

# Comparison of microclimate between breathable and non-breathable shoes

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**Introduction:** Demands of running shoes defined by Reinschmidt & Nigg (2000) can be referred to shoe climate, too (Auer et al., 2008).

Demands of running shoes	Reference to shoe climate
injury prevention	blisters and runner's feet (Steigleder, 1977)
comfort	part of long term comfort (Auber et al., 1983)
performance	evidence that cooler feet lead to better performance (Livingston et al., 1995)

**Method:** Comparison of microclimate in running shoes via wearer trials and apparative tests with a moveable sweating foot.



Shoe 1  
adidas ClimaCool Revolution  
with a breathable mesh



Shoe 2  
varied version with a non-breathable PU-leather

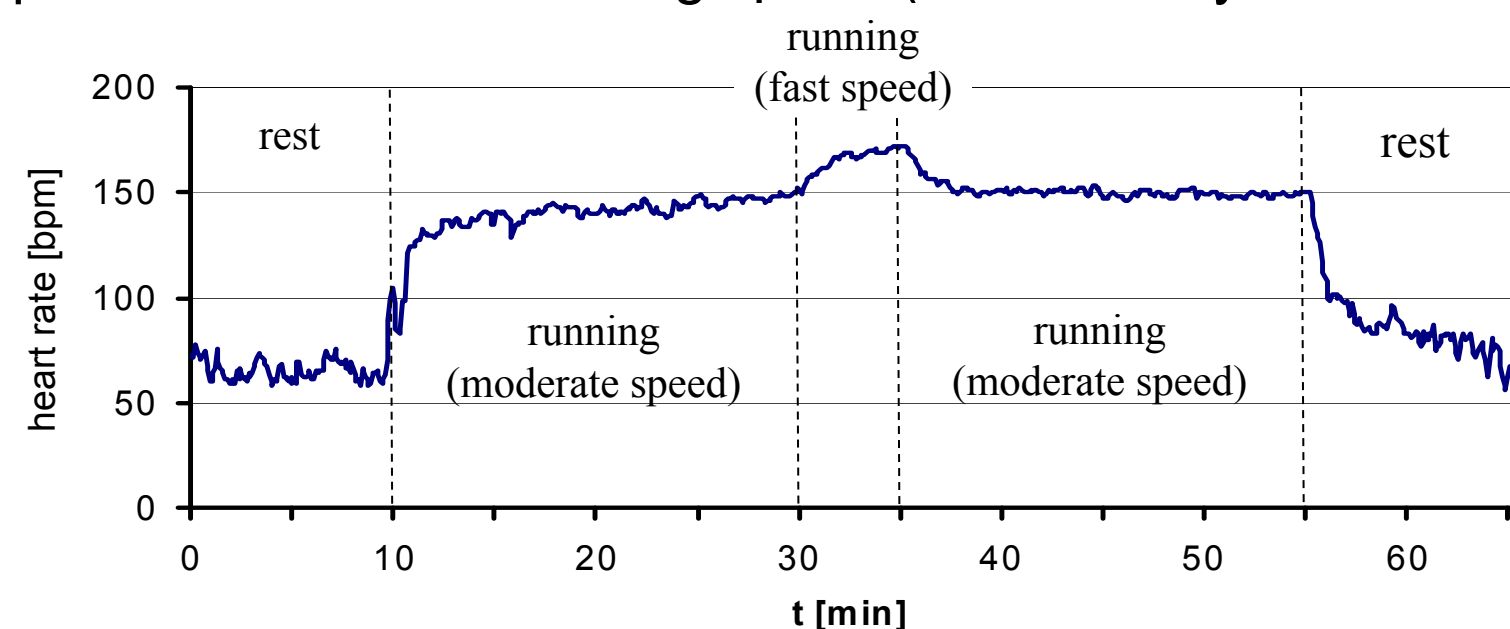
**wearer trails:**

treadmill running with 30 experienced runners (age 33±10, 36±20km/week)

microclimate measurements with 20 sensors (temperature and humidity)

subjective feedback

phases of different running speed (individual by 10km best)



**apparative tests:**

measurement of thermal insulation and water vapour resistance with a moveable sweating foot

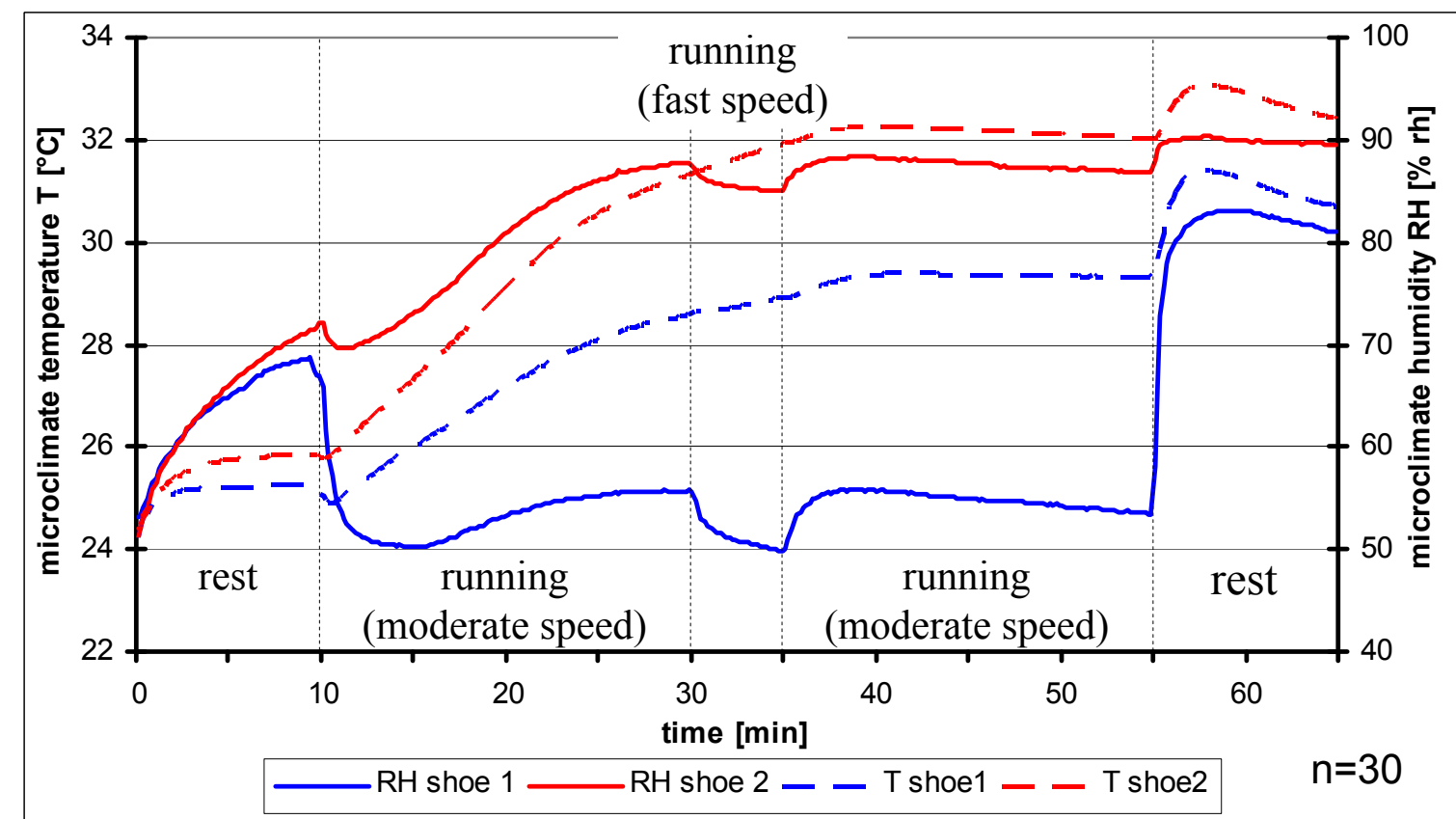


$R_c$  measurements:  
 $T_a=15^\circ\text{C}$ ,  $\text{RH}_a=50\%\text{rh}$ ,  $T_s=31^\circ\text{C}$

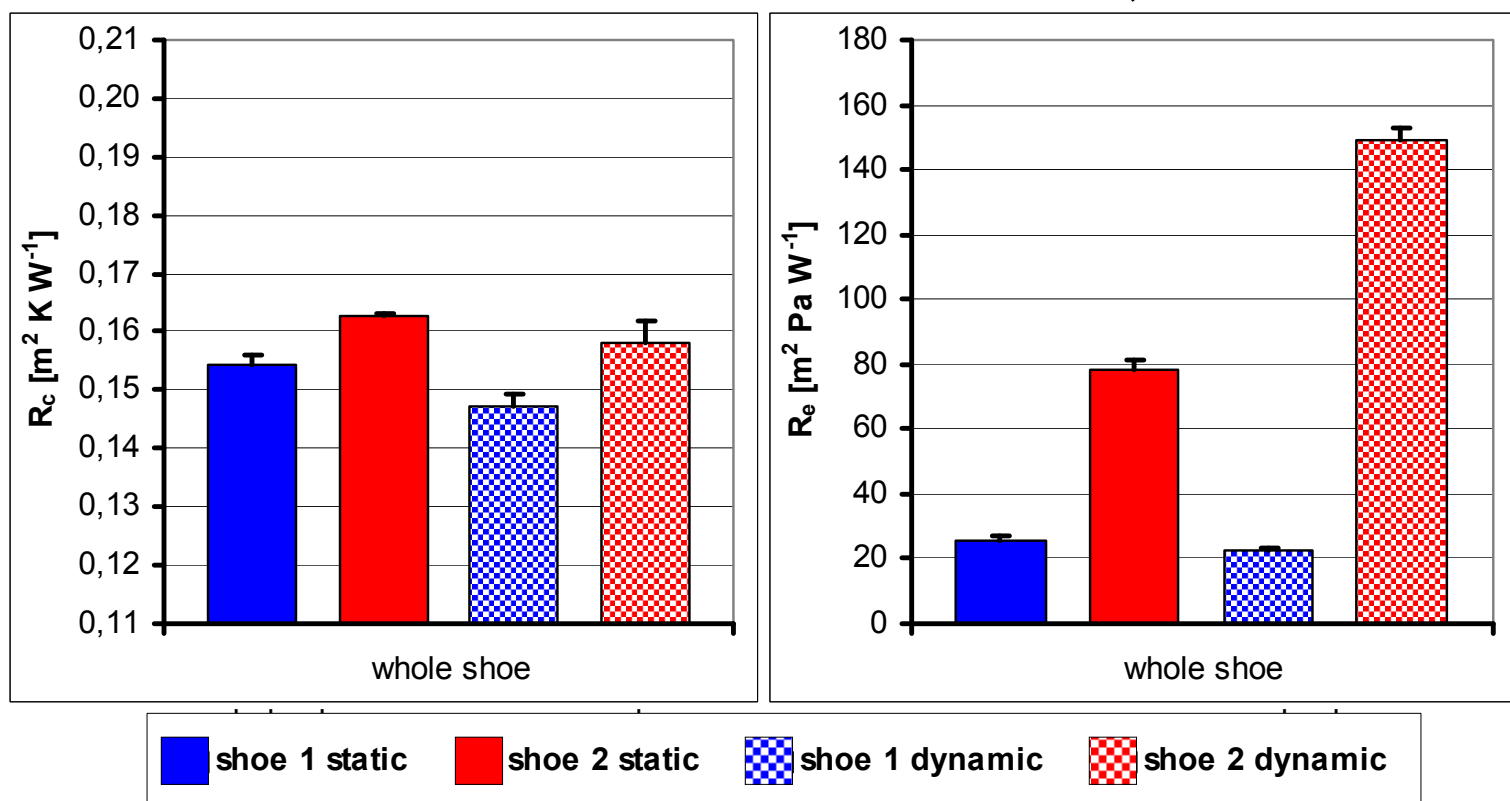
$R_e$  measurements:  
isothermal,  $T_a=23^\circ\text{C}$ ,  $\text{RH}_a=25\%\text{rh}$ ,  
 $T_s=23^\circ\text{C}$ , sweat rate 28,5g/h

both static and dynamic (40 steps per minute, 25kg)

**Results:** During *wearer trials* measured temperature and humidity were always highly significant lower for the breathable shoe compared to the non-breathable one.



**Apparative tests** of thermal and water vapour resistance show lower values for the breathable shoe, too.



**Conclusion:** In *wearer trials* values of temperature and humidity were much lower in the breathable shoe compared to the non-breathable and subjects could feel these differences. This fact could be proved by apparative tests with a moveable sweating foot. Highest differences could be found during motion. This allows the conclusion, that shoe climate can be improved by a breathable mesh-upper.

**Acknowledgements:** The *wearer trials* were supported by adidas AG (*ait.*-Research).

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