Increased Metabolism while standing with unstable shoe construction.

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ABSTRACT

This research investigated the issue of the extent to which wearing footwear with unstable sole construction can stimulate metabolic activity of the muscles in the lower extremities. The study examined whether, and how heavily, wearing an MBT shoe (Masai Barefoot Technology) influences energy consumption in everyday life. Oxygen consumption and heart rate were examined for differences between the MBT shoe, a conventional running shoe of equal weight, and barefoot.

Female (n = 6) and male (n = 10) persons (29.8 ± 6.8 years) were recruited. The subjects completed standing trials in the laboratory with running shoes and MBT shoes to assess possible differences in the footwear when standing calmly in terms of metabolism. When standing calmly for two lots of 6 minutes, a significantly higher oxygen intake was recorded for the MBT shoe compared to the running shoe ($p < 0.01$). The increase in oxygen consumption was on average 9.3 ± 5.2 %.

Oxygen consumption and heart rate were also analysed in the laboratory on the treadmill at different speeds (4 to 7 km/h) and at different gradients (horizontal, +10 and -10%). The MBT shoe data was compared to a control shoe of equal weight, and barefoot. Female (n = 5) and male (n = 11) persons (32.8 ± 7.5 years) were again recruited. For an n of 16, no significant increase in oxygen consumption or heart rate was recorded between an MBT shoe and a control shoe of equal weight (p-values depending on

speed/gradient between 0.12 - 0.83 for oxygen consumption and 0.35 - 0.89 for heart rate).

The results between an MBT shoe and barefoot (horizontal, 5 km/h) were a different story. With the MBT shoe, a 4.4 ± 8.2% higher oxygen intake ($p < 0.01$) and a 3.6 ± 7.3% higher heart rate ($p < 0.01$) were recorded compared to barefoot.

A field test on a 400-metre track was also conducted with 5 male subjects (29.7 ± 3.1 years). No increased oxygen consumption was recorded between the MBT and running shoes. The same observation applied for heart rate. On the other hand, between the MBT shoe and barefoot, a tendency towards an increased oxygen consumption with MBT ($p < 0.1$) was recorded, but not for heart rate ($p = 0.25$).

It appears that the unstable sole construction of the MBT causes an increased metabolism particularly when standing, meaning the basic caloric metabolic rate also increases when wearing the shoe regularly in everyday life. Although the change only affects approximately 20 kJ/h, the cumulative effects could very much be of relevance to individual persons over 1 year.

A functional advantage can be expected through sensorimotor activation of the small foot muscles and lower leg muscles, particularly the type I fibres. This would lead to additional muscular joint stabilisation and encourage balance.