

# ANALYSIS OF BILATERAL ASYMMETRIES BY FLIGHT TIME OF ONE LEG COUNTERMOVEMENT JUMP

Hans-Joachim Menzel, Silvia Ribeiro Araújo, Mauro Heleno Chagas  
Federal University of Minas Gerais, Belo Horizonte, Brazil

**KEY WORDS:** lower limbs' asymmetries, vertical jump, flight time.

**INTRODUCTION:** Lateral differences concerning the magnitude of strength are frequently found in the lower limbs (LL) and may be related to preference (dominant and non-dominant) and skill performance. For jump tests the lateral differences greater than 15% are considered clinically significant (Noyes et al., 1991). Since Countermovement Jumps (CMJ) on a force platform are an adequate method for the identification of lateral asymmetries (Menzel et al., 2006), the objective was to verify if lateral asymmetries of CMJ performance can also be identified by the flight time of single leg CMJ on a contact mat.

**METHODS:** 29 male physical education students without history of knee injury (mean age  $20,56 \pm 2,25$  years) performed three maximal CMJ on a double force platform where the force-time histories of the vertical ground reaction force were measured separately for each leg. Three one leg CMJ with each leg were also performed on a contact mat where the jump height was determined by flight time. During the CMJ the hands remained fixed on the hips. The jumps were randomly ordered and a rest interval of 2 min was maintained between the jumps. The highest jump was used for further analysis. In order to verify the correspondence of lateral differences identified by the vertical impulse determined by two-leg CMJ on a force platform and one leg CMJ on a contact mat, the contingency coefficient was calculated.

**RESULTS:** The numbers of identified bilateral asymmetries by the different methods are shown in table 1. A significant contingency coefficient (0,617;  $p = 0.01$ ) was found, which indicates a rather good concordance of diagnostic information between the methods.

**Table 1 Crosstabulation of prevalent laterality determined by CMJ on force platform and on contact mat.**

Contact mat (Flight time)	Force platform (Impulse)	
	Symmetry	Asymmetry
Symmetry	23	4
Asymmetry	0	2

**DISCUSSION:** Using a double force platform seems to be the more sensitive method for the identification of bilateral differences, since this method identified 6 cases with relevant differences, whereas one leg CMJ on a contact mat only identified 2 cases. Considering the double force platform a valid criterion, the contact mat method did not identify false asymmetries.

**CONCLUSION:** Though one leg CMJs on a contact mat, which is a less expensive and simpler method than the use of a force platform, do not identify false asymmetries, this method seems to be only a restricted alternative for the identification of bilateral asymmetries of the lower limbs since asymmetries are only partially identified.

## REFERENCES:

- Menzel, H.J.; Chagas, M.H. & Cruz, G.H. (2006). Identification of bilateral asymmetries in lower limbs of soccer players by vertical jumps on a double force platform. Salzburg, Austria: XXIV ISBS, 727-730.
- Noyes, F.R., Barber, S.D. & Mangine, R.E. (1991). Abnormal lower limb symmetry determined by function hop tests after anterior cruciate ligament rupture. *American Journal of Sports Medicine*, 19, 513-518.