ANNOTATIONS

LATULIPPE — A CASE STUDY OF A ONE HUNDRED AND SIXTY KILOMETRE RUNNER —
Part II — ENVIRONMENTAL CONDITIONS

L. A. KUEHN, PhD

*Biosciences Division, Defence and Civil Institute of
Environmental Medicine, 1133 Sheppard Avenue W., DOWNSVIEW, Ontario, Canada*

The physiological and biochemical data concerning the hundred and sixty kilometre run performed by this 55 year old athlete in 20 hours was described by O'Hara *et al* earlier this year, 1977. The environmental conditions and other biophysical measurements were not included in this earlier paper, and may be of interest to readers in regards to the environmental stress experienced by this remarkable individual.

During the run, ambient meteorological conditions were monitored by wet bulb (WB), dry bulb (DB) and globe (GT) thermometers for the purpose of determining the heat stress encountered during the run, as defined by the formula of the Wet Bulb Globe Temperature (WBGT) index (Yaglou and Minard, 1957):

$$\text{WBGT} = 0.7 \text{ WB} + 0.2 \text{ GT} + 0.1 \text{ DB}$$

The ambient climatic conditions are shown in Figure 1. Dry bulb temperature ranged from 6.1 to 18.9°C (43 to 66°F); wet bulb temperature from 4.4 to 12.2°C (40 to 54°F) and globe temperature from 4.4 to 29.4°C (40 to 85°F). During the night, the globe temperature fell below the dry bulb temperature, indicative of radiative heat loss to the night sky and the reverse of the situation during the day when the runner was the recipient of solar radiation. Such a condition was beneficial to him during his night run, allowing him greater ease of thermoregulation, already aided by low dry and wet bulb temperatures. The climatic variation during the day was due to periods of cloud.

WBGT calculations in excess of 26.7°C (80°F) are considered thermally uncomfortable and those in excess of 29.4°C (85°F) are considered thermally hazardous. As shown in Figure 1, the heat stress encountered during the run was never thermally uncomfortable or hazardous. Wind speed varied from 5 to 27 km/h (300-1500 ft/min) and relative humidity varied from 46 to 81%. The running conditions were judged to be excellent, especially in consideration of the fact that over 50% of the running took place at night during cooler climatic conditions.

During each field stop (brief (2.5 min) halts for physiological monitoring were made after 3.5, 5.25, 6.75, 9.0, 11.0, 13.0 and 17.5 hours of running), the legs

1. Climatic conditions during the run. The letters P2 to P10 denote stops for physiological monitoring.

2. Skin temperatures measured with AGA Thermovision infrared imaging system at stops P2 to P10 with reference to control measurements in comfortable laboratory surroundings, P1. In P1, the mean temperature of the legs was uniformly near 32°C. The clear empty isotherm depicted in P2 denotes 34°C and the cross hatched isotherm first observed in P3 denotes temperatures equal or higher than 36°C.

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of the subject were photographed with an AGA Thermovision infrared imaging camera for documentation of the surface temperature changes occurring as a consequence of running. Figure 2 shows the progressive changes in leg skin temperature as measured by the infrared, imaging camera relative to a control assessment made in comfortable laboratory surroundings (Pose 1). The times at which Poses 2 to 10 inclusive were obtained are indicated in Figure 1. During the early part of the run, the leg skin temperature increased markedly, particularly over the lateral aspect of the quadriceps femoris, the dorsiflexors of the ankle and the gastrocnemius, reaching a maximum intensity at Pose 4 (5.25 hours after start of

the run or 1925 hours clock time). Thereafter the temperatures decreased during the cool night phase of the run, increasing again after sunrise (Pose 10). Particularly interesting are the results for Pose 4 which were taken shortly after the first caloric ingestion of the run. The region of the abdomen overlying the liver increased greatly in temperature. This observation may reflect an elevated internal temperature in the liver as a consequence of having run continuously for a prolonged period (4 hr) without nourishment. The thermovision measurements should be considered only in a qualitative sense as they were not performed at a standard room temperature.

REFERENCES

- O'Hara, W. J., Allen C., Shephard, R. J. & Gill, J. W. 1977: Latulippe — a case study of a one hundred and sixty kilometre runner. *Brit.Journ.Sports Med.* 11 83-87.
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