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Effect of carbon fiber plate equipped running shoes on lactate metabolism during incremental running test

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## INTRODUCTION:

The purpose of this study was to examine the changes in physiological load in hypoxic environment caused by differences in shoes with and without carbon fiber plates in an elite Japanese distance runner.

## METHODS:

The Carbon Plated Shoes: Nike-ZoomX Vaporfly Next% 2 (VFN), and the non-carbonated shoes: Nike-ZoomX Pegasus Turbo 2 (PT2) were tested in an elite male distance runner on a 10-step x 3-min incremental running test under normobaric hypoxia ( $F_{iO_2}=14.4\%$ ).

## RESULTS:

The longest 30-min incremental running test could not be completed in either shoe condition, with a duration of 26 min in PT2 and 28 min 30 sec in VFN. Running speeds at blood lactate concentrations ( $La$ ) of 2 mmol/L and 4 mmol/L were 242 m/min and 280 m/min, respectively, for PT2 compared to 285 m/min and 308 m/min, respectively, for VFN. The highest value of  $La$  occurred at stage 9, when exhaustion was reached in both conditions, at 15.2 mmol/L for PT2 compared to 12.5 mmol/L for VFN. In addition, lower heart rate and higher arterial oxygen saturation were observed in the VFN condition compared to the PT2 condition at the same stage.

## CONCLUSION:

These results suggest that changes in running shoes with and without carbon fiber plates may alter energy metabolism in the glycolytic system, and therefore, continuous assessment of aerobic capacity by running should be performed using the same running shoes.

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