FOOT LOADING
UNDER THE HEEL BONE OF SUBJECTS STANDING IN UNSTABLE SHOES

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INTRODUCTION

One of the most frequently hurt tarsal bones is the injury of the calcaneus. Patients usually load the injured foot significantly less than the healthy one. In the last couple of years there has been an increase in promotion of unstable shoe constructions because of the health benefits of this footwear (e.g. MBT - Masai Barefoot Technology). Several studies have focused on biomechanical and neuromuscular changes occurring during gait and standing of subjects wearing these shoes (Nigg et al., 2006; Demura et al., 2012; Price et al., 2013). Nigg et al. (2006) introduce MBT shoes worn during standing as a mechanical muscle training device. Boyer & Andriacchi (2009) mention potential therapeutic opportunities due to the different profile of pressure distribution to the flat-soled shoes. However, a few completed investigations have presented diverse results.

AIM

The aim of this study was to examine whether the usage of MBT shoes influenced the vertical load under the calcaneus.

MATERIAL AND METHODS

- Group of ten healthy women
  (age: 35.1 ± 13.26 years, height 170 ± 5.72 cm, weight: 64.1 ± 7.66 kg);
- Pedar system (Novel, Munich, Germany);
- Interactions between the sole and the insole were studied with subjects standing both in regular athletic shoes and shoes with unstable construction (MBT);
- 20s measurements, frequency of 50 Hz;
- Outcome variables: maximal pressure ($Y_{1,2}$), maximal force in vertical direction ($Y_{3,4}$), maximal vertical force in the area under the calcaneus ($Y_{5,6}$).
- The data were processed by the Matlab programme.

RESULTS

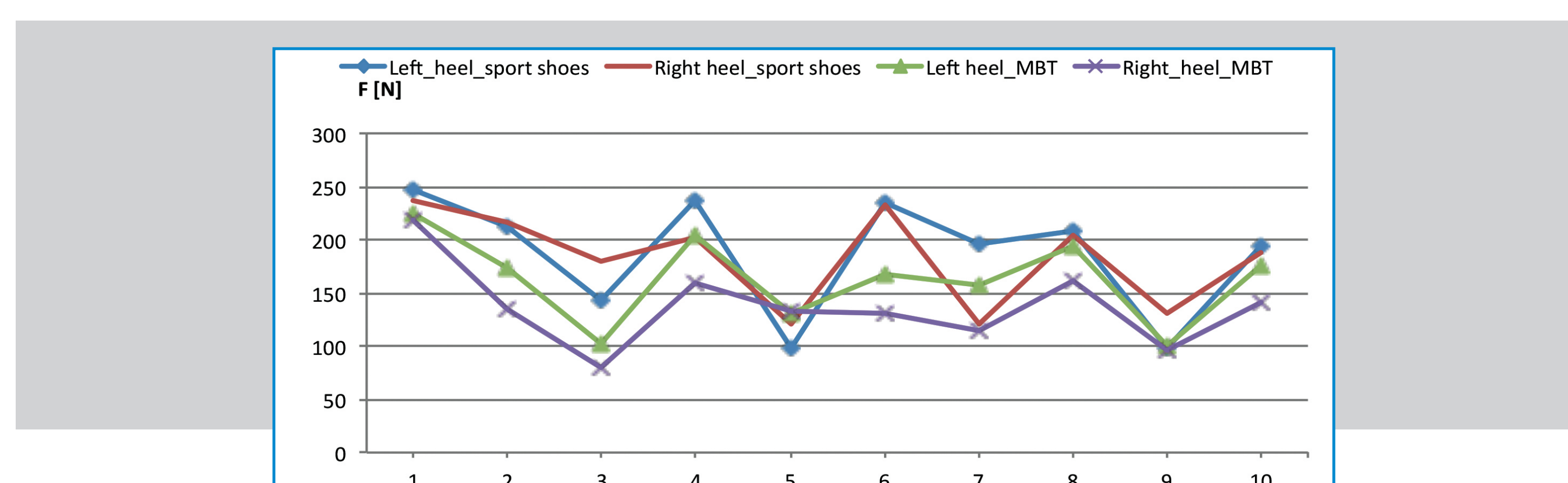Figure 1 presents the values of the vertical force component measured under the calcaneus ($Y_{5,6}$).

Figure 1: Comparison of forces under the calcaneus in MBT shoes and sport shoes (left and right)

To find the difference between the regular shoes and MBT, we used the paired t-test (Table 1). Normal distribution was verified by Lillieforse test.

Table 1: Results of the paired t-test

Variable	Aver. Z	Sz	p-value
Peak Pressure – left (Y_1)	7,30	11,78	0,082
Peak Pressure – right (Y_2)	-2,20	21,02	0,748
Max. Force – left (Y_3)	-7,10	25,26	0,397
Max. Force – right (Y_4)	-2,60	37,58	0,832
Force calcaneus – left (Y_5)	23,50	27,19	0,023
Force calcaneus – right (Y_6)	46,30	38,31	0,004

Z... average difference between MBT and sport shoes
SZ... sample standard deviation

CONCLUSIONS

The load values under the heel bone of subjects standing in MBT shoes are significantly lower than when standing in a pair of regular sports shoes. For other variables, we did not find any statistically significant differences.

REFERENCES

Boyer et al. *Clinical Biom*. 24: 872-76, 2009.
Demura et al. *The Foot* 22: 18-23, 2012.
Nigg et al. *Clinical Biom*. 21: 82-88, 2006.
Price et al. *Gait & Posture* 38: 410-415, 2013.
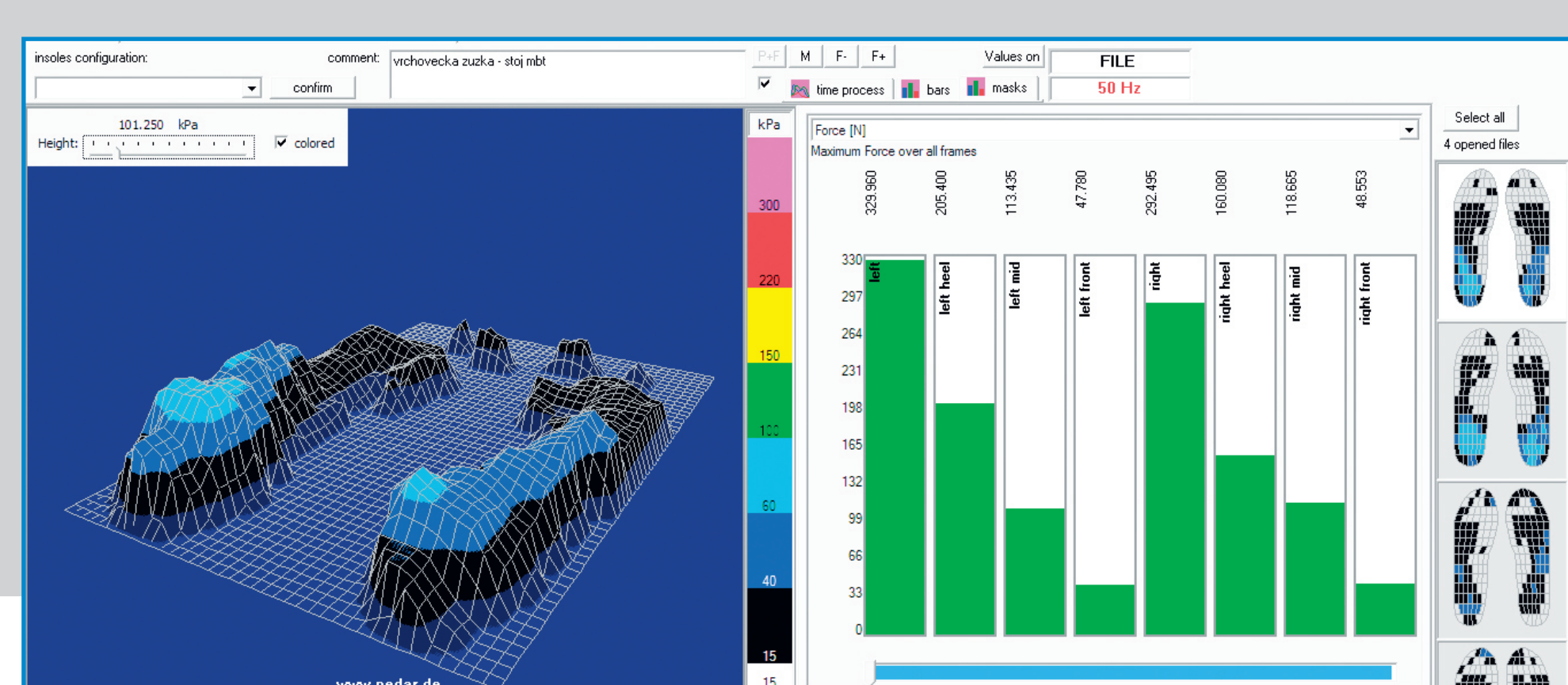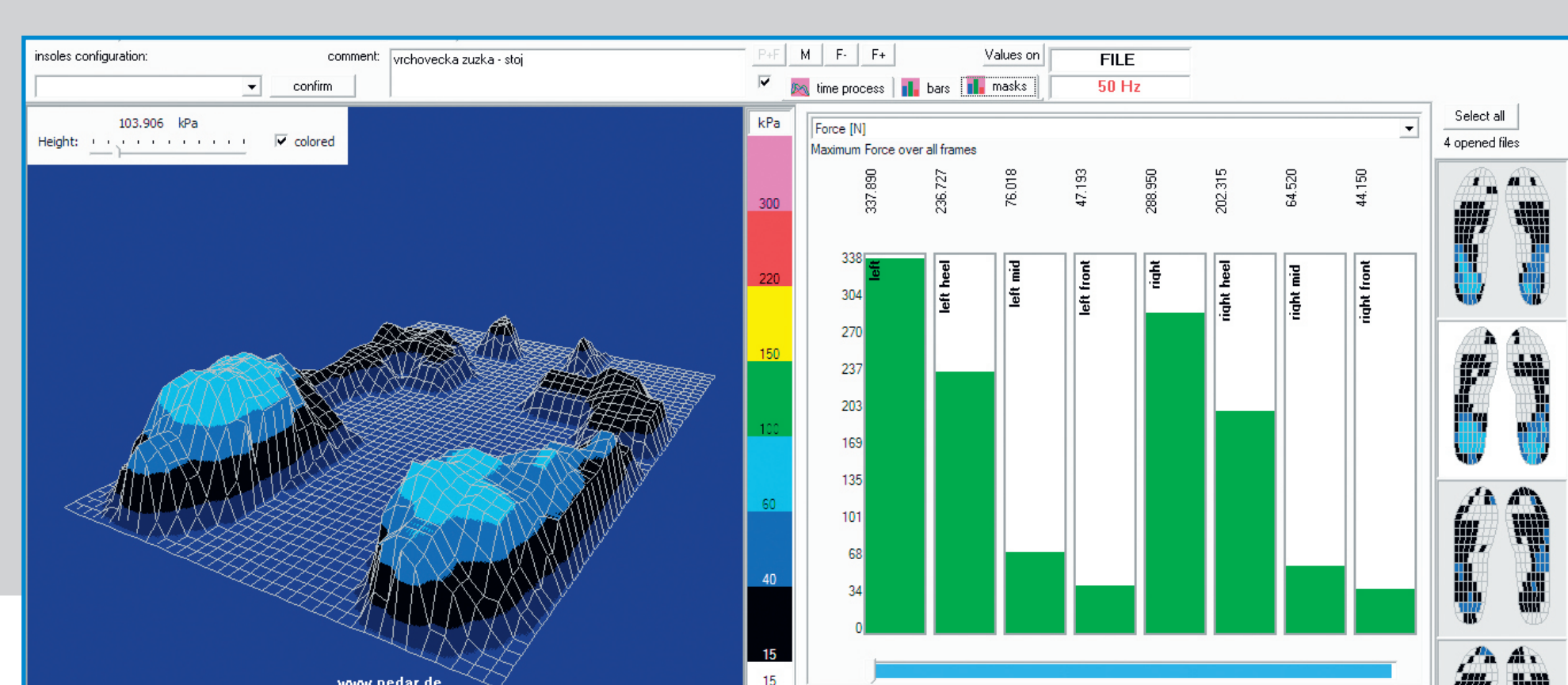
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