



PATIENT EDUCATION
Your Motion Analysis Test

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BARBARA WOODWARD LIPS
PATIENT EDUCATION CENTER

How Motion Analysis Can Help

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 you have muscle, joint and nerve problems, such as cerebral palsy, movement disorders or traumatic injuries, you may have difficulty coordinating movement. Motion analysis can help your health care provider to:

- Find the muscles or joints that are not working right.
- Recommend treatment to improve your physical abilities and provide the greatest level of independence.

This information is about testing in the Motion Analysis Laboratory at Mayo Clinic. Use it to help you understand what usually happens during a motion analysis test, the activities involved in the assessment, and the team of professionals who will guide the test. While most motion analysis tests are done to study walking, these tests 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 motion analysis called a gait study.

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

- How you move.
- The activity of your muscles.
- The forces your body uses to help you move.

You, however, are the most important member of this team. Be sure you understand how the test works, what happens during the test and how the information will be used. Ask questions at any time.

Preparing for Motion Analysis

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

It usually takes about three hours to complete the test.

What to Expect During the Test

Someone can come with you to the test and stay in the lab, however, do not bring small children since there will be no one to supervise them while you are busy.

When you arrive for your appointment, you are asked to change into shorts and a tank top that are given to you. You 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.

Physical exam

A typical visit begins with a physical examination. A physical therapist and kinesiologist work together to assess your 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 your motion analysis test. These markers are taped to specific places on your body (Figure 2). 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 used to detect when your muscles are active. This is called electromyography (EMG). EMG records the timing of muscle activity occurring as you move. Information collected shows when the muscles are working and the timing of the muscle activity during movement. These sensors connect to a backpack that collects the information.

Two kinds of sensors are used for EMG: surface and fine wire. Most people only need the surface sensors.

Surface sensors — These sensors, taped to your skin, provide information about the large muscles that are just below the skin's surface (Figure 3).

Fine wire sensors — Hair-sized sensor wires, placed in your muscles using a small needle, provide information about the muscles far below the skin. You may feel brief discomfort, similar to receiving an injection, when the needle is inserted.



Figure 3. EMG surface sensor

Motion analysis

With the reflective markers and EMG sensors attached, you are asked to walk across the floor several times (Figure 4). The laboratory floor has special sensors built in to measure the forces made by your movement. While you walk, the cameras and sensors record information about your movement patterns.

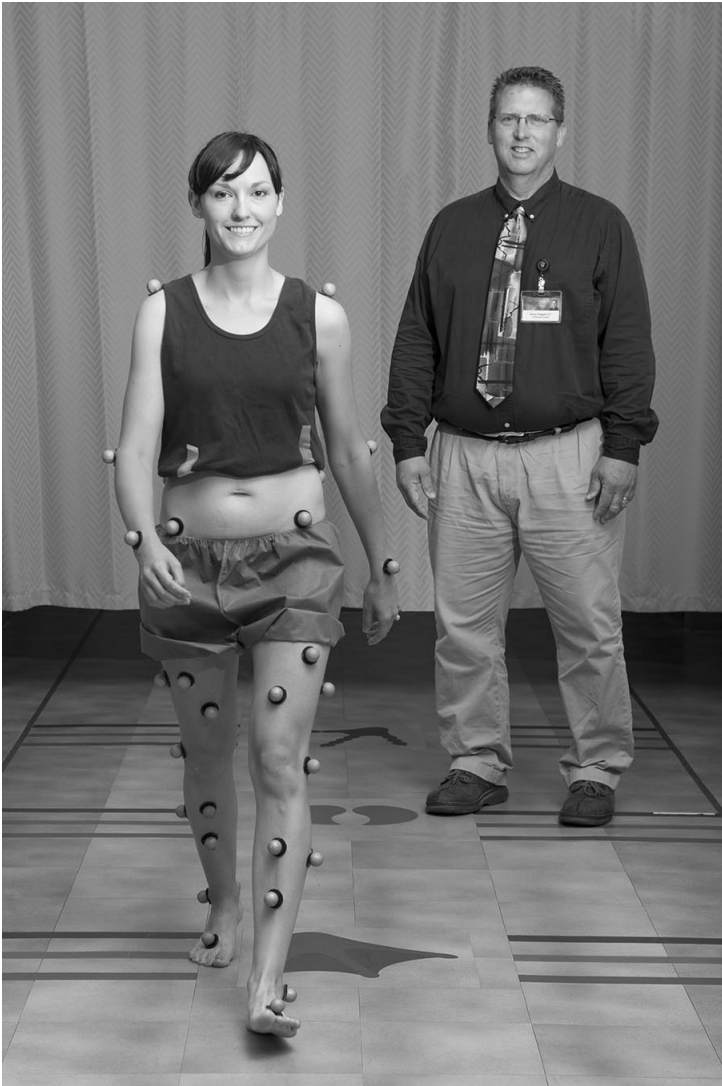


Figure 4. Walking across the lab floor

You are asked to use any devices you have, such as leg braces, walkers or crutches, and walk using these devices to help evaluate how they help you.

You may be asked to make other movements to help your health care provider further understand your unique condition. Make sure you understand what the therapist is asking you to do. Feel free to ask any questions.

When you are done, you can ask a team member to show you how your movement looks on a video monitor (Figure 5). You may be surprised to see yourself as a stick figure!

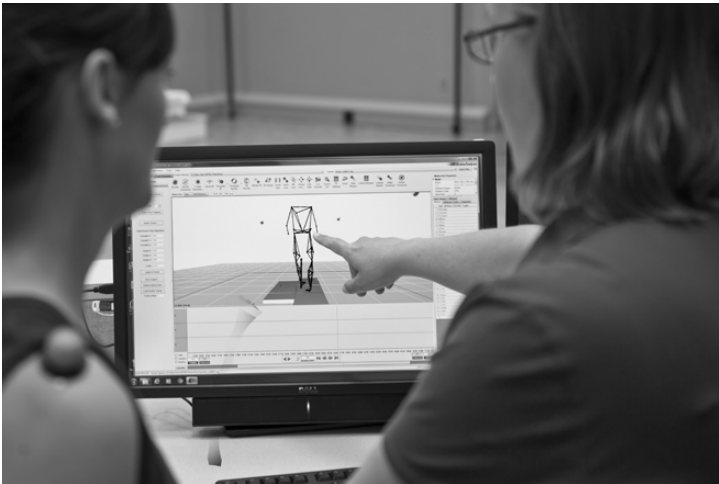


Figure 5. How your movement looks on a screen

After your 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 you can get dressed and leave.

Studying the Data

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

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

Follow-Up

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

Contacting your 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.

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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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