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Biofeedback Hand Grip Exercise Device for Assessing Muscle Function (20170200)

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20170200

Category
Life Sciences/Human Health
Life Sciences/Medical Devices
Life Sciences/Research Tools

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Novel game interface enables muscle exercise and testing

A new biofeedback hand grip device is used with a custom computer game to assess muscle function in patients with muscle diseases, particularly children with Duchenne muscular dystrophy (DMD). This novel muscle strength and fatigue assessment tool is quantifiable, can be performed by patients at all levels of muscle disease progression (including non-ambulatory patients) and is fun and motivating for the patient. The device features a grip sensor embedded in a custom handgrip piece designed to fit a child's hand. When the patient squeezes the device, the sensor records the isometric grip force of the patient and sends it wirelessly to a host computer (tablet). The tablet displays a fun and motivating video game where the patient performs a brief fatiguing exercise. A wide range of protocols can be specified, which may be useful for research or for clinical diagnostic means. The novel game-based tool encourages muscle disease patients to follow a prescribed protocol to train/fatigue the muscle. Furthermore, an assessment tool that is fun for the patient may limit the dropout of patients from trials where assessments were too stressful.

Adjustable level of force customizes assessment and fatiguing exercise protocols

Existing neuromuscular diseases (e.g., muscular dystrophy) muscle function tests are difficult to quantify and are often limited to ambulatory patients and/or those with relatively mild disease. Some therapies are susceptible to declining motivation, where doing the test can be depressing/demotivating for patients with DMD because they immediately see that their performance was worse than before. Current solutions do not motivate patients to perform to their maximal ability and do not allow a specific muscle-fatiguing protocol that can be used for research or for clinical diagnostics. This new medical device provides a simple, engaging upper-limb assessment tool that measures muscle strength and fatigue in children with DMD. The new

biofeedback grip sensor is combined with a game-based interface to motivate patients to complete maximal and fatiguing grip protocols. The new device uniquely enables customized assessment and fatiguing exercise protocols. The level of force for the game can be tailored to the disease or to each patient—and can be done without the patient knowing. By adjusting game parameters as disease progresses over time, the game is equally easy to play at all visits, regardless of actual force production. This way, the child can achieve the same—or an even higher—score over time, and can even compete against friends and family. This competitive aspect improves patient experience and compliance with the exercise protocol and motivates the child to keep playing.

Phase of Development

- Prototype dev. working prototype.

Benefits

- Encourages patients to follow a prescribed protocol to train/fatigue the muscle
- Fun and motivating for the patient
- Level of muscle force required to play the game can be adjusted
- May limit the dropout of patients from trials where assessments were too stressful
- Wide range of protocols can be specified
- Quantifiable results
- Applies to patients at all levels of muscle disease progression (including non-ambulatory patients)

Features

- Biofeedback hand grip device
- Computer video game
- Measures muscle strength and fatigue in children with muscle diseases, e.g., Duchenne muscular dystrophy (DMD)
- Wide range of protocols may be useful for research or for clinical diagnostic means
- Motivates patients to complete maximal and fatiguing grip protocols

Applications

- Clinical research, clinical assessments/diagnostics
- Muscle testing
- Muscle force assessment tool
- Studying effects of various treatments for progressive neuromuscular diseases
- Testing muscle function in patients in clinical trials for new drugs. e.g., Spinal Muscular Atrophy (SMA) and Amyotrophic Lateral Sclerosis (ALS)
- Athletic trainers, muscle training
- Fatigue testing automation
- Rehabilitation

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

Please contact TLO to share your business' needs and learn more.

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