

# Inline Lunge Movement Pattern

## WHY THE SPLIT STANCE PATTERN?

The lunge is our ability to lower our center of mass in a stride or asymmetrical foot position that is most used in times of deceleration and direction change. This pattern requires us to lower our center of mass like we do in the squat pattern, but in a more dynamic way. The lunge is a natural extension of developmental patterns and the developmental posture called the half kneel position.

We witness lunging in sport when a sprinting football player needs to quickly decelerate and change direction. The player uses this asymmetrical position to lower their center of mass and control changes in their base of support while in motion. We also see lunging used to lengthen the base of support and create a stronger base along the sagittal plane. The complementary and contrasting upper and lower body movements serve to push the limits of mobility, stability, motor control and dynamic balance. We get a glimpse of this when watching a rugby player sprinting to tackle the opponent.

The half kneeling pattern was a developmental pattern used when transitioning from the ground to standing to explore our environment. In everyday life, we can choose the lunge or half kneeling pattern to lower ourself to pull weeds from our garden or pick up a ball on the golf course. We use the long base of the lunge to brace ourselves in order to push a heavy sofa across the floor or to push a broken-down car off the road. A soldier must maintain a motionless long base when shooting a gun.

Without access to an efficient lunging ability we begin compensating with poor deceleration mechanics. This is one of the known causes of non-contact injuries in many field and court sports. In everyday life lunging and half kneeling are movement strategies for lowering ourselves safely to the ground as well as getting up from the ground. It is obvious that the inability to lunge could impact us in different stages of life and truly affect our quality of life.

## WHY THE INLINE LUNGE SCREEN?

The Inline Lunge Screen (IL) places the lower extremities in an inline split-stance position while the upper extremities are in an opposite or complementary reciprocal pattern. This replicates the natural counterbalance the upper and lower extremities use to complement each other, as it uniquely demands spine stabilization. This test also challenges hip, knee, ankle and foot mobility and stability, while at the same time simultaneously challenging flexibility of multi-articular muscles such as the latissimus dorsi and the rectus femoris.

A true lunge requires a step and descent. The inline lunge test only provides observation of the descent and return; the step would present too many variables and inconsistencies for a simple movement screen. The split-stance narrow base and opposite shoulder position provide enough opportunity to uncover mobility and stability compensations within the lunging pattern.

We do not exercise in a position this extreme, but in the screen we are only asking for an In-line Lunge (IL) using body weight.

# Inline Lunge

## DESCRIPTION

Attain the client's tibia length by either measuring it from the floor to the top center of the tibial tuberosity or acquiring it from the height of the cord during the hurdle step test. Tell the client to place the toe of the back foot at the start line on the kit. Using the tibia measurement, have the client put the heel of the front foot at the appropriate mark on the kit. In most cases, it's easier to establish proper foot position before introducing the dowel.

Place the dowel behind the back, touching the head, thoracic spine and sacrum. The client's hand opposite the front foot should be the hand grasping the dowel at the cervical spine. The other hand grasps the dowel at the lumbar spine. The dowel must maintain its vertical position throughout both the downward and upward movements of the lunge test. Do not manually manipulate set up positions, but absolutely spot for safety and be aware of possible balance issues that could put the person being screened at risk.

To perform the inline lunge pattern, the client lowers the back knee to touch the board behind the heel of the front foot and returns to the starting position. The knee must touch down on either the test kit or the ground and then return to standing position on the test kit to complete the movement.

If any of the criteria for a score of three are not achieved, the client receives a score of two. If any criteria for the score of two are not achieved, the client receives a score of one.

## VERBAL INSTRUCTIONS

For consistency throughout all screens, this script should always be used. The bold words below should be repeated to the client.

- **Step onto the center of the board with the left foot and your toe on the zero mark.**
- **The right heel should be placed according to your tibial measurement at "\_\_\_".**
- **Both toes must be pointing forward with the entire foot in contact with the board.**
- **Place the dowel along the spine so it touches the back of your head, your upper back and your tailbone.**
- **While grasping the dowel, your left hand should be in the curve of your neck, and the right hand should be in the curve of your lower back.**
- **Maintaining an upright posture so the dowel stays vertical and you maintain the three points of contact, descend into a lunge position so your left knee touches the center of the board.**
- **Then, return to the starting position.**

Referencing the right Inline Lunge, repeat on the left by changing the indicated side

## TIPS FOR TESTING

1. The front leg identifies the side you are scoring.
2. The dowel remains vertical and in contact with the head, upper back and tail bone during movement.
3. The front heel remains in contact with the board, and the back heel touches the board when returning to the starting position. Watch for loss of balance. For inline lunge, a loss of balance is stepping off the board.
4. Remain close to the client to prevent a complete loss of balance.
5. It's important to remember that if the person does not at least make contact with the board or ground with the knee somewhere, it is the inability to complete the movement pattern, this is a score of one.
6. Repeat the test on both sides.
7. The client can perform the movement up to three times on each side if necessary



# Scoring the Inline Lunge

## 3

- Dowel contact maintained
- Dowel remains vertical
- Minimal to no torso movement
- Dowel and feet remain in sagittal plane
- Knee touches the center of the board
- Front foot remains in start position



## 2

- Dowel contact not maintained
- Dowel does not remain vertical
- Movement in torso
- Dowel and feet do not remain in sagittal plane
- Knee does not touch center of the board
- Flat front foot does not remain in start position



## 1

- Loss of balance by stepping off the board
- Inability to complete movement pattern
- Inability to get into set up position



An individual receives a score of zero if pain is associated with any portion of this test. A medical professional should perform a thorough evaluation of the painful area.

# Ankle Clearing

## PURPOSE

An important purpose for this screen is to identify pain and to ensure ankle mobility is not a barrier to movement pattern competency and capacity. The lower body motor control is adversely affected when ankle mobility is painful and/or dysfunctional/limited. Normal, adequate mobility without pain is a prerequisite for motor control needed in multiple movement patterns.

## VERBAL INSTRUCTIONS

- Please let me know if there is any pain while performing any portion of the screen.
- Please lace or strap your shoes snugly.
- Place the outside of your left foot up next to the FMS test kit so that the outside foot is in contact with the kit.
- Place the right foot in front of the left foot so that you are in the heel-to-toe position with both feet touching each other and the FMS test kit and use a dowel for balance.
- I will adjust the FMS kit so that the red start line is at the front of the medial malleolus.
- While maintaining the heel-to-toe position drop straight down, bending the back knee and taking it as far as possible in front of your toes while keeping the heel down.
- Once you have reached your maximum distance, I will measure and ask you where you felt the stretch (Front, Back of Ankle, or no stretch).

Have the participant perform the ankle clearing screen at least three times for consistent measurement.

## TIPS FOR TESTING

- The back foot is the ankle being tested.
- Adjust the FMS kit so that the red start line lines up with the front of the medial malleolus.
- Both feet must remain in the heel-to-toe position throughout the movement.
- Use the dowel for balance so that range of motion is not limited due to a lack of balance.
- The verbal instructions and setup should guide the individual to move the back knee laterally to avoid contact with the forward leg.
- If there is pain, refer to a healthcare professional.

# Documenting Ankle Clearing

## GREEN

- Knee moves beyond the medial malleolus of the front leg while the heel stays down.
- This indicates the ankle has cleared mobility requirements



## YELLOW

- The knee resides within the width of the medial malleolus of the front leg while the heel stays down.
- This indicates a potential ankle mobility limitation.
- Failure on the Ankle Clearing screen implies that ankle mobility should be addressed and cleared.



## RED

- The individual's knee does not reach the medial malleolus of the front leg while the heel stays down.
- This indicates a potential ankle mobility limitation.
- Failure on the Ankle Clearing screen implies that ankle mobility should be addressed and cleared.



## ADDITIONAL CONSIDERATIONS

- **Pain** - If the individual experiences pain with this screen, indicate positive for pain in scoring and referral to a healthcare professional is recommended.
- **Stretch** - If the individual experiences a stretch or feeling of tightness of the ankle and it does not resolve with soft tissue or stretching applications, further assessment by a health care professional is needed.



# Rotary Stability Movement Pattern

## WHY THE REACTIVE TRI-PLANAR PATTERN?

The reactive tri-planar pattern is something we experience when we resist rotation to maintain a position when there is a push or a pull on one side of the body. Rotary Stability (RS) is expressed when we create or resist rotation to crawl, climb, run, swing and throw. In our developmental stages we use the cross connection of opposite arm to opposite leg to crawl. As kids, we learn to climb, run, and bound by expressing this ability.

When heading to the airport, we may need to toss a heavy bag into the car. Many of us naturally will load into a bit of rotation then uncoil to toss it in. This coiling affect is the natural extension of the crossing diagonal pattern that we see in something as simple as walking. If we take a step forward with one leg, the opposite arm should also swing forward. We also depend on the ability to resist rotation when we pick up an object on one side of the body and brace ourselves with the opposite side.

Many sport and recreational movements are heavily dependent on this reactive tri-planar pattern. Whether throwing a punch or a baseball, we need the ability to coil and uncoil the torso to transfer forces to our extremities. We also see this when resisting an opponent in soccer who is trying to push you out of position to get to the ball. Activities like paddling use rotation to perform each stroke.

Resisting rotation is seen on the job when a firefighter drags the firehose over one shoulder to move it closer to the fire. Police officers and soldiers must maintain RS in order to set a steady, precise position to aim a firearm and handle the force when taking a shot.

## WHY THE ROTARY STABILITY SCREEN?

The reactive tri-planar pattern is screened with the Rotary Stability screen. This screen is not designed to replicate crawling, even though crawling may be very restorative and corrective for this pattern. It is better to consider this a perturbation challenge. Perturbation literally means an agitation or a loss of balance. The change in base of support when you lift an arm and a leg forces the need for a shift and disturbance to your stability that requires the body to react quickly and communicate using the deeper core musculature to maintain the position.

Not many people practice the unilateral movement seen in this screen and there is an obvious inability to do it when someone fails this motor control challenge. This unique unilateral challenge also allows us to observe the reactive tri-planar on both sides in order to identify asymmetries in this pattern. The opportunity allows us to further explore the pattern to insure it contributes fundamental stability to the movement baseline.

TSPU looks at motor control to see if you sacrifice stability to complete a task. RS looks at a feedback motor control on the left and right side with a perturbation.

# Rotary Stability

## DESCRIPTION

The client gets into the quadruped position with a board, either the FMS kit board or one of similar size, on the floor between the hand and knees. The board should be parallel to the spine, and the shoulders and hips should be 90 degrees relative to the torso, with the ankles relaxed and plantar flexed with toes pointing backwards.

Before the movement begins, the hands should be open, with the thumbs, knees and feet all touching the board. The client should shift and lift the same side hand and knee to initiate the movement. Then the client reaches back with the hand to touch the same-side ankle. Following the touch, they then flex the shoulder while extending the same-side hip and knee so that it creates a straight line and is in-line with the board on the ground. The hand is brought back to touch the ankle for a second time, then return to the start position. Do not manually manipulate set up positions, but absolutely spot for safety and be aware of possible balance issues that could put the person being screened at risk.

This is performed bilaterally for a maximum of three attempts if needed. If one repetition is completed successfully, there is no reason to perform the test again.

## FLEXION CLEARING

A clearing exam is performed at the end of the rotary stability test. This movement is not scored; it is performed to observe a pain response. If pain is produced, a positive (+) is recorded on the sheet and a score of zero is given to the entire rotary stability test. We clear flexion from the quadruped position, then rocking back and touching the buttocks to the heels and the chest to the thighs. The hands remain in front of the body, reaching out as far as possible. If there is pain associated with this motion, give a zero score. If the client receives a positive score, document both scores for future reference.

## RS VERBAL INSTRUCTIONS

- Get down on your hands and knees straddling the board with your thumbs, knees and toes touching the board.
- Your hands are under your shoulders and your knees are under your hips with your toes pointing backward.
- At the same time, in one smooth and controlled motion, shift and lift the same side arm and leg.
- Without touching down, reach back with your hand and touch the outside of the ankle.
- Then extend that same side leg backward and arm forward, fully extending knee and elbow.
- Finally reach back to touch the ankle with the hand again, and then return to the starting position.
- Perform this pattern while keeping the arm and leg moving in-line with board.

## FLEXION CLEARING VERBAL INSTRUCTIONS

- Get into the same start position with feet pointed backwards, and rock your hips toward your heels.
- Lower your chest to your knees and reach your hands in front of your body as far as possible.
- Do you feel any pain?

# SCORING THE ROTARY STABILITY

## 3

- Hand and knee leave ground at the same time.
- Ability to perform this pattern while keeping the arm and leg moving in-line and parallel with the board.
- Fingers touch the lateral malleolus.
- Knee and elbow achieve full extension.



## 2

- Hand and knee did not leave ground at same time
- Inability to keep the arm and leg moving in-line and parallel with the board
- Fingers touch the lateral malleolus
- Knee and elbow achieve full extension



## 1

- Loss of balance
- Hand does not touch the lateral malleolus
- Knee and elbow do not fully extend
- Inability to get into set-up position



An individual receives a score of zero if pain is associated with any portion of this test. A medical professional should perform a thorough evaluation of the painful area.

## FLEXION CLEARING TEST

Flexion can be cleared by first assuming a quadrupedal position, then rocking back and touching the buttocks to the heels and chest to the thighs, the hands should remain in the front of the body, reaching out as far as possible. If there is pain associated with this motion, give a positive (+) score with a final score of zero and perform a more thorough evaluation or refer out. If the individual receives a positive score, document both scores for future reference.



