Showmotion

Transforming the way human

movements are evaluated and measured

Show Motion™ is a revolutionary tool that provides a comprehensive analysis to monitor motion patterns and related muscle activity.

Through the use of inertial platforms and validated protocols for upper and lower limbs, Show Motion™ is the perfect tool for measure, record, segment, compare and report movements and provide a visual representation of the variables involved, highlighting underlying information and permitting an in depth analysis of the movement in real time.

Functions

With **Show Motion™** you are able to:
-   Quantify the evolution of the treatment over time
-   Correlate results to expected outcomes
-   Identify alterations in movement
-   Identify compensatory strategies
-   Provide biofeedback input to understand and teach correct movements
-   Objectively understand the effectiveness of the treatment
-   Evaluate and compare treatment outcome

How it works?

Functional analysis is simple and totally guided, no expertise is required.

Wear the sensors …   Start the session …   Now move !

Place the sensors - move to perform a short calibration - the evaluation begins
The data is transmitted, analyzed and saved - completing the session all in 10-15 minutes
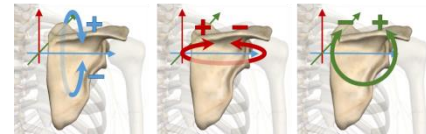
Upper Limb and Scapula Kinematics

Show Motion's validated protocols make it possible to understand the kinematics of the scapula. Specifically it identifies how the scapula moves relative to the humerus.
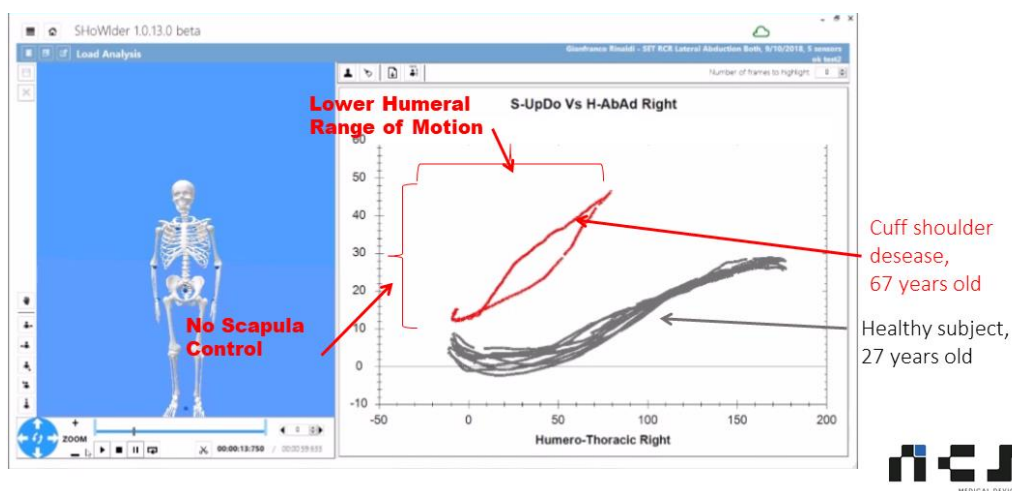
It is possible to determine and describe important scapular variables, that have been difficult to measure until now, such as:

- the anterior/posterior tilt
- upward/downward rotations
- protraction/retraction

Show Motion™ makes possible to measure and quantify scapular dyskinesias. The application of inter/intra operator have reported a RMSE < 4°, showing a strong reproducibility and effectiveness* .

This chart shows the upward and downward kinematics of the scapula during the abduction of the shoulder in a healthy subject (gray) and in a patient with a rotator cuff disease (red). Note in the pathological patient the altered kinematics including lower mobility of the humerus and the total absence of control of the scapula

Show Motion™ was developed according to the ISEO protocol (INAIL Shoulder and Elbow Outpatient) for the monitoring of the upper limb. Following is a list of a few publications that use ISEO protocol:

- A.G Cutti; *Ambulatory measurement of shoulder and elbow kinematics through inertial and magnetic sensor*; Med Bio Eng Comput; 46: 169-178; 2008
- A. Pellegrini; *Motion analysis assessment of alterations in the scapulo-humeral rhythm after throwing in baseball pitchers*; Musculoskelet Surg; 97: S9-S13; 2013
- A.G. Cutti et al; *Prediction bands and intervals for the scapulo-humeral coordination based on the Bootstrap and two Gaussian methods;* Journal of Biomechanics; 47(5):1035-1044*;* 2014
- *Effects of scapula calibration in sensor-based and marker-based protocol*; GNB 2018, June 25th-27nd 2018, Milan, Italy
- Parel et al; Ambulatory measurement of the scapulohumeral rhythm: Intra- and inter- operator agreement of a protocol based on inertial and magnetic sensors; Gait & Posture; 35(4):636-640; 2012*

Lower Limb and Gait analysis

A clinical gait analysis provides quantitative information that highlights and analyzes problems of posture, ambulation, load anomalies and muscular insufficiencies that cannot be measured by objective examination and video recording.
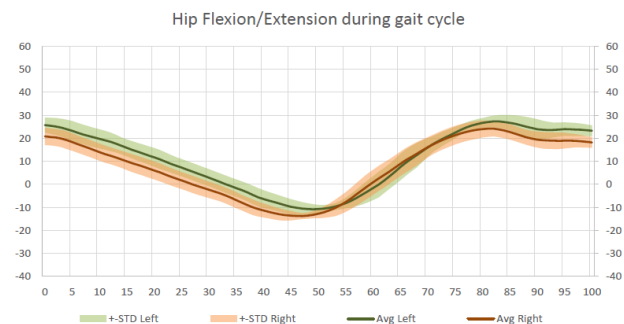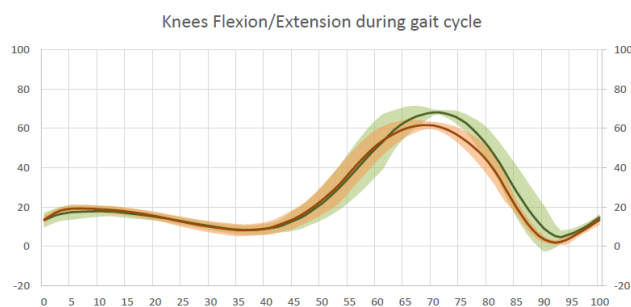
Show Motion™ performs this analysis using a validated scientific protocol.
Our proprietary algorithms will automate the segmentation of movements and identify the various phases in the exact instant in which the alteration occurs. In a few minutes, the therapist can identify variation of knee, hip and foot angles and at the same time providing:

- Time parameters and distance spaces such as: average stride, step, stance, swing, double support and single support time
- EMG signals, if integrated
- Balance variations

This report shows information that can be obtained through the execution of the "Time Up and Go" Test. The Software is able to detect differences that are most often difficult to see with the naked eye.

GAIT PARAMETERS

	Left	Right
Average Stride Time [s]	1.103	1.115
Average Step Time [s]	0.529	0.488
Average Stance Time [s]	0.603	0.610
Average Swing Time [s]	0.500	0.505
Average Double Support Time [s]	0.066	0.043
Average Single Support Time [s]	0.525	0.557
Knee Max Flex [°]	68.2	61.7
Knee Min Flex [°]	4.7	1.9
Hip Max Flex [°]	27.3	24.2
Hip Min Flex [°]	-10.9	-13.8

Knees Flexion/Extension during gait cycle

Hip Flexion/Extension during gait cycle

+-STD Left   +-STD Right   Avg Left   Avg Right

Show Motion™ has been implemented according to the OUTWALK protocol (used in Gait analysis). Below is a list of articles, that discuss the use of the Outwalk protocol:

- A. Ferrari et al; *Outwalk: A new protocol to measure the 3D kinematics of gait in real-life environment using an inertial & magnetic measurement system;* Gait & Posture; 30: S52-S53; 2009
- P. Garofalo et al; *Measure of the 3D gait kinematics in real-life environments through the Outwalk protocol: Development of the end-user clinical software*; Gait & Posture; 30: S132-S133; 2009
- A. Ferrari et al; *First in vivo assessment of ''Outwalk'': a novel protocol for clinical gait analysis based on inertial and magnetic sensors*; Med Biol Eng Comput; 48:1-15; 2010