# Muscle strength measuring device

## Development status

**Phase 2**

**Feasibility study.** There is a realistic design of the technology and the initial tests in the laboratory are leading to the specification of the technology requirements and its capabilities.

## IP protection status

Czech patent no. 308216, priority 19. 10. 2018, PCT/CZ2019/050045

## Partnering strategy

*Co-development, Collaboration, investment, licensing*

## Challenge

Measuring muscle strength may be an important component of physical training or nutrition evaluation and assessment. Manual muscle-testing and the use of a dynamometer are the most common methods to measure muscle strength. Currently used methods of semi- and quantitative measurement of maximal muscle strength require subject cooperation and thus depends on engagement of tested subject.

## Description

The lack of quantitative data of muscle strength resulted in the development of our device. Our solution is objective dynamometry. The device works on the principle of electrical stimulation of the musculus tibialis at the motor point by a series of stimulations with increasing intensity. Our device uses standard commercially available electrostimulators provided with electrodes that are glued to the skin at the motor point of the muscle. Pressure sensor measures pressure in the pressure cuff placed in the splint. The maximum muscle strength and muscle fatigue are determined from the measured values. Our device is intended not only for sports medicine (effect of training and nutrition on athletes' performance) and for athletes themselves, but also for intensive medicine (sarcopenia, coma, long-term diseases). We have developed a prototype of second generation according to regulations that are required to follow for devices of such type. The device has CE mark for non-medical use (athletes).

## Commercial opportunity

Currently, the devices on the market are based on dynamometric principle engaging human will. These devices are characterized by low sensitivity or large measurement variance that may be for example also dependent on the daytime. The size of medical dynamometers market for 2017 has been estimated at 554 mil. USD, while the expected market growth for the period 2016 - 2025 is estimated at 6.5% (CAGR). The significant factor attributing this market's growth is the growing incidence cases of sports injuries, a rise in patients

suffering from arthritis, orthopedic procedures, an increase in ergonomic methods to wellness, along with the increase in research and development measures as well as growing demand for diagnostic systems will upsurge the growth of dynamometers market. For example, high school athletes alone account for 2 million incidents, 50,000 visits to the doctor, and 30,000 hospital admissions in the U.S. each year. Our device operates objectively independently of human wil and the measuring principle eliminates all the above-mentioned disadvantages of the conventional dynamometers. Furthermore, our device is mobile, simple and easy-to-use. Our device was already tested on 20 healthy volunteers where the mentioned benefits were verified. An extensive study is currently underway on 200 volunteers of various ages and physical activity and fitness. Moreover, our solution offers technique that teaches athletes how to improve their health and physical performance by responding to signals from their own body.

## Institution

**Fakultní nemocnice Hradec Králové**