

Gait and Motion Analysis

What Is Gait and Motion Analysis?

Using innovative computer technology, motion analysis captures movements, muscle activity and forces that the eye can't see. Although people might have similar walking patterns, the way their muscles and joints work together can vary widely—gait and motion analysis helps to understand and recognize how orthopedic, neurological and muscular conditions can hinder motions that are critical to daily living.

Information from gait analysis—together with imaging scans, medical history and the results of other evaluations—helps your care team recommend the best treatments for a wide variety of conditions that disrupt movement.



Gillette operates one of the world's busiest and most respected clinical gait and motion analysis centers. The James R. Gage Center for Gait and Motion Analysis is known worldwide for expertise in diagnosing and planning treatments for people who have walking and movement disorders.

Watch Ava's experience with gait and motion analysis at Gillette Children's Specialty Healthcare to understand how the analysis can guide successful treatment.

Who Benefits From a Gait Analysis?

Kids who have complex conditions and injuries are often candidates for movement analysis. Your child might benefit from a gait assessment if they have:

- **Cerebral palsy.**
- **Brain injury** and related neurotrauma.
- **Complex movement disorders.**
- Conditions that cause toe-walking.

- Hand and upper extremity movement problems.
- **Limb-length discrepancy and limb differences.**
- Misaligned bones and foot abnormalities.
- **Spina bifida.**
- Other neurological or orthopedic conditions.
- Amputations.

Motion Analysis for Upper Extremities

Although motion analysis is primarily used to understand walking problems, the technology at Gillette can document movement and muscle activity of the arms and hands.

Motion Analysis for Teens and Adults

Kids who experience difficulty with movement often need ongoing evaluation and treatment as they transition into teens and adults. If you are a teen or an adult, you might have motion analysis for the first time because your condition has begun causing pain and stiffness with age. At Gillette, you'll get health care tailored to your specific needs.

What to Expect

Gait and motion analysis is done by a team of specialists in a gait lab that is equipped with advanced video, motion capture and other monitoring equipment. A typical visit lasts about three hours and involves several steps.

Video

First, your child walks across the room while being videotaped from two angles. This visual record helps providers understand walking difficulties and provides a reference point for measuring treatment outcomes.



Physical Exam

A physical therapist assesses your child's strength, range of motion, bony alignment, levels of spasticity and motor control. These measurements provide important information when analyzing the gait data in order to plan treatments and help measure the effectiveness of treatment.



Equipment and Motion Analysis

Before motion capture and muscle monitoring begin, a physical therapist applies small reflective balls and sensors to your child's body. Special cameras track the movement of the reflectors as your child walks through the gait lab—recording when muscles are active and at rest. Instruments in the floor measure the force produced by the

muscles at the joints as your child walks.



Plantar Pressure Testing

Your child walks across a special mat that senses the pattern and distribution of pressure under the feet. This data helps to highlight patterns, forces, and pressures that cameras can't capture. **See an example image from plantar pressure testing.**



Oxygen Consumption Test

Your child wears a mask that covers the nose and mouth to help measure how much energy is required to walk.

While wearing the mask to measure the amount of oxygen inhaled and carbon dioxide exhaled, your child first sits for a rest period of 10 minutes, and then walks for a period of six minutes.

For the walking portion, a technician or engineer pushes a cart with the monitoring equipment behind your child.



Analyzing the Data

Once your child has completed the activities of the gait and motion analysis, an engineer or technician processes the data and creates a series of graphs showing movements, muscle activity, force production and energy use—**see example graphs**. A physical therapist analyzes this information and then discusses it with an orthopedic surgeon.

Next, the physical therapist and surgeon generate a list of problems and potential treatments—and share the information with your specialty physician. Your family meets with your specialty physician (usually within four weeks of the analysis) to discuss the results.

Get a glimpse into how motion analysis guides clinical decision-making and is incorporated into patient care.

- **[Gait and Motion Analysis for Treatment Planning and Outcomes Assessment \(FlipBook\)](#)**
- **[Gait and Motion Analysis for Treatment Planning and Outcomes Assessment \(PDF\)](#)**

We reviewed outcomes for patients who were evaluated in the James R. Gage Center for Gait and Motion Analysis during a 39-month period, and our assessment produced the following insights:

- Gait analysis is a valuable tool for diagnosis and treatment planning.
- Data-guided diagnoses and treatment planning resulted in better outcomes for patients.

- Patients and their families reported that treatment was worth any challenges they encountered and their expectations were met.

Follow-up Evaluation

After a period of time your child might be asked to come back for follow-up testing. Repeated analyses can help determine whether your child has changed after treatment or with time.

Preparing for Your Visit

Review helpful guidelines to [prepare for a visit at Gillette](#).

Complete Paperwork and Mail Ahead of Time

Functional Assessment Questionnaires

Please return by mail prior to your appointment date if possible.

- For first-time visitors—[English \(PDF\)](#), [Spanish \(PDF\)](#)
- For returning patients—[English \(PDF\)](#), [Spanish \(PDF\)](#)

Pediatric/Adolescent Outcomes Questionnaires

Please return by mail prior to your appointment date if possible.

- For patients ages 2 to 10—[English \(PDF\)](#), [Spanish \(PDF\)](#)
- For patients ages 11 to 18—[English \(PDF\)](#), [Spanish \(PDF\)](#)

Mail completed forms to:

Center for Gait and Motion Analysis – Pamela Ciresi
Gillette Children's Specialty Healthcare
200 University Ave. E.
St. Paul MN 55101-2507

What to Bring

- Loose fitting shorts with an elastic waist, girls should bring along tank tops.
- Braces and walking aids (such as crutches, walkers or canes), if applicable.
- Shoes used for walking with and without braces.
- Camera (optional).
- Familiar toys or books (optional).

- Completed functional assessment questionnaire, if you haven't mailed it in advance.
- Completed pediatric or adolescent outcomes questionnaire, if you haven't mailed it in advance.

Consenting to Observation

Gillette is a teaching facility, and we often have requests from visitors to observe gait analysis testing. We always ask permission before any visitors are allowed to be present during gait analysis testing. If you know in advance that you or your child would not be comfortable with observers, please let us know so that we can plan visitors for different times.

Discover how research benefits [ongoing gait and motion analysis studies](#) at Gillette.

Arrival and Check-In

Please arrive 30 minutes before your scheduled appointment. Check in at the fourth floor registration desk, where you'll be directed to the James R. Gage Center for Gait and Motion Analysis. Be sure to ask to get your ramp ticket stamped for reduced parking.

For directions and parking information, visit [Directions and Locations](#).

Integrated Care

At Gillette, you'll work with an expert team that includes technicians, engineers, therapists and surgeons who are experts in the study of human movement.



Back row (L to R): Sue Sohrweide, Mary Trost, Jean Stout, Tom Novacheck, Pam Ciresi, Adam Rozumalski, Rocio Riveros-Charry, Roy Wervev, Brian Chen and Tou Kong.

Front row (L to R): Liz Boyer, Andrew Georgiadis, Katie Walt, Michael Schwartz, Andy Riesand Torey Tilahune.

Your team of specialists will develop an integrated care plan and help you navigate the services you need, which might include:

- **Assistive technology.**
- **Neurosurgery.**
- **Orthopedics.**
- **Physical therapy.**
- **Rehabilitation medicine.**
- **Spasticity evaluation.**

Locations



St. Paul Campus

Make An Appointment **651-290-8707** Refer a Patient **651-325-2200**

This information is for educational purposes only. It is not intended to replace the advice of your health care providers. If you have any questions, talk with your doctor or others on your health care team.

If you are a Gillette patient with urgent questions or concerns, please contact Telehealth Nursing at **651-229-3890**.