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REDAKSIONEEL — EDITORIAL

Die skielike heengaan van Mnr. Martin Coetsee was 'n geweldige skok, nie alleen vir sy gesin en die Departement van Vervoer nie, maar ook vir die groot kring van kennisse en belanghebbendes by die werk wat hom so na aan die hart gelê het. Dit kan vergelyk word met 'n klip wat in 'n poel water gegooi is, wat al wyerwordende kringe op die oppervlakte veroorsaak, elke kabbeling verteenwoordigend van 'n liggaam of 'n instansie met wie hy geskakel het, veral in die afgelope paar jaar.

Dit is veral sedert Augustus 1965 toe hy hoof geword het van die Algemene Afdeling waaronder die Antarktiese afdeling, onder andere ressorteer, dat sy onderhandelings met soveel uiteenlopende instansies 'n aanvang geneem het. As gevolg van sy besondere organisasievermoë is Antarktiese Navorsing in Suid-Afrika uitgebou en op vaster voet geplaas, veral deur die bewerkstelling van die 2e vyfjaarplan, en die nouer samewerking met Buitelandse Sake en die WNNR. Martin Coetsee het 'n besondere gawe gehad om met belanghebbendes in die Buiteland om te gaan, en sy kontak met, byvoorbeeld, gesante van Japan, België en Noorweë, om maar 'n paar te noem, was meer as net amptelik. Ook hulle sal sy heengaan voel as die verlies van 'n vriend en medewerker vir Antarktika.

Dit was deur sy toedoen dat nuwe Antarktika spanne meer intensief opgelei is, trouens, tot so 'n mate dat die sekretaris van die S.A. Federasie vir Jeug en Sport in 'n brief aan die President van die Federasie, Mnr. D.J. Joubert, melding gemaak het van die indruk wat die fiksheid van die

span op die ander Antarktiese ekspedisies gemaak het, tydens hulle besoek in 1966. Dit is hy wat gereël het vir die intensiewe opleiding, nie alleen in algemene fiksheid nie, maar o.a. ook in brandbestryding, kookkuns, oorlewing en ander belangrike aspekte ten opsigte van hul verblyf daar in die koue Suide. Tydens die Simposium oor Logistiek in Tokyo (wat deur Mnr. Joubert en Mnr. Coetsee bygewoon is) is daar met belangstelling deur die afgevaardigde van die Verenigde State uitgevra na die opleidingsprogram van die Suid-Afrikaanse spanne. By die, en ook by ander geleenthede is melding gemaak van die besonder gulle ontvangs wat ekspedisies van die ander Verdragslande te beurt val wanneer hulle Suid-Afrika besoek, en die eer vir reëlins van hierdie aard kom Mnr. Coetsee toe.

Die inisiatief deur hom aan die dag gelê met die beplanning van die Bouvetekspedisie dien gemeld te word. Dit is deur sy toedoen dat die koördinering van al die verskillende fasette van die ekspedisie kon plaasvind en dat dit in so 'n groot formaat kon geskied.

Hy het hom ook besonder daarvoor beywer dat Antarktiese Navorsing meer publisiteit geniet, beide in die pers asook oor die S.A.U.K., sodat die belangstelling van die publiek gaande gemaak is en die aandeel van die Departement beklemtoon is. Dit alles het bygedra dat Suid-Afrika vandag een van die toonaangewende lande onder die Antarktiese Verdragslande is. Sy nagedagtenis sal lank, ver en wyd bly voortleef.

Reactions to cold¹

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¹ This paper was published in *J. Appl. Physiol* 24(3), p.282-287, 1968. This article consists of selected extracts from the latter publication.

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In a recent study of the metabolic and body temperature reactions of men during short periods of exposure (2 hr) to different air temperatures in the range 27-5 °C, before going to the Antarctic from South Africa and at different times during their stay in Antarctica (12), a significant and marked decrease in metabolic rate was demonstrated in cold-air conditions, but there was no

change in the metabolic rate at the thermoneutral temperature of 27 C. There was also no significant change in core temperature, but the mean skin temperature fell progressively during the men's stay in Antarctica and the weights of the men increased. On these findings it was postulated that the decrease in metabolism, the fall in skin temperature, and the unchanged core temperature could be explained by the increase in insulation due to the gain in body weight. It was also considered that habituation to cooler body surface temperatures, i.e., a shift in the threshold of cold at which discomfort is experienced, might play some part in the findings in Antarctica.

The first of these postulates can be tested by studying the reactions to cold of fat men and men with average insulation over a range of air temperatures similar to that used in the Antarctic study. If the hypothesis postulated above is correct, then the fat men should not increase their rates of metabolism until the air temperature has fallen to a level lower than that at which the normal men shiver, and the fat men should also have lower skin temperatures. A study to test this hypothesis has been carried out on a very fat man and on an average man.

PROCEDURES

Subjects. The physical characteristics of the fat man were: weight 93.8 kg, height 172.3 cm, surface area 2.1 m², and mean skinfold thickness (average of seven measurements) 18.3 mm. The physical characteristics of the average man were: weight 59.1 kg, height 162.1 cm, surface area 1.62 m², and skinfold thickness 6.8 mm.

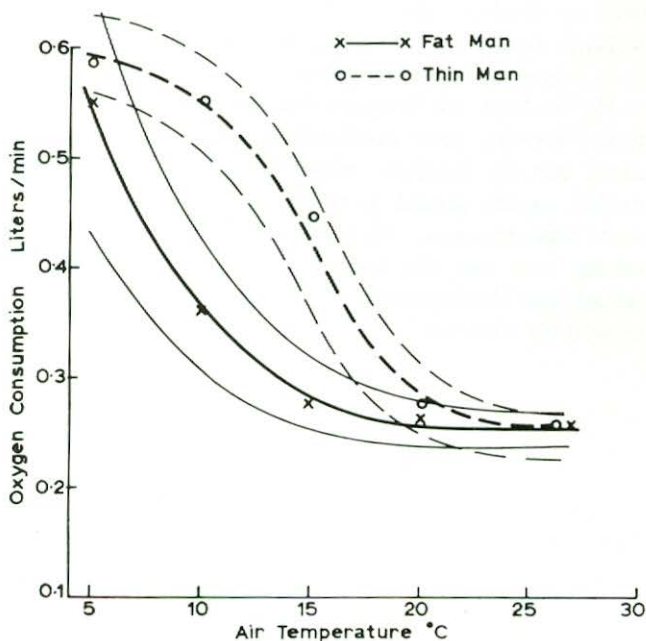


FIG. 1. Oxygen consumption compared to air temperature.

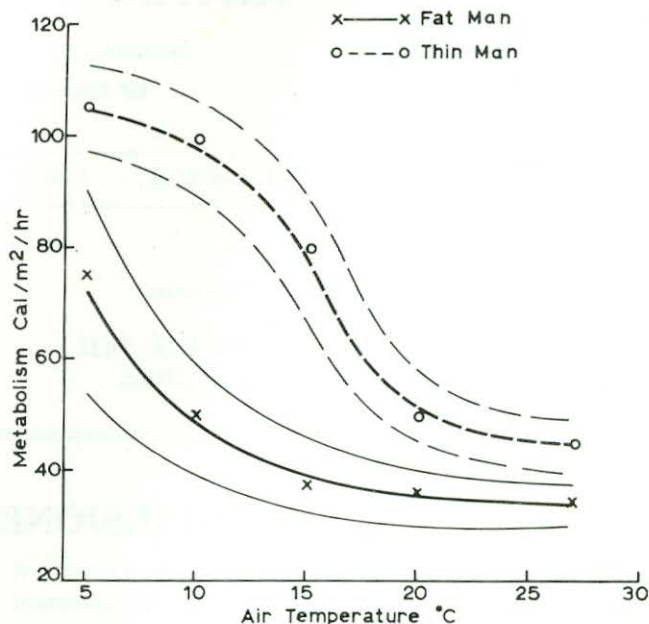


FIG. 2. Metabolism per square meter compared to air temperature.

The subjects were in the postabsorptive state and had rested for 1 hr at 27 C before entering the climatic room. Three separate measurements on different days of metabolic rates, skin temperatures at 15 different sites on the body, and rectal temperatures were made at 27, 20, 15, 10, and 5 C over a 2-hr period of exposure.

In the climatic room the subject, clad only in shorts, lay in a special stretcher which supported the body only at the head, the shoulders, the hips, and the heels. This insures an extensive exposure of the skin surface to the ambient air. During the experiments every endeavour was made to get the subject to maintain a standard posture, i.e., with arms and legs extended and the hands and fingers extended also.

Skin temperatures were measured on the forehead, chest (near nipple), solar plexus, lateral forearm, back of hand, anterior and posterior thigh, lateral and posterior calf, top of foot, shoulder blade, and small of back. Temperature measurements were recorded at the .5, 1, and 1.5 hr.

Expired air was collected in Douglas bags from the 60th-75th min. An aliquot sample was analyzed in a Haldane apparatus for O₂ and CO₂. Oxygen consumption, metabolism rates and conductance values were calculated from these measurements. The results are given in figures 1 to 8.

DISCUSSION

This study has demonstrated that an average man, clad only in shorts and lying at rest, increases his metabolic rate sharply when air temperatures fall below 20 C, whereas a fat man in the same circumstances does not do so until the air temperature falls below 10 C. In the

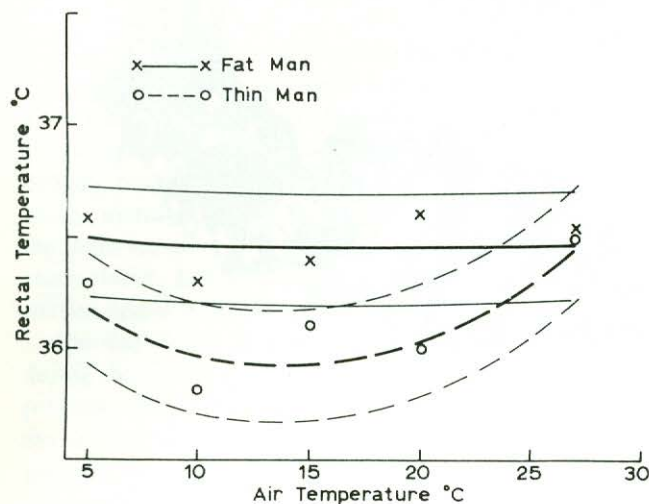


FIG. 3. Rectal temperature compared to air temperature.

range of air temperatures where metabolism is increased, the skin temperatures of the normal man are higher than those of the fat man and, except at 5 C, the rectal temperatures are lower. These findings suggest that the insulation against heat flow is less in the thin man than in the fat man. Calculation of heat conductances shows that the fat man has about half the heat conductance of the normal man. These calculations of heat conductances are subject to errors, as pointed out in recent papers from this laboratory (11, 13), and cannot be taken as exact quantitative estimates of insulation. They, nevertheless, give a semiquantitative idea of differences be-

tween the fat man and the normal man in subcutaneous insulation. The differences between the men in insulation accords with the differences between them in mean skin-fold thicknesses. The average for the fat man was 18.3 mm and 6.8 mm for the normal man. The hypothesis we set out to test has been validated by this study. Fat men can endure lower air temperatures than normal men before they begin to shiver, and thereby increase their rate of metabolism, because of the greater insulation of their thicker subcutaneous fat.

Comparison between these results on a fat and a normal man, and those on the men before they went to Antarctica and after a year there, is of interest. The curves fitted to plots of metabolism per square meter, 1) against air temperatures and 2) against average skin temperature before the men went to Antarctica, are similar to those of the normal man in this study in that a sharp rise in metabolic rate occurred when the air temperature fell below 20 C and the average skin temperature fell below 30 C. The curves for the men, after a year in Antarctica, are similar to those of the fat man in this study in that the sharp rise in metabolic rate occurred when air temperature fell below 10 C and average skin temperature fell below 25 C. The present results, therefore, give support to the hypothesis, put forward in the paper on the men in Antarctica (12), that it is the increase in body weight of the men and in their thermal insulation that is the main factor responsible for the decrease observed in metabolic rate and the fall noted in average skin temperature after the men had been 1 year in Antarctica.

Daniels and Baker (2) in 1961 demonstrated that for unclothed men a negative correlation ($r = 0.60$) between metabolic rate and percentage body fat occurs at an air temperature of 15 C. Buskirk, Thomson, and Whedon (1) in 1963 found a similar correlation at an air temperature of 10 C. Those two studies, each being carried out at one air temperature only, left unanswered a number of questions concerning the differences between fat men

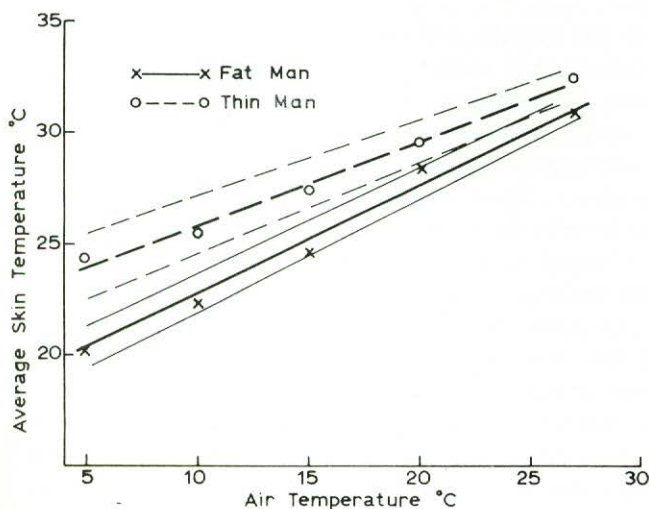


FIG. 4. Average skin temperature compared to air temperature.

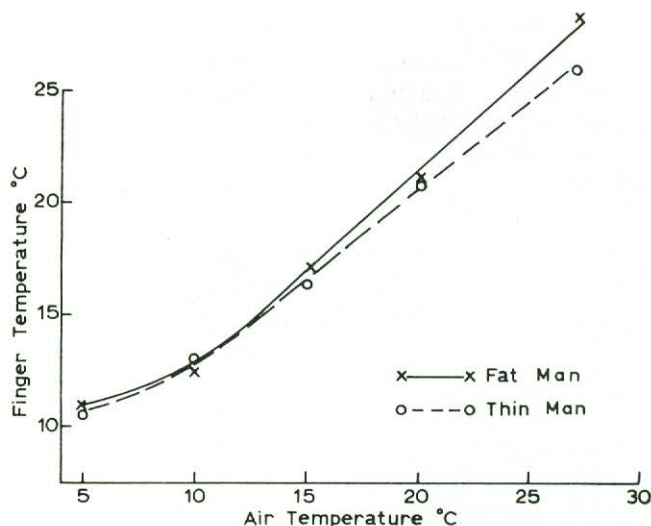


FIG. 5. Finger temperature compared to air temperature.

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