The Gait Analysis Laboratory

"Nemours is one of the nation’s leading pediatric health systems, dedicated to advancing higher standards in children’s health.

The impact of gait analysis has changed how children with walking difficulties are diagnosed and treated. Gait Analysis has allowed us to be much more specific about surgery and the surgery we’re doing has more predictable results."

Freeman Miller, MD
Orthopedic Surgeon
Medical Director of Gait Analysis Laboratory

The promise of achieving higher standards in children’s health.


The Nemours/Alfred I. duPont Hospital for Children offers a treatment philosophy and level of care and comfort that sets the standard for children’s health care. Nestled among beautifully landscaped gardens, lush lawns, sunlight and fresh air, the 200-bed teaching hospital offers pediatric specialty care in a patient- and family-centered environment.

84 pediatric specialists from the duPont Hospital for Children are among the 146 Nemours physicians named Best Doctors in America® 2009-2010.

To schedule an appointment with the Gait Lab, please call 302-651-4248
Nemours.org/gaitlab

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Metabolic Analysis: A small breathing mask is worn to measure the volume and percentage of oxygen and carbon dioxide in the child's expired air. Along with heart rate and respiratory rate, this information suggests the energy expenditure and overall efficiency of the child's gait.

Who Should Be Referred For An Appointment

The present focus of the clinical gait laboratory is on detailed assessment of children with neurological disorders. Appropriate referrals include children with cerebral palsy, myelomeningocele, other neuromuscular conditions that cause significant impediment to gait, and when a major change in treatment is being considered (e.g. surgery, therapy, orthotics). The child must be cooperative in all modes of testing for a valid evaluation to be conducted.

The data collection should take two hours. After motion data is processed, it is combined with the physical examination and interpreted by the team. The final report will be available to the referring physician within five to six weeks. It is therefore imperative that the gait analysis be requested and scheduled with adequate time before any intervention is scheduled.

New referrals may be made for children up to age of 18 by calling 302-651-4248.

Available Tests

The gait analysis may involve a variety of testing procedures. The referring physician, orthopedic surgeon, physical therapist and other members of the team consult to decide which tests are appropriate for each child. Age, diagnosis, level of functional independence and ability to cooperate for structured testing are all considered in the testing decisions.

Standard Video: A variety of walking conditions are videotaped for a permanent visual record of changes in the child's gait pattern.

Physical Examination: Detailed physical examination performed by a physical therapist includes measurement of joint range of motion, strength, muscle tone and motor control. Functional ability is also evaluated using standardized objective measures.

Three-dimensional kinematic assessment: Eight high-speed digital cameras simultaneously record the movement of the trunk and extremities as the child walks. These views are sent directly to a computer to construct a three-dimensional model that is utilized to calculate joint motion in each of the three planes. Data is represented in graphic form along with normative data to illustrate the range of motion during the child's gait. In some instances, specialized marker sets are utilized to more closely examine foot or upper extremity anomalies.

Kinetic Assessment: Force plates in the testing space measure the foot's interaction with the ground. Three-dimensional force and torque generated by each foot strike are measured and used along with the kinematic data to determine how forces affect joints in the legs and to calculate how the child generates power for walking.

Diagnostic Electromyography: Surface electrodes are applied to the skin to collect muscle activity data. This data is synchronized with the kinematic data so that the muscle activity 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.

What is Gait Analysis?

Created in 1993, our Gait and Motion Analysis Lab was among the first of its kind. We're proud of the many breakthrough techniques it has provided the medical community, and the way it allows us to better serve children with orthopedic disorders.

If your child has cerebral palsy, spina bifida, or another neuromuscular condition, he or she may benefit from a visit to our lab at the Nemours/Alfred I. duPont Hospital for Children.

We’ll use a computer to capture a 3-D model of your child’s walk so that our team – a pediatric orthopedic surgeon, a biomechanist (a mechanical engineer specially trained to apply the laws of mechanics and physics to the human body), and a physical therapist – can better understand his or her needs and make the best possible recommendations for treatment.

The Gait Analysis Team

The collection and interpretation of motion analysis data is a team effort. The administrative assistant schedules appointments, and works with families regarding insurance, reports, emergencies, and general questions. The physical therapist supervises the child throughout the gait analysis, assists with the interpretation of the results and can also help educate the family regarding possible recommendations. The biomechanist runs the hardware and software necessary for data collection, processes the data to generate graphics for the final report and maintains the wide array of technical equipment in the laboratory. The pediatric orthopedic surgeon leads the team in interpreting the test results and recommending treatment.

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