



MYOTONPRO-1B DEVICE – CHARACTERISTICS AND CLINICAL APPLICATION

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ABSTRACT

The most common reason for work related diseases in Europe are musculoskeletal damages /MSD/. MSD affect mainly back, neck, shoulders and upper extremities. Some of them have typical clinical features whereas others don't – there is only pain or discomfort. The diagnosis of muscular damage is set after a detailed anamnesis and a precise physical examination. An accurate assessment of the character, localization and severity of impairment is done, including expensive laboratory and imaging investigations. Our purpose, materials and methods used are description of technical characteristics and clinical applications of MyotoPRO-1B device based on available scientific publications for the last 5 years. Results and discussion: MyotoPro-1B is an innovative device in Bulgaria. It makes a quick, objective and noninvasive assessment of superficially situated muscles, tendons and other soft tissues. Different parameters such as muscle tone, some biomechanical and viscoelastic properties are measured. It helps to assess the progression and efficiency of various medical, rehabilitation and therapeutic interventions. Conclusion: MyotoPRO-1B is an innovative device for measuring and objective assessment of superficial soft tissues.

Keywords: MyotoPRO-1B device, musculoskeletal damages, digital palpation, soft tissue assessment

The most common reason for work related diseases in Europe are musculoskeletal damages /MSD/. Almost 24 % of the employees in EU countries report about neck pain and 22 % complain of muscle pain (1). MSD affect mainly neck, shoulder girdle and upper limbs (1). Data from many and different studies show that back pain is the most commonly identified health problem followed by muscular pain in upper limbs and neck (1). Some of them have typical clinical features whereas others don't – there is only pain or discomfort. The diagnosis of muscular damage is set after a detailed anamnesis and a precise physical examination. An accurate assessment of the character, localization and severity of impairment is done, including expensive laboratory and imaging investigations.

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Modern medicine has seen numerous novel solutions to improve the quality of patient care and still there are some fields where no major breakthroughs have been done. One of them is an objective and non-invasive assessment of skeletal muscles and other soft biological tissues. There is a lack of simultaneously practical, objective, non-invasive and cost-effective solutions that are widely accessible (2). An innovative digital palpation solution has been invented to fill in this gap in muscle and soft tissue assessment (2).

MyotonPRO-1B is a small hand-held device which is quick and easy to use (2). Different scientific studies have proven its practicality and advantages. The current MyotonPRO model is designed for research use only (2).

A measurement method defined as the **Mechanical Dynamic Response method** based on a “tap and listen” method has been used (2).

The method consists of recording the damped natural oscillation of soft biological tissues in the form of an acceleration signal and the

subsequent simultaneous computation of parameters including the state of tension, biomechanical and viscoelastic properties (2).

The parameters measured are:

- muscle tone – the state of tension

F – natural oscillation frequency /Hz/ - describes the tone of muscles at rest. The device range of measurement is 6 to 110Hz.

The oscillating frequency of a contracted muscle defines the state of tension

Biomechanical properties:

- dynamic stiffness **S** /N/m/ - characterizes the resistance of soft tissues to a force of deformation – the device measures from 70 to 3000N/m.

- logarithmic decrement **D** – inversely describes elasticity or dissipation of natural oscillation

Elasticity is that property of a tissue which enables it to recover its initial shape after it's been deformed. The higher the decrement, the lower the elasticity.

Viscoelastic properties:

- mechanical stress relaxation time /ms/ **R** – Myoton measures from 3.5 to 50ms.

The higher a tissue's tone or stiffness, the faster it recovers to its initial shape, meaning R is lower.

- creep - ratio of relaxation and deformation time - **C** – the gradual elongation of tissue over time when placed under constant tensile stress /0.3-2.8/

MyotonPRO measures each of the parameters for 15 ms.

The device measures the parameters both in rest and muscles contracted.

This new technology provides valuable information about the state of superficial skeletal muscles, tendons and other soft tissues in several fields in medicine and sport /2/. Myoton makes possible the objective assessment and efficacy of various factors, such as medical interventions, sports, injuries and ageing (2).

Myoton can be applied to:

- measuring changes in tissues caused by various health disorders (2-4)
- monitoring the progression of different diseases (2, 5-7)
- intervention efficacy evaluation (2, 8-10)
- physiotherapy or rehabilitation outcome monitoring (2, 11, 12, 14)
- monitoring of muscles training efficacy (2, 10, 13, 15)

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- prevention of trauma caused by muscle overload due to uncomfortable working position when working for a prolonged period (2, 14, 16)
- monitoring the changes in muscle condition due to uncomfortable muscle position assumed for a prolonged period (2, 16, 17)
- detection of fatigue and muscle overtraining (2, 17)
- prevention of muscle and tendon injuries (2, 18)

MyotoPRO-1B is an innovative device for measuring and objective assessment of superficial soft tissues. There are many more areas and possible applications for MyotonPRO to be examined. Results and studies including the device so far have proven it's reliable and repeatable tool for measuring superficial muscles mechanical and viscoelastic properties and can be used for a number of diagnostic and therapeutic intentions.

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