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A new, non-invasive method to assess specific strain in horses

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Horses' reactions to normal environmental and training situations play an important role the human-horse relationship. These demands on horses can either lead some individuals to withdrawal, immobility or aggressive defence. However, the reaction to such situations varies greatly among horses, which is reflected in individual differences in sympathetic, parasympathetic and muscular reactivity. The observable behavioural responses of the horses seem to be qualitatively related to the internal state of physiological arousal. In future it should be possible to identify behavioural signs which really do reflect internal states of the autonomic nervous system to provide general advice concerning human handling and training in view of reducing stress in horses.

For these purposes, we have determined responses of the vegetative nervous system based on variation in skin potential, skin resistance and electromyogram using non-invasive real-time measurements. All these parameters can be measured by a SMARD-Watch®-System (System of non-invasive Measurement and Analysis for Regulatory Diagnostics), which can be externally attached to the horses using a harness.

The physiological data will assess using a time series analysis. Thereby the changes in the regulatory processes in each of the three physiological systems can be determined in detail. Based on this analysis characteristic behaviour patterns will be analysed by the variability of the regulatory processes. According to temporary shifts in regulatory processes, stable and unstable regulation states will be determined. Depending on the proportions of unstable regulation processes during and after external threat, four types of regulation can be defined: the Control, Cope, Compensate and Non-cope- type. Defined time-windows, for example a ten minutes lasting pre- and post-test phase and a ten or twenty minutes lasting time-window for the execution of the specific stimulus have to be chosen to decide these regulation types.

These four regulation types and the preferred individual behaviour strategies have to be compared to evaluate the relative frequency of occurrence of a behaviour strategy depending on responses of the vegetative nervous system. In view of validating behavioural indicators of emotional reactivity, the aim of this new method is to characterize individual differences in the behavioural and physiological responses of horses to normal environmental and training stimuli. Evidence is provided by human and animal data that the non-invasive real-time measurement of the vegetative nervous system based on variation in skin potential, skin resistance etc. is a promising approach for evaluating stress and emotional states in vertebrates. It will be explained that the chronobiological evaluation of physiological parameters has the potential to contribute much to our understanding and assessment of the underlying physiological processes of stress responses in horses.

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