Repeatability and Uncertainty of a Protocol in Children Gait and Database for a Reference Group

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Introduction. The protocol of Helen Hayes is the most used in children gait analysis, especially in Cerebral Palsy studies. Its repeatability was evaluated primarily for adults [1]. The aim of this research is to evaluate uncertainty and repeatability of the protocol and to constitute a database of healthy children.

Materials and Methods. 56 asymptomatic children (28 boys, 28 girls) aged between 5 and 15 years old (mean: 10) have performed the gait exam using VICON® system (MX3). 29 kinematics parameters [2] were extracted. 16 subjects performed the exam twice with markers replacement. In addition, Monte Carlo simulations were carried out by adding a noise measurement (0.58 mm) on markers, to evaluate uncertainty on the calculated angles by the protocol in the 3 plans.

Results and Discussion. A healthy children database with corridors of normality was established for kinematics and kinetics curves. Maximal uncertainty of measurements (2 SD) obtained on angles calculated by the protocol was 4º in frontal and sagittal planes and 8º in horizontal plane. 3 calculated parameters among 29 had a poor repeatability ($p<0.05$).

Conclusion. This study allowed a quantification of uncertainty when Helen Hayes protocol is used for children aged between 5 and 15 years. Studies are in progress to calculate normalcy gait index and its repeatability on asymptomatic children. The database should allow better objectivity on CP pathologies.

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References

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