Personal cooling with phase change materials to improve thermal comfort from a global warming perspective

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PERSONAL COOLING WITH PHASE CHANGE MATERIALS TO IMPROVE THERMAL COMFORT FROM A GLOBAL WARMING PERSPECTIVE

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INTRODUCTION
Climate change increases the frequency of heat waves. During July and August 2003, significantly above-average temperatures were observed throughout Europe. It is important to be prepared for such impacts on the society. The objective was to study if the personal cooling with phase change materials (PCM) could improve thermal comfort in simulated office work.

METHODS
 Cooling vests with PCM (melting at 21 °C) was used. Eight male subjects, age 27.0±2.3 years, height 1.73±0.03 m and weight 71.4±10.0 kg participated in the study in a climatic chamber (Ta=34 °C, RH=60%, and Va=0.4 m/s) and worked with a laptop computer. The subjects wore only a T-shirt and shorts during the first 30 min, and then put on the PCM vest, and continued working for 60 min. Skin and rectal temperatures, whole body and local thermal sensations were recorded.

RESULTS
Results showed that the torso skin temperatures decreased about 2-3 °C and stayed at 33.3 °C. Both whole body and torso thermal sensations were improved.

CONCLUSION
 The findings imply that the personal cooling with PCM can be used as an alternative to improve thermal comfort for office workers without air-conditioning, and may be used for elderly people confronting with heat waves.

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