



CLINICAL RESEARCH

illness, ethological deficits or husbandry shortcomings.

Ethical animal research: Owners gave informed consent for their horses' inclusion in the study. **Source of funding:** None. **Competing interests:** None declared.

Reference: [1] Kalus, M. (2014) *Schlafverhalten und Physiologie des Schlafes beim Pferd auf der Basis polysomnographischer Untersuchungen*. Ludwig-Maximilians-Universität München.

15.00

Percutaneous electrical nerve stimulation (PENS) neuromodulation for the management of trigeminal-mediated headshaking: Results from 48 horses at five referral centres, since 2013

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Reasons for performing study: Early results in seven horses receiving percutaneous electrical nerve stimulation (PENS) neuromodulation for trigeminal-mediated headshaking were positive, with no significant adverse effects and medium-term remission in five horses [1]. Longer term follow-up and data from a greater number of horses is required. **Objectives:** To document safety and efficacy of PENS neuromodulation for management of trigeminal-mediated headshaking in all horses treated between August 2013 and February 2016. **Study design:** Prospective case series. **Methods:** All hospitals currently trained to use PENS neuromodulation were involved. Trigeminal-mediated head-shakers were treated with at least three PENS neuromodulatory procedures [1]. History including known seasonality, numbers of procedures performed per horse and adverse effects were recorded prospectively. Follow-up was owner-reported, considering for simplicity, only results from the most recent procedure. Information obtained was whether or not the horse had returned to its previous level of ridden exercise and for how long. **Results:** Forty-eight horses received PENS neuromodulation with 138 procedures performed in total. No significant adverse effects were reported. Seven had not yet completed their initial three procedure course. Success, judged as remission of signs sufficient as to allow return to ridden exercise at the previous level and not complicated by known seasonal remission was obtained in 16/41 (39%) horses. Median length of remission by February 2016 was five months, mean ten months (range 0.5–27 months, remission on-going in nine horses). Remission of at least two months' duration was obtained in 14/41 horses (34%). **Conclusions:** PENS neuromodulation is a safe procedure, resulting in useful remission in approximately one-third of cases. **Ethical animal research:** Owners gave informed consent for their horses' inclusion in the study. **Source of funding:** None.

Competing interests: None declared.

Reference: [1] Roberts, V.L.H., Patel, N.K. and Tremaine, W.H. (2016) Neuromodulation using percutaneous electrical nerve stimulation for the management of trigeminal-mediated headshaking: a safe procedure resulting in medium-term remission in five of seven horses. *Equine Vet. J.* 48, 201–204.

15.10

Intra-individual comparison of motor latency times (MLTs) of muscular motor evoked potentials (MEP) of transcranial magnetic (TMS) and electrical stimulation (TES) in horses with neurological motor symptoms

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Reasons for performing study: Motor latency times (MLTs) in healthy horses are shorter for TES when compared with TMS [1–3], and TES may be a more sensitive diagnostic technique. **Objectives:** To compare latency differences for the *mm. extensor carpi radiales* (ECR) and *tibialis craniales* (TC) bilaterally. **Study design:** Clinical study. **Methods:** MLTs of MEPs using both TMS and TES on the ECR and TC were recorded in neurological horses. For TES, biphasic multipulse voltage trains (pulse width: 0.1 ms, interpulse interval: 1.3 ms, 3 pulses/train) were applied [1]. For TMS, the circular coil was positioned with the frontal rim covering the vertex of the head so that the induced biphasic TMS currents agreed with the course of the TES currents. In each muscle, 5 subsequent MLTs above 20% of motor threshold (MT) were averaged. TMS and TES MLTs were compared using the *t* test checking on nonzero differences. **Results:** MLTs for ECR were left: -3.92 ± 2.70 ms (mean \pm s.d.; $P = 0.009$) and right: -3.20 ± 1.58 ms ($P = 0.002$) and for TC: -5.29 ± 4.74 ms ($P = 0.03$) (left) and -6.16 ± 6.45 ms ($P = 0.05$) (right). **Conclusions:** MLTs of multipulse TES-MEP are shorter compared with TMS. **Ethical animal research:** Owners gave informed consent for their horses' inclusion in the study. **Sources of funding:** JS Center and Wolvega Equine Clinic. **Competing interests:** None declared.

References: [1] Journée, S.L., Journée, H.L., de Bruijn, C.M. and Delesalle, C.J.G. (2015) Design and optimization of a novel method for assessment of the motor function of the spinal cord by multipulse transcranial electrical stimulation in horses. *J. Equine Vet. Sci.* 35, 793–800. [2] Nollet, H., Deprez, P., van Ham, L., Dewulf, J., Decler, A. and Vanderstraeten, G. (2004) Transcranial magnetic stimulation: normal values of magnetic motor evoked potentials in 84 normal horses and influence of height, weight, age and sex. *Equine Vet. J.* 36, 51–57. [3] Burke, D., Hicks, R., Gandevia, S.C., Stephen, J., Woodforth, I. and Crawford, M. (1993) Direct comparison of corticospinal volleys in human subjects to transcranial magnetic and electrical stimulation. *J. Physiol.* 470, 383–393.