(AMTI®), connected to the motion analysis system. Results The analysis yields for most of the parameters and curve conditions ICCs from good (r = 0.72) to high (r = 0.96) magnitude for the measured spatio-temporal and dynamic parameters. Conclusions Based on our findings it can be assumed that locomotion strategies, related to the measured gait parameters of common daily curve walking tasks, are stable and reproducible.

COMPARISON OF KINETIC VARIABLES AND THEIR TIMING BETWEEN WALKING BAREFOOT AND WALKING IN TONING SHOES

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Introduction Previous studies have compared the kinetics of walking in toning shoes (TS) with walking in conventional shoes (CS) (Nigg et al., 2006; Stöggl et al., 2012; Taniguchi et al., 2012). However, the rationale for the development of the MBT shoe (a type of TS) was to mimic barefoot walking (http://www.mbt.com). Additionally, a limited number of studies focused on the timing of kinetic variables (Stöggl et al., 2010/2012; Taniguchi et al., 2012), whereas the timing of these variables is essential to accurately describe loading on the body during gait. Therefore, the goal of the current study was to compare the kinetics of TS with BF walking including the timing of the variables. Methods Three-dimensional ground reaction force (Bertec) and kinematic data (Flock of Birds) of the dominant leg were recorded for 13 college age females during gait at self-selected speed. Subjects performed three trials for the BF condition and three trials walking in TS (Sketchers Shape-Ups). Interpolation and filtering of kinematic and kinetic data as well as synchronization and time normalization of kinematic data with kinetic data were performed using Motion Monitor interface. Exported data were processed off-line using Matlab 7.6 software. Selected kinetic variables and their timing were studied to describe differences between the two conditions. Results Walking in TS showed greater impact peak and braking force in ground reaction force (GRF) than BF walking. This was accompanied by a more posterior center of pressure at heel strike and an earlier transition from deceleration to acceleration phase in TS condition. Shorter times were observed between the peak in ankle plantar flexion moment and the push-of-peak of vertical GRF, and acceleration force in anterior-posterior direction, respectively. Discussion Results suggest different strategies between the two conditions (BF vs. TS) to prepare for the swing phase. Furthermore, several of the observed characteristics of TS walking were similar to characteristics reported when walking in CS compared to BF walking. Further research will specifically focus on variability when comparing TS and BF. References Nigg BM, Emery C, Hiemstra LA (2006). Med & Sci in Sports & Exer, 38,1701–1708. Stöggl T, Haudum A, Birklbauer J, Murrer M, Muller E (2010). Clin Biom, 25, 816–822. Stöggl T, Müller E (2012). Footwear Science, 4, 131–143. Taniguchi M, Hiroshige T, Toru T, Ichihashi N (2012). Gait and Posture, 35, 567–572. Contact klousm@cofc.edu

INDIVIDUAL GAIT PATTERNS ARE CHANGING MUCH MORE BY ITSELF

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Introduction Biomechanical diagnoses as well as therapeutic interventions typically assume quasi-constancy or nearly reproducibility in their subjects. Despite the knowledge of continuous changes in living systems, only a small amount of variation is tolerated without intervention. The aim of this study is to look for the reliability of force time curves of gait patterns over several hours. Methods Nine healthy and physically active subjects (three female, six male; 27.4 ± 3.0 years) performed six sessions of 15 gait trials at a self-selected speed. The time intervals after the first, second and fifth session to the beginning of the subsequent session were ten minutes. The interval between session two and three and between session four and five were 30 and 90 minutes, respectively. For each trial the ground reaction force of one gait cycle was recorded by two force plates (Kistler, Switzerland) at a frequency of 1000 Hz. The estimation of changes over time based upon the classification rates of support vector machines, which were conducted for each subject individually by means of a multi-session- and session-on-session-classification. The Liblinear Toolbox 1.4 (Fan et al., 2008) was used with a leave-one-out cross-validation to distinguish the classification rates. Descriptive results were presented and statistically tested by a repeated measures ANOVA in four time intervals (T1: 10 min, T2: 30-50 min, T3: 90-110 min and T4: 130-150 min). Results The mean classification rate for the multi-session-classification is 59.5 ± 9.0%. The mean classification rates for the session-on-session-classification result T1 (71.6 ± 14.3%), T2 (85.8 ± 14.7%), T3 (83.3 ± 12.3%) and T4 (92.2 ± 9.3%). The statistical test shows significant results over the four time intervals (p = .000). The pairwise comparisons of T1 and T2 (p = .006) as well as T1 and T4 (p = .001) are significant, T1 and T3 (p = .085) show a statistical trend, whereas T2, T3 and T4 show no statistical trend. Discussion The multi-session-classification rate of 59.5% clearly differs from a random classification of 16.7% and points out differences between the sessions. The session-on-session-classification trends that increasing classification rates go along with increasing time durations between the sessions. This shows differences of the gait patterns and thus indicates changes of the movement. Several reasons like structural system changes, adaptation to the experimental setup and the effects of pauses could cause these changes and should find consideration in further research. The results lead to rethink the classical relationship between diagnosis and therapy or training fundamentally. References Fan RE, Chang KW, Hsieh CJ, Wang XR, Lin CJ (2008). Journal of Machine Learning Research, 9, 1871-4. Contact horst@uni-mainz.de

ANALYSIS OF IMMEDIATE EFFECTS OF UNEVEN GROUND ON GAIT PATTERNS BY MEANS OF SUPPORT VECTOR MACHINES

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Introduction The direction and amount of immediate and delayed effects of interventions are of most interest for training and therapy. The purpose of this study is the immediate (proprioceptive) effect of a mechanical stimulus by an uneven ground surface on the human gait. Effects of ground incline on the muscle activity in a gait study were shown by Klint et al. (2008). For the diagnosis of individual characteristics a complex pattern recognition approach has been suggested (Janssen et al., 2008). With a similar approach Tscharner et al. (2013) could show influences of shoe midsoles on gait patterns. In this context the holistic and immediate effects of an uneven ground surface on time continuous data of the normal human gait were analyzed by means of Support Vector Machines (SVM) and Root Mean Square Error (RMSE). Methods In this study 22 young adults completed ten gait trials before and ten gait trials immediately after an intervention of ten minutes. Kinematic data was captured with a marker based infrared camera system (Qualisys, Sweden) at 250 Hz. The joint angles of the lower body were calculated for the hip, knee and ankle. Kinetic data was measured as ground reaction force (GRF) with two force plates (Kistler, Switzerland) at 1000 Hz for one gait cycle. After post-processing both datasets were used separately for further analysis.