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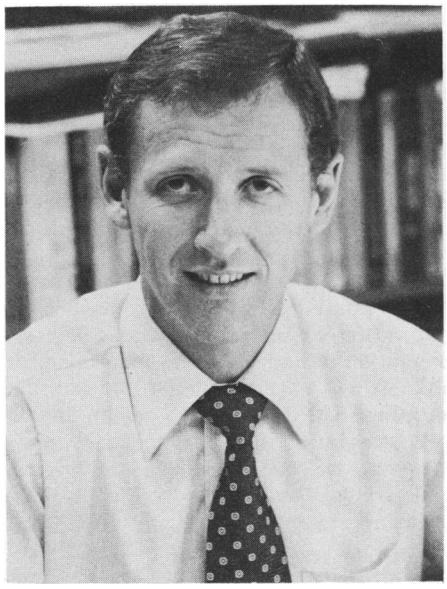

# THERMOREGULATORY RESPONSES DURING A MARATHON
## A CASE STUDY OF A WOMAN RUNNER

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Rectal temperatures ($T_{re}$) of 40°C and greater have been recorded from men immediately after completing marathon (42.2 km) races (Pugh, Corbett et al, 1967; Costill, Kammer et al, 1970; Wyndham, Strydom, 1969). Data on two male runners suggest that after an early initial rise in $T_{re}$, a high $T_{re}$ (39°C to 41°C) is maintained throughout the run (Maron, Wagner et al, 1977). To provide information concerning the thermoregulatory responses of women during a marathon run, $T_{re}$ (10 cm beyond the anal sphincter), and thigh temperature ($T_{th}$, anterior, mid-thigh) were measured from a moderately trained (48 to 65 km · $wk^{-1}$, $\dot{V}_{O_2}$ max = 56.3 ml · $kg^{-1}$ · $min^{-1}$) 38 year old woman runner.

Temperatures, including air temperature ($T_a$), were measured on a battery-powered digital thermometer approximately every ten minutes during the race, and for an hour afterward. Eight kilometre split times obtained from officials stationed along the course indicated that the runner maintained a 5.6 min · $km^{-1}$ pace throughout the entire run, finishing in 235 minutes.

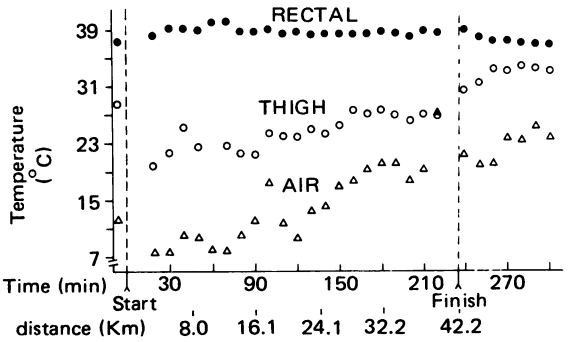


*Fig. 1. Rectal, thigh and air temperatures during and following a marathon.*

Recorded temperatures are depicted in Figure 1. At the beginning of the run, $T_a$ was 12.7°C, declining to 7.8°C, 20 minutes into the run, and then gradually rising and reaching a plateau of 18.1°C to 20.5°C from 170 to 210 minutes. The sharp increase to 27.9°C in $T_a$ at 220

minutes occurred when the runner was on the only portion of the course without shade. The runner's $T_{th}$, an estimate of mean skin temperature (Mitchell, Wyndham, 1969), followed a similar pattern. As the race started, $T_{th}$ was 28.5°C which decreased to 20.9°C after 20 minutes, and then began to rise slowly as the race continued. Thigh temperature fluctuated between 27.7°C and 26.3°C during the final 80 minutes of the run, and did not increase with the final increase in $T_a$.

In contrast to the "fall and rise" pattern observed in both $T_a$ and $T_{th}$, $T_{re}$ rose from 37.5°C just prior to the race to 38.9°C after 20 minutes of running. Except for one brief period, $T_{re}$ was maintained between 38.9°C and 39.1°C throughout the run, despite increases in $T_a$ and $T_{th}$. Between 60 and 80 minutes of the race, $T_{re}$ rose to 40.0°C, which coincided with running up a four kilometre long hill. Rectal temperature returned to pre-race values, 37.5°C, within 45 minutes of finishing the race.

The $T_{re}$ of this woman runner was similar to that reported for competitive male marathon runners (Maron, Wagner et al, 1977). As with their subjects, there was no evidence of either heat stress or decrement in performance associated with the high $T_{re}$ for our woman runner. Although the evidence is scant, it appears that high body temperatures can be maintained by women marathon runners for considerable lengths of time with no apparent adverse effects. Further studies are necessary to determine if other women runners maintain similar $T_{re}$ during marathon runs, and to determine the underlying mechanisms of thermoregulation in women long distance runners.

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