The Y-Balance Musculoskeletal Screening

Why Do We Need The Y-Balance Musculoskeletal Screening (YBT)?

When a student takes a math or reading test in school, it establishes a baseline, assists in academic planning, identifies competence in an area, and can show progress. But most importantly, testing can identify and lead to the resolution of problems that the student may have that could impact their learning and future success. Similarly, in training or rehabilitation, the Y Balance Test sets a baseline and can show progress or competence as a part of comprehensive return to activity testing.

A test gauges a person's ability and is a measurement that does not require interpretation. A comprehensive functional test would examine a client's ability across multiple domains and give a precise numerical rating that corresponds with aptitude in those domains. This is what the Y Balance Test does. It acts as a "functional goniometer" by allowing precise quantification of an individual's relative body movement by simultaneously requiring strength, flexibility, neuromuscular control, core stability, range of motion, balance, and proprioception.

How is it used with the Functional Movement Screen?

The Functional Movement Screen separates movement patterns. The Y Balance Test brings all the patterns back together in tri-planar movement. In the Y Balance Test, mobility and stability within multiple planes of movement are challenged. The movements of the Y Balance Test require range of motion, strength, stability and coordination in multiple joints. Any one or a combination of multiple deficits can cause a failure of the test. Think about all of the areas that can cause a problem in the Y Balance Test Lower Quarter:

- Stability or mobility problems in the foot, ankle, knee, hip and spine
- Strength deficits anywhere in the limb or spine
- Coordination problems anywhere in the limb or spine

Therefore, the Y Balance Test is an excellent test for finding deficits in multiple systems in multiple areas of the body and potential risks of injury. That makes it a powerful test, but it does **not** simply identify where the problem lies and that an individual ‘’**will**’ get injured. Data indicates that approximately 20% of people who have a normal Functional Movement Screen score fail the Y Balance Test (and vice versa). The Functional Movement Screen is extremely useful in identifying what movement pattern is dysfunctional and where an injury could possibly occur. The Y Balance Test is the precise gauge that can measure the severity of motor control deficit found with the Functional Movement Screen. Thus both complement each other perfectly and are most powerful used in combination. If the client has pain or

injury, the Selective Functional Movement Assessment can provide even greater detail by specifically identifying the location of the mobility or stability problem and potential injury site.

In What Populations is the Y Balance Test Useful?

The Y Balance Test has been effectively used in multiple populations from children to 85 year olds. While the Y Balance Test originated in sports and has become widely used in all major professional sports teams, it has been utilized widely in research and the field throughout the lifespan around the world.
Because the Y Balance Test has the unique ability to identify motor control deficits it has been used to test aspiring athletes to determine if they have dynamic motor control which is an essential foundation for higher level performance and skill acquisition.

In the military it has been extensively used both in the Special Forces (U.S Army Rangers and Navy Seals), general NZDF combat and support personnel and is currently utilised during the Army Officer Selection Board (OSB), at The Army Training Depot (TAD) and Navy Leadership Development Group (LDG). At the other end of the spectrum, the Y Balance Test has been used in numerous research studies involving older adults who underwent balance training programs or as an outcome measure after total hip, knee, or ankle replacement, and elite athletes of all levels.

The Y-Balance Musculoskeletal Screening Test

To determine musculoskeletal deficiency and potential injury risk, dynamic balance w testing is used for both the Lower (YBT-LQ) and Upper Quartiles (YTB U-Q).

Lower Quartile Y Balance Test (YBT-LQ)

- The YTB L-Q test observes lower extremity reach of the contralateral leg while maintaining unilateral stance. The YBT-LQ examines unilateral reach in three different directions, anterior, posteromedial, and posterolateral.
- To perform the YBT-LQ, each recruit was required to stand with the right foot on the centre foot plate and the most distal aspect of the participants barefoot at the starting line.
- The recruits were given a trial in each direction before measurements were taken. The same process was repeated using the contralateral limb as the stance limb.
- Differences in the maximum reach distance for left and right leg were compared to examine reach asymmetry for each direction.
- Recruit’s lower limb reach was also normalised to leg length, which was measured from the anterior superior iliac spine to the most distal portion of the medial malleolus.

Starting Position

Anterior

Post Medial

Post Lateral

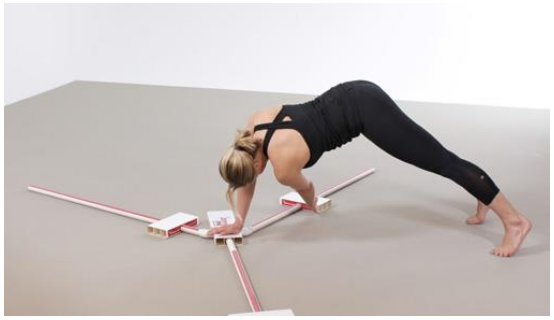
Upper Quartile Y Balance Test (YBT-UQ)

- The YBT-UQ test is designed to obtain a quantitative measure of trunk and upper extremity functional symmetry, core stability, strength and mobility.
- It is shown to be a valid, time efficient, and cost effective initial screening tool to reliably predict upper body musculoskeletal injuries, particularly in the shoulder girdle.
- The YBT-UQ is performed by maintaining three points of contact with the ground in a constantly raised press up position, one hand moves whilst one hand and two feet stabilise the body in a press up position.

- Participants are required to reach in three directions: Medial, inferomedial, and superomedial.
- Each reach distance is measured to the nearest 0.5cm increment. In order to determine percentage of functional symmetry and potential injury risk, the participant's arm length is measured from the spinous process of the cervical vertebrae C7 to the tip of the longest finger of the right arm.

Start Position

Medial Reach



Inferolateral Reach

Superolateral Reach

The YBT-LQ has been shown to be a reliable test for injury prediction and research has identified that individuals with asymmetries greater than 4cm are more likely to sustain a lower extremity injury.

Reach scores and limb measurements are used to determine a composite score using the following equations:

$$\textit{YBT-UQ Composite Score} = \frac{\textit{(Medial + Inferomedial + Superomedial)}}{\textit{(3 x Limb Length)}} \textit{ x 100}$$

$$\textit{YBT-LQ Composite Score} = \frac{\textit{(Anterior + Posteromedial + Posterolateral)}}{\textit{(3 x Limb Length)}} \textit{ x 100}$$

The composite score gives an indication of upper body strength and core stability. For upper limb injury risk a composite score of less than or equal to **88%** for males and less than or equal to **85%** for females are strong indicators that the participant is at risk of injury due to inadequate core stability and strength.

For lower limb injury risk a composite score of less than or equal to **98%** for males and less than or equal to **92%** for females are strong indicators that the participant is at risk of injury. Right and left reach direction scores are compared to determine functional symmetry levels. Differences between left and right reach distances more than 4cm are an indicator of asymmetry and a risk for injury.