

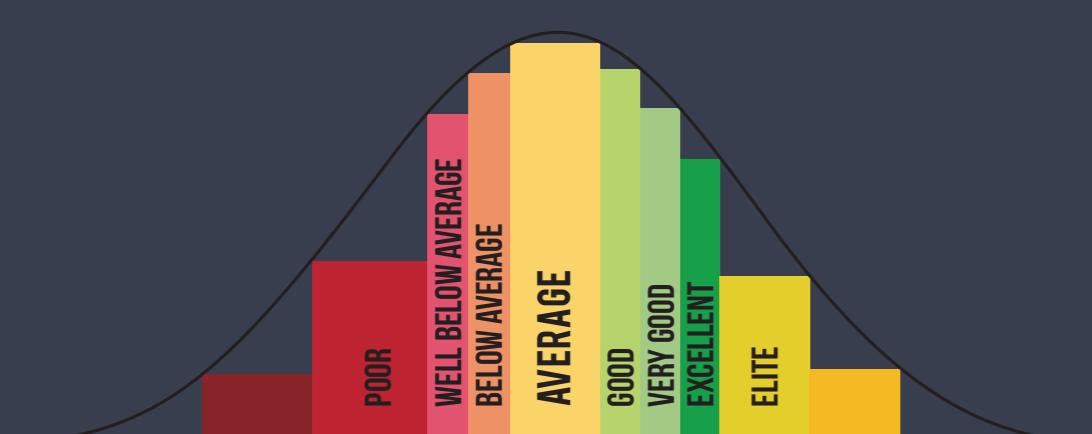
# PHYSICAL PERFORMANCE PROFILE

TESTING THE BOUNDARIES OF ATHLETIC POTENTIAL



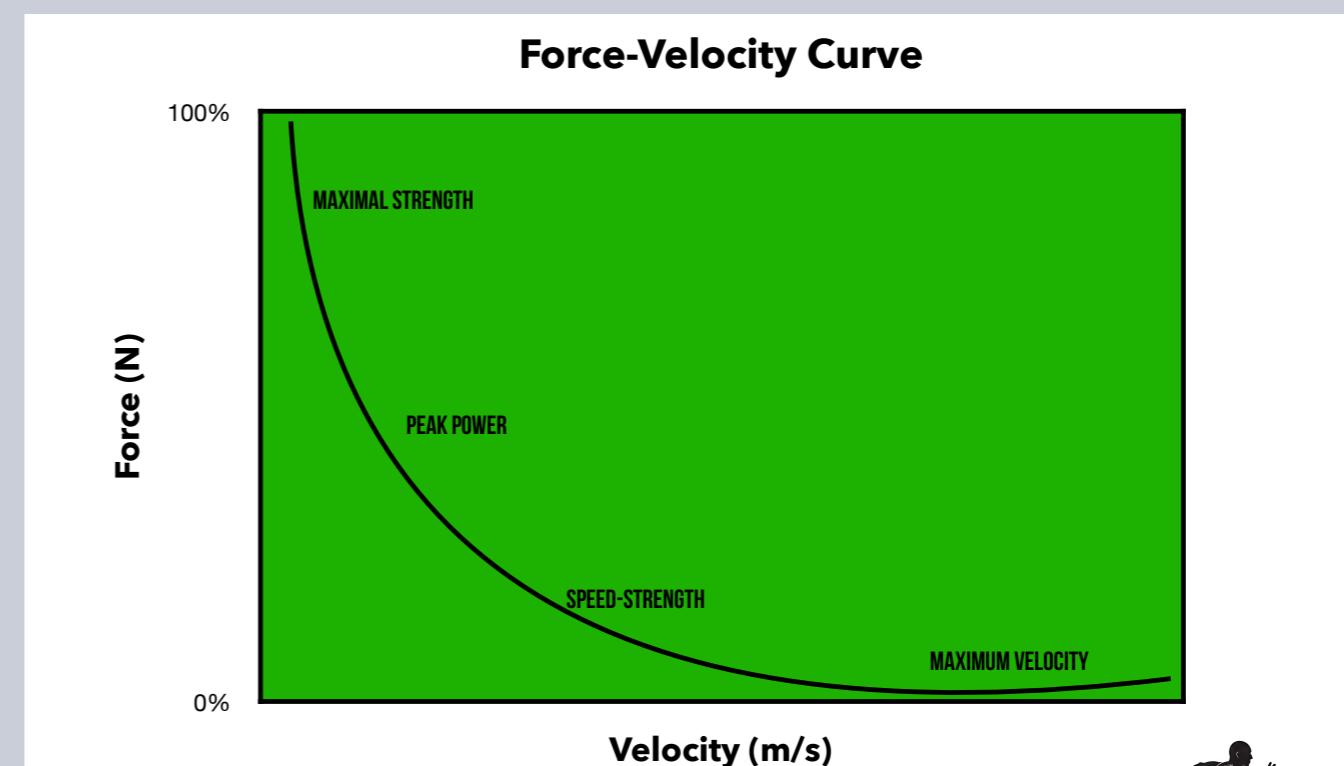
# What is **BENCHMARKING?**

- Process of evaluating objective performance standards against others considered to be the best in your age/sport.
- See how you compare to your competition and where you rank.
- Strategic way to learn how to focus your training to define opportunities for physical development.



## STRENGTH QUALITIES

**What defines an elite athlete? When it comes to the majority of sports, the more powerful and explosive you are physically, the better your odds of success. At Better Faster Stronger Science, we have selected a range of performance tests to objectively understand and profile the strength and power attributes of athletes. With this battery of tests, we can evaluate and assess you compared to the best athletes in the country. This objective information will allow you to see your progress over time and focus your training to reach your full athletic potential.**



# BFS SCIENCE ASSESSMENT

Age:

Sport:

Weight:

Sex:

BFS TESTING: PERFORMANCE TESTS	REACTIVE STRENGTH (IN)	ELASTIC STRENGTH (IN)	BALLISTIC STRENGTH (IN)	ACCELERATION/SPEED (SECS)	MAXIMAL STRENGTH (LBS)
YOU					
ELITE PERFORMERS AVG					
YOUR BENCHMARK					

The table above summarizes your raw performance data across a series of performance tests. Your numbers are compared to the average athlete in your age range and primary sport.

The table listed above presents the raw data that was collected with your performance tests, comparing you to your age related peers. Track your results to see how you progress over time. The following reports will help explain each test in detail, along with your Benchmark percentile ranking. You will read in each assessment section a

personalized report, detailing your findings and a guide on how you can train to improve.

# BFS SCIENCE ASSESSMENT

BFS TESTING: PERFORMANCE TESTS	STATIC MED BALL THROW (W)	ROTATIONAL MED BALL THROW (W)	SINGLE LEG STRENGTH (#)	PUSH-UPS (#)	CHIN UPS (#)	5-10-5 AGILITY TEST (SECS)	1.5 MILE BIKE TEST (TIME)
YOU							
ELITE PERFORMERS AVG							
YOUR BENCHMARK							

The table above summarizes your raw performance data across a series of performance tests. Your numbers are compared to athletes in your age range and respective sport.

# REACTIVE STRENGTH

## FUNCTIONAL ASSESSMENT: REBOUND JUMP

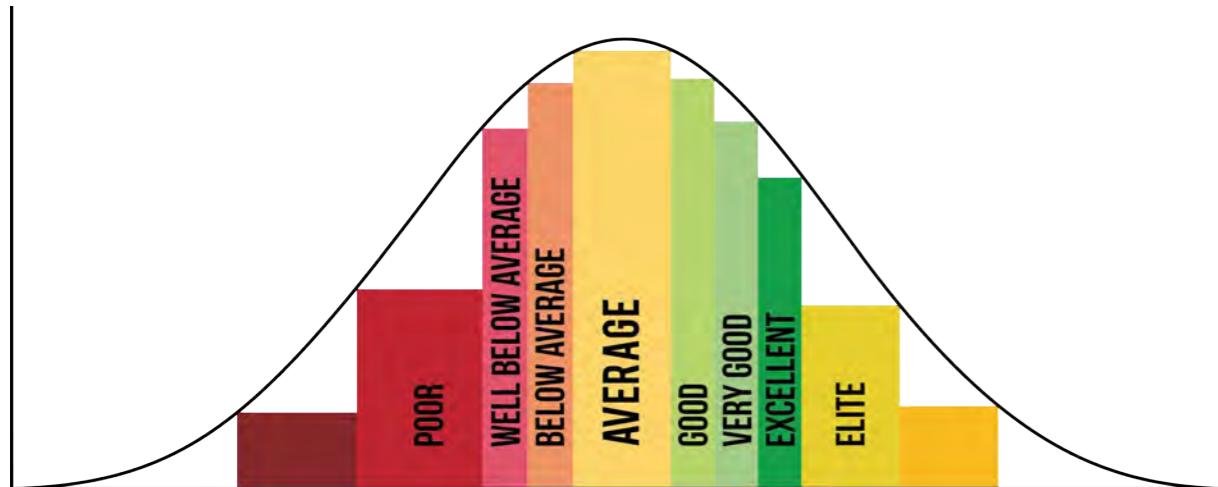
This test is used to measure how an athlete manages and functions during “fast” plyometric activities. Plyometrics are defined as quick, powerful movements that begin with an eccentric (braking) action and is immediately followed by a concentric (acceleration) action.

Reactive strength is critical as it demonstrates the ability to develop the maximal amount of force in fractions of a second. This strength quality is directly correlated to an athletes ability to accelerate, speed, change of direction and agility.



# RESULTS: REBOUND JUMP TEST

## ASSESSMENT:



**Your Rank is:**

### **Benchmark: Reactive Strength Index (RSI)**

The Reactive Strength Index (RSI) is a useful measure in assessing an athlete's explosive capabilities via the Rebound Jump Test. The RSI demonstrates an athlete's ability to rapidly change from an eccentric (braking) motion into a concentric (acceleration) motion.

**How it is measured:** RSI=Jump Height/Ground Contact Time

Other measures taken: Jump Height (cm/in), Flight Time (ms), Contraction Time (ms), Eccentric Duration (ms), Concentric Duration (ms)

Your RSI Score	Jump Height (in)	Ground Contact Time (ms)

The RSI is a score that tells you not only how high you jumped, but also how fast. The faster and higher an athlete moves, the more explosive they are. An RSI score can be improved by either increasing jump height (how high) or decreasing ground contact time (how fast).

Reactive Strength Index	Rank	Training Recommendations
	Below Average	Strength development needs to be the primary focus. Once established address ground contact speed through plyometrics.
	Average	You are prepared for moderate intensity plyometrics involving various jumps, hops, skips and bounds.
	Good	Intensive plyometrics are appropriate with progressions into multi-plane and single leg plyometrics.

# ELASTIC STRENGTH

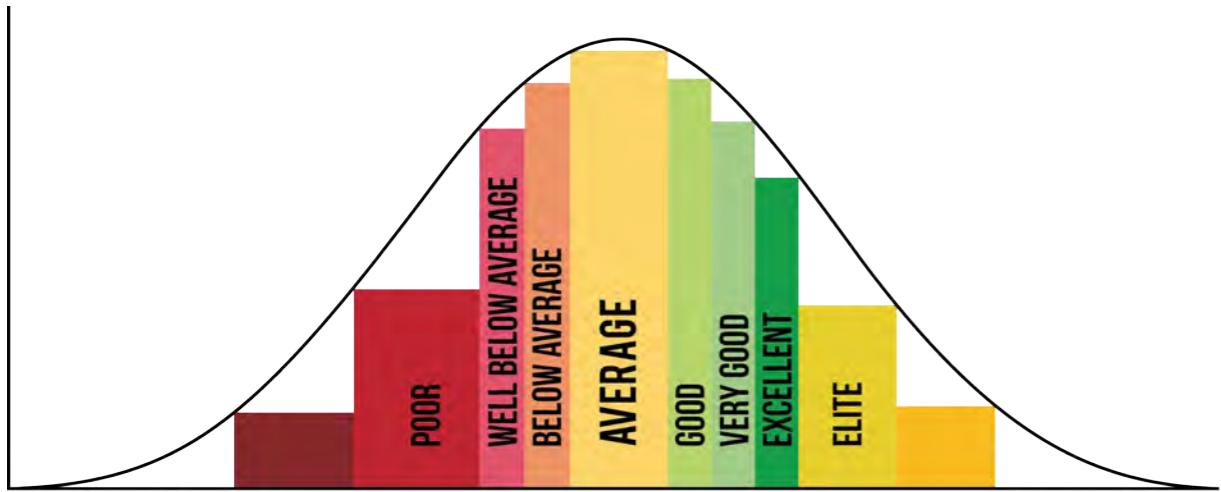
## FUNCTIONAL ASSESSMENT: COUNTER-MOVEMENT JUMP

The CMJ test is used to measure how an athlete copes and performs during "slow" plyometric activities, also known as Elastic strength. This slow ground contact time refers to anything over 250ms. Elastic strength is a critical component of athleticism and is directly related to the ability to generate peak power (Power=Strength x Speed). Elastic strength also uses the stretch-shortening cycle, similar to the Rebound Jump to express power, but in more prolonged fashion.



# RESULTS: COUNTER-MOVEMENT JUMP TEST

## ASSESSMENT:



**Your Rank is:**

### Benchmark: Jump Height (cm/in)

The CMJ jump is used as a measurement of vertical lower-body power, and thus as an indirect measure of performance.

**How it is measured:** Height (cm)

Other measures taken: Power (W), Relative Force (F/g), Eccentric/Concentric Diff (%), RFD (N/s), EUR (%), Contraction Time (ms), Eccentric Duration (ms), Concentric Duration (ms)

Measurement	You	Elite Performers
CMJ Height (in)		
CMJ Peak Force (N)		

The ability to produce high levels of power is associated with athletic success. High level athletes are not only able to jump high but are also able to produce the force required to do so, extremely quickly. The Counter Movement Jump (CMJ) evaluates an athlete's ability to utilize elastic energy to produce force and the time required to do so. The greater the amount of force produced in a shorter period of time, the greater the athlete.

Improving your vertical jump requires having a strong strength base first and foremost. Once this has been established, addressing speed and velocity with loaded jumps (30-60% 1RM), olympic lifts, velocity based training and plyometrics are key to reaching your full power potential.

See the EUR section to see what type of training would benefit you to maximize your potential.

# BALLISTIC STRENGTH

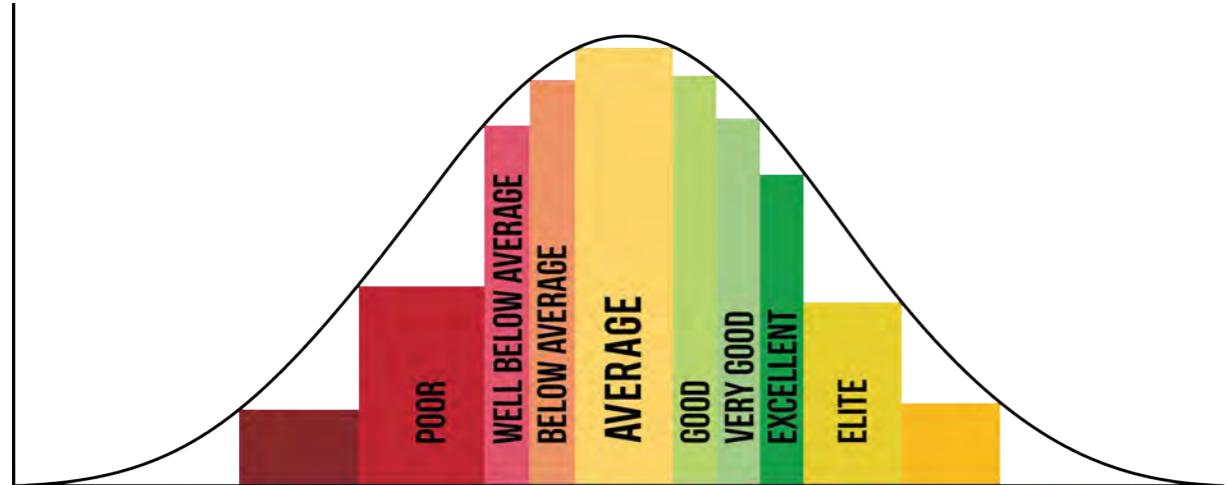
## FUNCTIONAL ASSESSMENT: SQUAT JUMP

The SJ test is a measure of how an athlete utilizes the concentric (acceleration) portion of a muscle contraction. The SJ Test does not allow an athlete to use the stretch-shortening cycle or eccentric (braking) muscle action like in plyometric testing (Rebound Jump and CMJ Test). In other words, we are assessing how well an athlete generates power when we remove the muscle's natural "spring".



# RESULTS: SQUAT JUMP TEST

## ASSESSMENT:



**Your Rank is:**

### **Benchmark: Jump Height (cm/in)**

The Squat jump is used as a measurement of vertical lower-body power, utilizing the concentric (acceleration) portion of a jump only.

**How it is measured:** Height (cm)

Other measures taken: Power (W), Relative Force (F/g), RFD (N/s), EUR (%)

Measurement	You	Elite Performers
Jump Height (in)		
Peak Force Produced (N)		

The Squat Jump (SJ) is a simple and reliable strategy used to measure an athlete's Ballistic/Starting Strength and power output of the lower extremities. Differing from the Counter Movement Jump, the SJ begins from a still position to separate the athlete's ability to utilize elastic energy from relative strength for power production. The SJ has a direct correlation to an athlete's maximal strength and acceleration performance.

See the next section, (Eccentric Utilization Ratio) to determine what strategy you utilize for lower extremity power production.

# ECCENTRIC UTILIZATION RATIO (EUR)

Eccentric Utilization Ratio is the ratio between the Counter-movement Jump and the Squat Jump

**How it's measured:** CMJ (Jump Height)/ Squat Jump (Jump Height) = EUR

The EUR reflects an athlete's reliance on the stretch-shortening cycle (springs) and eccentric (braking) strength compared to the concentric (explosive) contraction for power. Testing your EUR measures whether you are efficiently using the elasticity in muscle tissue to maximize your power during high-speed movements.

Your EUR **score** was

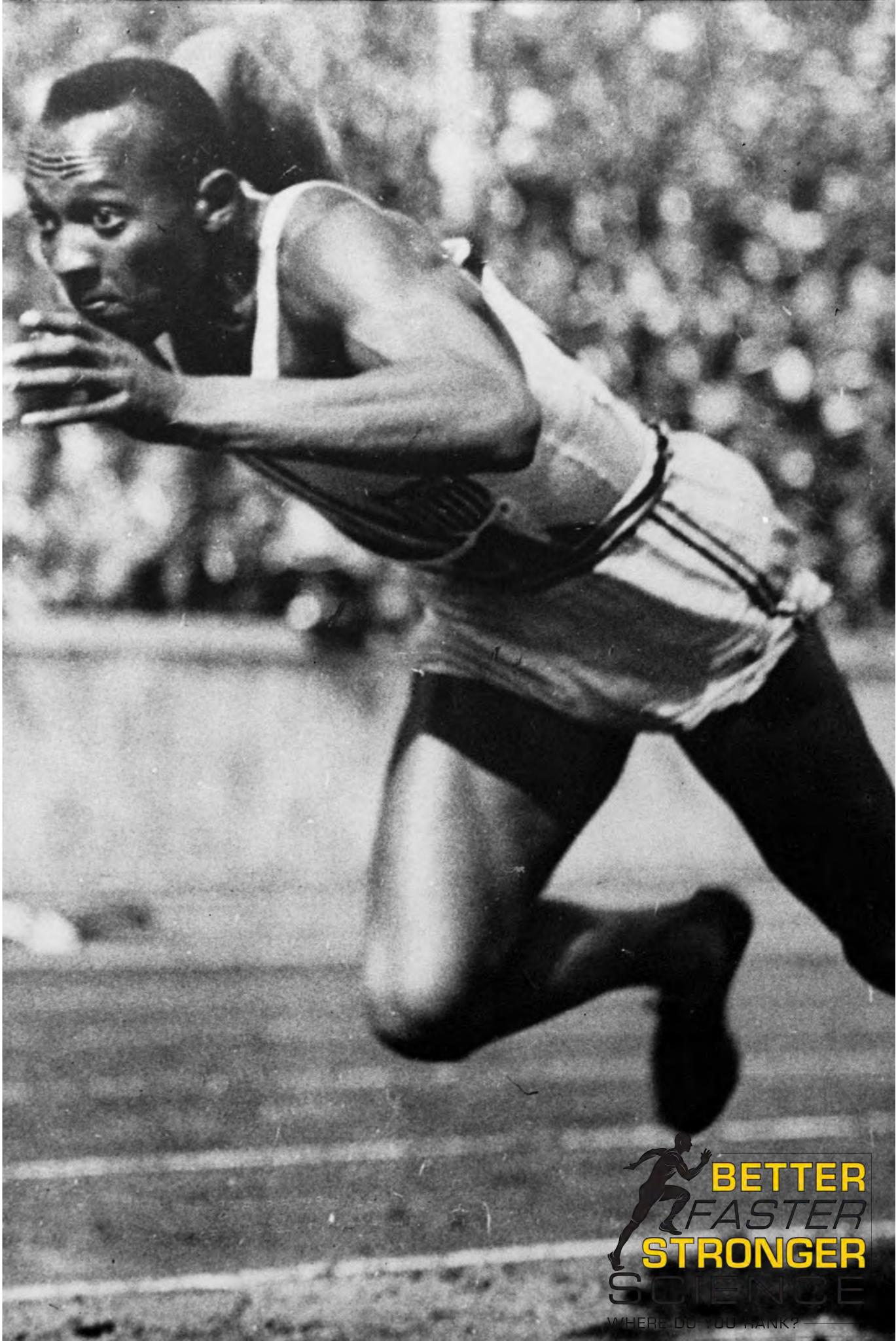
EUR	Training Goal	Training Recommendation
<1.0	Improve use of stretch-shortening cycle	Eccentric strength training and plyometrics emphasizing minimal ground contact time
1.15	Maintain current EUR	Concurrent training with strength and plyometric/ballistic activities
>1.30	Improve ballistic/startling strength	Maximal strength to develop overall force production



# SPEED/ACCELERATION

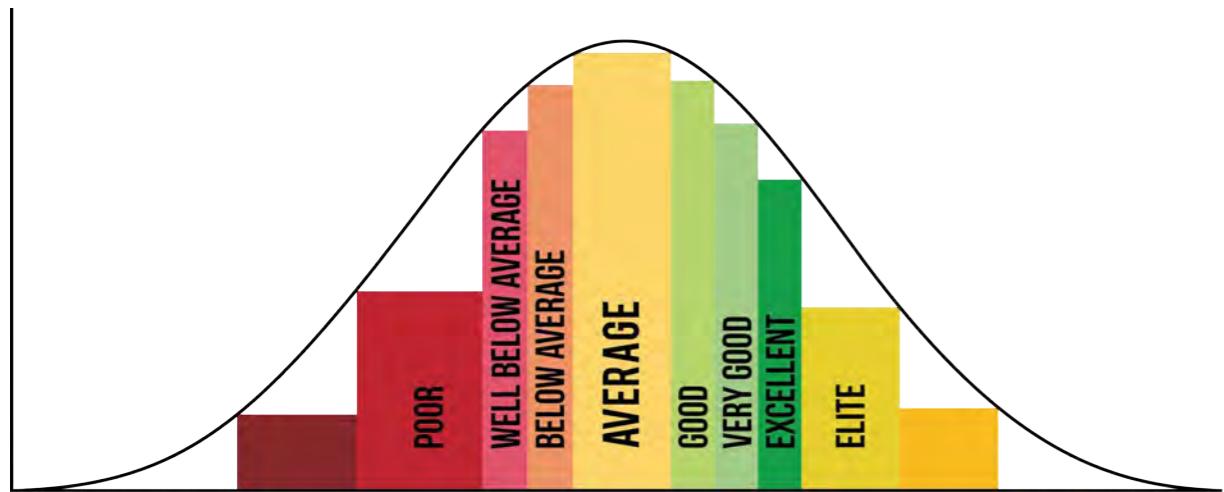
## FUNCTIONAL ASSESSMENT: 10YD/40YD SPRINT

The 10/40YD sprint test is a simple and popular test used to measure an athlete's ability to accelerate and reach near top speed. As short-distance accelerations are common in a large variety of sports, the 10YD portion is used to measure an athlete's linear speed/acceleration capabilities, while the 40YD distance is used to measure top speed. The ability to get the most explosive first step, reach top speed first and stay at top speed is the difference in almost any sport. Where do you rank?



# RESULTS: 10YD/40YD SPRINT TEST

## ASSESSMENT:



**Your Rank is:**

### **Benchmark: 40YD Sprint (secs)**

The 40YD Sprint is a simple, reliable test used to measure an athlete's ability to accelerate and reach near top speed.

**How it is measured:** Time (secs)

Other measures taken: Acceleration (time at 10YD) Top Speed (MPH)

Measurement	You	Elite Performers	Training Recommendation
10 YD Sprint (sec)			
40 YD Sprint (sec)			

An athlete's maximal speed is highly correlated to their Reactive Strength ability as measured with the Counter-Movement Rebound Jump. The higher an athlete's reactive strength, the higher their maximal speed will be. A comprehensive training program that incorporates sprinting, posterior chain strength development, ankle stiffness, and sprinting postures will all help to improve your maximal speed.

The best predictor for an athlete's acceleration ability is peak force production measured during a Counter Movement Jump (CMJ). The faster an athlete is able to produce a high amount of force, the faster they are able to reach maximal speed. Implementing a comprehensive training program that incorporates maximal strength, acceleration mechanics, posterior chain strength, horizontal force development, and ankle stiffness can all have a positive impact on your acceleration ability.

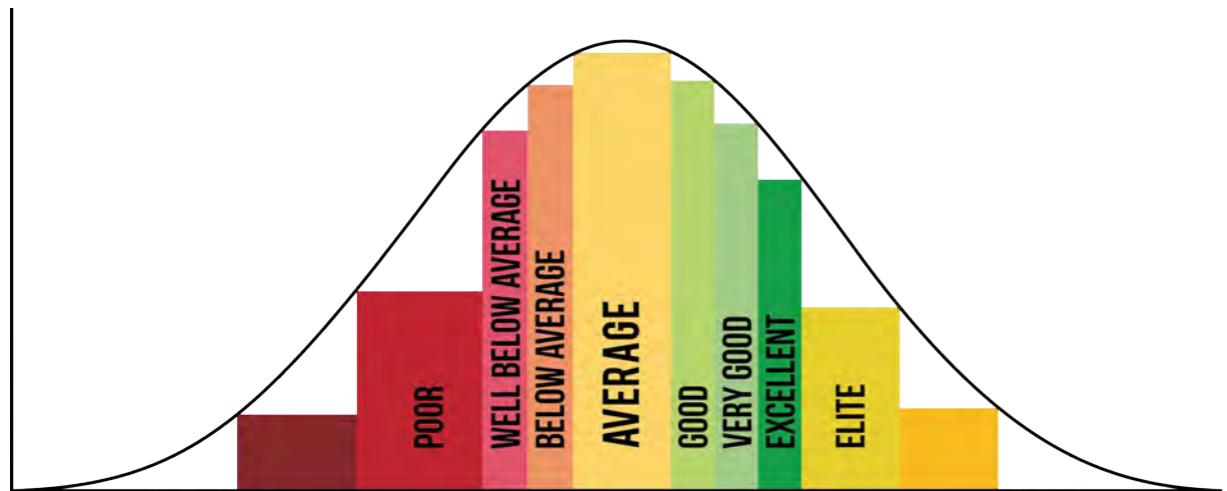
# MAXIMAL STRENGTH

## FUNCTIONAL ASSESSMENT: ISO MID-THIGH PULL

Maximal strength is the greatest amount of force that can be produced, regardless of time. All strength qualities are important, but unless you have enough raw horsepower in your engine, you won't be going anywhere in a hurry. Training to increase maximal strength also builds the foundation of "power" by increasing the force variable in the power equation ( $P=F \times V$ ).



# RESULTS: ISOMETRIC MID-THIGH PULL TEST (IMTP)



**Your Rank is:**

## Benchmark: Maximum Force (N)

The IMTP is an assessment of an athlete's force producing capabilities. Maximum strength/force is the greatest amount of force you can produce.

**How it is measured:** Force (Newtons) \* This is then calculated in to pounds (lbs)

Other measures taken: RFD (N/s), DSI (Dynamic Strength Index= CMJ (Peak F)/IMTP (Peak F)

## ASSESSMENT:

Your Weight	

Measurements	You (N)	You (lbs)	Elite Performers	Elite Performers
Absolute Strength				

Measurements	You	Elite Performers
Relative Strength Percentage (Your Weight/Peak IMTP Force-lbs) *Lower the % the better		

Absolute strength is the maximum amount of force exerted, regardless of your size. Relative strength is the amount of strength to body size, or simply how strong someone is compared to their size.

Based on current literature, it appears that there is no substitute for greater muscular strength when it comes to improving an athlete's performance across a wide range of both general and sport specific skills while simultaneously reducing their risk of injury.

# RATE OF FORCE DEVELOPMENT (RFD)

The rate of force development (RFD) is a measure of explosive strength, or simply how fast an athlete can develop force. Athletes with higher rates of force development have been shown to perform better during numerous physical performance tests. Rate of force development can be separated into two distinct phases. Early stage RFD is typically measured from 0-100ms, while late stage is anything thereafter. Athletes who demonstrate better early stage RFD possess greater nervous system function, plyometric ability and velocity. Athletes with better late stage RFD generally present with a greater strength base. Whilst many forms of training have been shown to improve the rate of force development in untrained individuals, only resistance and ballistic training have shown to enhance this quality in trained athletes.

## ASSESSMENT:

Peak Force (lbs)	Your Weight (lbs)	Peak Force/Body Weight	Force (N) @ 0-100ms	0-100ms RFD % of Peak Force

In addition to providing us insight on how much strength the athlete possesses, the Isometric Mid-Thigh Pull (IMTP) also allows us to see the *Rate of Force Development (RFD)*, or how quickly the athlete can produce that force. The faster an athlete is able to produce a greater amount of force, the more explosive the athlete will be. The critical factor in Rate of Force Development is the amount of force produced within the first 100 milliseconds (ms).

Peak Force	Rank	Training Emphasis Recommendations
	Low	Maximal Strength Training
	Average	Concurrent Training Program
	High	Velocity Based Training Program

\*Our data shows that once an athlete is able to generate a peak force on the IMTP greater than 3x bodyweight, the training emphasis should begin to transition to increase the Rate of Force Development or Explosive strength.

# DYNAMIC STRENGTH INDEX (DSI)

Dynamic Strength Index (DSI) measures the difference between an athlete's maximal and explosive strength capacity.

**How it's measured:** CMJ (Peak F)/ IMTP (Peak F) = DSI

The DSI provides information regarding how forceful you as an athlete are and how much of that strength you can use during fast explosive movements. The DSI reflects the percentage of maximal strength "potential" which is not being used within a given explosive movement. In other words, it demonstrates the athlete's ability to use their full "force potential" during an exercise such as a CMJ.

IMTP Peak Force	CMJ Peak Force	Your DSI Score

DSI	Training Goal	Training Emphasis Recommendations
<.60	Increase concentric force production	Ballistic Strength activities such as velocity-based training and/or plyometrics
.60-.80	Maintain current DSI	Concurrent training program including ballistic training and maximal strength development
>.80	Strength	activities to improve overall force production.



# UE POWER

## FUNCTIONAL ASSESSMENT: SUPINE MED BALL THROW

The Supine Medicine Ball Chest Throw is an excellent test to assess UE pressing power and explosiveness. We utilize two different tests with the Med Ball Throw to assess your strategy for using upper body power.

The Static Throw is assessing an athlete's ability to produce concentric/ballistic power, while the Plyometric version is looking at the ability to produce force with the assistance of an eccentric muscle contraction and stretch shortening cycle.



# RESULTS: SUPINE MED BALL CHEST THROW

TEST	YOU
STATIC CHEST THROW	
PLYOMETRIC CHEST THROW	
ECCENTRIC UTILIZATION RATIO (EUR)	

## UE Power

UE power is the ability to produce maximal force and velocity.

**How it is measured:** Power (W)

Other measures taken: Eccentric Power Difference (%)

EUR SCORE	TRAINING GOAL	TRAINING EMPHASIS RECOMMENDATION
86	Improve use of stretch-shortening cycle and/or eccentric strength.	Velocity Based Training and Upper Extremity Plyometrics
<87	Maintain current EUR score	Concurrent Training Program
88	Increase ballistic/startng strength and/or maximal strength	Maximal Strength Training to improve overall force production

# UE/TRUNK POWER

## FUNCTIONAL ASSESSMENT: ROTATIONAL MED BALL THROW

The ability to generate power through the trunk and upper extremity plays critical roles in many sports. Rotational power production and performance are important for sports that involve swinging, throwing and punching.



# RESULTS: ROTATIONAL MED BALL THROW TEST



**Your Rank is:**

## Benchmark: Power (W)

The Rotational Med Ball Throw Test measures an athlete's ability to generate functional upper extremity/trunk power.

**How it is measured:** Power (W)

Other measures taken: Peak Speed (m/s), Peak Force (N)

## ASSESSMENT:

Measurement	You	Elite Performers	Training Recommendations
Rotational Power (W)			Various Med Ball Throws

The ability to exert peak power outputs is a balance between high amounts of force and velocity. Power training specifically targets fast twitch fibers. In the Rotational Med Ball Test, the specificity of the movement highly correlates to rotational sports like soccer, golf and baseball.

Research has suggested that the optimal loading percentage for peak power training ranges between 30-80% of your 1RM (rep max). There are a few key principles to remember when training for power.

1. Focus on getting stronger first. If strength is an issue, which it is for most, start there. Remember that **Power = Force × Velocity**. Getting stronger will improve your ability to improve force.
2. Improving maximal strength allows for greater power potential. Now you need to train velocity and the specific skill you're working towards. Train less than 30% of your 1 RM to improve velocity
3. Training for power means to train with maximal intent and velocity. Once you fatigue and velocity decreases.....Stop and rest

# STRENGTH ENDURANCE

## FUNCTIONAL ASSESSMENT: MAXIMAL REP TESTING

Strength endurance of the upper body, lower body and core is essential for all athletes.

Strength endurance is used to test an athlete's capacity to maintain the quality of their muscles' contractile force. All athletes need to develop a basic level of strength endurance.



# RESULTS: STRENGTH ENDURANCE TESTING

TEST MEASUREMENT	YOUR REPETITIONS	ELITE PERFORMERS REPETITIONS	TRAINING RECOMMENDATIONS
CHIN UPS			Maximal Pulling Strength Training Increased Volume w/ Reduced Rest between Sets. Density Training
PUSH-UPS			Maximal Pressing Strength Training Increased Volume w/ Reduce Rest between Sets. Density Training
SINGLE LEG SQUAT			Progressive Single Leg Strength Training Increased Volume w/ Reduced Rest between Sets.

## Strength Endurance

Strength Endurance is used to test an athlete's capacity to maintain a quality contractile force over time. The upper body, lower body, and core must all continue to produce an optimal contraction throughout competition, even when fatigued. To perform at the highest level, all athletes need to develop a basic level of strength.

**How it is measured:** Time (sec), Reps (#)



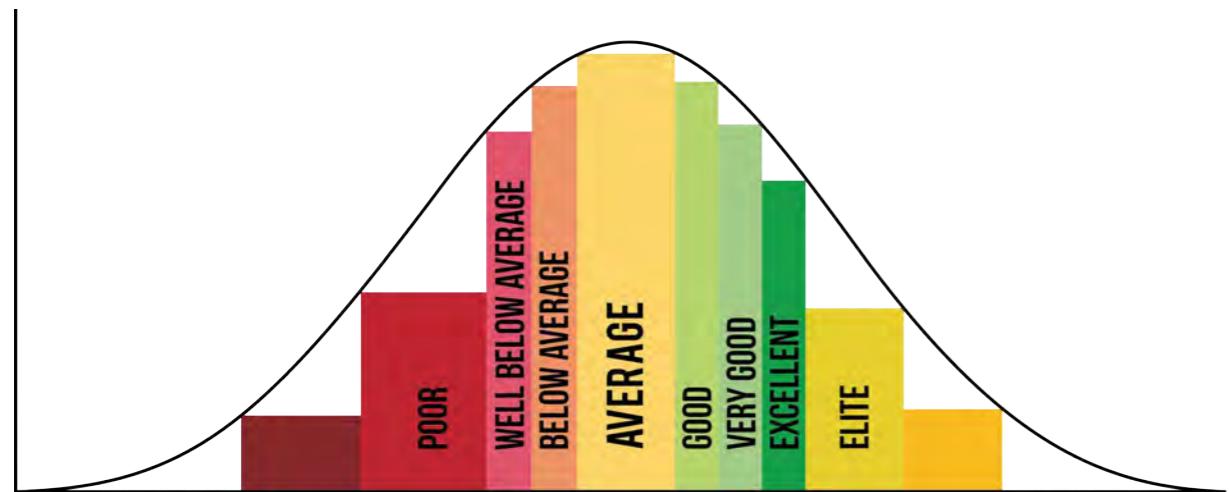
# CHANGE OF DIRECTION

## FUNCTIONAL ASSESSMENT: 5-0-5 AGILITY TEST

The 5-0-5 Agility test measures an athlete's ability to change direction in the horizontal plane. Change of Direction (COD) ability is a crucial aspect of performance in many sports. COD ability requires an athlete to decelerate and then accelerate as quickly as he/she can. Producing power in multiple planes of movement is the key to becoming better at this ability.



# RESULTS: 5-10-5 AGILITY TEST



**Your Rank is:**

**Benchmark: 5-10-5 Agility Test (secs)** The

5-10-5 Pro Agility Test is a simple, reliable test used to measure an athlete's ability to change direction.

**How it is measured:** Time (secs)

## ASSESSMENT:

Measurement	You	Elite Performers	Training Emphasis Recommendations
5-10-5 Agility			<ul style="list-style-type: none"><li>• Lateral Jumps, Hops, Bounds</li><li>• Olympic Lift Variations</li><li>• Eccentric Strength Training</li></ul>

Creating space is often what sets elite athletes apart in most sports. Possessing high levels of Change of Direction (COD) is a critical component of athletic performance and can be the difference that allows an athlete to separate from an opponent. COD requires an athlete to possess the ability to decelerate and then accelerate quickly in the horizontal plane.

# AEROBIC POWER/HR RECOVERY

## FUNCTIONAL ASSESSMENT: 1.5 BIKE TEST

Aerobic fitness, also called cardiovascular fitness, improves an athlete's ability to use oxygen to sustain activity for periods of time. Examples of sports that demand long-term supplies of oxygen include marathon runners and distance swimmers.

Success in many sports requires repeated bursts of high intensity activity that draw on quick energy sources, but require increasing levels of aerobic fitness as the duration of the activity increases.



# RESULTS: 1.5 MILE BIKE TEST

MEASUREMENTS	YOU (TIME)	ELITE PERFORMERS (TIME)	TRAINING RECOMMENDATIONS
1.5 MILE BIKE TEST			<b>TEMPO METHOD HIGH INTENSITY CONTINUOUS TRAINING THRESHOLD TRAINING</b>
HEART RATE RECOVERY			<b>CARDIAC OUTPUT TRAINING</b>

## Aerobic Power/Capacity

The 1.5-mile bike test is used to measure your Aerobic Capacity. The amount of time required to complete the test is used to calculate your Aerobic Capacity.

**How it is measured:** Time (Minutes/Seconds)

HRR: Measures an athlete's ability to recover following maximal aerobic testing. The time starts immediately following completion of the test to when your HR drops 30 beats. The faster your HR recovers the better aerobic system development.



# SUMMARY OF FINDINGS

BFS TESTING: PERFORMANCE TESTS	REACTIVE STRENGTH INDEX	DYNAMIC STRENGTH INDEX	ECCENTRIC UTILIZATION RATIO	RELATIVE STRENGTH
YOU				
ELITE PERFORMERS				
BENCHMARK				

**BFS Science**

# CONCLUSION



At **Better Faster Stronger Science**, our goal is to help you reach your athletic potential. We know what it takes to be the best, with over 20 years of experience working with teams and players in the NBA, MLB, NFL, PGA and more. Take advantage of the objective data in this report and **"Maximize your strengths; Minimize your weaknesses."**

If you have questions or interested in our other services, please let us know. We offer consultations and work with an integrated group of coaches, trainers, therapists and doctors around your area.

Visit our website at [www.bfsscience.com](http://www.bfsscience.com)

**"TESTING THE BOUNDARIES OF ATHLETIC POTENTIAL"**