERCENT THREE-DAY VERSUS TWO-DAY IN-SEASON MODEL							
TRAINING WEEK:		DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
THREE-DAY MODEL	FOCUS	TOTAL BODY	OFF	TOTAL BODY	OFF	TOTAL BODY	OFF
	LOAD	82-87%		90-97%		75-80%	
	MEANS APPLIED	TRIPHASIC		DYNAMIC		TRIPHASIC	
TWO-DAY MODEL	FOCUS	TOTAL BODY	OFF	LOWER BODY	OFF	OFF	OFF
	LOAD	82-87%		90-97%			
	MEANS APPLIED	TRIPHASIC		DYNAMIC			

TABLE 5.11: 55-80 PERCENT THREE-DAY VERSUS FOUR-DAY MODEL							
TRAINING WEEK:		DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
THREE-DAY MODEL	FOCUS	TOTAL BODY	OFF	TOTAL BODY	OFF	TOTAL BODY	OFF
	LOAD	62-70%		72-80%		55-62%	
	MEANS APPLIED	BIOMETRIC		DYNAMIC/ BIOMETRIC		VOLUME	
FOUR-DAY MODEL	FOCUS	LOWER BODY	UPPER BODY	OFF	LOWER BODY	UPPER BODY	OFF
	LOAD	62-70%	62-70%		72-80%	72-80%	
	MEANS APPLIED	BIOMETRIC			DYNAMIC/ BIOMETRIC		

TABLE 5.3: PROGRESSIVE LOADING SCHEME FOR 55-80%			
WEEK	MONDAY LOADING (MEDIUM INTENSITY)	WEDNESDAY LOADING (HIGH INTENSITY)	FRIDAY LOADING (LOW INTENSITY)
1	62.5% 3 REPS, 4-6 SETS	72.5% 1-3 REPS, 4-5 SETS	55% 5-6 REPS, 4-6 SETS
2	65% 2-3 REPS, 4-6 SETS	75% 1-3 REPS, 4-5 SETS	57.5% 5-6 REPS, 4-6 SETS
3	67.5% 2-3 REPS, 4-6 SETS	77.5% 1-3 REPS, 4-5 SETS	60% 5-6 REPS, 4-6 SETS
4	70% 2-3 REPS, 4-6 SETS	80% 1-3 REPS, 4-5 SETS	62.5% 5-6 REPS, 4-6 SETS

TABLE 5.2: BLOCK 4 LOADING VARIABLES (55-80%)				
BLOCK	DAY	LOAD	REPS	SETS
BLOCK 4 3-4 WEEKS	MONDAY (MEDIUM INTENSITY)	62-70%	2-3	4-6
	WEDNESDAY (HIGH INTENSITY)	72-80%	1-3	4-5
	FRIDAY (HIGH VOLUME)	75-80%	5-8	4-6

Other Aspects of Training

Possible Pairing of the undulated model – Keep in mind that you make any pairing you want with model.

	Loading Day 1 of week Sub maximal loading		Pairing	Loading Day 2 of week Max loading, Heavy Day, Max Effort		Pairing	Loading Day 3 of week High Volume, Lighter weight day, Work Capacity		Pairing
97.5%				1 Repetition	1 - 2 Sets				
95 %				1 Repetition	2 - 3 Sets				
92.5%				1 Repetition	3 - 4 Sets	A1			
90%				1 Repetition	3 - 4 Sets	B2			
87.%				1 Repetition	3 - 4 Sets	C3			
85%	1-2 Repetitions	4 - 5 Sets	A1	1-2 Repetitions	4 - 5 Sets	D4			
82.5%	1-2 Repetitions	4 - 5 Sets	B2	1-2 Repetitions	4 - 5 Sets	E5			
80%	1-2 Repetitions	4 - 5 Sets	C3	1-2 Repetitions	4 - 5 Sets	F6	3-4 Reps	4-5 sets	A1
77.5%	1-3 Repetitions	4 - 5 Sets	D4	1-3 Repetitions	4 - 5 Sets	G7	3-4 Reps	4-5 sets	A1
75%	1-3 Repetitions	4 - 5 Sets	E5	1-3 Repetitions	4 - 5 Sets	H8	4-5 Reps	4-5 sets	B2
72.5%	2-3 Repetitions	4 - 5 Sets	F6	2-3 Repetitions	4 - 5 Sets	I9	4-5 Reps	4-5 sets	C3
70 %	2-3 Repetitions	4 - 6 Sets	G7				5-6 Reps	4-5 sets	D4

67.5%	2-3 Repetitions	4 - 6 Sets	H8				5-7 Reps	4-5 sets	E5
65%	3 Repetitions	4 - 6 Sets	I9				5-8 Reps	4-6 sets	F6
62.5%	3 Repetitions	4 - 6 Sets	I9				5-8 Reps	4-6 sets	G7
60%							5-8 Reps	4-6 sets	H8
57.5%							5-8 Reps	4-6 sets	H8
55%							5-8 Reps	4-6 sets	I9
52.5%							5-8 Reps	4-6 sets	I9
50%							5-8 Reps	4-6 sets	I9

Schemes for load and Reps for Main Lifts Back Squat, Bench, Olympics

Percent of Maximum load	Maximum Reps in one Set (Rarely done)	Reps For High Quality Strength	Sets of High Quality Reps (use Colum to left) off- season	Sets of High Quality Reps (use 2 Columns to left) in- season	Sets of High Volume for day 3 Training in undulated
97.5%	1-2 Reps	1 Repetition	1 - 2 Sets	1 - 2 Sets	
95 %	2 Reps	1 Repetition	2 - 3 Sets	1 - 2 Sets	
92.5%	2-3 Reps	1 Repetition	3 - 4 Sets	1 - 2 Sets	
90%	3-4 Reps	1 Repetition	3 - 4 Sets	2 - 3 Sets	
87.%	4 Reps	1 Repetition	3 - 4 Sets	2 - 3 Sets	
85%	4-5 Reps	1-2 Repetitions	4 - 5 Sets	2 - 3 Sets	

82.5%	5 Reps	1-2 Repetitions	4 - 5 Sets	2 - 3 Sets	
80%	5-6 Reps	1-2 Repetitions	4 - 5 Sets	2 - 3 Sets	3-4 Reps, 4-5 sets
77.5%	6-7 Reps	1-3 Repetitions	4 - 5 Sets	2 - 3 Sets	3-4 Reps, 4-5 sets
75%	7-8 Reps	1-3 Repetitions	4 - 5 Sets	3 - 4 Sets	4-5 Reps, 4-5 sets
72.5%	8-9 Reps	2-3 Repetitions	4 - 5 Sets	3 - 4 Sets	4-5 Reps, 4-5 sets
70 %	9-10 Reps	2-3 Repetitions	4 - 6 Sets	3 - 4 Sets	5-6 Reps, 4-5 sets
67.5%	11-12 Reps	2-3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-7 Reps, 4-5 sets
65%	13- 14 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
62.5%	14-15 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
60%	15-16 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
57.5%	17-18 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
55%	19-20 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
52.5%	20-21 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets
50%	22-24 Reps	3 Repetitions	4 - 6 Sets	3 - 5 Sets	5-8 Reps, 4-6 sets

18.2 The Advantages of Block Training in Athletics

Reaching optimal performance for all athletes in the most efficient manner must remain a top priority for all performance coaches. This goal is exceeded in importance only by reducing injury during competition. Even with the inclusion of injury reduction training tactics, which are commonly congruent with many desired training adaptations, the use of efficient training methods to gain and maintain optimal performance enhancements are vital for successful athletic performance.

Coaches must also realize the perfect training model for athletes only exists in theory and there are never absolute outcomes with the use of various training methods. This is due to the dynamic systems theory and the understanding that all systems of the body, along with their reactions to each stressor would need to be accounted for in a real-time setting for the “perfect training model” to be executed. We, as performance coaches, must deal with athletes’ external stressors such as tests, personal lives, jobs, and even occasionally misguided practice techniques. Even though the perfect training model only exists in completely controlled and understood world, an attempt is made by all coaches to create the ideal model.

Before efficient manners of training can be discussed and argued it is important for all coaches to first have a firm understanding of the meaning of “optimal performance”. Optimal performance can only be achieved when all qualities, or parameters, used within the event are peaked simultaneously, to their appropriate amount for each competition event. The peaking of these parameters relies on each of their individual responses to training, which determines their windows of availability for use in competition. The importance of each of these individual qualities varies depending on the requirements of each sport. However, sports will commonly include the adaptations to parameters in the aerobic system, maximum strength levels, anaerobic endurance or repeat sprint effort, and maximal speed. As stated previously, a coaches understanding of each event and its specific quality requirements of that event will determine the specific training protocol utilized.

There are many known periodization models that have been used throughout the training process. Two of the well-known periodization methods are the block and conjugate models, which will be compared in this article. Both are common practices used within the strength and conditioning world and have their own respective benefits. For those unfamiliar with the differences between the two, block training places a highly specific stress on one of the above mentioned qualities, while conjugate training stresses all qualities within a training cycle. It should be noted here that even when the focus of adaptation is placed on a single quality, as seen in block training, other parameters may be affected due to the training. An example of this occurs when seventy or more high-quality repetitions of 10 seconds or less are completed in a training session, yet a significant aerobic training effect was seen.

Block Training

As stated above, the concentration of training workloads is the most decisive and fundamental principle of block periodization. This concentration of stress based on the specific desired quality allows the organism to place focus on a single adaptation, which greatly reduces the required time to maximize the adaptation. Once the desired adaptation is acquired, a new stimulus is implemented to improve a new, specifically chosen quality. This approach by block training allows all adaptations to be realized with the least amount of required volume, which means athletes do not experience as much “wear and tear” during training. May be placed here

The block training model can be broken into simple components, such as the three specialized phases termed accumulation, transmutation, and realization. However, this model is much more complex when considering the multi-year training model remodeling, which must match the adaptations made by each athlete. Each phase is designed to build upon the adaptations from the previous and ultimately lead to peaking of all abilities. Accumulation is programmed for the development of basic abilities such as aerobic endurance, muscular strength, and general movement patterns. This phase of training will be completed for the longest amount of time as the desired physiological and morphological changes develop the most slowly. These general adaptations are then built upon in the transmutation phase of training in which anaerobic endurance and specialized muscular endurance training takes place. Finally the realization phase is designed as a pre-competitive training phase in which maximal speed and the nervous system are maximized. It is clear these three phases function on a continuum which begins with the most general adaptations occurring in the accumulation phase and becoming more specific as training progresses through the transmutation and finally the realization, or peaking phase.

The block training method further functions on the systematic principles of residual effects, which are based on the amount of time each quality remains in a highly-trained state once training is ceased. This builds on the previous idea that once one parameter is maximized, others can be specifically trained while maintain the adaptations to the previously trained qualities.

The residual effects of each training quality are as follows:

- Aerobic endurance (30±5 days)
- Maximum strength (30±5 days)
- Anaerobic glycolytic endurance (18±4 days)
- Maximum speed (5±3 days)

The knowledge of these training residuals allows for a systematic training of each individual quality, along with the peaking of all qualities simultaneously, which must be the goal for all coaches prior to the competition phase of the annual cycle. Based on the residual effects shown above, aerobic qualities and maximum strength maintain their training effects the longest, while the nervous system, or max speed, have the shortest residuals. It is for this reason aerobic and maximum strength abilities are trained during the accumulation phase, or early in the annual cycle. By stressing and adapting these qualities with longer residuals, the qualities more specific to sport, such as maximal speed, can be improved while the aerobic and strength qualities remain elevated due to their long residual effects. Transfer of training is also improved as more specific training is completed prior to competition, which is also in accordance with the three block training phases. Coaches must understand the importance previous training plays in regards to determining the length of time each quality is stressed. The individual athlete responses to training must be considered at all times, as these will ultimately determine the residual length windows, and thus the optimal results of block periodization can be reached.

Conjugate Training

The conjugate training model takes a different approach as it attempts to train all qualities within a single phase or training session. The majority of conjugate training models follow a similar training session, which begins with maximum strength training, followed by a lighter exercise which is aimed at increasing power and velocity, and then finish with some exercises aimed at improving work capacity, or anaerobic endurance. This model leads to inefficient adaptations and reduced quality of work as the

athlete's body can become confused by the multiple signals being sent as it is being told to be fast, strong, and increase duration all within the same training session.

It is important to understand that this method will lead to performance improvements. However, some adaptations will occur at a much slower rate when multiple stressors are presented within the same cycle. This is due to the fact that not all parameters require the same amount of time to adapt maximally. If one of these qualities adapts at a faster rate than others then that one ability will be maximized. However, the others will lag behind and optimal performance will not be reached in a time efficient manner. Some adaptations occur more quickly than others, which means they are being trained unnecessarily while other qualities are trained with sub-optimal stress levels. This can lead to the continued training of a quality that may already be adapted optimally and will remain adapted due to its residual training effect. This inefficient and elongated adaptation phase leads to an excessive amount of time spent in the preparation phase, which eliminates the ability to execute multiple realization, or peaking, cycles within the annual training cycle.

This model of training is useful, however, for low level athletes that are continuing to improve a strong foundation of abilities if it is completed over multiple cycles. It should be noted that the block method can also be used in low level athletes with great success, it simply depends on the focus of the training completed for the athlete. Block training can also be used in the same annual cycle as conjugate training if an increased focus on a specific adaptation is needed in an athlete. Once that foundation has been created through training athletes will no longer receive the appropriate stimulus for adaptation within the annual cycle when all parameters are stressed simultaneously

Applying the Block Training Model to the Triphasic Annual Plan

In the realm of collegiate and professional athletics, the majority of athletes must reach the stage of optimal performance specific for their individual event multiple times within the annual cycle. Using the idea that optimizing all abilities simultaneously will lead to the greatest chance of a successful performance, specific peaking programs can be created within the annual cycle. These peaking times can be used at any time throughout training, however, they are typically applied at specific phases. Examples of these peaking times are prior to training camps, the beginning of conference play, and post-season competition periods.

Triphasic training takes full advantage of the block system and its benefits of peaking athletes at specific times of the competition calendar. The three phases of the block model can be clearly seen with the above 80% training block, the high-velocity high-load block, and the high-velocity low-load block. The residual effects of each quality are also taken into account, which becomes clear when the entire training calendar is laid out.

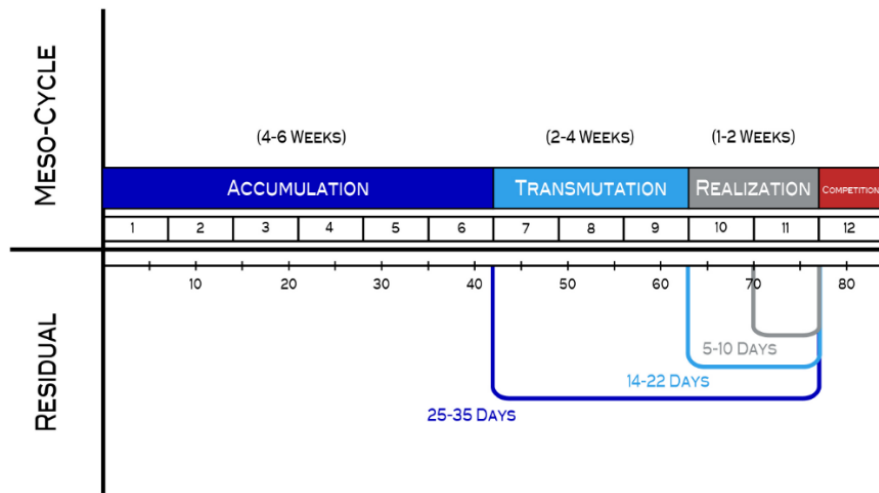
Before the focus of a specific block can be chosen within the training cycle a coach must first determine the competition dates. The knowledge of when athletes must be peaked will allow a coach to set up a plan that will complete all phases of training within the allotted time frame. Once these dates are determined, the duration of each block must be determined. The needs of each athlete must be considered during this planning of each phase. Some athletes will require different stressors due to sport requirements, prior training status, genetics, etc. it is important all of these factors are understood before a program is finalized.

The phases of the block training model, as described previously, include the accumulation, transmutation, and realization stages. Within the Triphasic Training model, the accumulation block consists of the GPP training blocks and the muscle action training at above 80% of one rep max. These two training blocks are aimed at increasing the aerobic capacity and energy systems of the organism and improving maximal strength. These two qualities are very general and non-specific to sport, but they are responsible for creating the foundation upon which all other abilities are able to be built. When the long residual effects of these two qualities (aerobic and maximal strength) are considered, it is clear these abilities are able to be trained, and then maintained for an extended period of time. As stated above, the retention of these qualities allows other parameters such as anaerobic endurance and maximal speed to be trained, ultimately leading to all qualities peaking simultaneously. Due to the physiological adaptations occurring in the body and these qualities building the foundation for others, the greatest amount of time is spent in this accumulation phase.

During the transmutation phase of block training anaerobic endurance, or the ability to repeat high intensity bouts, is trained specifically. Based on the continuum of residual effects training this quality becomes ideal. This phase becomes more specific to sport as energy systems required for competition can be trained more specifically now that a solid foundation has been built. Biometric training, as seen in Triphasic Training, can be completed in this phase to ensure all athletes receive the appropriate stimulus, which also continues to reinforce the previous training completed on the aerobic system. Training percentages are also lowered during this time as power, rather than maximum strength, is now the focus of training. The reduction in percentage also makes training more specific to sport as bar speed is increased.

Finally the realization phase occurs just prior to competition and consists of maximal speed training. This block is executed using lighter-loads, less than 55% of one rep max, at high-velocities. This training is more specific to sport as it most closely mimics the velocities seen throughout competition. The effects of this nervous system training are the shortest, thus this quality must be trained immediately prior to competition.

The picture below depicts the ability of the block training model to peak all qualities simultaneously, ultimately leading to maximized ability to compete and perform. The adaptations of training the aerobic system and maximum strength early in the cycle do not diminish for up to 35 days, especially if the qualities are “touched up” throughout that residual time period. The transmutation phase effects will remain for up to 22 days, which allows the realization phase to take place while remaining adapted.



Ultimately, all qualities for the desired competition event can be trained, adapt, and supercompensate simultaneously when the block model is programmed correctly. This will lead to the greatest opportunity for a successful competition.

19.0 Band Training

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Overview

The use of elastic bands in training has occurred for quite some time, increasing in popularity with each passing year. Initially utilized by “old time strongmen” in the form of [chest expanders](#), elastic resistance has long been a convenient (though sometimes dubious) means of training the muscles. More recently, elastic resistance has taken the form of [bands](#), which are either used on their own or in unison with free weights and/or machines. These loops of durable rubber have many different uses in the weight room.

Support In Research

Studies have suggested support for the use of bands in training, primarily with regard to improvements in peak force and peak power during exercises which combine bands and traditional weight training exercise (such as [back squats](#)) (2). For example, a back squat load of 85% of an athlete’s maximum, combined with resistance bands attached to the barbell, has been shown to significantly increase the athlete’s peak force and peak power output during the exercise (2). This increase in force and power during training may, over time, induce favorable adaptations in the athlete to a greater extent than weight.

Using Bands For Resistance

By far the most common use of bands is in the form of resistance for exercise. Whether they are used alone, such as in the [Bulgarian Band Squat](#) or in combination with weighted implements (barbells and/or dumbbells), bands can supplement nearly any exercise and add greater stress and variety. Increased stress and novel stimuli training without bands (1).

In some cases, the addition of bands in training has increased strength and power levels two- to three-times greater than training that does not include bands (1).

Using Bands For Assistance

There are several different ways of utilizing bands in training. One method is to use them as a means of assisting exercises or other activities. This type of use helps to introduce bands to athletes unfamiliar with them. For example, an athlete may choose to use a band to aid with stretching, known as [band stretching](#). The band essentially replaces the need to have a partner to help with stretching. Athletes may also use bands to assist with exercises, such as the [band pull-up](#) or chin-up. By taking advantage of the band's elasticity, the athlete is able to more easily complete the exercise and perform more repetitions than without the band. help to encourage adaptation, and challenge athletes to develop a higher level of force and power output in such activity.

Using Bands For Resistance

By far the most common use of bands is in the form of resistance for exercise. Whether they are used alone, such as in the [Bulgarian Band Squat](#) or in combination with weighted implements (barbells and/or dumbbells), bands can supplement nearly any exercise and add greater stress and variety. Increased stress and novel stimuli help to encourage adaptation, and challenge athletes to develop a higher level of force and power output in such activity.

Using Bands Alone

The elastic resistance provided by bands alone is often enough to make several exercises much more difficult. The [piston squat](#) becomes decidedly more intense with the addition of a [band](#), as does the [split squat](#). For these normally body weight exercises, resistance is increased with use of the band. The addition of the band also compels the athlete to exert more force throughout the entire range of motion (accommodating resistance) (3). In the piston squat, for example,

the band is lax when the athlete is sitting upon the bench. The most difficult part of this exercise is the initial liftoff phase from the bench, and body weight alone is more than adequate for resistance. As the athlete stands up, the exercise becomes easier as the active muscles move into a range of motion of increased mechanical advantage.

During this part of the exercise, the athlete's own body weight is significantly easier to move. To make this phase more difficult, the band begins to stretch and provide increased resistance. Thus the athlete receives a greater amount of stress throughout the entire range of motion for this exercise with the addition of a band. This scenario may be duplicated with many other body weight exercises, such as push-ups and sit-ups. Once an athlete has adapted to a particular body weight exercise, one may add additional resistance in the form of a band in order to increase the degree of difficulty.

Adding Bands To Weights

Bodyweight exercises are not the only activities that can be made more difficult with the addition of bands. One can attach bands to a weighted barbell and perform back squats, bench presses, and a host of other exercises as well. As mentioned before, the addition of bands to an exercise forces the athlete to exert a greater amount of effort throughout the entire range of motion. This is true for weighted exercises as well. For example, a maximum back squat of 500 lbs represents the amount of weight an athlete can successfully lift from a full squat to an erect position. The limiting factor for success this lift is the highly difficult range of motion near the bottom of the squat. Once this is negotiated, the rest of the range of motion is considerably easier.

This essentially means that the athlete can lift 500 lbs from the bottom of a squat.

As we know from experience, however, athletes can squat considerably more weight in shorter ranges of motion (such as the half squat or quarter squat). As a result, coaches will often prescribe [half rack squats](#) with significantly more weight than the athlete's maximum full squat in order to properly stress the athlete within that range of motion.

While this is certainly an acceptable practice, it may be easier and more efficient to attach bands to the barbell for use during full squats.

The bands will be lax at the bottom of the squat, where the load on the bar is enough to fully stress the athlete, but increase in tension as the athlete stands up (which more adequately trains the stronger portion of the lift).

Bands can be added to numerous exercises, even dumbbell exercises. If a coach seeks a method of making an exercise more difficult, or simply wants to add more variety to a program, band training may be an excellent option.

Band Training Exercise Examples

[2 Way Band Kicks](#)

[Ankle Band Work](#)

[Anterior Tibialis Band](#)

[Back Squat With Bands](#)

[Ball Band Leg Curls](#)

[Band Abduction Speed](#)

[Band Adduction Prehab](#)

[Band Face Pulls](#)

[Band I Band Stretch](#)

[Band Leg Speed Abduction](#)

[Band Leg Speed Adduction](#)

[Band One Arm Tricep Push Down](#)

[Band Pull Through Toes In](#)

[Band Pull Throughs](#)

[Band Rear Delt](#)

[Band Rev Grip Straight Arm Lat Pull Down](#)

[Band Side Lat Pull](#)

[Band Speed Push Backs](#)

[Band Speed Scap Pulls](#)
[Band Squat Jump](#)
[Band Squats](#)
[Band Straight Arm Pull Down](#)
[Band Tricep Extension](#)
[Box Back Squat Bands](#)
[Box Back Squat with Bands](#)
[Box Front Squat with Bands](#)
[Bulgarian Band Squat](#)
[Chest Band Adduction](#)
[Closed Lunge V Band Twist](#)
[Cross Over Step Up Band Dumbbells](#)
[Cross Over Step Up Bands](#)
[Double Step Up Band Dumbbell](#)
[Double Step Up With Band](#)
[Dual Action Bicep Curls](#)
[Dual Action DB Rows](#)
[Dual Action Tricep Band Extension](#)
[Dumbbell Bench Press With Bands](#)
[Dumbbell Step Up Band](#)
[External Rotation Band](#)
[Forward Eccentric Band Jumps](#)
[Front Squat With Bands](#)
[Glute Band Cycle Kicks](#)
[Glute Ham Hyper Incline Band](#)
[Glute Ham Hyper With Band](#)
[Hip Flex Band Pulls](#)
[Hip Flex Band Pulls Lateral](#)
[Incline Dumbbell Press With Bands](#)

[Internal Rotation Band](#)
[Isometric Lunge Band](#)
[Lateral Band Lunge](#)
[Lateral Band Step Up](#)
[Lateral Single Leg Band Jumps](#)
[Lateral Walking Band Lunge](#)
[Open Lunge V Band Twist](#)
[Partner Band Abs](#)
[Piston Squat With Band](#)
[Push Up Scapula Shrug With Bands](#)
[Reverse Band Crunch](#)
[Reverse Hyper On Glute Ham With Band](#)
[Reverse Hyper Wide Leg With Band](#)
[Single Leg Hops Low Box With Bands](#)
[Single Leg Low Box Band Dumbbell Step Up](#)
[Single Leg One Arm Band Row](#)
[Split Squat Band](#)
[Squatting Band Row](#)
[Squatting One Arm Band Row](#)
[Stand Alternating V Band Flexion](#)
[Standing Band Leg Curl](#)
[Step Up Band Glute Kick](#)
[Triangle Terror](#)
[Tricep Push Down Band](#)
[Walking Band Lunge Jumps](#)
[Walking Lunge With Band](#)

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2. Wallace, B.J., Winchester, J.B., and M.R. McGuigan. Effects of elastic bands on force and power characteristics during the back squat exercise. *Journal of Strength and Conditioning Research* 20 (2): 268-272. 2006.
3. ZATSIORSKY, V. *Science and Practice of Strength Training Second Edition*. Human Kinetics Publishers. Champaign, IL. 1995.

20.0 Ramadan and Athletes

I have had a number of people ask about Ramadan and the effects it plays on athletic performance this over the years. Below is a plan to allow for performance gains to be made during this time.

The plan will begin in the evening, when nutrients are allowed to be consumed.

Directly after sunset, when it is permissible to intake liquids, the athlete should consume some mixture that includes the 9 essential amino acids, and glutamine in a carbohydrate drink. After this drink has been finished, a meal high in fat and protein should be eaten. Slow digesting carbohydrates should be consumed to ensure no insulin spike occurs, as an insulin spike could lead to an inability to sleep. If an athlete does not seem to have this issue, I would consume as many carbohydrates as possible.

The middle of the night is another great chance to supply your body the nutrients it will need to perform. During this time a protein shake or snack including whey and casein should be consumed. This will allow the body to continue in an anabolic, or building, state.

Before sunlight it is imperative that you wake up to eat a breakfast including both carbohydrates and protein. This can range from hash browns, or other forms of potatoes, or rice. Along with meat, nuts, eggs or another form of protein. Just prior to sunrise a large protein shake consisting of mostly casein protein should be taken. Carbohydrates should be added to this shake such as honey almond milk or regular milk. This will help the protein to be absorbed more slowly, thus supply the body for a longer amount of time.

These nutritional tactics will allow an athlete to continue competing and training at high intensities while following Ramadan appropriately.

21.0 Performance Calculators

This [Repetition Calculator for Strength Athletes](#) will provide you a tool in which you can type in the Weights Lifted and the Repetitions Completed and you will get your athletes estimated Max Lift numbers

The [Peak Power Vertical Jump Test Calculator](#) will figure the peak power output during the vertical jump movement. This tool can show an athlete that has put on body weight and hasn't increased their vertical they have increased the power output of the vertical jump.

[Back Squat Max and Assisted Lift Weight and Reps Guide](#)- After downloading Excel File click on Yellow “Enable Edit” Button at top of Page to place in your maxes.

[Bench Press Max and Assisted Lift Weight and Reps Guide](#)- After downloading Excel File click on Yellow “Enable Edit” Button at top of Page to place in your maxes.

[Power Clean Max and Assisted Lift Weight and Reps Guide](#)- After downloading Excel File click on Yellow “Enable Edit” Button at top of Page to place in your maxes.

The [Explosive Strength Deficit Test](#) can show an athlete if they need to either work on strength to increase their vertical jump, or if they need work on plyometrics to get faster for improved vertical jump performance.

The [Average Power Vertical Jump Test Calculator](#) will figure the average power output during the full range of the athletes vertical jump. This tool can show an athlete that has put on body weight and hasn't increased their vertical they have increased the power output of the vertical jump.

This [Repetition Calculator for Endurance Athletes](#) will provide you a tool in which you can type in the Weights Lifted and the Repetitions Completed and you will get your athletes estimated Max Lift numbers.

[Max Reps Calculator and Reps Scheme](#) After downloading Excel File click on Yellow “Enable Edit” Button at top of Page to place in your maxes.

Bringing it All Together

The goal of training at all times is to enhance performance of your athletes, no matter what their specific competition event is. Each event and athlete must be considered and trained on an individual basis, but there are some aspects that remain the same through the majority of sports. Increasing max strength, power, and reactivity of your athletes will dramatically improve their performance. All of these qualities will be maximized through the Triphasic Training methods explained in earlier pieces of this book. It is important to note that there are many ways the Triphasic model can be implemented into a program and we have yet to find a program that cannot add Triphasic into it effectively.

A few notes that we want to leave you with as take away points from this book:

- Encourage proper teaching and execution of technique prior to adding weight. We as coaches are often too worried about numbers in the weight room, rather than the effects the training is having on their athletes. We cannot stress the importance of this main point.
- The second take away message builds on the first, and that is that the weight room is only one aspect of training. It is crucial to remember we are training athletes, not weight lifters. Do not make the goal of your training to improve strength. There will, however, be blocks throughout the year in which that is the ultimate goal, but max strength cannot be the purpose of your strength training as it will only improve your athletes to a certain point.
- As coaches we always need to remember that our athletes adapt in the way they are trained. This is especially important when training max speed. We must give full rest times while training max speed, or our athletes will not recover and these drills will become more of a conditioning tool.
- The final take away message we want to leave you is that rest is a weapon! After each phase of training your athletes must be given time to recover or they will not be able to supercompensate. If proper recovery time is not given athletes will eventually become

worn out and over trained. The down load weeks as well as the time between workouts are both necessary rest times that must be used wisely. The 23 hours spent during the day are just as much, if not more important in the aspect of performance increase than the single hour spent training. When proper recovery is given through down load weeks and your athletes take care of their body between training sessions your athletes will see the benefits of their hard work on the field or in competition.

Want to Learn More?

At XL Athlete, we realize that you strive to provide the best training methods for your athletes and seek to contribute to the overall success of your athletic department. XL Athlete will provide the most up to date, scientifically-based training methods that you can implement in your school's strength and conditioning program. We will also personalize these methods to best fit your school's facilities, athletes and coaching staff. We can format the clinics to consult with your entire coaching staff. Our experienced and certified clinicians across the country can work with your school to design an agenda to make sure you get exactly what your high school needs. Travel may require additional cost.

Here are a few of the topics typically covered at an XL Athlete High School Clinic:

Introduction to and benefits of strength training for high school athletes

Prevention of injury prevalent to high school sport

Improved health of strength training participants

Weight reduction/Loss of fat

Reduce likelihood of chronic pathology to the joints

Improved sporting performance

Improved strength and power performance

Improved speed and explosiveness for all sports

Common misconceptions associated with strength training

Basic strength training concepts

Weight room necessities

Free weights versus machines

Strength training exercises

Olympic lifts

Complex/contrast training

Plyometrics

Sprint training

Acceleration and maximum speed

Planning a strength training program

Recovery/restoration

[One Day xlathlete.com High School Clinic](#)

[Two Day xlathlete.com High School Clinic](#)

In Closing Please e-mail Xlathlete@gmail.com and tell us about your issues as a Strength coach and let us write articles to help you and others improve. This is what xlathlete has been built on the request of coaches in need.