

## **Changes in back musculature after neuromuscular electrical stimulation and infrared therapy in warmblood horses – a blinded and placebo-controlled study**

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### **Scientific background of the project:**

Electrostimulation has been widely used in human as well as in veterinary medicine (1–4). In humans, improvement in muscle strength and preservation of muscle mass have been described (5,6) and in horses, this technique has been reported in the treatment of muscle dysfunction after suprascapular and radial nerve lesions (7). However, its effectiveness remains largely anecdotal.

### **Aims:**

To evaluate changes in back musculature after treatment with neuromuscular electrical stimulation (NMES) and infrared (IR) therapy with the Equery R6 system (Equery-tech Ltd, Hungary).

**Hypothesis:** Horses will present an increase in back muscle mass and an improvement in physiotherapeutic parameters after treatment with NMES/IR in comparison with the placebo group.

### **Methods:**

In a pilot study, an innovative thoracolumbar shape measuring system will be tested (intra-, interobserver and interday variability) and compared to the method with a flexible curve ruler as described by Greve and Dyson (2013). The new system is based on a tracking system that determines the position of points in space with sub-millimeter accuracy at 100Hz, using two base stations emitting invisible infrared laser beams which are registered by sensors on a tracked object. Mounting the sensors in a row on a deformable but not stretchable band creates a 3D ruler, which can be laid transversely over the back of the horse. From the line of points in space, the area below these points can be calculated to estimate muscle mass.

In a second phase, a blinded and placebo-controlled study will be performed to investigate the effect of NMES/IR with the Equery R6 system in horses with poor back musculature without obvious orthopaedic problems. Written owner consent will be obtained. No other concurrent therapies are allowed. Horses' normal training will not be interrupted during the study, but no changes in intensity will be made. In total, 40 horses will be examined weekly for eight consecutive weeks. The horses are randomly divided in different groups: the first five groups are starting the treatment staggered by one week each (sessions prior to the start of NMES/IR treatment will be placebo sessions), the last group is a placebo group which does not receive any treatment. The NMES/IR treatment consists of a 1h-session per week for five consecutive weeks. Before every treatment session, the horses will be subjected to a physiotherapeutic evaluation and horses' back shape will be measured (cf. pilot study) at the level of T8, T13,

T18 and the tuber coxae. All operators involved in data collection are blinded to the treatment groups. Every week, standardised digital photographs will be taken from the left and from the right side and from behind each horse. After the study period, the photographs will be scored for muscle condition in a randomized order by a separate group of veterinarians blinded to treatment group. A questionnaire regarding perceived effects and any relevant observations will be filled in by the owners after each session. Treatment groups will only be revealed after blind statistical analysis.

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