# PHYSICAL DILATATION OF THE NARES LOWERS THE THERMAL STRAIN OF EXERCISING HYPERTHERMIC HUMANS

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## INTRODUCTION

The magnitude of respiratory heat loss in exercising, hyperthermic humans was demonstrated to be as high as 100 W (1) suggesting this avenue of heat loss is of sufficient magnitude to contribute to SBC. Also in hyperthermic exercising humans the inhalation of supersaturated air, that suppresses evaporative heat loss in the upper airways, appeared to remove a local cooling effect causing a convergence of brain temperature indexed by $T_{ty}$, and trunk temperature indexed by esophageal temperature ($T_{es}$) (2). Petruson and Bjuro (3) reported a smaller increase in systolic blood pressure during dynamic exercise to maximal work rates, during nare dilatation than during the same exercise with undilated nares. In the present work the nares were physically dilated to examine the possible involvement of the upper airways in the perspective of selective brain cooling in hyperthermic humans.

## METHOD

Six subjects of 25.3 ± 1.4 years of age exercised on a bicycle ergometer in a warm room (28 ± 0.2°C and 28 ± 5%RH) to induce a moderate level of hyperthermia. Each subject participated on 2 occasions, on separate days, once with the nares physically dilated with blunted hooks and an elastic cord (average dilatation 1.64 ± 0.21 times) and once without the nares dilated. Work rates were the same in the two sessions. Following a 5 min resting period subjects pedalled at 60 W for 5 min, 100 W for 15 min and 150 W for 20 min.

## RESULTS

Tympanic temperature ($T_{ty}$) increased at a rate that was significantly smaller during the exercise condition with dilated nares (1.5 ± 0.3°C·h$^{-1}$) than during the control condition (1.8 ± 0.4°C·h$^{-1}$). This decrease in the rate of $T_{ty}$ from the control to the dilated condition was negatively and significantly correlated to the degree of nare dilatation in the group of subjects ($r$=0.85, $P$<0.05). Skin temperature measured on the Eace showed parallel changes in the two conditions, and as such did could not be used in the explanation of the results. The mean forehead skin blood flow estimated by laser Doppler velocimetry was significantly lower during the dilated condition. indicating a reduced thermal strain.

## CONCLUSION

These results suggest that the nose is involved as a heat exchanger involved in selective brain cooling of hyperthermic humans.

## REFERENCES

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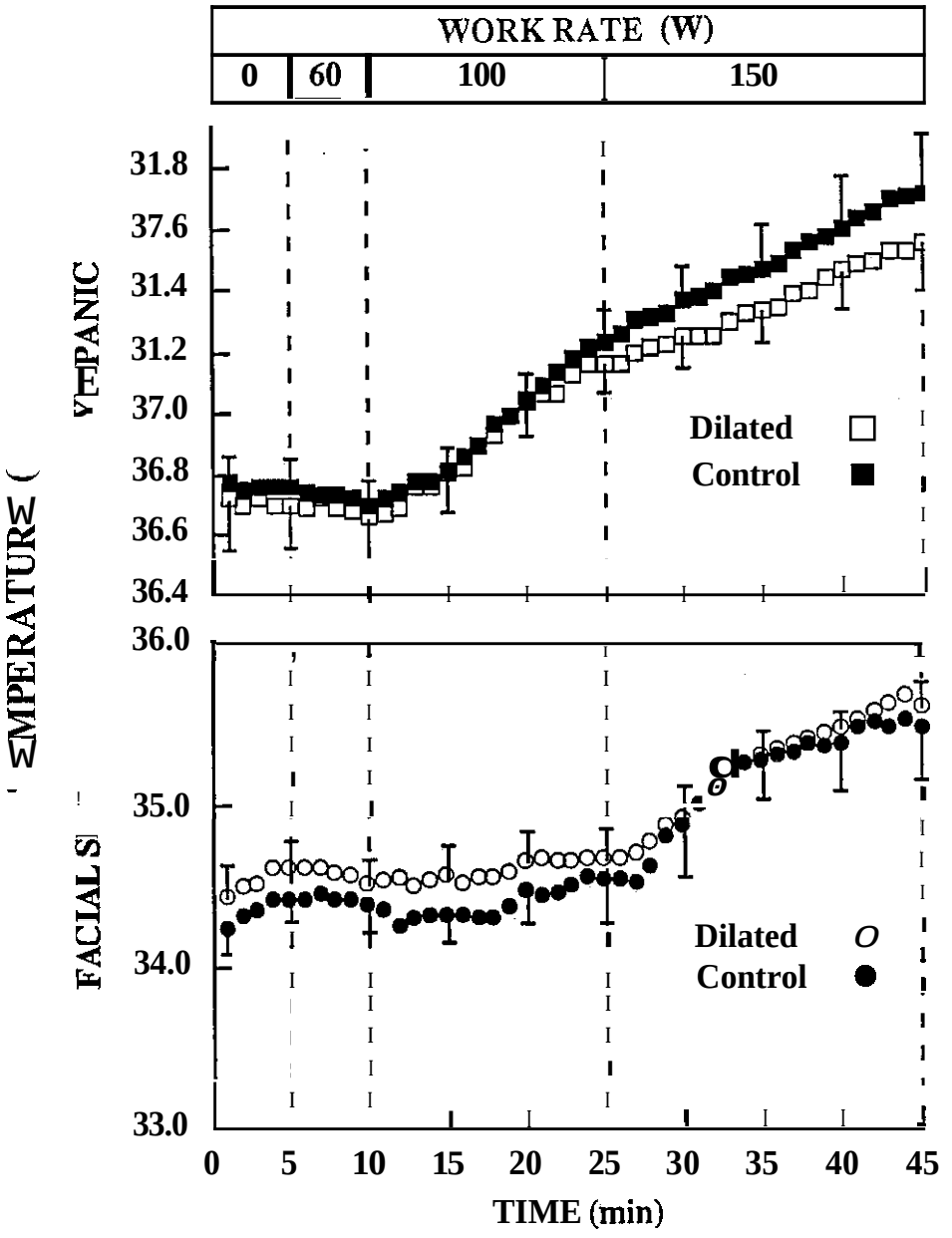


Figure 1 ***Upper Panel*** Time course of tympanic temperature ($T_{ty}$) with the nose dilated, and during the conuol sessions of exercise. The **rate** of increase of $T_{ty}$ in the dilated condition was greater than that in the control, following the increase of work rate from 100 W to 150 W at min 25. ***Lower Panel*** indicates the corresponding values for the skin temperature for the dilated and control conditions. All values are mean ± SE for the group of 6.

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