

Quantitative gait analysis as an objective tool to assess functional outcome of musculoskeletal regenerative therapies in horses and dogs

Análisis cuantitativo de la marcha como una herramienta objetiva para determinar el resultado funcional de terapias regenerativas musculoesqueléticas en caballos y perros

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Abstract

Musculoskeletal regenerative medicine (RM) aims at restoring components of the musculoskeletal system. Most outcome parameters that are used to judge the efficacy of RM treatments focus on the degree to which the newly generated tissue resembles the native tissue and make use of histological, biochemical, and biomechanical techniques. However, in the end it is the functional outcome that counts, and gait is the functional product of the musculoskeletal system. In human medicine, measurement of function is based on the feedback of patients, mostly in the form of so-called visual analogue scoring (VAS) scales, which are seen as relatively reliable, though still subjective and susceptible to bias. In animals this is not possible, and gait is typically scored through application of semi-quantitative scores, like the American Association of Equine Practitioners (AAEP) scale in the horse.

Various techniques to measure gait using parameters describing exerted forces (kinetic parameters) and parameters describing motion in space (kinematic parameters) have been developed over the past decades and in more recent times the use of some of these quantitative techniques has become standard in clinical practice in various places (Serra Bragança *et al.* 2018). It is expected that this use will rapidly increase further, which will have a profound impact on clinical practice. The current developments have already led to a discussion whether we should redefine lameness in the era of quantitative gait analysis (van Weeren *et al.* 2017). As an evaluation tool for measuring the functionality of musculoskeletal regenerative techniques, quantitative gait analysis has many advantages as it is an excellent technique for longitudinal monitoring in an objective and unbiased way and for subsequent documenting. In this field, the horse is leading but similar techniques are being developed for the dog. Future developments

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include the generation of big data sets and their exploitation for the development of pattern recognition techniques based on an artificial intelligence approach.

References

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