



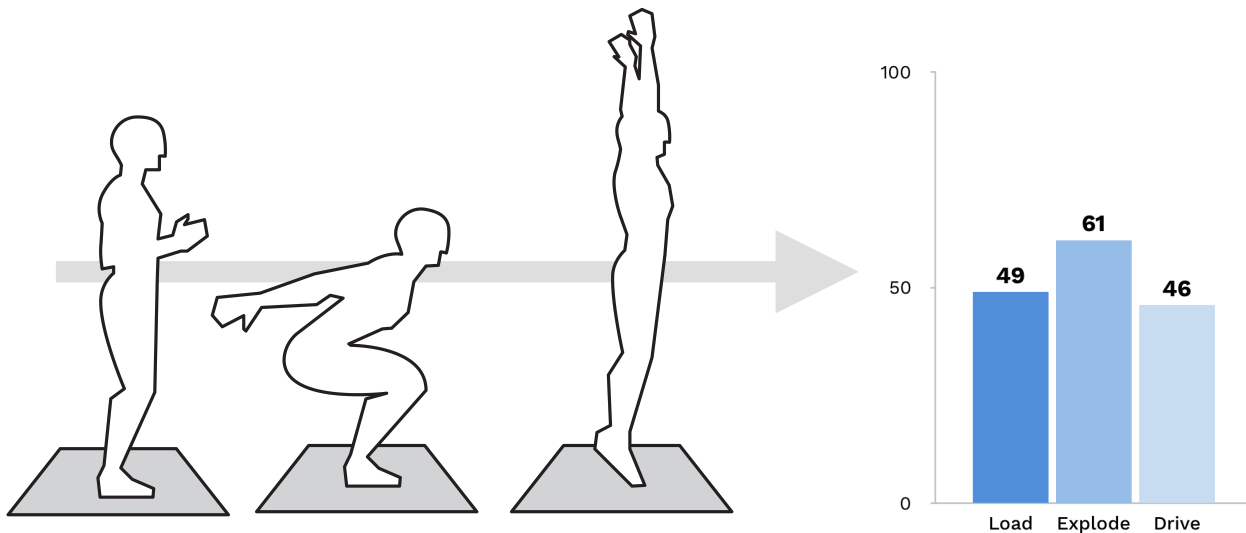
SPARTASCIENCE

Quick Start Guide

The Jump Scan

Sparta Science optimizes health and performance for athletes, warfighters, fitness clients and patients with evidence-based movement scans and data-driven exercise prescriptions that **increase resilience, minimize injury risk** and **speed efficient rehabilitation** to physical activity. The Sparta System, comprised of force plate hardware and machine learning software, is powered by a database of nearly one million scans and thousands of injuries from tens of thousands of people to assess movement health and injury risk in seconds.

Three key variables make up the Sparta **Movement Signature™** measured during the **Jump Scan** assessment - **Load, Explode, and Drive** - defining a person's ability to **start, transition, and finish a movement**. From these variables, we deliver actionable insights and provide key recommendations to target the individual's strengths and weaknesses.



LOAD

LOAD is the first movement measured and represents an individual's ability to generate force.

EXPLODE

EXPLODE is the transitional stage and measures an individual's ability to transfer force.

DRIVE

DRIVE is a product of force and time. It represents an individual's ability to finish movements smoothly.

Injury Risk Assessment

How do we determine injury?

The Sparta Scan takes a comprehensive look into an individual's movement qualities by measuring force production. The **magnitude** as well as **efficiency** of force production is analyzed to determine an individual's risk of suffering an injury, and where that injury is likely to occur.

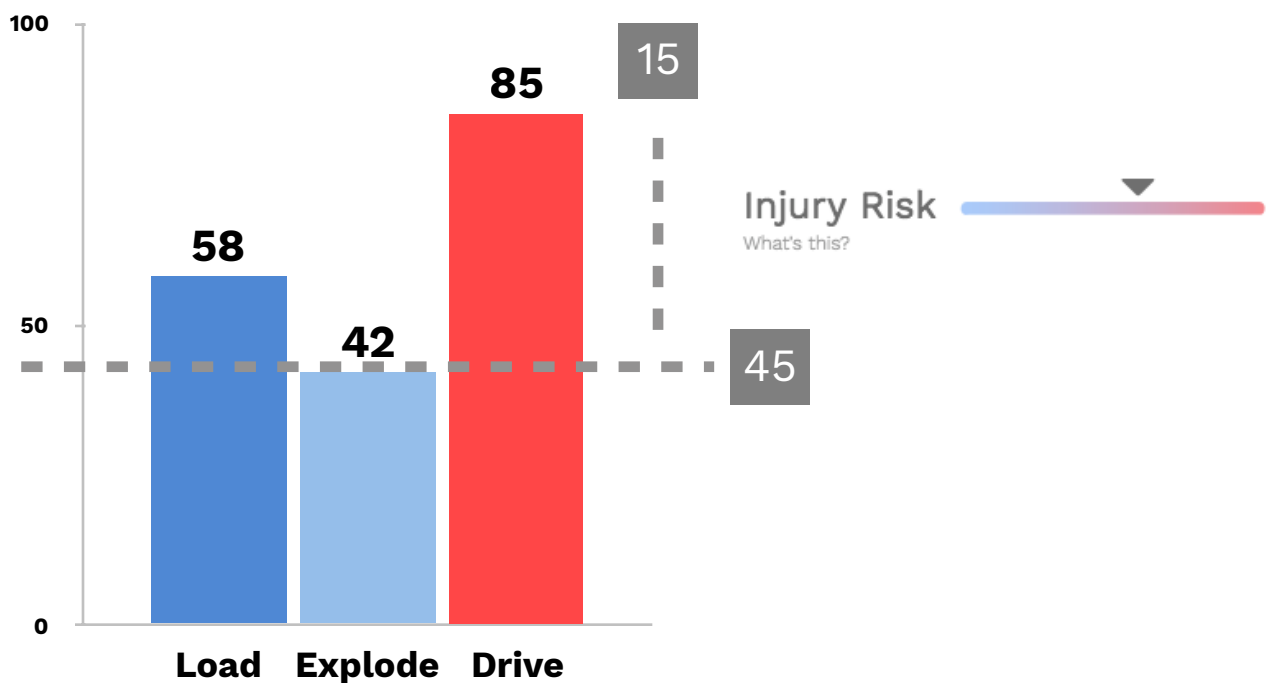
It is easy to measure quantitative outputs like vertical jump height, but two people that jump 25 inches may use entirely different mechanisms to produce that leap.

Relative Assessment

A score **below 45** is an indicator of a lack of strength relative to their peers, and also indicates a risk for injury.

Imbalance & Injury Risk

When variables are more than **15 points away** from each other, the athlete is mechanically imbalanced and at an increased risk of injury.

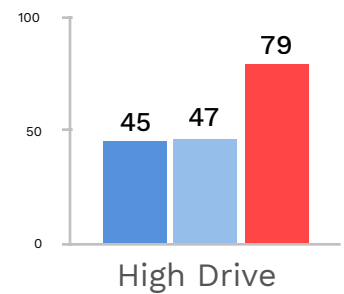
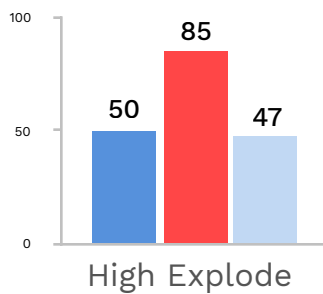
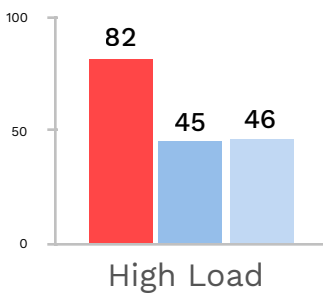


Examining Movement Signatures

Risk Analysis

A Movement Signature™ is considered ‘High’ when there is a variable 15 greater than others. A Movement Signature™ is considered “Low” is a variable is below 45 or 15 less than others. A more balanced scan signifies and lower risk of injury and a more efficient mover.

High Variables

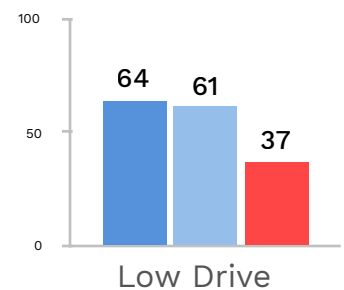
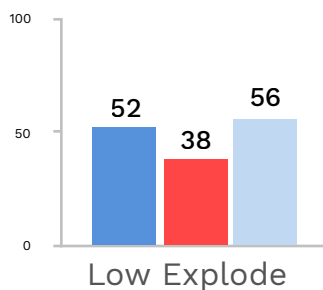
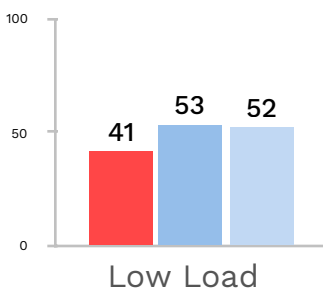


INSIGHT: Inability to absorb force effectively by flexing
RISK LOCATION: Foot (Lisfranc), Knee (ACL/Meniscus)

INSIGHT: Moves through short range of motion due to lack of mobility/strength
RISK LOCATION: Labrum Tears (Hip), Low Back (Spondy)

INSIGHT: Relies on momentum due to lack of eccentric strength/timing
RISK LOCATION: Ligamentous (UCL, Spinal)

Low Variables

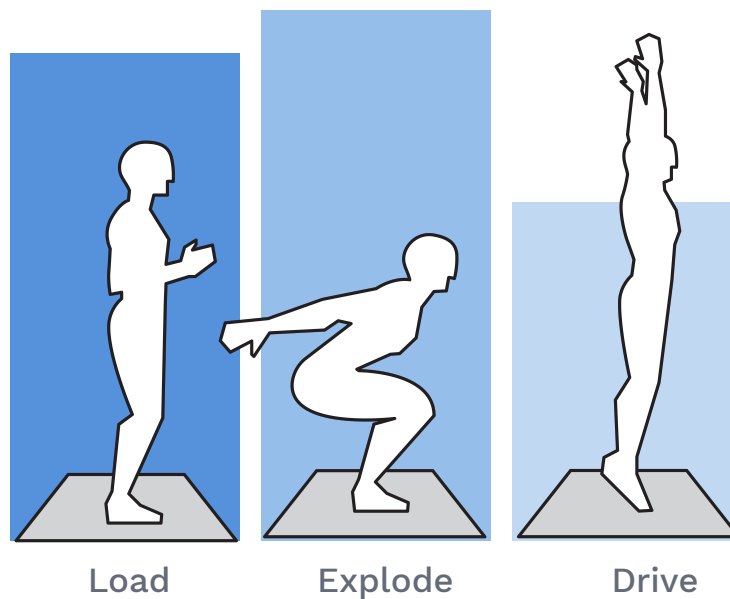


INSIGHT: Inability to develop tension due to lack of strength or ankle range of motion
RISK LOCATION: Patella-femoral (Tendinosis)

INSIGHT: Poor postural stability
RISK LOCATION: Lumbopelvic hip pain (Osteitis Pubis), Low Back

INSIGHT: Inability to finish a movement smoothly
RISK LOCATION: Musculo-tendinous (Hamstring, Groin, Quad strain)

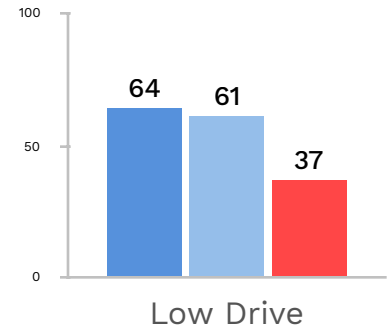
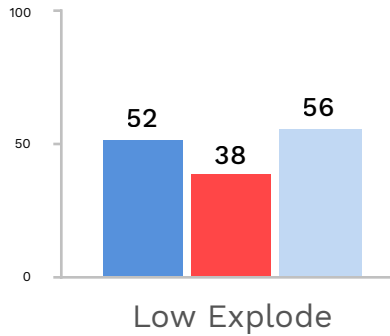
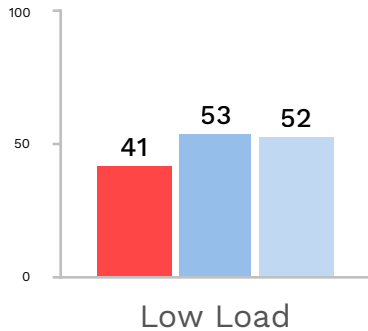
Load, Explode, and Drive



	LOAD	EXPLODE	DRIVE
MEASURE	Average Eccentric Rate of Force	Average Relative Concentric Force	Relative Concentric Impulse
GLOBAL	Strength	Power	Active ROM
LOCAL	Anterior	Torso	Posterior
PHASE	Eccentric	Amortization	Concentric
FORCE	Create	Transfer	Apply

Individualized Validated Prescriptions

Individual Needs



Movement Effects

	LOAD		EXPLODE		DRIVE
Quarter Squat	▲	Suitcase Deadlift	▲	RDL	▲
1 Leg Squat	▲	Wood-chop	▲	Overhead Squat	▲
Squat	▲	Deadlift	▲	Split Squat	▲

LOAD

- Poor ankle mobility
- Struggle creating force quickly
- Poor quad activation
- Avoid utilization of anterior chain
- Previous ankle/knee injury

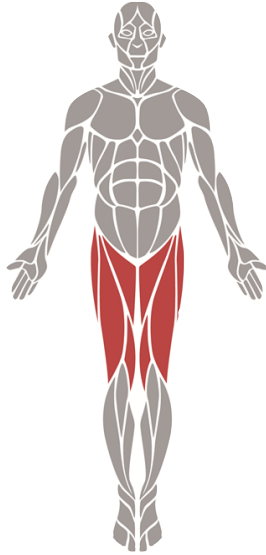
EXPLODE

- Poor relative strength
- Struggle transitioning through movements
- Poor lumbo-pelvic stability
- Over-utilize momentum
- Previous low back pain/injury

DRIVE

- Poor hip/thoracic mobility
- Struggle achieve triple extension
- Poor glute activation
- Inability to prolong force
- Previous muscle strains (calf/groin/hamstring)

Improving Movement Signatures



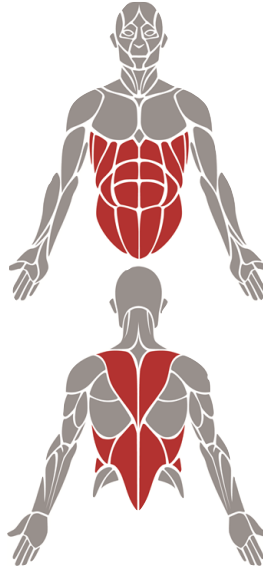
LOAD

Training Concepts

- Anterior Chain Emphasis
- Quad Activation
- Eccentric Strength
- Bilateral Emphasis
- Balance/Foot & Ankle Stability

What is Load?

The ability to **generate force quickly** and efficiently requires sufficient **triple flexion**, including **anterior chain** strength, mobility, and stiffness (quad and ankle). Sufficient **eccentric strength** as well as the ability to absorb eccentric forces effectively are two critical components. These allow for sufficient **LOAD**, and a more resilient individual.



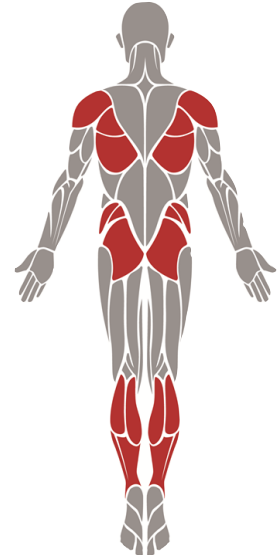
EXPLODE

Training Concepts

- Strength to Bodyweight Ratio
- Limited ROM
- Lumbo-pelvic Stabilization
- Anti-Rotation/Lateral Flexion
- Reactive/Explosive Emphasis

What is Explode?

The ability to **transfer forces effectively** requires sufficient musculo-tendinous **elasticity**, as well as a strong and responsive **connection** between upper body and lower body segments (core strength and stability). These two qualities describe the **EXPLODE** variable, and are a prerequisite to minimize weak links in the kinetic chain.



DRIVE

Training Concepts

- Active Hip and Thoracic Mobility
- Glute Activation
- Triple Extension
- Unilateral Emphasis
- Soft Tissue Manipulation

What is Drive?

The ability to **apply forces efficiently** requires sufficient **triple flexion and extension**, including efficient utilization of the upper body in movement. Effective **posterior chain** mobility (thoracic, shoulder, and hip) and musculo-tendinous **compliance** are two common characteristics of individuals with sufficient **DRIVE**, and key contributors to efficient movement.

The Healthy Imbalance

Individuals will often show different relationships within their **Movement Signature** related to genetics, movement history, and training history. The goal is to decrease these imbalances to within a **healthy range** to improve efficiency of movement.

We quantify this using the **Sparta Score**, as a single number that best represents an individual's resilience. In general, a higher Sparta Score is desired as this single number is highly related to both **injuries** and **performance** in a wide range of populations.



The **Sparta Score** is a proprietary algorithm calculated from **Load**, **Explode**, and **Drive** rewarding high magnitudes of force production and balanced or efficient **Movement Signatures**. These two concepts identify efficient movers who are at a decreased risk of injury and improved potential for higher performance.

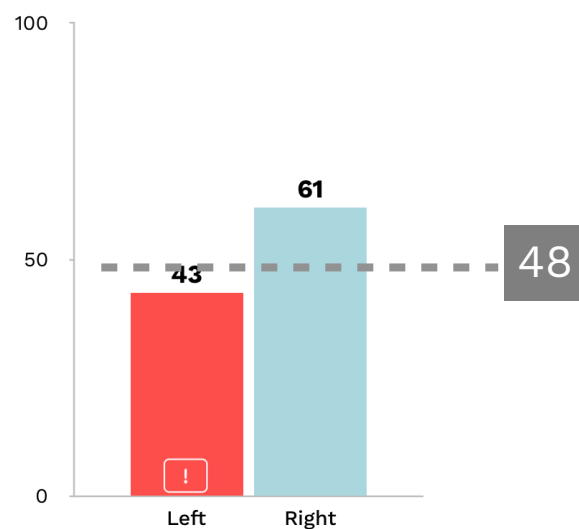
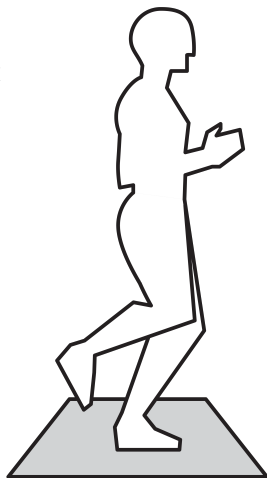
The Balance Scan

The **Balance Scan** assesses an individual's global balance, body awareness, and body control (proprioception), measured on each limb. This quickly tells you if an individual is at an increased risk of injury (lower body) or re-injury, and if they are physically able to progress in **rehabilitation**.

The **Balance Scan** is done barefoot and blindfolded before stepping onto a force plate. When needed the individual can touch down the opposite foot to avoid falling. Two 20-second balance trials are collected on both sides, alternating between trials.

Did you know?

An individual with a score below 48 is **5x more likely** to suffer a **knee injury** than an individual above 48.



A score **below 48** indicates increased risk of suffering a lower body injury and is a common threshold used in the return from injury process. An individual must show sufficient balance and proprioception in all three dimensions in order to protect from injury.

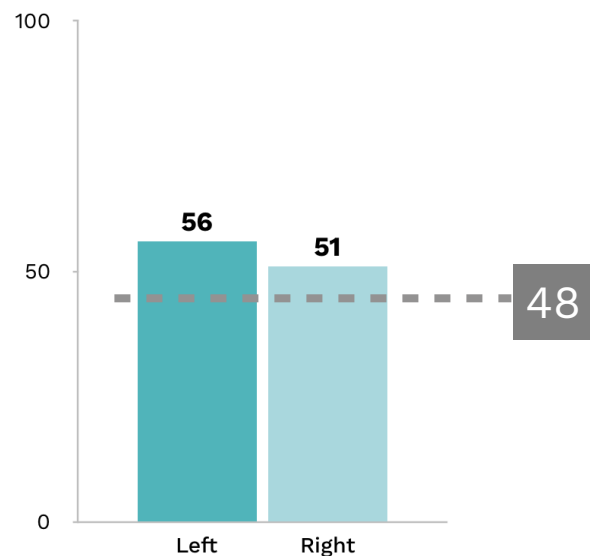
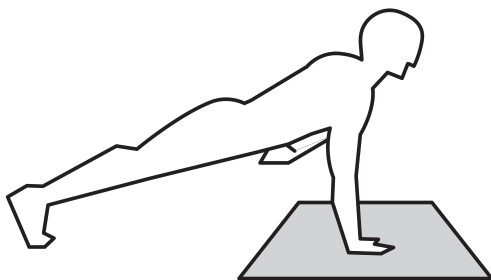
The Plank Scan

The **Plank Scan** assesses an individual's global static stability measured on each limb. This quickly tells you if an individual is at an increased risk of injury (shoulder, groin, concussion) or re-injury, and if they are physically able to progress in **rehabilitation**.

The **Plank Scan** is done in a prone push-up position and begins with lifting one hand off of the force plate. When needed this assessment can also be done from a kneeling position. Two 20-second plank trials are collected on both sides, alternating between trials.

Did you know?

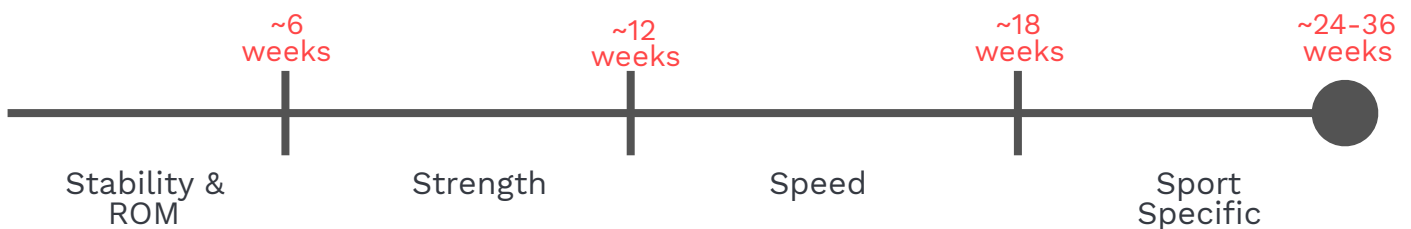
Every increase by 1 shows a **7%** decreased risk for **concussion** and a **6%** decrease for **shoulder strains**.



A score **below 48** indicates increased risk of suffering an injury and is a common threshold used in the return from injury process. An individual must show sufficient stability in all three dimensions in order to protect from injury.

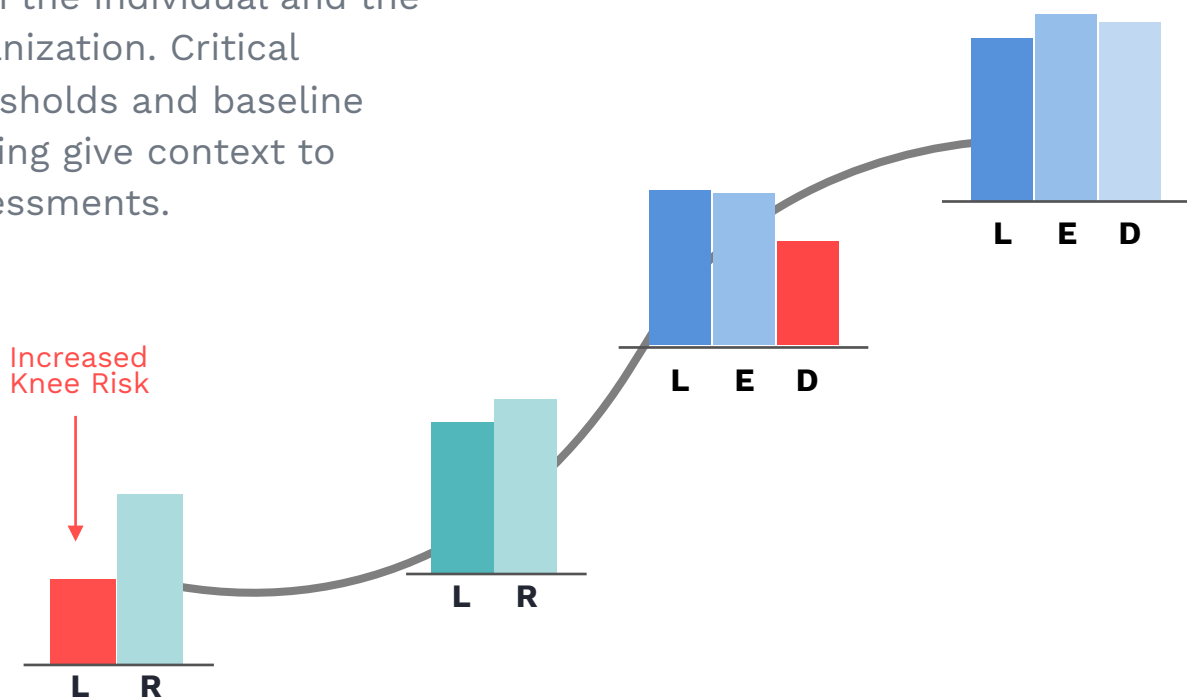
Objective Rehab Progressions

Return from injury protocols have long been a one-size fits all approach based on average timelines, largely ignoring individual differences and adaptations. Utilizing **frequent, objective**, movement assessments of proprioception, stability, and neuromuscular sequencing allows for a more individualized and accurate approach to allow for the quickest and safest **return to performance**.



Individual Engagement

Objective metrics provide clarity in rehabilitation for both the individual and the organization. Critical thresholds and baseline testing give context to assessments.



Our Mission

About Us

Sparta Science optimizes health and performance for athletes, warfighters, fitness clients and patients with evidence-based movement scans and data-driven exercise prescriptions that increase resilience, minimize injury risk and speed efficient rehabilitation to physical activity.

The Sparta System, comprised of force plate hardware and machine learning software, is powered by a database of nearly one million scans and thousands of injuries from tens of thousands of people to assess movement health and injury risk in seconds.

Sparta technology is used worldwide by elite and conventional military forces, professional, collegiate, high school and youth sports organizations, strength training professionals and medical providers committed to helping people move better, **at work, at play, and on duty.**



SPARTA SCIENCE

