A Historical Perspective and Rationale Behind the *Hruska Adduction Lift Test*

Webinar
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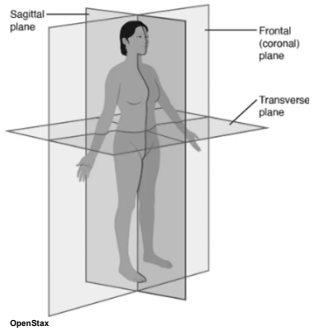
Postural Restoration Institute®

Regulating balance and posture during walking or forward locomotor progression represents an extremely complex motor and sensory system of integration.

Rotary movement in the transverse plane of human forward movement is dependent on the simultaneous effort and amount of lateralized movement in the frontal plane.



OpenStax

Human posture is unique to everyone.

It is built off of and from the input the brain receives from a narrow width of the base of support, during the single leg support phase of walking.

We rely on the references on the bottom of the foot that provide both forward and backward movement and rotation synergistic patterned activity, which allows us to intermittently, and mindlessly or reflexively, hold us upright in our balanced position that was developed around safety, ease, and weakness.

As our asymmetrical body mass neurologically adapts to this planet's gravity, we immediately begin to lose some degree of adduction and abduction function at the proximal joints, that reflect dominant lateral rotational patterns of overuse and adductor-abductor weakness associated with patterned lateral placement.

Humans usually, do not lose rotational ranges of body motion because of frontal plane adduction and abduction weakness.

We lose <u>both</u> rotational ranges of motion and adduction-abduction ranges of body motion secondary to limited alternation of our body mass to one side, or both sides, of our environmental framework.

Limitations in adduction and abduction of the appendages on the body, or the body on the appendages, is usually designed around cortical and mid brain design of movement associated with vertical spinal and brain stem horizontal displacement neurology.

Human asymmetrical structure, which includes both the body and the brain, is dissymmetrical structure.

Dissymmetry influences human patterns of rotary function.

[See attached handout "Dissymmetrical Asymmetry – What is Posture?"]

Generalized neurologic function built off of dissymmetrical structure, is easier to break down and objectively reduce, through frontal plane assessment of hip performance and perception in the frontal plane, using a sagittal axis.

A substantial amount of cortical and functional work has to be done in the frontal and transverse planes by the hip, before control of the pelvis and trunk can be achieved, maintained or challenged during sagittal function.

(Eng JJ, Winer DA. Kinetic analysis of the lower limbs during walking: what information can be gained from a three-dimensional model? J Biomech.1997 Jun;28(6):753-758.)

One of her hips work better in the frontal plane. Which one is it?

This webinar presentation, and the one following it in this series, will be addressing the most reproducible assessment of human function as it relates to gravity, neurologic hemispheric asymmetry, body dissymmetry with the thoracic diaphragm length on the right being longer than the left, and sensorium as related to spatial and ground awareness.

Standing more often on the right leg, is the result of left-brain dominance of right sided function, respiration patterning, and left muscular efferentation weakness related to limited left neurologic anatomical referenced afferentation of left mechanoreception, proprioception and sense in general.

The primary goal of the frontal plane control system, using both hips, is to maintain the center of mass within the lateral borders of the base of support provided by our sense of the ground when the feet are directly located below each hip.

Our balance is the regulation of dynamic movement of body segments built around a supporting joint or a base of support.

Our hips and our feet provide the support and the self-sense of that support as related to the orientation and position we place them in, with respect to each other, during alternating lateral displacement.

Postural ‘happiness’ relates to resonating, rhythmic, alternating authentic hip *adduction*.

SELF CENTERING

Our posture is directed, developed and designed through the maintenance of neurologic establishment of a specific segmental or relative joint position.

This ubiquitous pattern of postural function reflects both our limitation in balance, or gravitational regulation, and our provision of self-centering adjustments made by our central nervous system to move to, or toward a “midline” using appendicular adductors and abductors.

All of the “HRUSKA” test outcomes reflect the orientation of the individual’s sense of location with respect to the spine, its sacral base and its sphenoid base.

This is important to recognize because our central nervous system continuously adjusts the actions of our vestibular ocular reflex and vestibulospinal reflex.

This central processing system sends outputs to the spinal cord and ocular muscles to generate motor function to manage and maintain a stable perception of the world around us.

The “HRUSKA” tests recognize the integrated bias associated with our peripheral sense and motor control regulation, through recognition of the proprioceptive sense associated with sphenoid occipital, sphenoid ocular, and sacral ilium activity.

MUSCLES PULL, THEY DO NOT PUSH, US TO ONE SIDE

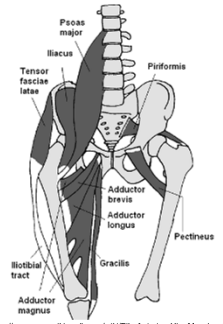
A minimum of two opposing muscles, one on each side of the bone, is necessary to maneuver any given bone because muscles can only exert force by pulling. Muscles cannot push because myosin rachets along actin fibers in only one direction. We look the way we do and are shaped the way we are because of this planet's gravitational force enabling us to pull ourselves from one side to the other side, that correlates to the direction we want to move in. The tongue and the iris muscles of the eye are an exception to this behavior.

(Held L. Quirks of Human Anatomy – An Evo-Devo Look at the Human Body. Cambridge Univ. Press. 2009)

When we pull ourselves to one side, or to our "middle", we use the highest horizontal muscles of the inner thigh of the same side that we are moving the mid-body and pelvis to.

These muscles attach to the pubic bone region, and to the anterior bones that make up the obturator foramen.

These horizontal muscles include the Pectineus, the Adductor Magnus and the Adductor Brevis.



https://commons.wikimedia.org/wiki/File:Anterior_Hip_Muscles_2.PNG
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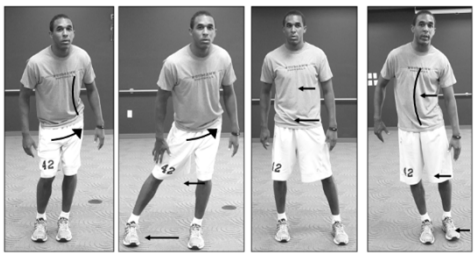
Gray H. Gray's Anatomy. Plate 433.
Public Domain. Available at
https://commons.wikimedia.org/wiki/File:Gray433.png

We structurally function using our adductors for everything we do in life, through use of acute proximal hip angulation and adduction pulling, to stabilize the body on either the floor or chair.

Just as we usually structurally function through the use of obtuse proximal angulation and abduction pulling, coherently on the other side.

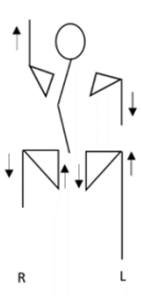
Right Lateral Walking
(Integration - Standing #80)



The primary goal of the adductor-abductor horizontal plane of control at the hips is to maintain the proximal center of mass within the lateral borders of our distal base of support (our feet).

This control of the mass that lies between the two outside feet borders, requires a large internal abductor moment of pull at the hip that stabilizes the pelvis and, secondarily, the thorax.

However, stabilization of the pelvis and thorax begins with the timely pull from the proximal hip adductors, which also theoretically serve as ipsilateral low back abductors or abdominal synergists.



Hip abdominals work with hip adductors and hip adductors work with hip abdominals.

[This is why we ask someone to “raise the lower knee and ankle” as they internally rotate and lift their knee to midline using their proximal horizontal adductors early on in this test. (Grade 2) Grade or level 2 activity is ipsilateral feedforward preparational abdominal activity for the next grades or levels, where abdominal coactivity is required.]

The control of body mass lateral movement is not the responsibility of the head and neck.

Furthermore, all measures to keep the head and neck out of the picture should be taken when testing lateral mass movement, regardless if testing takes place in an upright or in a sidelying position.

3. Copenhagen Adductor Strengthening: Rest on your side, with your bottom leg and elbow bent to 90 degrees. Place your top leg on a chair or high step. Lift your pelvis from the floor. Elevate your bottom leg so your knees touch. Move your bottom leg down. Repeat as required. This is a strengthening exercise for your adductor or inner thigh muscle.

https://www.youtube.com/watch?v=1uOkRLSRgqI

When you lose sufficient adductor motor control at this region, the cervical spine (i.e. neck) will substitute that control, by going forward.

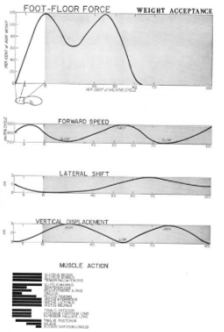
LATERAL DISPLACEMENT

This is the path one has to take to move forward when walking.

In the PRI Forward Locomotor Movement course, I describe it as a “single sinusoid wave for each lower extremity in the forward locomotor movement cycle.”

Motion of the axial segments is toward the side of the supporting limb. Adduction and abduction of all limbs (frontal plane) at the proximal joints (esp. at the hips and pelvis), are the greatest at the ‘single lower limb support phase’ of the ‘gait’ cycle, where ‘push-off’ or terminal stance correlates with contralateral pre- ‘heel-strike’, and where ‘double lower limb support phase’ is about to begin.

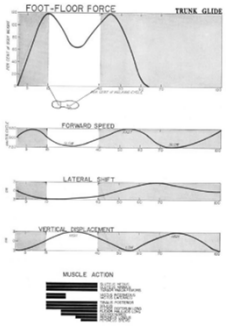
**See figure 7.2 from Jacquelin Perry’s book, Gait Analysis, SLACK Inc (1992).*



Perry J. The mechanics of walking: A clinical interpretation. Physical Therapy. 1967;47(9):778-801. Permission granted through the Copyright Clearance Center.

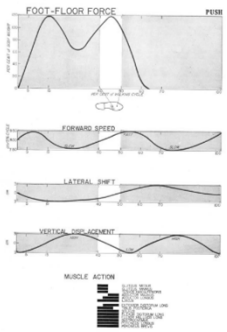
We begin to laterally shift our body to the side our foot is forced up by the floor or ground, as we allow the floor or ground "accept" our weight.

We "glide" our "trunk" forward, to reach the outer range of lateral displacement.



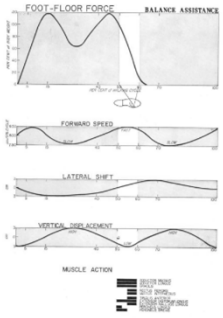
Perry J. The mechanics of walking: A clinical interpretation. Physical Therapy. 1967;47(9):778-801. Permission granted through the Copyright Clearance Center.

We then check our lateral movement of displacement by 'pulling' ourselves back over to the mid-range of the frontal plane, through the use of our ipsilateral proximal concentric-minded hip adductors and peroneus muscle. This frontal plane mid-range return is also provided by the forward 'push' movement, over a more centered or neutral position in the frontal plane range, that is reinforced by the gastroc and soleus muscles.



Perry J. The mechanics of walking: A clinical interpretation. Physical Therapy. 1967;47(9):778-801. Permission granted through the Copyright Clearance Center.

Lateral shifting to the other side at the end of the stance phase, or 'balance assistance' moment is provided by the distal eccentric-minded hip adductors.



Perry J. The mechanics of walking: A clinical interpretation. Physical Therapy. 1967;47(9):778-801. Permission granted through the Copyright Clearance Center.

This lateral placement and displacement create gluteal, abdominal and shoulder/arm coherence that is necessary for balance management of upright anti-gravitational motor control.

The lateral displacement and replacement of our body mass through hip and pelvis lateralized function is a necessary requirement for head, arm and trunk (HAT) rotational function.

If you can not adduct your hips and pelvis to move laterally against gravity, you may not be able to rotate your head, arms and trunk reciprocally and evenly.

SIDE TO SIDE SELF REGULATION

Before we ever took a step forward, we had to respect the consequences of not moving our ‘selves’ over one leg, to ground and stabilize ourselves, so that we could operatively use the transverse plane for advancing ourselves into the sagittal world of discovery.

Our brain had to figure out how to activate eye muscles to create binocular movement at the exact speed and time to oppose the contralateral direction of our head movement, in order to stabilize our retinal images for discovery of side to side regulatory function.

Our body had to figure out how to activate hip muscles to create hip movements at the exact speed and time to offset the opposite direction of our pelvis movement, so we could recognize when and how to stabilize our ground reaction forces.

Over 30 years ago, I recognized the importance of objectively assessing and addressing the limitation we as humans develop as a result of not owning the symmetry that places us in imbalanced (lateralized) states.

For the indoctrination of required 'off-setting' pendular appendicular function, we all must learn to balance our head, arms and trunk, both at rest and during upright function.

Early in my career, I observed the human's orientation of their body to the right, which preceded rotation of the neck to the left. I also observed eyes moved to the side opposite the direction of neck and head orientation. The lower neck and the base of the head on these patients, and on the general public, appeared to be oriented to the right and the head and its orbits were directed or to the left.

The cervico-ocular reflex is a reflexive eye response that is elicited by rotation of the neck. This commonly seen patterned rotation of the head and neck, along with the corresponding adaptation of vestibular ocular reflex, and the vestibulospinal reflex influence of associated bias motor control, reinforces patterned lateralized self-sense of the center of gravity over to the right.

(Kelders WPA, et al. Compensatory increase of the cervico-ocular reflex with age in healthy humans. J Physio. 2003 Nov 15; 553(Pt 1): 311–317.)

Finding a way to demonstrate this sense of axial longitudinal biased dissymmetry, required one to compare the frontal and rotational limitations of one side to the other side, when tested in a horizontal position.

WHEN WAS IT FIRST INTRODUCED?

The Hruska Adduction Lift Test was first introduced in the Myokinematic Restoration course in July of 2002.

However, the reasoning and designed methodology behind the test began in the summers of 1978 and 1979, when I worked as a physical therapy aide at the Omaha Veteran's Administration Medical Center (OVAMC).

In 1981, I worked full time as a physical therapist, directly out of PT school, at the OVAMC.

I wanted to work under the mentorship of George Blanton PT, who had over 30 years of experience working with people who had both upper extremity and lower extremity amputations, cardiac rehabilitation needs, CVAs and a myriad of other neurological and vascular issues.

George understood the necessity for hip adduction and abduction, simply because he worked with amputees who depended on every hip adductor and abductor muscle cell they owned.

SERVICE PINS

Mary Ellen Jones	25 years	MAS
Kristy Kruse	10 years	MAS
Debra Pike	10 years	Lab
Marian Reeder, RN	15 years	Nursing
Gerald Ferguson	30 years	Canteen
George Blanton	30 years	RMS
Leigh Drake, JR.	40 years	Radiology
Sherry Marten	10 years	Lab

In those next five years, I learned how to prepare the dismembered body for locomotor function, with the integrative assistance of two or three other extremity sense and support.

Mr. Blanton convinced me that the rehabilitation did not begin with the missing limb's remaining anatomy.

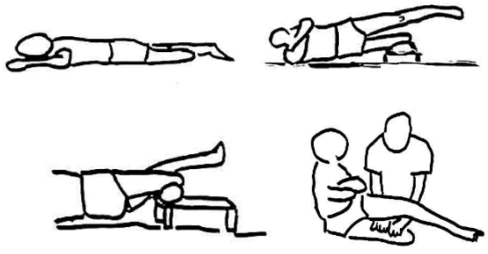
It began with lateral control of body mass on a dismembered body, that primarily needed to occur through the integration of abdominals and hip/pelvis adductors, integration of abdominals and hip/pelvis abductors, and integration of the remaining hip/pelvis or shoulder/scapula adductors and abductors.

Toughening up the end of an anatomical stump was not the primary issue.

Strengthening the proximal section of the end of the stump with contralateral extremity stability and control, always was the primary concern.

Working the body while holding onto the end of the stump in horizontal positions is where this test really was initiated.

Prone-Lying



Preprosthetic Exercise Program (Dave Thompson PT)
https://ouhsc.edu/bserdac/dthompso/web/gait/pobmk/ampex.htm

The level of amputation had a dramatic effect on the outcomes of lateral displacement capabilities when donning a temporary prosthesis.

The patients who had a hemi-pelvectomy or a hip disarticulation were very limited using a prothesis, only because of the limited ability to adduct their pelvis or hip on the prosthesis.

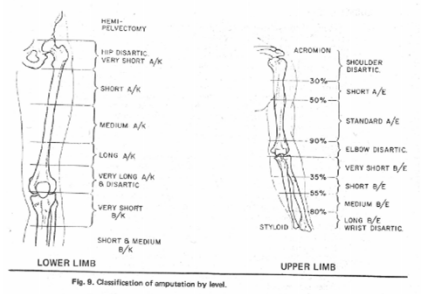


Fig. 9. Classification of amputation by level.

Figure from: Wilson AB. Limb prosthetics (5th Ed.), 1976.
Krieger Publishing Company.
1725 Krieger Lane
Malabar, FL 32950
info@Krieger-publishing.com
Use with permission from the publisher.

They were not limited in accepting, or wearing, or holding the prosthesis in place. They were limited because of the amount of adductor or abductor muscle that was lost.

I still remember many young men, some my age, wishing they had more or even some hip adductors. In fact, some of these individuals would say to the fellow mat sharer, who was recovering from a CVA, that they wish they had a CVA instead of a short above knee amputation.

This is where my former education in pre-dentistry was challenged.

These individual's necks, mandibular elevators and respiratory mechanics were compensating because of the limitation of ground use and ground sense for midline shifting.

Teeth, sight, and necks were all influenced by the sense of the inner thigh or the phantom sense provided by the end of a stump.

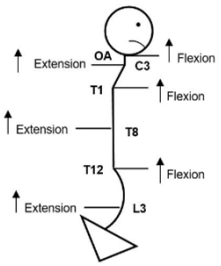
It changed me forever.

The next 14 years, I worked as a director and clinician of a hospital outpatient physical therapy clinic, where I had the wonderful opportunity to work with patients who had temporomandibular dysfunction, cervicalgia and curvature of the spine.

One of the most important underlying things I learned about these patients was that they usually had accompanying forward heads.

Most of them had some degree of over-flexion of the spine at T1 and heads and upper necks that projected forward.

FLAT BACK AND FORWARD HEAD AND NECK POSITION



Countless thoracolumbosacral (TLSO) were put on some of these patients.

I learned immediately their abdominal-adduction and abdominal-abduction function improved, because of the repositioning that the orthosis provided to the pelvis/hip femoral region. I also learned that the more one could move laterally with sense of the floor below them and sense of the space above them, the more this orthosis would, literally, fall off.

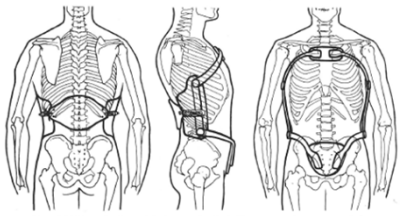
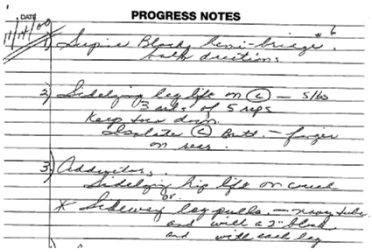


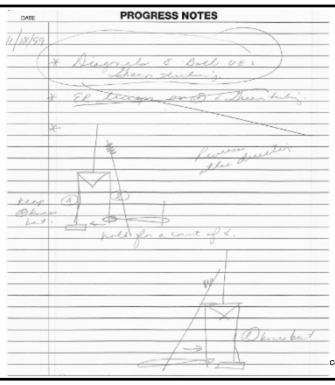
Fig. 19-15. Thoracolumbosacral flexion control orthosis (Jewett or anterior hyperextension).

Atlas of orthotics: biomechanical principles and application. (American Academy of Orthopaedic Surgeons). St. Louis. The C.V. Mosby Company (1975).

Thoracolumbosacral (TLSO) Brace

I reinforced the need to feel, be mindful, and use the inside thigh muscles.





WHY WAS IT INTRODUCED?

To determine an objective level of midline to lateral neurologic sense, strength and stability of upright function without VOR, COR and vestibulospinal reflex influence, prior to selecting upright gravitational double or single leg stance PRI techniques.

Frontal plane balance is difficult, considering the narrow width of the base of support during the single support phase of forward locomotor movement.

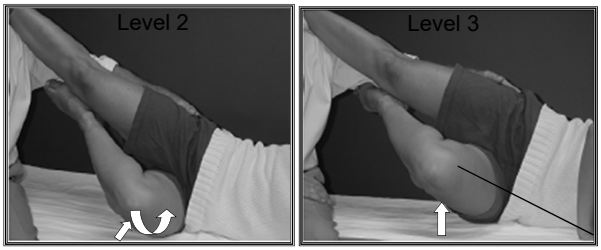
It was therefore a test that I felt could identify where control of the center of mass trajectory was most limited prior to addressing upright forward locomotor motor control deficiencies.

Adductors are one of the few muscles of the body that will either internally rotate or externally rotate an extremity, in this case the femur or the hip, depending on what position the femur or hip are placed in during the adduction moment.

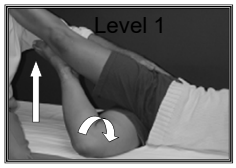
This is why testing their external rotation initial activity followed by internal rotation activity keeps their appropriate rotation in check, as demands on their function is increased.

Therefore, this is an obligatory test.

If internal rotation of the femur on the right side doesn't precede grade 3 of a left Hruska Adductor Lift Test, the ability to lift the right lower hip off the table (grade 4 or higher), would not occur correctly because of the inability to allow hip translation to the left with acetabular femoral internal rotation on the left. In other words, right femoral acetabular internal rotation (grade 2) precedes left acetabular femoral internal rotation. And vice versa.



The left proximal hip adductors (as external rotators in this flexed hip position), along with the right external obliques are being integrated when the left ankle is raised (level or grade 1) in the right Hruska Adduction Lift Test position.



The flexed hip position reflects kinetic function at the swing phase of forward locomotor movement, regardless of which side is being tested.

At grades 3 and above in the right Hruska Adduction Lift Test, the left internal obliques and transverse abdominals and the right hamstrings and posterior gluteus muscle is objectively tested, by maintaining grade 2 position.

Grades of testing following 2, occur through pulling of the lower anterior rib cage downward, toward the ipsilateral ilium that one is laying on and is serving as an anchor for this abdominal pulling effort.

Level 3

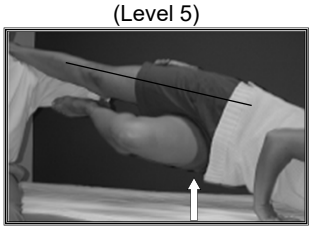
Grade 3 is also the 'transitional' or 'neutral' zone where the proximal and distal adductors of the extended leg, along with the bilateral abdominal walls are tested.

Lateral abdominals on the side one is laying on are secured positionally by the contralateral hip adductors and gluteal extensor muscle and the ipsilateral gluteal abductor muscle.

The adductors of the extended leg, when in or at a level 4 or 5, are adducting through integration effort with the opposite abdominals while the center of mass is shifting to the side of the extended hip and knee, in a gravitational horizonal state.

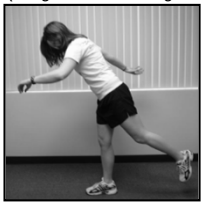
This reflects the ability to swing the leg in hip flexion with the extended leg's adductors, when walking.

Hruska Adduction Lift Test (Level 5)



PRI Left AIC Single Leg Stance

(Integration - Standing #112)



This level or grade of successful effort also reflects the function needed to extend or stand on the same horizontal extended leg in the vertical position, and use the distal and proximal ipsilateral adductors for support during upright shifting of the center of mass over the supporting lower extremity, during upright opposite upper extremity abduction, or movement away from the side of the body.

Our forward locomotor skills reflect our ability to concentrically and eccentrically use frontal and transverse plane adductor muscle during ankle and hip alternation of lateral body translation.

This test is taught in the Myokinematic Restoration course, but as you can see it's application goes above and beyond that primary course.

In the Myokinematic Restoration course, we also outline the muscle(s) that need facilitated or inhibited, in order to achieve each grade or level of the Hruska Adduction Lift Test, along with PRI non-manual technique recommendations.

It is truly a FUNCTIONAL test, and such an important piece of your assessment, in order to appropriately progress a patient or client's PRI program.

If you are a PRI practitioner, and you are not using the Hruska Adduction Lift Test (or Hruska Abduction Lift Test that we will discuss in the next webinar), how are you assessing the body's ability to use frontal and transverse plane adductor or abductor muscle during alternation of lateral body translation (i.e. gait or forward locomotor movement)?

WHAT TYPICAL AND COMMON MUSCLE PATTERNS OF WEAKNESS ARE ASSOCIATED WITH SIDELYING TESTING OF HIP SHIFT AGAINST GRAVITY?

Patterns of concomitant hip adductor and hip extensor fragmentation.

This test assures that at some point (grade 3 “Inability reflects weakness of femoral acetabular stabilizers on the extended extremity including the short head of the bicep femoris and adductor magnus...”) there will be enough acknowledgment of strength, from both hip adductors and hamstrings, for appropriate extensor muscle sequencing during stance phase.

*See figures 6.6 and 9.9 from Jacquelin Perry’s book, Gait Analysis, SLACK Inc (1992).

When adduction of either leg is not complimented through coactivation of the glutes, hamstrings or obturators, as outlined in the different levels of the test grading criteria, the “ability” to perform a desired level of activity will be related to the control of the obturator foramen, the coexistence of bicep femoris extensor function at the ischium, and the strength or position of the anterior gluteal medius and minimus muscle.

Very little EMG activity of the hip adductors is found during swing phase. Which is why this test is considered a stance phase test even when the feet are not on the floor or ground.

WHO WAS IT DESIGNED FOR?

It was designed for those who wish to assess single leg stance deficiencies, dysfunctional patterns of vertical lateralization and sense of horizontal trunk rotation limitation.

To distinguish differences between horizontal and vertical gravitational hemi-structural demands.

It was primarily designed for those who are experiencing forward locomotor movement deviations secondary to adductor inactivity during *stance* phases and hamstring extensor mal-sequential activity during *swing* phases of forward locomotor movement.

*See figures 6.6 and 9.9 from Jacquelin Perry's book, *Gait Analysis,* SLACK Inc (1992).

WHEN SHOULD IT BE CONSIDERED?

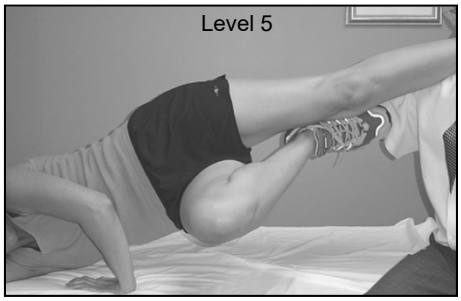
All PRI programs should include at least one functional test, and this test is often the most appropriate test to assess upright postural function.

More specifically, if someone is experiencing difficulty with left 'Single Leg Abdominal – Abductor Stance', consider testing the frontal plane integration of the left abdominals with the right hip proximal hip adductors in the right sidelying position first. (Left Hruska Adduction Lift Test)

This will help to determine if the right adductors and obturator muscle are capable of stabilizing the right femur when it comes off the floor, when the patient stands.

Next, check the ability to raise the right hip or lower hip off the table slightly.

This will help to determine if the left adductor and short head of the biceps femoris and the right external obliques can raise the right hip above the patient's right shoulder using motor control provided by proprioception and stabilization of the left hip/pelvis and sufficient hip adductor and extensor strength.



Keep in mind, the same patient may also have limited ability to raise the left hip off the mat, a grade 4, when laying on the right side (Right Hruska Adduction Lift Test).

The right hip adductors and short head of the biceps femoris may not be as much of an issue on this side (level 2), as the strength and proprioception of the left internal obliques and transverse abdominals may be insufficient to raise the left hip (level 3), which contributes to over adduction of the right upper extremity when the same individual stands.

The same issues seen on the left side, with grades 1 through 3, may also exist, and often times these patients are in a Bilateral PEC pattern.

Our need to keep our arms and hands by our side often relates to the overactivity of the ipsilateral hip adductors and underactivity of the contralateral lateral abdominals.

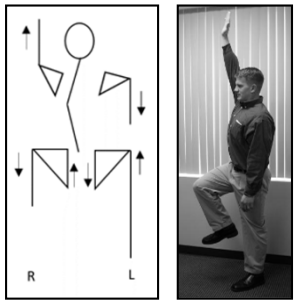
This is why so many of our patients walk with poor complete arm swing on the right side.

Also, keep in mind that we are only discussing the historical perspective and rationale behind this test, as it relates to alternation of lateral slide and glide of the center of mass during forward locomotor movement.

I will be reviewing the role of the Hruska Abduction Lift Test and Hruska Alternating Reciprocal Rotation Test in upcoming webinars in this series.

WHICH UPRIGHT PRI TECHNIQUES IN STANDING, COULD ADDRESS LATERAL LIMITATION OF CENTER OF MASS, AS EXPRESSED BY THE HRUSKA ADDUCTION LIFT TEST?

- Standing on one leg, or with one foot off the floor, and reaching with the contralateral arm and hand above the head requires concentric abdominal work from the side one is standing with. These abdominal 'concentric to concentric' muscles will need to work with 'eccentric to concentric' hip abductors from the side one is standing with.

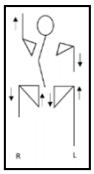


- Centering the body over the leg used to stand with or on, requires restricted ground support and sense on the contralateral side and compression placed on the top of the femur from ipsilateral ground upward force, ipsilateral upper quadrant downward force and contralateral lower quadrant horizontal force toward midline.

- Pelvis orientation and pelvis balance, in a single leg state of mind and function, is the primary recipient of the above muscle co-contraction and concomitant scapula and ilium compression as outlined above.

- Reduction of stance femoral abducted positioning, stance pelvic outlet adduction, stance pelvic inlet abduction and stance thoracic adduction is required.

These photos and figures show someone standing on their left leg with the right arm and hand in the air. The wording reflects either side to stand on, as long as the corresponding arm and hand are in the air.



PRI Techniques

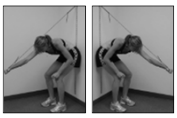
Standing Resisted Right Diagonal Flexion

Standing Resisted Right Diagonal Flexion in Right AIC

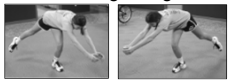
Scapular Compressive Overhead Locomotor Movement

Single Leg Right Apical Overhead Reach

Standing Wall Supported Resisted Serratus Punch



PRI AIC Single Leg Horizontal Reach



Standing Resisted Right Diagonal Flexion in Right AIC *(Voice Box Resonation Course)*

Standing Resisted Left Diagonal Flexion in Left AIC (Voice Box Resonation Course)

Lateral Left Ascension
(Voice Box Resonation Course)

Lateral Right Ascension
(Voice Box Resonation Course)

PRI AIC Single Leg Horizontal Reach
(Voice Box Resonation Course)

Thank you for joining us and for your genuine interest in human adduction assessment.

SAVE THE DATE
for part 2 of this webinar series:

- **A Historical Perspective and Rationale Behind the *Hruska Abduction List Test***

November 10, 2023
1pm CT