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PHYSIOLOGICAL STUDIES OF HEAT STRESS ACCLIMATION DURING A SPECI—ETC(U)

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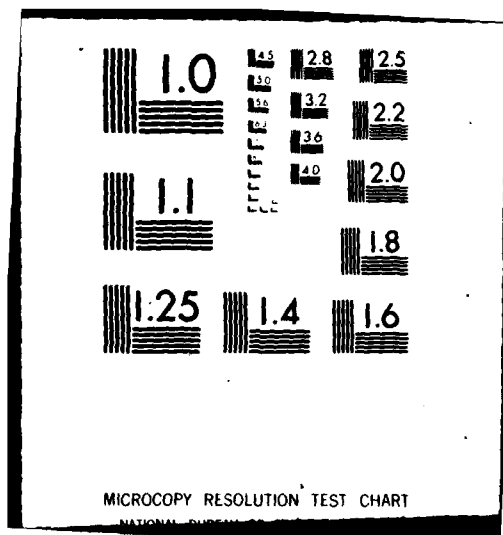
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Final Technical Report
October 1981

PHYSIOLOGICAL STUDIES OF HEAT STRESS
ACCLIMATION DURING A SPECIFIC EXERCISE REGIMEN

UNIVERSITY OF ARKANSAS
LITTLE ROCK, AR 72204

Dr. Morgans

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Body of the Final Report

I. A comprehensive list of the research objectives

The primary objectives of this study were to measure (1) core temperature, (2) skin temperature, and (3) sweat production of subjects while they were involved in the exercise regimen of racquetball in order to determine whether or not that sport can act as a heat acclimator by producing a high level of hyperthermia.

II. Status of the research

All of the research objectives were completed during this past summer. A total of eleven subjects were used in this study. The results were used in this study. The results are summarized as follows:

(1) There was a significant increase in core temperature (rectal) during an hour of racquetball play (Table 1). Rectal temperatures increased from 37.6° at the beginning of the hour to 39.0° at the end of the hour. Thus, the exercise regimen of racquetball had a significant hyperthermic effect. ($P < .001$).

(2) There was a significant decrease in skin temperature ($P < 0.025$) during an hour of racquetball play (Table 2). Skin temperature fell from 32.6° at the beginning of the hour to 31.1° at the end of the hour. The core hyperthermia thus produced a sweating response which in turn had a cooling effect on the skin.

(3) An hour of racquetball caused a high level of sweating (Table 3). The average subject secreted 1.58 mg/cm²/min of sweat during the hour.

(4) There were weight losses during a hour of racquetball play (Table 3). The average subject lost 1.21 kg., or 1.53% of his total body weight, during the hour.

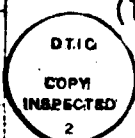
III. A cumulative chronological list of written publications in technical journals.

Since the data for this project was collected during this past summer, the results are not yet in press. The article has been sent to the Journal of Applied Physiology.

IV. Coupling activities - spoken papers presented at meetings and seminars

This paper will be presented at the annual meeting of the American Alliance for Health, Physical Education, Recreation and Dance, the American College of Sports Medicine, or the Federation meetings.

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NOTICE OF RESEARCH RESULTS

This technical report is approved and is approved for publication in AFSC 130-12.

Distribution is unlimited.

MATTHEW J. KERTER

Chief, Technical Information Division

V. Applications stemming from the research effort

The primary application derived from this research effort was that the exercise regimen of racquetball has been shown to be a good heat stress acclimator by virtue of the finding that it produces a significantly high level of hyperthermia.

Table 1. Core temperature responses of subjects while they played racquetball for one hour

Time-minutes							
Subjects	0	10	20	30	40	50	60
1	37.4	38.2	38.6	38.7	38.8	38.8	38.8
2	37.9	38.4	38.7	38.8	39.0	39.1	39.3
3	37.4	37.7	38.2	38.7	38.9	39.0	39.2
4	38.0	38.5	38.9	39.3	39.4	39.5	39.5
5	37.8	38.4	38.5	38.6	38.7	38.6	38.8
6	37.7	38.0	38.3	38.8	38.9	38.9	38.9
7	38.0	38.1	38.4	38.7	39.0	39.1	39.1
8	37.6	37.7	38.3	38.7	39.0	39.3	39.5
9	37.4	38.0	38.3	38.4	38.4	38.5	38.6
10	37.6	38.3	38.6	38.9	39.2	39.3	39.5
11	37.2	37.4	37.7	37.9	38.0	38.1	38.1
$\bar{X} \pm SD$	37.6 ± 0.26	38.1 ± 0.33	38.4 ± 0.30	38.7 ± 0.32	38.8 ± 0.36	38.9 ± 0.39	39.0 ± 0.42

* $\bar{X} \pm SD$ = mean $\pm$ standard deviation

Table 2. Skin temperature response of subjects while they played racquetball for one hour.

Subjects	Time-minutes						
	0	10	20	30	40	50	60
1	33.4	31.6	32.3	31.8	31.8	31.8	31.1
2	31.7	31.9	30.3	29.1	34.0	33.9	33.5
3	33.6	30.5	28.8	30.5	31.2	29.5	31.1
4	32.4	31.8	32.4	33.3	33.5	32.1	31.2
5	32.9	31.6	33.2	33.7	33.8	32.7	33.2
6	32.4	32.8	31.5	31.8	31.2	29.4	29.6
7	32.6	32.1	30.5	31.0	32.9	31.0	29.7
8	31.3	30.1	30.4	29.4	32.5	31.6	29.6
9	**ND						
10	33.0	31.7	30.9	31.5	31.4	30.8	31.3
11	33.1	32.1	31.5	30.7	30.1	31.6	31.0
* $\bar{X} \pm SD$	32.6 ± 0.69	31.6 ± 0.74	31.2 ± 1.21	31.3 ± 1.41	32.2 ± 1.24	31.4 ± 1.30	31.1 ± 1.29

* $\bar{X} \pm SD$ = mean $\pm$ standard deviation

** ND = no data

Table 3. Sweat rates and weight losses of subjects while they played racquetball for one hour.

Subjects	Sweat rates (mg/cm ² /min)	Weight Loss (kg)
1	1.77	**ND
2	1.32	0.91
3	2.03	1.70
4	1.73	2.04
5	1.56	1.36
6	1.49	1.07
7	1.39	1.02
8	2.00	0.91
9	1.29	0.79
10	1.90	1.59
11	0.95	0.68
* $\bar{X} \pm SD$	1.58 ± 0.32	1.21 ± 0.42

* $\bar{X} \pm SD$ = mean $\pm$ standard deviation

** ND = no data

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