



What Is Gait Analysis?

The Gait and Motion Analysis Laboratory uses state-of-the-art computer technology to capture a 3-D image of a child's walk. Electrodes and reflective markers that are placed on the child measure muscle activity and track motion of body segments. Foot pressure and energy use are also measured. This data, along with a physical examination, can help the team identify specific ways to help improve the child's ability to walk, step and run.

Our gait lab is one of just 10 in the country with full accreditation and one of just two in the region based in a pediatric hospital. As an accredited lab, we have demonstrated the highest level of clinical and technical excellence in movement analysis. We can, therefore, offer our patients the best care possible when evaluating gait and motion challenges and help them reach their full potential.

Who Can Benefit From Gait Analysis?

In general, there are two groups that most commonly benefit from gait analysis.

- Many children with cerebral palsy (CP), spina bifida and other neuromuscular conditions have difficulty walking. Their gait, which includes walking, stepping or running, can be unsteady or awkward resulting in falls or even injuries. As children grow, gait problems can become worse due to changes in the bone or severe muscle tightening. When left untreated, gait problems can lead to pain, fatigue, weakness and/or loss of walking ability. Therefore, children with these conditions may benefit from gait analysis.
- Children for whom surgery is an option will be referred for a gait analysis three to six months *before surgery to examine the possible causes of their walking problems.* Usually, four to six weeks after the testing, the surgeon will share the gait analysis results with the family and explain how this information will guide the surgical plan for the child.

Frequently Asked Questions About Gait Analysis (continued)

How is an appointment scheduled with the Gait and Motion Analysis Laboratory?

- Call (302) 651-4248 to make an appointment.
- Stop by the Gait and Motion Analysis Laboratory located on the ground floor of the hospital.

Does insurance cover the cost of gait lab visits and testing?

- There is no billing for videotaping a child's gait and StepWatch tracking because these are considered part of the child's orthopedic care.
- If the orthopedic surgeon requires a complete gait analysis prior to surgery, it may be covered by insurance, but this varies by provider. It is important to check with your insurance provider.
- The postsurgery gait analysis also may be covered by insurance. It is important to check with your insurance provider.



The Gait and Motion Analysis Laboratory

Nemours/Alfred I. duPont Hospital for Children is ranked by *U.S. News & World Report* as one of the best children's hospitals in the nation for pediatric orthopedics.



Nemours. Alfred I. duPont
Hospital for Children

1600 Rockland Road, Wilmington, DE 19803

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Nemours.org/gaitlab

Nemours. Alfred I. duPont
Hospital for Children



The Gait Analysis Team

The collection and interpretation of motion analysis data is a team effort. There are three types of health care providers involved:

- **physical therapist** – supervises and guides the child through all of the testing procedures and helps educate the family
- **biomechanist** – runs the computer technology, collects the data and processes it for the report
- **orthopedic surgeon** – leads the team in understanding the data and making treatment recommendations

Available Tests

Gait analysis may involve a variety of testing procedures. Age, diagnosis, level of functional independence and ability to follow directions are all considered by the team when determining which testing procedures should be used. Below are some of the available tests.

Standard Video

- Different walking conditions are videotaped as a baseline for comparison over time.



Physical Examination

Performed by our physical therapist and includes measures of:

- joint range of motion and muscle strength
- muscle tone and motor control
- motor coordination and balance

Foot Pressure Mapping

- A pressure sensitive mat records the amount and location of pressure along the sole of the foot as the child walks over the mat.

Three-Dimensional (3D) Kinematic Assessment

- Eight high-speed digital cameras record the three-dimensional movement of the child's trunk, arms and lower body.
- Data is shown in graph form to represent the range of motion that the child has when they walk.
- Sometimes, special markers are used to look more closely at foot and finger movements.

Kinetic Assessment

- Force plates in the testing space measure the foot's interaction with the ground, how these forces affect joints in the legs and how the child generates energy for walking.

Diagnostic Electromyography

- Electrodes are placed on the skin to collect muscle activity data.
- This data is synchronized with the movement data so that the muscle coordination patterns can be analyzed for each phase of gait.
- The use of fine-wire electrodes that are inserted with a needle is not routine and is done only when requested by the referring physician.

Metabolic Analysis

- A small breathing mask is worn to measure the volume and percentage of oxygen.
- Along with heart rate and breathing rate, this information helps to determine the energy used and the overall efficiency of the child's gait.

Physical Activity Monitoring

- A portable activity tracker called a StepWatch can be sent home with the child to record how much walking the child does over the course of a week. This information is very useful for children who are recovering from surgery.

Frequently Asked Questions About Gait Analysis

What is the recommended gait lab appointment schedule for children with walking problems who do not need surgery?

To establish a video baseline and a record of gait changes, a child should be seen by the gait lab:

- within six months of when the child starts walking or when the child is first seen by the orthopedic surgeon if he or she is already walking
- at minimum every year for repeat video analysis during the child's early development

What is the recommended gait lab appointment schedule for children who require surgery?

- three to nine months before surgery (This helps plan the specifics of surgery.)
- three, nine and 12 months after surgery to monitor recovery of walking function
- one to two years after surgery for a full examination to evaluate if goals of surgery were met

In general, how long is each gait appointment?

The length of each appointment will vary:

- 15 minutes for a video
- two to three hours for a complete gait analysis

Is a referral needed for a gait lab appointment?

- A referral from a physician is needed for each gait lab appointment.