Computer-Supported Test and Training Systems (CTT)

The future of neuromuscular testing and training for spine and trunk.

Musculoskeletal diseases (problems) cause economic loss in the billions. The increase in efficiency of treatments in the framework of Medical Training Therapy (MTT) and targeted prevention are effective evaluation for the reduction of effort and improvement of results.

The securing of the efficiency of the therapeutic and preventative testing and evaluation of the MTT is completely dependent on the quality of the diagnosis and the thus resulting targeted dosage of physical strain. The physical strain is the trigger for the active-adaptive reactions, which are the basis of the regenerative processes. This therapeutic approach is only effective if the quality of diagnosis, dosability and control of the physical strain exposition is guaranteed.

MOST COMMON CAUSES OF APPLICATIONS

The impairment of performance of the motion function and the resulting problems are in the majority of cases (for the back in 85 per cent of cases) a result of developing deficiencies in the control programmes of the sensorimotor function. This can lead to neuromuscular imbalances or neuromuscular deficits of the joint motor function. Muscular imbalances and deficits are also the causes of diminished flexibility of the joint stabilising musculature. Thus a permanent overload is created, which in turn can lead to pain, sometimes recurrent or chronic. The causes for the emergence of neuromuscular imbalances and deficits can be found in our modern way of living:

» Immobility: Cause of muscular deficits
» Bad/Wrong Posture: Cause of muscular imbalances

TREATMENT AIMS

The most important treatment aims are:

» Identify existing neuromuscular imbalances and deficits and coordinative deficits of the skeletal musculature (sensorimotor function) and
» Treat these by targeted strain in the framework of a medically controlled functional training (MTT)

SPECIFICATION FOR AN APPROPRIATE LABORATORY

The functional complexity of the musculoskeletal system requires a number of specific devices, being similar to a biomechanical lab.

The following computer-supported test and treatment systems are the basis of such a laboratory:

1. PEGASUS
   Seated test- and training system for the spine (neuromuscular and sensorimotor function)

2. CENTAUR
   Functional test- and training system for the spine in standing position (sensorimotor and neuromuscular function)

EACH OF THESE DEVICE SYSTEMS:

» Realizes a three dimensionality of the musculature by real 3D testing and training.
» Visualizes the neuromuscular imbalances and deficits:
- Neuromuscular imbalances are identified by measuring the strength and the range of motion in the anatomical main planes and by comparison of the results.
- Neuromuscular deficits are identified by measuring the strength in all anatomical planes and are compared with reference values.
- Neuromuscular imbalances and deficits are trained by defining appropriate strain on the skeletal sensorimotor function giving defined and well-dosed load.

» Allows an exact definition of the physical strain by using feedback training with sine curves:
- Capture of individual data
- Definition of training structure
- Control of the trainings by online feedback methods
- Display of results, documentation and archiving

PEGASUS

Neuromuscular testing and feedback training unit

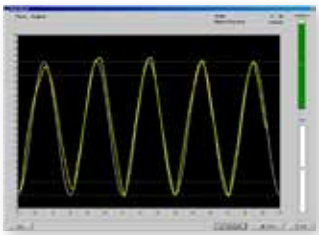
STRENGTH AND MOBILITY: MEASURED PRECISELY, STRENGTHENED SPECIFICALLY

The complexity of the back requires an equally complex system for the precise diagnosis and treatment of back problems. These requirements are ideally met by the computer-supported test and training system (CTT) PEGASUS in a very time-efficient way. The range of motion and the strength profiles of the spine-stabilizing musculature are measured in all anatomical planes. Thus mobility and strength deficits and imbalances are identified. On the basis of these results a specific, highly efficient training (maximum strength, strength endurance, strength coordination and mobility training) of the sensorimotor systems of the lumbar spine can be realized. Thereby existing muscular imbalances and performance deficits are tackled and the natural mobility and resilience of the spine reestablished and retained.

DIAGNOSIS AND TREATMENT OF THE THORACIC AND LUMBAR SPINE JOINT MOTOR FUNCTION: CTT PEGASUS WITH BIOMC SOFTWARE

» Measurement of the range of motion of the spine, especially in the thoracic and lumbar segments. The measurement can be conducted simultaneously or successively in the anatomic planes. That way, it is possible to objectify existing deficits of the range of motion, define treatment targets and document the recovery progress.
» Measurement of the strength capacity in any measuring point of the anatomic planes of the thoracic and lumbar spine joint motor function. Any specific measuring point is exactly reproducible. The measuring position can be locked; the measured values (of the chosen effective directions) are stored and displayed as polar (radar) and column charts.
» Execution of a specific training (treatment) of the sensorimotor systems of the thoracic and lumbar spine joint motor function under isometric and isotonic working conditions. The training aims at reducing existing muscular imbalances and deficits and at restoring and improving the natural range of motion and resilience of the spine in those segments.
» A complex test for the identification of functional imbalances and deficits only takes 15 minutes.
» Networking of the device and storage of data for an efficient execution of tests and training.

CTT PEGASUS
Three dimensional computer-supported test and training system



CENTAUR

Unit for testing and training of the stabilizing core muscles by computer controlled tilting and rotating

STRENGTHEN THE BACK, KEEP THE POSTURE

The majority of back problems are the result of functional imbalances and deficits of the torso sensorimotor function, which CTT CENTAUR identifies and treats. With this device the global torso musculature can be specifically strengthened and its coordination trained. Furthermore, for the first time it is possible to directly train the local, deeper lying muscles (stabilizer). CTT CENTAUR works on the basis of the following active principles:

» By a coordinated tilt of the body, the torso needs to be stabilized against gravity.
» By tilting and rotating the body is put into an instable position so that the balance analyser sends impulses to the deeper lying muscles.
» Due to the upright posture during the training, the muscles are strengthened in the position in which they have to do the most supporting work.
» The precisely reproducible application of strain allows for a targeted and exactly documentable therapy and training.

CTT CENTAUR
Three dimensional computersupported test and training system

EFFECTIVE PREVENTION, REHABILITATION AND TRAINING WITH CTT CENTAUR:

» Three-dimensional computer-supported training for the muscles of the lumbar spine segment including those on the side and the stomach muscles.
» Determination of neuromuscular imbalances and deficits in the lumbar spine segment.
» Targeted training to improve existing neuromuscular imbalances and deficits.
» Conditioning of the musculature as precondition of the general stabilising of the back and as basis for any further training.
» Controlled activation of the autochthonic back musculature.
» Neuromuscular training by activating the balance analyser.
» Functional training by synergetic demand on the balance analyser and the sensorimotor systems of the lumbar, thoracic and cervical spine.
» Cardio-pulmonary training by straining and relieving the blood vessels in tilt.
» Isometric training device.
» Networking of the device and data transfer for an efficient execution of tests and training.