gait diagnostics

optimising function

walk (wôk) **vi.** ME [walken ‹----OE *wealcan.* to roll, journey, akin to Ger *walken,* Frank* *walken* to full (cloth), stamp ‹----IE* wolg ‹----base* *wel-,* to turn, roll, ----›L *volvere,* to roll, Gr *eilyein,* to rollup, wrap] to go along or move about on foot at a moderate pace; sepcif., to move by placing one foot firmly before lifting either of the others, as four legged creatures do, to go about on foot for exercise of pleasure; hike vt. to tranverse, **n.** the act of walking, a route traversed by walking, to take a **walk, walk, walk, walk**

resonance podiatry

stepping forward

Lisa Whiteman Podiatry Group

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Welcome to our gait diagnostics evening; we appreciate your interest and support.

gait diagnostics is equipped with state of the art dynamic computer video equipment, the first of its kind in the country. Using a combination of video capture and a pressure multi sensor runway, we are able to evaluate a patient's dynamic movements and the angles of individual joint segments. This new diagnostic equipment will provide quantifiable patient information not only for podiatry, but for use by a multidisciplinary health care team. A brief outline of our new system is shown below for your information.

The gait diagnostics system has been developed by a leading manufacturing Company of:

- foot pressure analysis systems to perform the study of the patient standing on while walking;
- optoelectronics features systems to investigate body structure and posture.
- The system, Digital Biometry Images Scanning (DBIS) is the integration of optical devices and foot pressure platform, which is utilised in a Digitalized Evaluation Lab, in order to investigate biomechanical and postural problems.

Digitalized Biometry Analysis involves the collection of information from:

- Electronic Baropodometer (Walk MultiSensor Electronic Baropodometer platform) to analyze foot pressure;
- Body Analysis Capture and Dynamic Image Systems (camera capture to analyze body structure; side by side/top views, and to study functional range of motion of the main articulations);
- PodoScanalyzer (optical 2D scanning) to analyze foot morphology;
- D.B.I.S. Software (with B.P.I.) index indicating partial/total numerical "scores" of the entire investigation.

Diagnostic Support is developing research activities in conjunction with a Postural Biomedicine Committee composed by 16 International Universities and National Research Centres. The Committee, in the last five years, has been researching how to approach and determine postural disease while observing a patient when it is impossible to correlate their symptoms to a specific pathology. The research integrates studies with Digitalized Biometry, evaluating physiological values of each measurement of the entire Bio Postural Test exam.

To support this research studies, Diagnostic Support developed the advanced "Milletrix Software", that provides, for the first time in the world, a unique diagnostic report analysing automatically the values of the investigations, and displaying for each value a deviation index (B.P.I. Bio Postural Index) on which '0' indicates a normal condition and '3' means the highest deviations.

The B.P.I. index is used within the Patient History Questionnaire Form, Clinical Folder, Static and Dynamic foot pressure exams, Stabilometry exams and Body Morphology Tests (including foot plantar surface and articulation ROM). This method of analysis is used for patient's postural studies, relating clinical examination and instrumental exams, in order to provide improved global management.

As we have come to better understand, over the past twelve months, the scope and ability of the gait diagnostics system to provide quantitative clinical data, we have continued to be challenged and excited by its application. We look forward to understanding your specific requirements so that we are able to provide relevant, meaningful information that will be of benefit in your clinical practice.

We look forward to working with you in the future, here at gait diagnostics.

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Test Information

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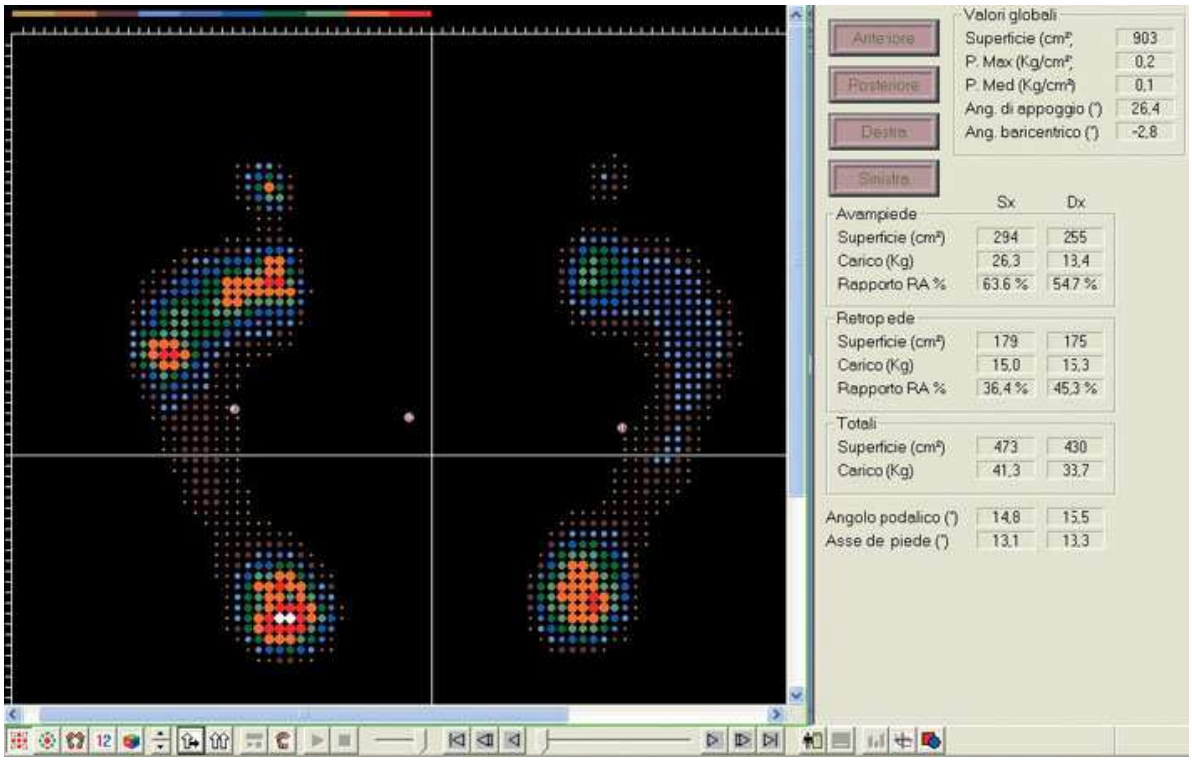
Static Test

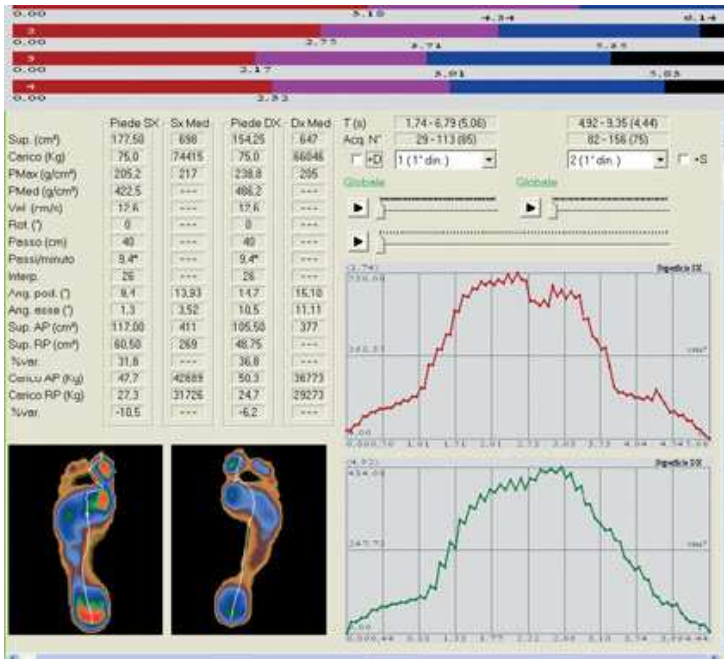
The Static test (Fig.1) is the average result of body oscillations expressed on 10 different chromatic scales and expressed as percentages of the maximum load value (M). The linear projection of the body's centre of gravity (C) determines the front-back movements of the trunk, while the linear projection of the legs (S-D) measures hip deviation of the patient expressed in degrees of rotation. The examination is completed with numerical surface and load values, both globally (for each foot) and partially (relative to back foot, medial mid foot and front foot) measured during the static and dynamic assessments.



(Fig.1)

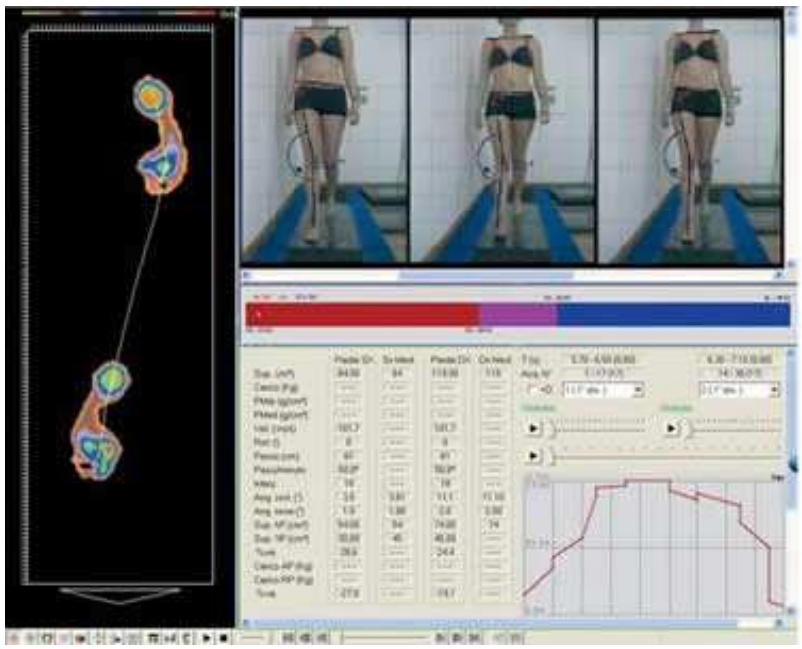
Dynamic Test

The test is performed by using a number of video cameras that capture the movements of joint segments while walking and each image shows angle measurements. The analytical profile of the patient's gait can be completed by merging the information obtained by the film with the still images of the Electronic Baropodometer. In particular it measures the specific phases of the walking movement (heel strike, complete plantar contact and toe lift), shoulder and pelvic inclinations and knee angles Image System registers and assesses the overall postural condition of the patient and print-outs of the results can be used during periodical control examinations during treatment and, even more importantly, during pre and post operative control examinations (Fig.2).



(Fig.2)

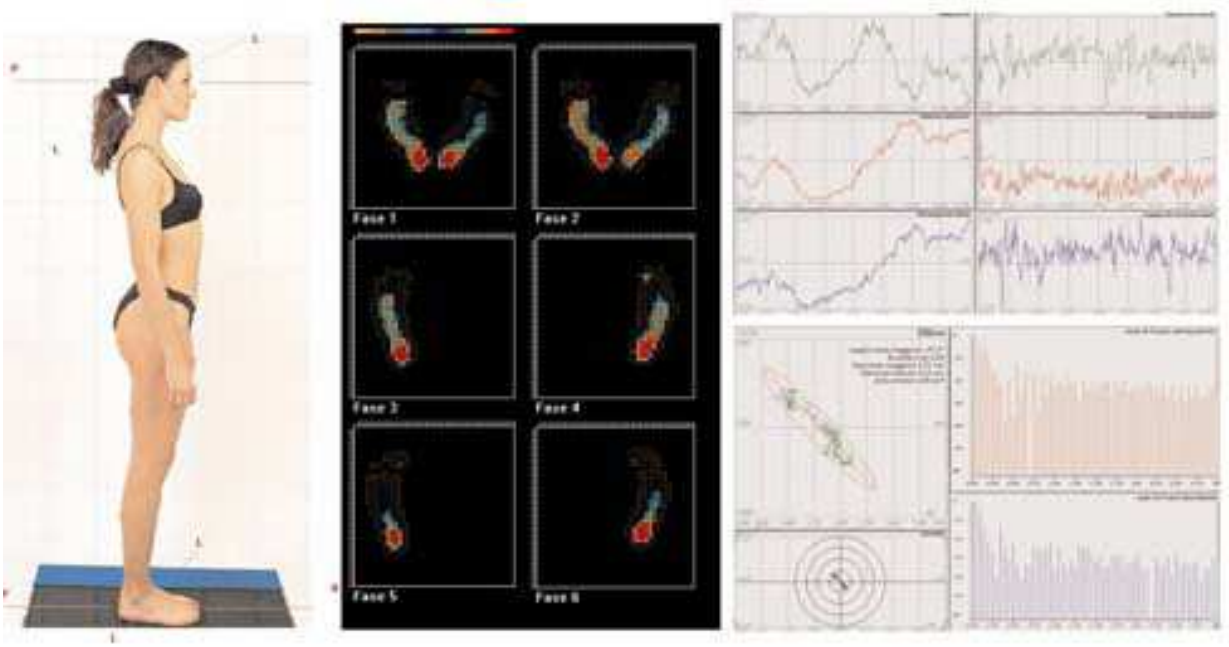
Gait is assessed by capturing in progression the various pressure moments by reading the central pressure point of each foot in each moment of the roll and the relative result for the step (Fig.3). The image is presented not only as a whole but also gives intermediary images of the various dynamics of the patient, with relative values at the end of the step cycle with touch/release/flight times, speed, number of steps per minute, step length, surface, load, peak curve, geometric centre of gravity etc.



(Fig.3)

Stabilometric Test

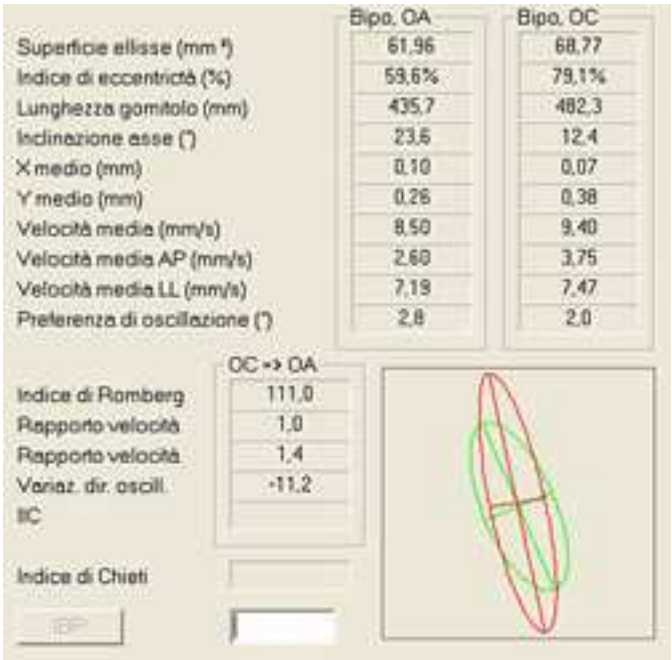
Clinical Stabilometry is used to study the body's oscillation in an orthostatic position (Fig.4).



(Fig.4)

This exam is useful for the diagnosis of:
•Balance disorders, vestibular peripherals pathologies, cerebellar disorders, cortical lesions, sightseeing apparatus disorder, osteo-muscular pathologies.
•Monitoring rehabilitative or pharmacological therapies, as a non invasive investigation, to evaluate the influences of some drugs with action on the CNS system

Stabilometry analysis is also a suitable method of observing disease causing imbalance, referring with extreme precision to factors such as incorrect disclosure of the dental arch or while investigating cephalalgia or back pain.



	Bipo. OA	Bipo. OC
Superficie ellisse (mm²)	61,96	68,77
Indice di eccentricità (%)	59,6%	79,1%
Lunghezza gomitolo (mm)	435,7	482,3
Inclinazione asse (°)	23,6	12,4
X medio (mm)	0,10	0,07
Y medio (mm)	0,26	0,38
Velocità media (mm/s)	8,50	9,40
Velocità media AP (mm/s)	2,60	3,75
Velocità media LL (mm/s)	7,19	7,47
Preferenza di oscillazione (°)	2,8	2,0

	OC => OA
Indice di Romberg	111,0
Rapporto velocità	1,0
Rapporto velocità	1,4
Variaz. dir. oscill.	-11,2
IIC	
Indice di Chieti	

(Fig.5)

After each test the software calculates the mean position of the Centre of Pressure and the small oscillations of each point due to the energy spent by the patient to keep the position. The values follow international standards with specific indexs (B.P.I.) compared to normal values.

The displacement of the CoP is visible in real time on the screen, on which is calculated the mean axis (both X/Y direction) the surface, the length and the frequency of the oscillation, the ellipse area, and the path length (Fig.5). Additional depth data on this exam are presented with a specific numerical graph.

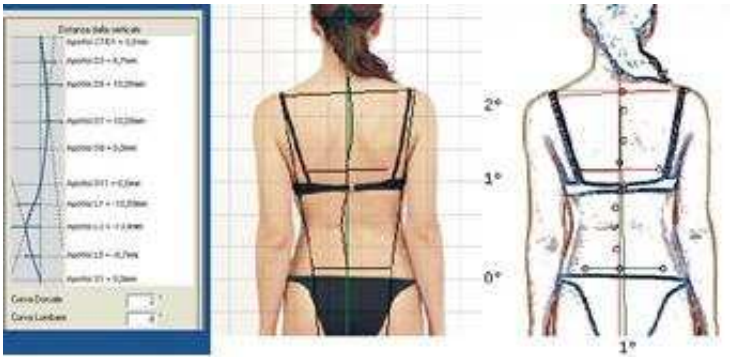
Body Analysis Test

The Body Analysis optical system is a non-invasive method that obtains information on the patient at rest, via a system of video registrations (one to eight infrared video cameras) that simultaneously obtain detailed and accurate measurements of the entire body structure. It provides a quali-quantative analysis of the front-back, side-to-side planes illustrated in stick diagrams. It is also possible to combine these projections with a view from the top, and with details of foot roll and jaw occlusion test. It measures inclinations, lengths and angles of the body, asymmetries (in grades) of the various planes (bipupillary, zygomatic, shoulder, scapula, pelvis, knee, ankle bone).

(Fig.6)

The system calculates the length and angularity of the principle skeletal joints (where the adhesive reflective markers are positioned) and the relative morphological goniometry of the head, torso, pelvis, lower limbs, etc. (data which is required for legal medicine assessment). It identifies measurement profiles and relative joint angles (Fig 7).

The analysis of the back is obtained by measuring in millimetres and degrees any deviations of the spine, degrees of mal-alignment of the shoulders and of the posterior superior iliac spine. The data captured via the scan regarding body morphology facilitates the technician's work in the biomechanical analysis of body structure and identifies postural disorders. All the values are included in the Bio Postural Index report (BPI).

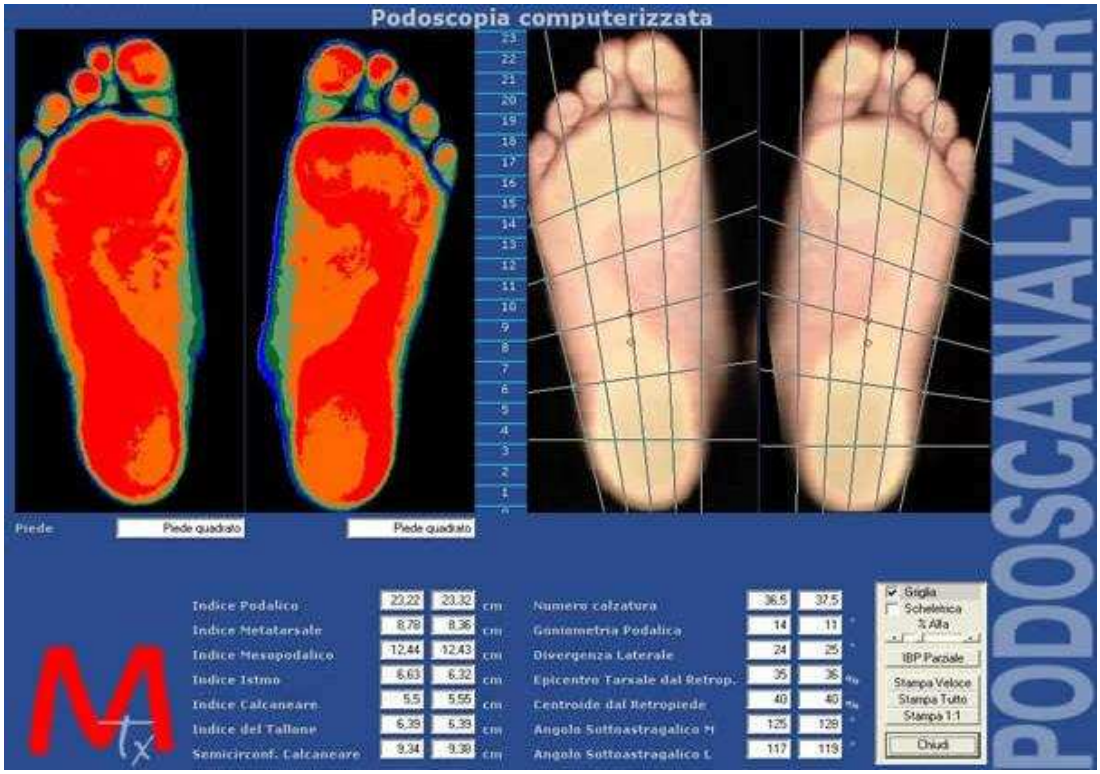


(Fig.7)

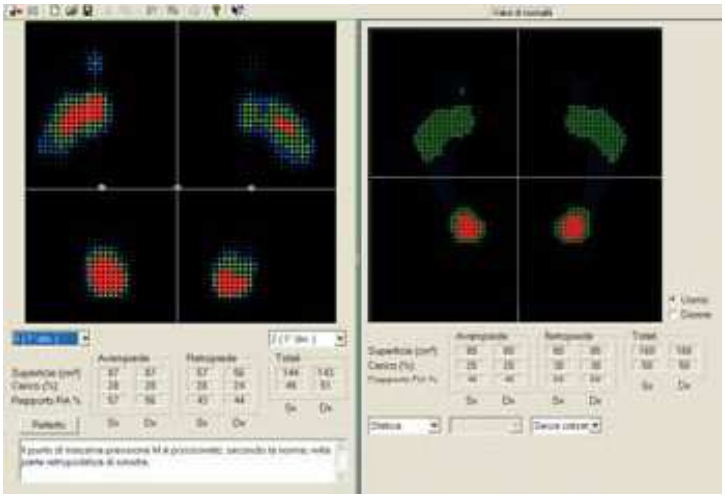
Podoscanalyser Test

The Podoscanalyzer is a computerised podoscope that scans the foot while under pressure in order to analyse the foot's structure. The image identifies any hyperkeratosis, ulcer mapping management, toe deformities and describes the actual conditions of the plantar arch.

The podoscope test will take various measurements: length, width, podalic geometric calculations with angles that can be combined with other radiographic morphological images and baropodometric tests of the patient. The DBIS software reports the values already collected in a Bio Postural Index report and compares them to the physiological values.

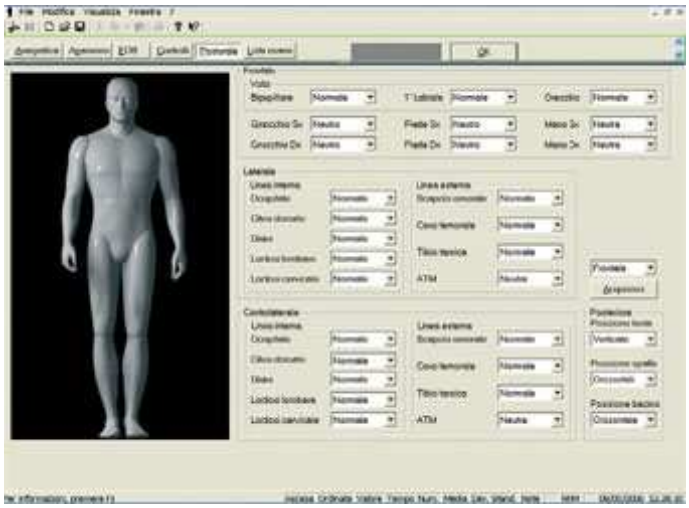


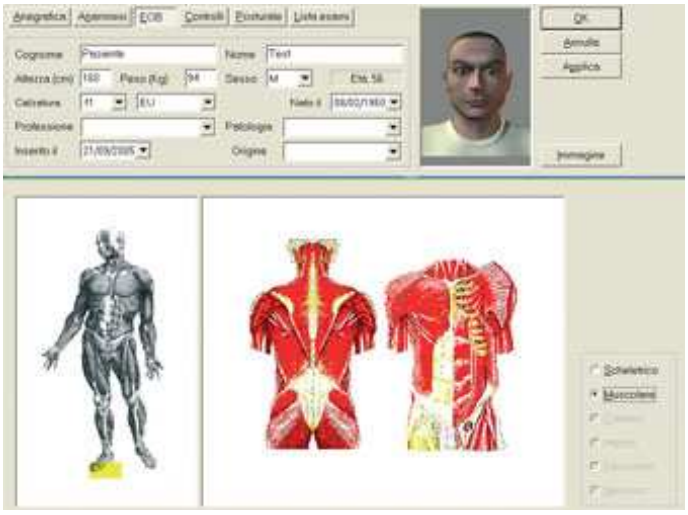
Additional Characteristics



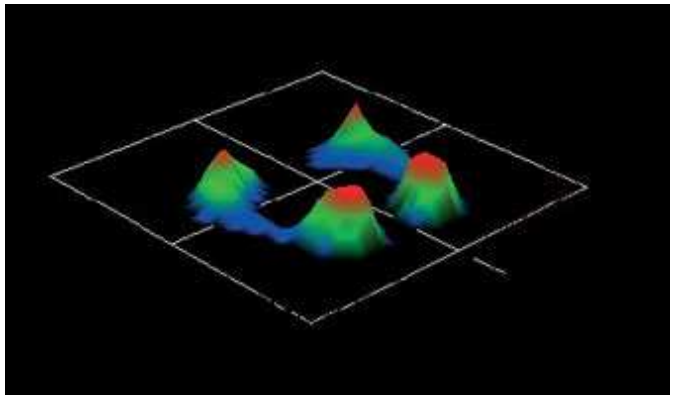
The software has the function of comparing the various tests with each other or with images of normal ranges in order to facilitate the interpretation of the data.

A database contains personal identity data, medical history and objective clinical examination with iconographic images of the body segments of the patient.





The captured data can be visualised in different manners for a more detailed evaluation of the test.



CENTRO DI VALUTAZIONE BIOMETRICA DIGITALIZZATA

BAROPODOMETRIA STATICA

PARAMETRI	U.M.	RISULTATI	I.B.P.
Posizionamento geometrico COP	%	38	0
Carico Bipodalarco (Differenza di carico tra % dx e % sx)	%	6	0
Differenza carico postero/anteriore dx	%	51	3
Differenza carico postero/anteriore sx	%	47	3
Divergenza COP tra sx – dx	gradi	5	1
Angolo dell'asse podalico dx	gradi	9	0
Angolo dell'asse podalico sx	gradi	10	0
Superficie del poligono d'appoggio	mm	525	0
Localizzazione PMP	AD	1	0
Superficie Podalica	mm	122	0
Variazione morfo-posturale di superficie	%	18	1
Totale I.B.P. Esame Geometrico (val. finisl. 0-7)			**8**

Each test is routinely accompanied by the pressure index. All the numerical values are processed by the DBIS programme and are included in the Bio-Postural Index (BPI) report.

A diagnostic summary of all the posture deviations captured during the tests is available.