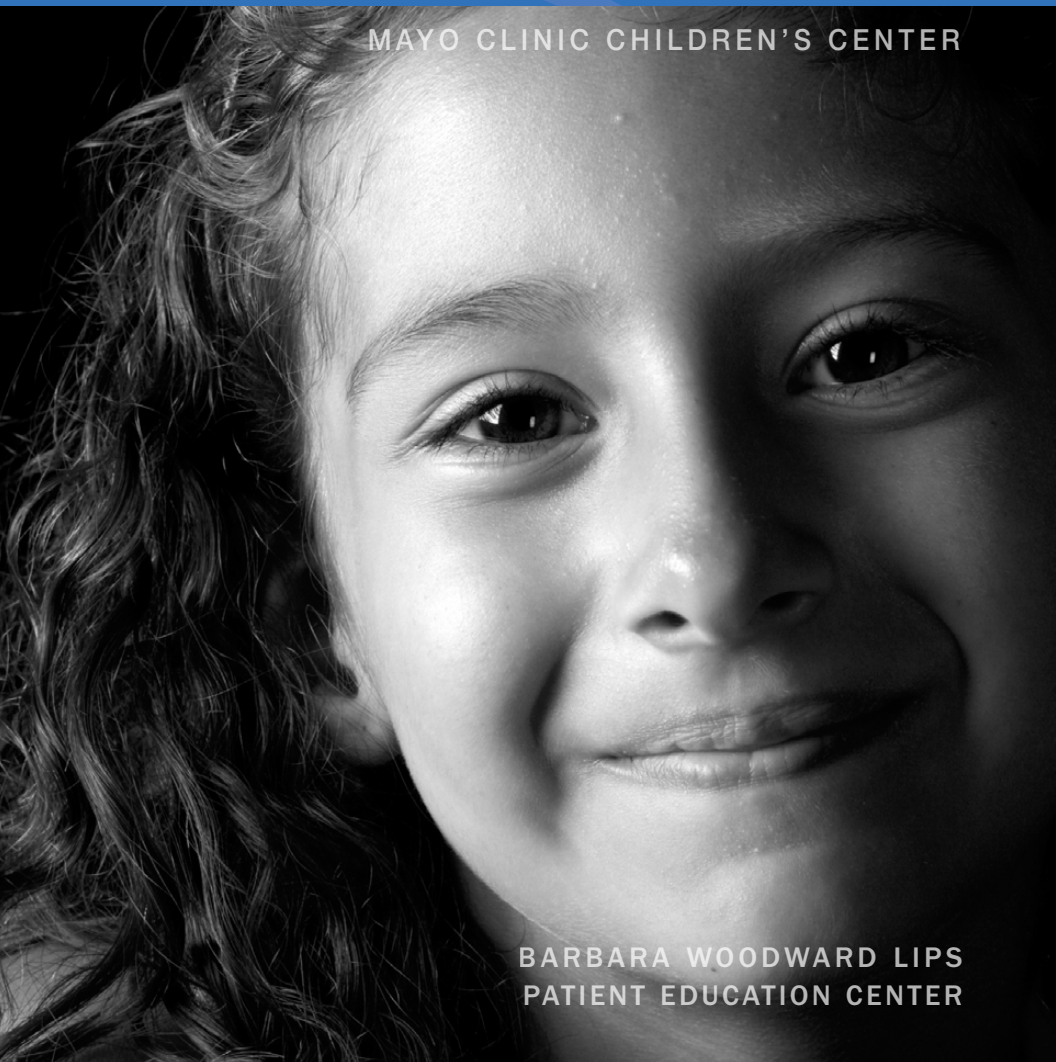




PATIENT EDUCATION

Your Child's Motion Analysis Test

MAYO CLINIC CHILDREN'S CENTER



BARBARA WOODWARD LIPS
PATIENT EDUCATION CENTER

Mayo Clinic Children's Center

For more than 100 years, teams of physicians have cared for children at Mayo Clinic.

T. DENNY SANFORD PEDIATRIC CENTER MAYO EUGENIO LITTA CHILDREN'S HOSPITAL

Pediatric Sub-Specialties in the following areas:

Allergy, Immunology and Pulmonology	Neurology
Anesthesiology	Neuropsychology
Cardiology	Neurosurgery
Cardiovascular Surgery	Ophthalmology
Community Pediatrics & Adolescent Medicine	Orthopedic Surgery
Critical Care	Otorhinolaryngology
Dental	Pain and Palliative Care Consulting Service (Inpatient)
Dermatology	Physical Medicine and Rehabilitation
Developmental and Behavioral Pediatrics	Plastic and Reconstructive Surgery
Emergency Medicine (Emergency Dept.)	Psychiatry & Psychology
Endocrinology and Metabolism	Pulmonology (see Allergy, Immunology & Pulmonology)
Gastroenterology and Hepatology	Radiation Oncology
General Medicine	Radiology
Genetics (Medical)	Rheumatology
Gynecology	Speech Pathology
Hematology and Oncology	Surgery (Pediatric)
Immunology (see Allergy, Immunology & Pulmonology)	Transplant
Infectious Diseases	Urology
Neonatology (Neonatal ICU)	
Nephrology	

Pediatric Specialty Clinics:

Cerebral Palsy/Spina Bifida Clinic	Inflammatory Bowel Disease Clinic
Chemotherapy/Radiation Long-Term Effects Clinic	Immunodeficiency Disorders Clinic
Child Advocacy/Child Abuse	Long QT Syndrome Clinic
Congenital Heart Clinic	Neuromuscular Clinic
Craniofacial Clinic	Pain Rehabilitation Center (3-wk outpatient)
Cystic Fibrosis Clinic	Pain Clinic (Outpatient consult)
Diabetes Clinic	Sleep Medicine Center
Epilepsy Clinic (Intractable)	Spinal Deformities Clinic
Hemophilia/Coagulopathy Clinic	Sports Medicine Center
	Travel Clinic

How Motion Analysis Can Help Your Child

The ability to move requires little conscious effort for most people. Though often taken for granted, achieving movement is a complicated process involving precise coordination of the brain, muscles and nerves.

If your child has muscle, joint and nerve problems, such as those caused by cerebral palsy, movement disorders or traumatic injuries, he or she may have difficulty coordinating movement. Motion analysis can help your child's health care provider to:

- Find the muscles or joints that are not working right.
- Recommend treatment to improve physical abilities so that your child can have the greatest level of independence.

This information is about testing in the Motion Analysis Laboratory at Mayo Clinic. Use it to help you and your child understand what usually happens during a motion analysis test, the activities involved in the assessment, and the team of professionals who guide the test. While most motion analysis tests are done to study how your child walks, this test can be used to study any kind of movement.

Motion Analysis Test

Overview

Motion analysis is the study of human movement. You may also hear a motion analysis test called a gait study.

The motion analysis team includes physicians, physical therapists, engineers and support staff. The team also includes a special type of provider called a kinesiologist, who, like the other members of the team, is an expert in human movement. Using advanced computers during a motion analysis test, the team collects information about:

- How your child moves.
- The activity of his or her muscles.
- The forces your child's body uses to move.

You and your child, however, are the most important members of this team. Be sure both of you understand how the test works, what happens during the test and how the information is used. Ask questions at any time and encourage your child to do the same.

Preparing for Motion Analysis

You are given information about how your child should prepare before you both arrive for the appointment. Please read the information as soon as you receive it and follow the instructions carefully. Contact your child's health care provider if you have questions.

It usually takes about three hours to complete the test.

What to Expect During the Test

When you arrive for the appointment, your child is asked to change into shorts and a tank top that is given to him or her. Your child can change in a private dressing room nearby.

The Motion Analysis Laboratory is a large, blue room that has innovative equipment including computers, video cameras and other monitoring devices. Before testing begins, a physical therapist explains what happens during motion analysis. You can stay in the Motion Analysis Lab with your child during all parts of the testing.

Physical exam

A typical visit begins with a physical examination. A physical therapist and kinesiologist work together to assess your child's flexibility, strength and muscle spasticity or stiffness.



Figure 1. Getting a physical exam

Attaching reflective markers

The therapist attaches special reflective markers that are used to collect information during the motion analysis test (Figure 2). The markers are taped to specific places on your child's body. The markers look like small balls attached to a small, round base. The therapist uses double-sided tape to attach them. It does not hurt to attach them. These markers are recorded by special computerized cameras positioned around the lab.



Figure 2. Attaching the reflective markers

Electromyography (EMG)

During the test, additional sensors may be taped to your child's muscles to detect when the muscles are active. This is called electromyography (EMG). EMG records the timing of muscle activity occurring while moving. Information collected shows when the muscles are working and the timing of the muscle activity during movement. These sensors connect to a special backpack that collects the information.



Figure 3. An EMG surface sensor is taped over a muscle. Most kids only need surface sensors. If your child's care team needs to collect information about muscles far below the skin, they may use a fine wire sensor. This is a hair-sized wire, placed in the muscle using a small needle. Your child may feel a brief moment of discomfort, similar to receiving an injection, when the needle is inserted.

Motion analysis

With the markers attached, your child is asked to walk across the floor several times. The laboratory floor has special sensors built in to measure the forces made by movement. While your child walks, the cameras and sensors record information about movement patterns.



Figure 4. Walking across the lab floor

Your child is also asked to use any devices he or she has – such as leg braces, walkers or crutches – and walk using these devices to help evaluate how they help your child.

Your child may be asked to make other movements to help your team further understand your child's unique condition. Feel free to ask any questions.

When you are done with the test, you can ask a team member to show you and your child how movements look on a video monitor. Your child may be surprised to see him or herself as a stick figure!

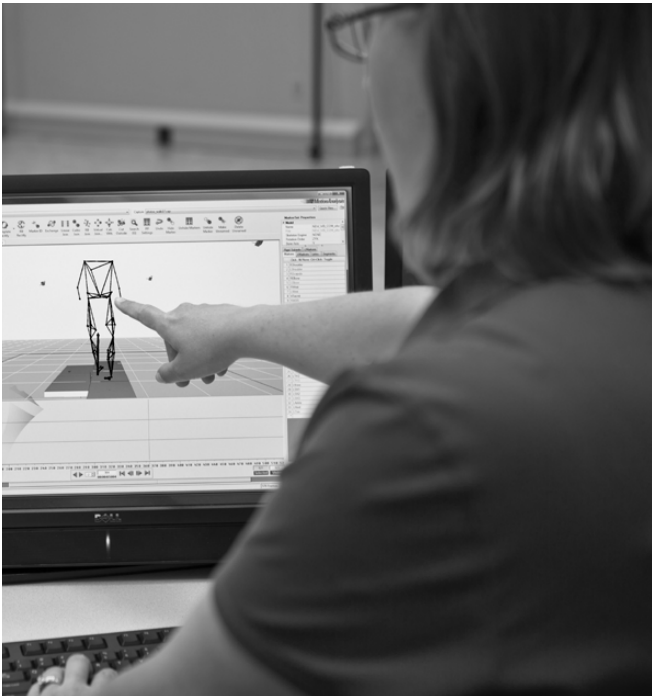


Figure 5. How movement looks on a screen

After your child's team has collected all the data, a team member removes the reflective markers and EMG sensors. Pulling them off feels like when you pull off a Band-Aid™. Then your child can get dressed and both of you can leave.

Studying the Data

After the test, the Motion Analysis Laboratory team evaluates the data. The team meets with your child's health care provider to help develop a list of treatment options.

Your child's health care provider will discuss treatment options and make a plan with you and your family at the next appointment.

Follow-Up

Your child's health care provider may recommend that you return to the Motion Analysis Laboratory after treatment. This is done so the provider can see how well treatment worked and to see whether additional treatment is needed.

Contacting your child's health care provider

If you have questions about this information, call Mayo Clinic and ask to talk with a member of your health care team.

Rochester, Minn.
507-284-2511

Notes

BARBARA WOODWARD LIPS PATIENT EDUCATION CENTER

Mrs. Lips, a resident of San Antonio, Texas, was a loyal Mayo Clinic patient of more than 40 years and a self-made business leader who significantly expanded her family's activities in oil, gas and ranching. Upon her death in 1995, Mrs. Lips paid the ultimate compliment by leaving her entire estate to Mayo Clinic. By naming the Barbara Woodward Lips Patient Education Center, Mayo honors her generosity, her love of learning, her belief in patient empowerment and her dedication to high-quality care.

This material is for your education and information only. This content does not replace medical advice, diagnosis or treatment. New medical research may change this information. If you have questions about a medical condition, always talk with your health care provider.

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