

Walking Tall

What Your Client's Gait Can Tell You Before They Even Speak!

Presented by Paul Chek

What is Gait?

Gait is the scientific term that describes walking.

Also one of the seven Primal Pattern® movements identified by Paul Chek (Ref. Chek, 1999)

The gait cycle

- Begins with heel contact and ends with same side heel contact.
- Each leg goes through a stance phase and a swing phase.

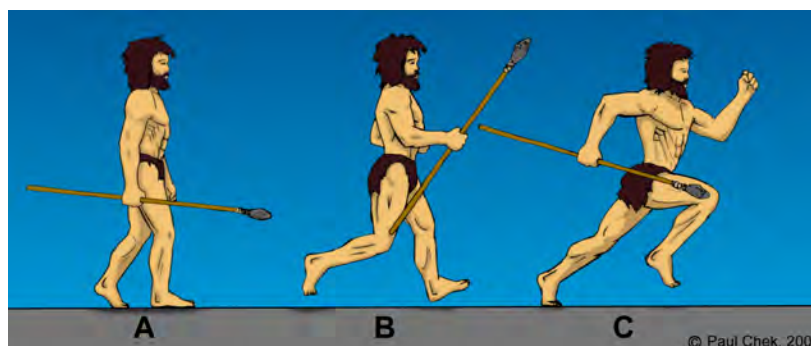
Analyzing the Gait Cycle

In a gait cycle, you analyze the cycle and related actions of each leg and related body actions in the following phases:

- A. Stepping forward with one leg (e.g. right).
 - B. Heel contact and action through the stance phase (e.g. standing on right leg while left leg goes through the swing phase).
 - C. If the person were to start with two feet together, step forward with one leg and continue until that leg was on the ground and both feet were together again, that would constitute a gait cycle.
- The gait cycle involves the whole body and is quite complex to analyze due to the complexity of the kinetic chain.
 - Start by focusing on one segment of the body at a time. Most therapists tend to work from the foot up when analyzing gait.
 - It is unwise to assess gait on a treadmill unless the client's pain is only recreated on a treadmill. The recruitment sequences for muscles and the arthrokinematics of the joints are reversed when the ground moves *under you* relative to when *you walk (jog or run) across the ground*.

Different Types of Gait

Walk – jog – run are controlled by separate general motor programs (Ref. Schmidt, 2007).



A = Walk B = Jog C = Run

This is a critical understanding to have because you cannot effectively analyze walking gait to determine possible source of pain or dysfunction that only occurs while jogging or sprinting.

As movement speed increases:

- Movement parameters change significantly (Ref. Inman, 1989).
- Stabilization faults and biomechanical forces will escalate
- The time you have to assess any aspect of the gait cycle decreases comparatively!

NOTE: It is a good idea to hone your gait assessment skills at walking speeds before trying to assess gait at faster speeds.

Legs are Optional!

You don't need legs to walk; the extremities express the complex motor actions of the core, which are largely driven by the abdominal wall muscles and the complex actions of the spinal discs and ligaments. (Ref. Gracovetsky.)

To watch: Nick Santos on YouTube and the Spinal Engine video with Gracovetsky. Both people are walking on their ischial tuberosities.

Walking Assessment

Preparation:

- Draw a line with a dark eyeliner pencil down center of knee cap by having your partner sit on a chair of the floor with their knees bent to about 90°; grab each side of the patella and draw a line down the middle between you thumb and index finger.
- Draw a line down the center of your second toe.
- Draw a line directly down the center of the Achilles tendon and heel.
- Draw a line in the popliteal fossae right where the skin behind the knee naturally creases.

What to look for:

- *Pronation / supination:*
 - As your partner walks toward you, pay close attention to see if the line on their knee drops inside the line on their second toe, which indicates *over-pronation*.
 - Look at the lines on their Achilles tendons and heels as they walk away from you. If they are over-pronating, the Achilles will look bowed, with the heel falling toward the inside respectively.
 - Try having your partner gently activate their TVA while they walk toward you and away from you to see if pronation diminishes toward optimal. If it does, this is an indicator that core control is part of their overall pronation pattern.
- *Stride:*
 - Is their stride length the same length on each side?
 - Do they have the ability to dorsiflex their big toe to at least 60°? If not, they have *hallux rigidus*, which means that they can't get enough extension of the great toe to push off effectively.
- *Movement through hips:*
 - The hips and pelvis should rotate naturally as one goes through the gait cycle.
 - Is there more rotation of the pelvis to one side than the other?
 - Compensation?

- Problems with the sacro-iliac joint on either side?
- Pathology of the hip joint itself?
- Degenerative hip joint disease can cause an imbalance in hip joint symmetry.
- Shoulder/arm restrictions may overflow into the opposite hip.
 - Comparative ROM testing of the shoulder can help identify.
- Trendelenburg - typically the result of lumbar nerve root compression, low back pain, and/or a sacroiliac joint dysfunction. It can also result from nerve root or spinal cord compression anywhere along the spine, but commonly comes from atlas subluxation.
- *Movement through spine:*
 - As a person walks, there is a rotational scoliosis created in the spine. This serpentine movement should be smooth, flowing, and relatively equal regardless of what leg is in swing phase or stance phase.
 - Any blockage to spinal movement can lead to overuse of the extremities to compensate:
 - Leads to chronic injuries to shoulders, hips, knees and the foot/ankle complex.
 - Treating the “spot that hurts” won’t address the problem when it emanates from the core or spine!
 - Identify where the blockage to movement occurs.
 - Mobilize, stretch or refer client out to correct.
 - There is also a correlation between the health of organs and glands, and the optimal functioning of muscles and joints (ref. Chek, 2004).
- *Arm swing:*
 - Arm swing should be symmetrical. Look for the following:
 - A. Carry Angle: Does one arm swing at a different angle than the other relative to the sagittal plane?
 - B. Shoulder height: The arms and shoulders should be relaxed.
 - C. Hands and pronation: how pronated is their arm? Compare both sides. If there is any tension in the medial rotators of the shoulder, it can cause over-pronation in the arm, which may mirror itself in the opposite hip-leg-foot complex.
- *Head Position:*
 - The head should maintain a horizontal gaze. The eyes should be level with the horizon. The head should remain stable
 - If the head is crooked, or moving too much, it usually indicates that the body can’t compensate effectively for a challenge either in the cranial structures, eyes, vestibular system, upper cervical spine, or any unresolved problem lower in the kinetic chain.

Supportive Assessments To Identify Gait Dysfunction Etiology

Musculo-Skeletal Issues

A. General Movement Issues When On One Leg

Test using the Toe Touch Drill

Common Faults:

- Poor or nonexistent core recruitment.
- Unilateral, unresolved musculoskeletal pain.



- Medial rotational instability – commonly caused by weak external rotators and tight or facilitated internal hip rotators; typically a compensation for poor core control.
- Trendelenburg sign – commonly caused by nerve root compression and/or weak hip abductors and tight or facilitated hip adductors.
- One leg weaker than the other.
- Capsular patterns in hips or shoulders
- Sagittal plane dominance leading to pronounced weakness as one takes on frontal and transverse plane movement challenges.

B. Musculo-skeletal imbalances - Perform Length Tension Testing.

Common stretch tests and flexibility assessments can identify length tension issues. (See. Chek, *How to Eat, Move and Be Healthy!* or *The Golf Biomechanic's Manual* for stretch tests for common areas)

C. Poor Inner Unit Function - Test using Forward Flexion Activation assessment

Common Faults:

- No TVA activation – fingers do not move in or out
- Rectus abdominis activation – fingers move out



Other Physiological Issues

A. Use of lifestyle questionnaires can identify issues such as chronic gastrointestinal inflammation that can disrupt core control and function. (See. Chek, *How to Eat, Move and Be Healthy!* for simple lifestyle questionnaires)

B. Incorrect movement development as an infant
Can your client squat and lunge correctly?

- Squat Assessment
- Lunge Assessment
- Crawling Assessment



Socio-Environmental Issues

A. *Footwear* - Different cultures have different footwear. Those that go barefoot have generally got the best natural gait.

B. *Functional Hip Wag* - Vladimir Janda, MD, identified that when women go through puberty, they typically develop a hormonally driven *functional hip wag*. Usually lasts for 2-3 years. If the functional hop wag isn't outgrown, it can cause chronic low back and SIJ problems. Correcting it is typically an "awareness exercise", but using lines on knees and toe-touch drills helps!

KEY REFERENCES

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Presenter Contact Details

Carlsbad, CA 92010 USA

800.552.8789 or +1.760.477.2620 - Fax: +1.760.477.2630

www.chekinstitute.com info@chekinstitute.com

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