

TM Focus on Clinical Challenges of FES of Denervated Muscle

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Editorial

Rise! Aufstehen! Standa u! Alzati!

The EU Project RISE: Use of electrical stimulation to restore standing in paraplegics with long-term denervated degenerated muscles (DDM) (Contract n. QLG5-CT-2001-02191).

This BAM TM-Focus collects original documents that were distributed, after Ethical Committees granted unrestricted permission, to persons enrolled in the EU Project RISE in Austria, Germany, Iceland and Italy.

The collective of documents include the English, German, Icelandic and Italian versions of the basics and of the detailed description of: 1. selection criteria & methods, 2. home-based FES training for denervated degenerated muscle (FES of DDM), and 3. results' evaluation methods during and at end-point of the EU RISE project. Preliminary analysis of results are included, while the final analysis of the successful results of the EU RISE Project will be presented at the 08Spring PaduaMuscle Days, which will be held next April 13 to 15 in the Aula Magna of the University of Padua and Terme Euganee.

Italian readers will find further information in Basic and Applied Myology 17 (1), 2007: Special Issue: *Recenti acquisizioni nella riabilitazione del paziente paraplegico e tetraplegico - Principi di biologia e patologia muscolare*, a cura di Ugo Carraro, Helmut Kern, Roberto Scelsi.

We hope that the present multilingual issue that open the Focus Series of the European Journal of Translational Myology, will contribute to spread information, beside specialists, to commons and their families to offer to a larger cohort of Spinal Cord Injured persons the benefits of a well-focused home-based FES-Training of DDM.

Based on the sound results of the EU RISE Project, the University of Padua Interdepartmental Research Center of Myology (cirMYO) is designing and implementing, with the supervision of the Vienna FES Group and of other European Experts, a new pilot study, the Rise-2 Italian Trial, in collaboration with other Italian Centers based in Padova, Udine, Villanova d'Arda/Piacenza, Milano and Chieti. Our goal is to extend to those persons, clinically defined as fully denervated lower motor neuron paraplegics but indeed with a limited, but relevant residual low level of innervation, the benefits of the home-based FES training.

The hypothesis to be tested is a progressive FES-training of partially denervated tight muscles by using: 1. FES-induced low force measurements and/or pendulum tests for enrolment of COMPLETE lumbar/sacral SCI, but INCOMPLETE nerve roots/nerve injury persons into two or more groups from 10 to 30% residual innervation; 2. Three to six months FES of residually innervated muscle fibers by standard clinical electrostimulators, followed by three to six months FES of denervated muscle fibers applying the Vienna protocol.

Success of the EU RISE Project for FES of DDM is the result of using large surface electrodes and high power electrical stimulation eliciting direct muscle fibers contraction by bursts of 40 msec impulse and 10 msec rest (20 Hz) 2 sec on / 2 sec off, for 3 - 5 minutes, 1-2 minutes pause, 3 - 5 times a session, once or twice a day, 5 days per week.

After the quadriceps reaches the ability to maintain tetanic contractions, the twitch-based training will be switched to the Force Training Progressive Protocol by 15 repetitions per set (2 min rest between each set), 6 - 8 sets a day; first sessions without ankle weights, later on 1 to 5 kg on the ankle.

Additional partners are welcome!

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