What Is Motion Analysis?

Motion analysis is a state of the art measuring technique that allows detailed evaluation of human movement. It shows how each joint moves, the timing and coordination of muscle activity, and the forces that affect movement. When used with people who have difficulty walking, motion analysis helps to identify specific reasons why the person has difficulty, and can lead to effective treatments.

What Does It Measure?

Walking is a highly complex process involving many body systems working together. When working properly, these systems combine to produce the most efficient walking pattern. For many people, disorders of the brain, spinal cord, bones, joints, and/or muscles prevent normal movement. As a result, distinct changes can develop in a person’s walking pattern which seriously decrease the speed and efficiency of movement.

The Motion Analysis Laboratory at Munroe-Meyer Institute combines innovative computer technology with the expertise of specially trained healthcare professionals, and allows precise measurement and thoughtful analysis of walking difficulties. Based on a person’s unique findings, specific recommendations can be made that can improve the person’s ability to walk. These recommendations may include surgical procedures, physical therapy, braces, medications, and/or assistive devices such as walkers or crutches.

Motion analysis can benefit many people who have cerebral palsy, spina bifida, muscular dystrophy, leg length discrepancy, or other conditions that affect the nervous system, bones, joints, or muscles.

How Does It Work?

Reflective balls are attached to many specific places on the body. As the person walks, special cameras measure the three-dimensional location of the reflective balls. Specialized computer software is used to analyze information from the cameras and to produce a three dimensional image of the person walking.

Muscle sensors or 'electrodes' are taped to the skin, to measure the electrical activity that muscles produce as they are working. In special situations when signals from key muscles cannot be obtained through the skin, an alternative method is available (fine wire electromyography). The electrodes are connected to a transmitter worn around the person’s waist, that sends these signals to the computer.

The forces a body produces while walking are measured through special plates built into the floor along the walking path.

The computer software combines and synchronizes information from the cameras, the muscle sensors, and the force plates to produce a series of graphs for comparison and analysis.

Data collected during motion analysis is always collected during barefoot walking, if possible. Sometimes, data is measured with and without braces or with different assistive devices such as walkers or crutches for comparison.

How Is the Information Used?

The information gathered from motion analysis is provided in a series of graphs showing movement, muscle activity, and force production. The graphs are compared with data from the walking cycles of individuals without walking difficulties and/or with information collected during previous visits.

The Motion Analysis Lab’s physician and physical therapist analyze the graphs. Together, they identify areas for improvement and recommend treatment options specific to each individual.

Each client’s Motion Analysis Lab Evaluation Report is sent to the client and to the referring doctor. Follow up then occurs between the client and the referring doctor.
What Happens in the Lab?

Everyone who is seen in the Motion Analysis Lab has been referred by their doctor. Each person attends one appointment that takes about three hours. The analysis typically includes the following components:

- Range of motion and strength assessment
- Videotape of the person walking
- Computer measurement of movement, muscle activity and force production during walking

Motion Analysis Lab staff members who are directly involved with patients include a physical therapist and a computer technician. The physical therapist performs an evaluation of the person’s range of motion and strength. Then they attach reflective balls and muscle sensors to the individual for the motion analysis and make sure the proper information is being collected. The technician operates the computer and video equipment while the measurements are being collected and stored. The technician also produces a series of graphs from the data collected for review and interpretation. Together, the physician and physical therapist interpret the results and develop recommendations.

How to Reach Us:

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Motion Analysis Laboratory

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