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Use of B-Proteus OX19 Agglutination in Diagnosis of Cancer.

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In a recent study the sera of pregnant women uniformly were found to contain a high titer of agglutinins for B-proteus OX19. In the course of that study¹ it appeared that the sera of women with malignant neoplastic disorders likewise strongly agglutinated proteus organisms. Even though the reaction was non-specific, yet it was believed that the agglutination test often might provide evidence for the existence of cancer.

For this reason the titer of B-proteus OX19 agglutinins* was measured^{2,3} in the sera of 30 normal women, 27 with mammary carcinoma, and 3 with carcinoma of the cervix. The diagnosis of carcinoma in each instance

was confirmed by microscopic examination of biopsied sections.

The results of this study failed to indicate any difference between the sera of the two groups (Table I). Of the 30 sera taken from persons having cancer, 14 gave positive agglutinations with B-proteus OX19, the titer ranging from 1:20 to 1:160 (only one serum agglutinated as high as 1:160). Of the control group, 21 sera showed positive reactions, the titers ranging from 1:20 to 1:80.

Conclusion. By the methods used, there was no evidence that the agglutination of B-proteus OX19 antigen would be of value in determining the presence of cancer.

TABLE I.
The Agglutination Titer of the Sera Studied for B-Proteus OX19.

	Titers				
	0	1:20	1:40	1:80	1:160
Control individuals	9	7	9	5	0
Patients with mammary or cervical carcinoma	16	6	5	2	1

¹ Gratch, I., *Am. J. Surg.*, 1943, **60**, 411.

(Yearbook).

* Lederle Laboratory antigen.

³ Welch, H., and Mickle, F. L., *Am. J. Pub.*

² Welch, H., *Am. J. Pub. Health*, 1937, **27**, 141

Health, 1936, **26**, 248.

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Effect of Cooling Isolated Parts upon the Comfort of Man Resting in Hot Humid Environment.*

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Hill¹ and Kuno and Ikeuchi² inhibited sweating in human subjects by cooling iso-

lated portions of the body. They made no attempt to correlate the temperature of the bath cooling the part, the temperature and humidity of the environment, and the size of the area cooled, with the quantity of sweat and the comfort of the subjects. Nor were attempts made to evaluate the efficiency of

* Aided by a grant in aid from the Rockefeller Foundation.

¹ Hill, L., *J. Physiol.*, 1921, **54**, 137.

² Kuno, G., and Ikeuchi, K., *J. Orient. Med.*, 1928, **9**, 53.

local cooling on the adaptation of a man to a very uncomfortable, hot, and humid environment. The present studies were undertaken to throw light upon these problems.

Methods and Materials. The studies were conducted in an air-conditioned room with the temperature and relative humidity controlled at $75^{\circ} \pm 1^{\circ}\text{F}$ and $50\% \pm 2\%$, respectively. The temperature and relative humidity of the room could be raised within 15 minutes to the desired levels as indicated below. The room in which the subjects rested contained very little of the recording apparatus in order to reduce the psychic disturbance to a minimum. Twenty-six (25 white and one negro) young adults, trained subjects who had had consid-

erable experience around research laboratories, were used. They varied from 22 to 37 years of age. Three of the subjects were females.

The rate of water loss was measured from the skin of the right index fingertip, right forearm, and midepigastrium by a method described by Neumann, Cohn and Burch.³ The oral and rectal temperatures were measured and recorded photographically by means of copper-constantan thermocouples. The variations in the volume of pulsations of the right index fingertip and right second toetip were measured by means of a modification of

³ Neumann, C., Cohn, A. E., and Burch, G. E., *Am. J. Physiol.*, 1941, **132**, 748.

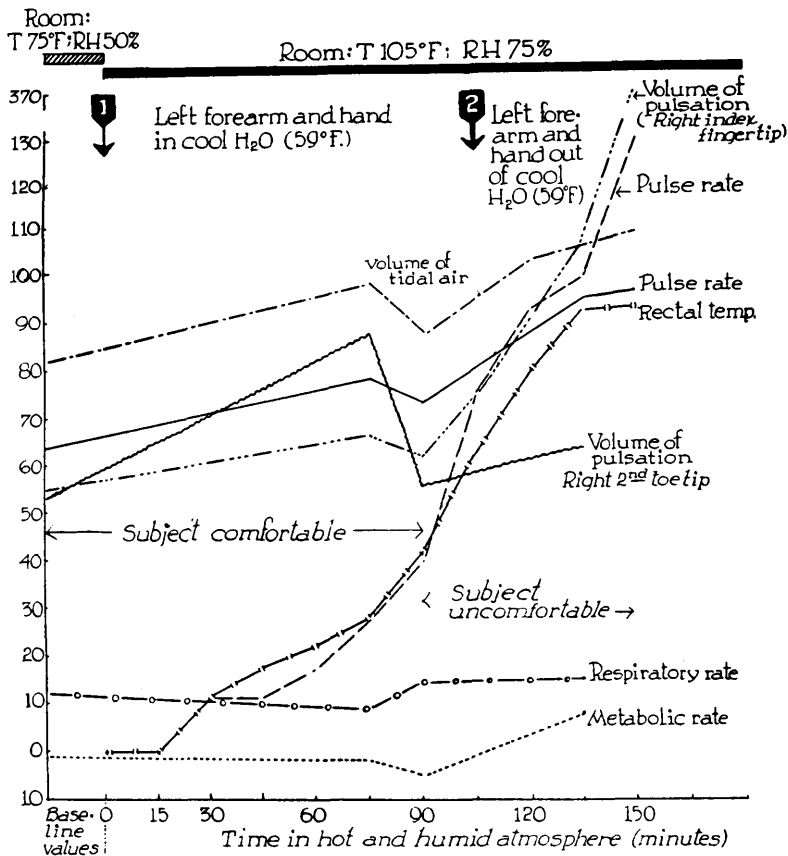


FIG. 1.

The mean effect of cooling a forearm and hand on several physiologic functions in 5 young adults resting quietly in a hot and humid room. The units of measurement indicated along the ordinate of the graph are: *Water loss on sweating*, mg per 5 sqcm of surface area of skin per 5 minutes; *change in temperature*, 0.01°C ; *volume of pulsations*, cumm per 5 cc of part; *pulse rate*, times per minute; *respiratory rate*, times per minute; *volume of tidal air*, 100 cc; *metabolic rate*, per cent of normal basal metabolic rate.

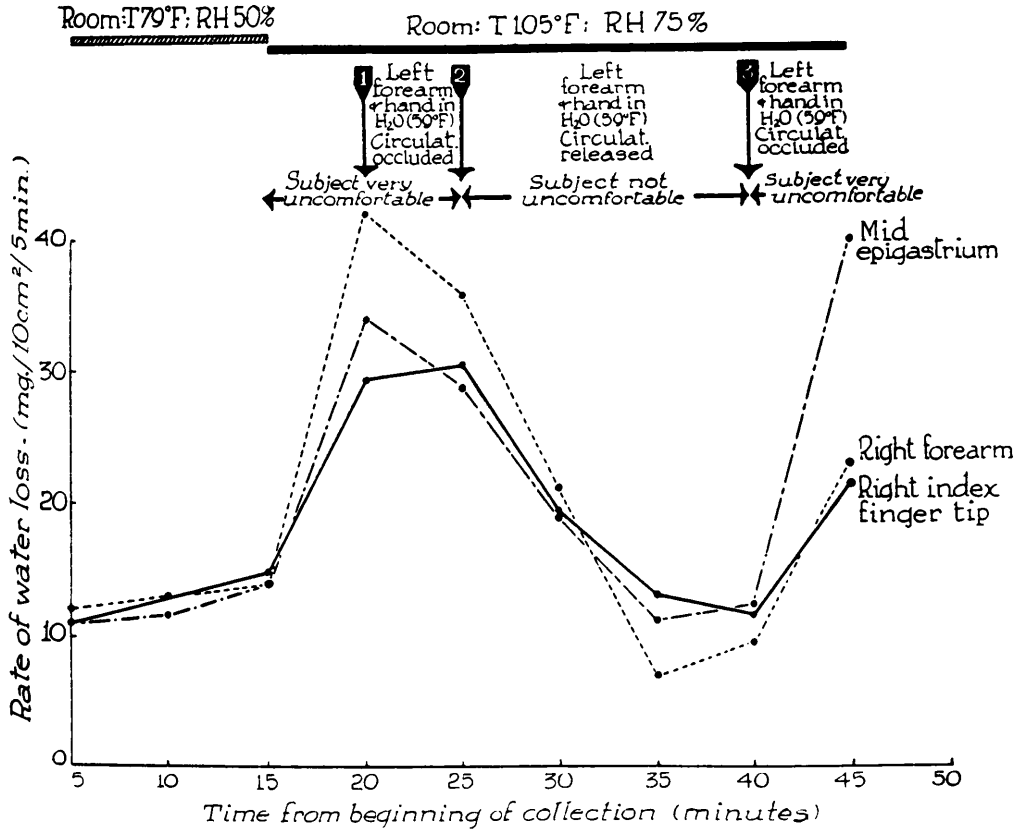


Fig. 2.

The influence of the circulation of blood in the forearm and hand cooled upon the rate of water loss from the skin of 3 areas in a representative normal young adult resting in a hot and humid environment.

the sensitive pneumoplethysmographic method of Turner.⁴ The metabolic rate and volume of tidal air were measured with the Benedict-Roth Basal Metabolism apparatus. The respiratory rate, pulse rate, and comfort were also recorded. The subject's comfort was estimated by conversation.

The subjects rested for about 30 minutes in the comfortable environment of 75°F and 50% relative humidity. The above mentioned physiologic processes were recorded simultaneously and in some instances in separate groups. The temperature and relative humidity of the room were increased within 15 minutes to 105°F and 75%, respectively. The physiologic processes were again measured with and without the left forearm and hand in a water bath maintained at 59°F. The same procedure was repeated in a dry and

hot atmosphere and with the subject in a water cooled chair. Higher room temperatures and humidities were tried. The subjects were kept in the hot and humid environment for as long as 3 hours.

Results. Some of the results are summarized by Fig. 1, 2, and 3. Absolute values are indicated in the figures.[†]

When the room temperature and relative humidity were increased from 75°F and 50% to 105°F and 75%, the subjects complained of discomfort from the heat, the pulse volume and rate increased, metabolic rate tended to drop, or not change, the volume of tidal air increased, respiratory rate decreased, sweating

[†] Ordinate units for the changes in the oral and rectal temperatures are equal to the ordinate value as indicated on the figure, times 0.01°C. In other words, the change from an ordinate reading of 0 to 90 would indicate a change of 0.90°C.

⁴ Turner, R. H., *J. Clin. Invest.*, 1937, **16**, 777.

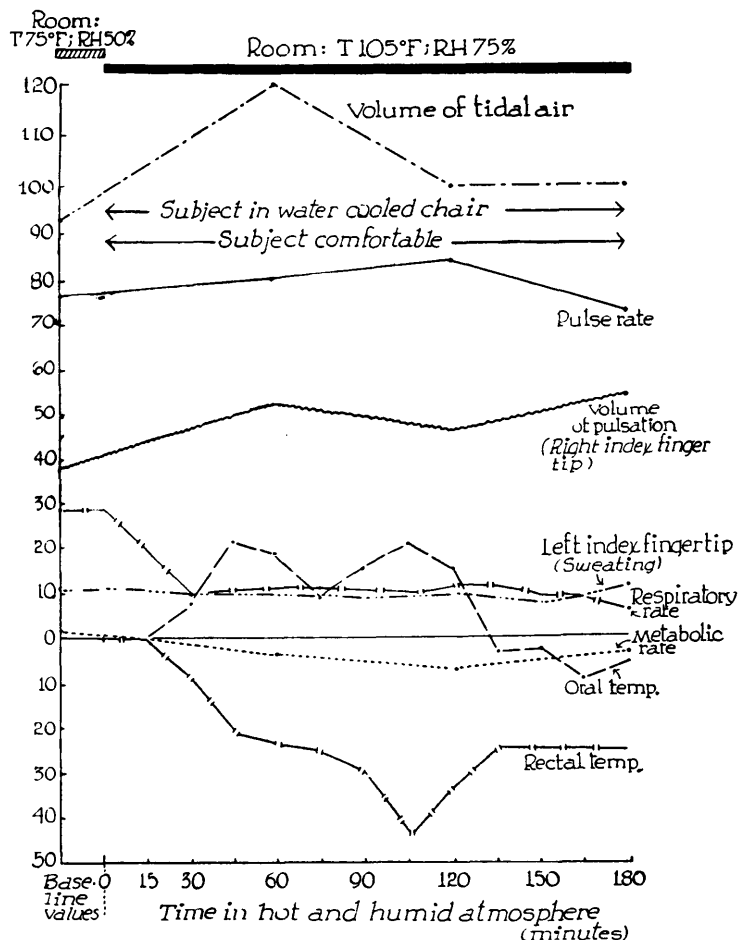


FIG. 3.

The mean effects of cooling a large portion of the body (that portion extending from the level of the inferior angles of the scapulæ above, to the junction of the middle and lower thirds of the thighs below) in a water cooled chair on certain physiologic functions in 5 young normal adults. The units of measurement shown along the ordinate are the same as for Fig. 1.

became profuse, the volume of pulsations in the finger and toetips increased, oral and rectal temperatures rose. When the left forearm and hand were placed in the cool water bath these changes were inhibited markedly, the inhibition of the changes ceasing whenever the parts were removed from the water bath (Fig. 1). The subjects were made comfortable. Occlusion of the circulation to the forearm and hand in the water bath by a blood pressure cuff removed the influence of cooling upon the physiologic processes. When the circulation was released, the parts in the cool water again inhibited the physiologic changes and the subjects again became com-

fortable. These effects upon sweating are illustrated, for a representative subject in Fig. 2.

It is seen from Fig. 1 that cooling of the left forearm and hand alone markedly inhibited, but did not completely prevent any of the physiologic changes. A larger area of body surface was cooled and isolated in a water cooled chair. Cooling and isolating that portion of the body extending from the inferior angles of the scapulæ above, to the junction of the middle and lower third of the thighs below, inhibited changes in the physiologic processes not completely inhibited by cooling a single forearm and hand (Fig. 3).

The subjects were able to remain in the hot and humid room without any discomfort for the period of 3 hours and could have remained there for longer periods without any real discomfort. The observers were unable to remain in the room for more than a few minutes at a time during the periods of observation without experiencing marked discomfort.

Comment. The data indicate that an individual resting in a hot and humid atmosphere can be made comfortable and many of his physiologic processes kept at a level for a comfortable environment by cooling a localized portion of the body. When only a small portion of the body is cooled, such as forearm and hand, the effects are definite, but not as effective as when larger areas are cooled. Cooling a localized portion of the body inhibits the accumulation of body heat. The forearm and hand represent about 5.5% of the total surface of the body,^{5,6} while the lower two-thirds of the trunk of the body and upper

two-thirds of the thighs represent about 50% of the total surface area. Obviously, since heat exchange between the environment and the body is a physical one, the larger the area of body cooled, the greater the loss of heat. However, the relatively great vascularity of the hand and fingers increases its capacity for heat transfer and thus tends to compensate for the smaller area cooled.

It is well to remember that when the parts are submerged in a cool water bath or enclosed in a cooled chair, the parts are not only sites for heat loss from the body, but also, in being isolated from the hot and humid environment, reduce the surface area exposed to the hot, humid atmosphere to absorb heat.

Since interruption of the blood supply to the cooled part with its nervous system intact failed to inhibit the production of physiologic changes by the hot and humid room, the effects of cooling the isolated part must result mainly from the maintenance of the normal body temperature and not to any significant neurogenic influences.

We wish to express our appreciation to Mr. G. Morgavi, Jr., who constructed the apparatus and participated in the studies.

⁵ DuBois, D., and DuBois, E. F., *Arch. Int. Med.*, 1915, **15**, 868.

⁶ Sawyer, N., Stone, R. H., and DuBois, E. F., *Arch. Int. Med.*, 1916, **17**, 855.

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Sudden Destruction of Motor End Plates by Lactic Acid.*

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The morphologic effects of lactic acid, in concentrations (0.05-0.3%) found in rigor mortis¹ of muscle, upon the labile structure of motor end plates are unknown. During post-mortem rigidity of muscle in man, monkey, and mouse there is a sudden or gradual disappearance of the end plates dependent upon the time of onset of rigor: extreme exhaustion induced by either physical activity or acute

infections immediately prior to the death of the experimental animal produces both rapid onset of rigor and rapid dissolution of the end plates.² Experimental morphologic studies of the motor end plates must be made therefore before the onset of rigor and preferably from muscles excised from the living animal and processed immediately by the gold method.

Methods. Kocher collar incisions were made through the shaved skin on the ventral aspect of the neck in adult white rats, *Mus norvegicus* (250-280 g), under anesthesia by intraperitoneal injection of nembutal, 25 mg

* Aided by a grant from The National Foundation for Infantile Paralysis, Inc.

¹ Fletcher, W. M., and Hopkins, F. Gowland, *J. Physiol.*, 1906-7, **35**, 247.

² Carey, E. J., unpublished observations.