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INVESTIGATIONS ON THE SKIN TEMPERATURE IN PATIENTS WITH DISEASES OF THE JOINTS.

BY

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In the earliest days of medicine it was observed that increased warmth might be a sign of disease, and Hippocrates taught that cold hands, feet, and head, together with warm chest and belly, was an "omen malum". Celsus showed that inflammation produced the following cardinal symptoms: rubor, dolor, tumor and calor—a teaching which holds to this day. After Galileo, in 1603, began to estimate temperature quantitatively by measurement with the thermometer, it was not long before such measurements were carried out on man by Santorini (1626). This gradually became a usual method of examination. Measurement of the skin temperature was first carried out by John Davey in 1814, after Claude Bernard had pointed out that it varied after injury to the sympathetic nerves.

In Scandinavia, work on skin temperature investigations has been carried out particularly by the Danish physicians Johs. Ipsen (Sønderborg) and T. Foged (Copenhagen).

By skin temperature we understand the temperature measured on the surface of the skin by a thermometer covered by a small piece of felt, sufficiently large to hold it in place. This should more properly be referred to as "skin surface temperature under felt" but as the expression "skin temperature" has become current we have also used it here.

There are a number of methods available for skin temperature investigations: the palpation thermometer, the dif-

ferential air thermometer (Kiss), the thermo-electric method etc., but it was shown by a number of tests made by Foged that the results were equally good and the measurements most easily made by using the thermometer recommended by Ipsen. This is a mercury thermometer with a mercury column somewhat longer than that of an ordinary clinical thermometer and with a scale reading from 23° to 42° C. The thermometer is fixed by a felt square 4×4 cm in size which has sewn to it tapes for fastening it around the limb. The thermometer is placed with its bulb under the centre of the felt pad.

As a result of some thousands of measurements carried out on healthy persons by the Danish physicians, it was found that the skin temperature is much influenced by the surrounding air, by movements and by the patient's position during examination; there was also a diurnal variation, and it was therefore necessary to obtain as constant conditions as possible for the tests. This was achieved by keeping the patient in bed for some time before the examination. The room must be free from draught and must have an even temperature, the patient must have been adapted to this temperature for a certain period etc.

From Foged's extensive work it appears that the skin temperature taken on the head was on the average 32—34° C, on the thorax 32—34°, abdomen 34—35°, hip 35.4°, medial side of thigh 34.4°, medial side of knee 33.5°, ankle 31.8° sole of foot 30.7°, i.e. uniformly decreasing from above downwards on the body. All patients had a normal rectal temperature and were free from inflammatory conditions of the body. Diurnal variations and differences between symmetrically placed points were found, but they were never more than 1.1° C.

In pathological conditions and particularly inflammatory conditions of bones and joints, considerable changes in skin temperature (up to 6° C) were found in some cases, and it was therefore suggested that such measurements might have great importance in the investigation of joint diseases.

As we had a larger number of patients with joint diseases than Foged and, for example, patients with many different stages of tuberculosis, my investigations may be adduced as supplementing those of the Danish observers.

Like Foged I found that average temperatures and individual measurements were of much less interest than serial measurements and, in particular, the difference between skin temperatures at symmetrically placed points. At C-H Stavern the examinations were carried out in the following way:

The patients were kept in bed for at least 12 hours in order to obtain as uniform test conditions as possible. Many of them were already confined to bed but as it was most convenient for the room employed (the X-ray department) the tests were carried out during the morning. The room was previously warmed to a temperature of 22—24° C, and precautions were taken to avoid draughts. All patients were wheeled to the examination room to avoid the influence of movement upon the temperature, and were examined in the supine position after having lain with their limbs exposed for 15 minutes.

When a plaster case was changed the test was carried out 24 hours after removal of the old case. Both legs were examined simultaneously, using a thermometer of the pattern recommended by Ipsen covered by a felt square 4×4 cm which has tapes sewn on at the corners. The tapes were tied as loosely as possible to avoid stasis. In most cases 4 thermometers were applied; one a little above the patella, one below, one medially and one laterally. The time of application was noted and readings were taken after 10—15 minutes.

The patients were afebrile (rectal temperature) at the time of the examination.

In the two collective tables are included 37 patients: 22 male and 15 female, their ages ranging from 5 years to 58 years. 32 were found to be Pirquet-positive, 5 Pirquet-negative; one had a positive Wassermann reaction, 36 were War-negative.

The clinical diagnosis was, in the great majority, tuberculosis of the knee joint, viz: in 25 cases. The remaining diagnoses were: Tuberculosis of foot: 2, Tuberculosis of the Tibia: 1. Arthritis Deformans, Synovitis, Chronic Focal Sepsis: 9.

From the measurements found in patients with different stages of disease I shall select those of greatest interest.

Patient No. 30. Borghild L., born 17.5.17. Admitted to "C-H" 25.2.31. Diagnosis: Tuberculous left knee. Synovitis. Family healthy. Pirquet +, Wassermann reaction ÷. Left knee began to swell about 1.12.30. No pain. Up and about. Plaster case applied 10.12.30. On admission to "C-II":—General examination: Carious teeth, otherwise nothing noteworthy. *Left knee*: In middle position, somewhat swollen, Effusion +. Measurement: 31 (Right: 30.5). Thickening of capsule +. Tenderness at joint-line. Flexion limited 20° (Right 140). *X-ray* showed rarefaction and irregular epiphyseal line. Traction applied.

26.5.31. Effusion still present. Tenderness +, Measurement round patella 32 cm (right 30.5). Flexion increased to 50° (140).

2.7.31. Effusion ÷ (?). Measurement 30.2 cm (R: 29.5) 32(30.6) 32.2 (R: 29.8) Flexion 70°.

Skin temperature taken 28.2.31:—

	<i>Above patella.</i>	<i>Below patella.</i>	<i>Medially.</i>	<i>Laterally.</i>
Left:	34.1°	34.2°	35.5°	35.5°
Right:	32.2°	32.8°	33.9°	32.3°
Difference:	1.9°	2.4°	1.6°	3.2°

Skin temperature taken 2.7.31:—

Left:	34.1°	32.0°	32.0°
Right:	29.5°	30.6°	29.8°
Difference:	0.7°	1.4°	2.4°

i.e. Decrease in Difference:—

1.2°	0.2°	0.8°
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Patient No. 35. Finn Sv. P., born 3.4.13, painter. Admitted to "C-H" 7.8.30, discharged 7.12.30. Readmitted 22.4.31. Diagnosis: Tuberculous right knee. Father died of heart disease, brother died of encephalitis. Many sanatorium patients among his neighbours. Patient states he has had whooping cough and measles. February 1930, after a blow on the right knee from

an ice-hockey stick, pain, swelling and discoloration of skin. Continued walking and symptoms disappeared after a week. 2 months later swelling reappeared, pain, particularly on stumbling. Also pain at night. No night starts. No fever. Exploration by needle produced 3 cc blood-stained fluid. Plaster applied for a month.

7.8.30. Right knee visibly swollen, 2.5 cm greater diameter. Effusion +. Flexion to 90°—further flexion prevented by pain; could not raise the leg actively with stiff knee. Tenderness to palpation and percussion over lateral condyle. Arthrotomy: Thickening of capsule +; changes in the synovial cartilage +. Erosion of synovial cartilage over lateral femoral condyle. 15.11.30, allowed up in plaster. 5.3.31 re-examination. Effusion + (Bloodstained). 23.4.31 readmitted. Knee stiff. Patella fixed. No effusion. A few degrees of flexion. Large swelling over lateral condyle; tenderness +. Measurements: Right knee 1 cm smaller diameter than left. Atrophy of thigh and calf: 3.5 cm. *X-ray*: Rarefaction, ? Focus in lateral condyle. 28.4.31. Resection of knee joint (right). Changes in Capsule, ossified foci laterally were found.

18.11.30. Skin temperature:—

	<i>Above patella.</i>	<i>Below patella.</i>	<i>Medially.</i>	<i>Laterally.</i>
Right:	35.3°	34.3°	35.9°	34.8°
Left:	34.9°	31.8°	31.4°	34.0°
Difference:	0.4°	2.5°	4.5°	0.8°
23.4.31:—				
Difference:	2.2°	4.5°	3.2°	3.1°
3.6.31:—				
Difference:	4.2°		3.8°	2.6°

Patient No. 32. Borghild J. T. Born 31.8.04, married. Admitted to C. H. 15.5.31. Diagnosis: Tuberculous knee. Synovitis. One sister dead of Pulm. T.B. Previously healthy, no pregnancies. Pirquet +, Wassermann reaction ÷. 1917, Right knee somewhat swollen, pain on walking. Later, knee weak. Autumn,

1930, pain in the knee with general swelling. No redness. On admission to "C-H". General condition: nothing noteworthy. Right knee in middle position, distinct swelling. Measurements 44 cm (13.9.05), 44 (40) 43.5 (38) above, at the mid point of, and below the patella respectively. Flexion 65°. Effusion ÷, crepitus on movement of the joint.

X-ray: Destruction of lateral condyles of femur and tibia. Lungs: Right side infiltration. 22.5.31. Resection of right knee: joint cavity filled by granulations; no fluid present, joint surfaces of tibia devoid of cartilage. In the lateral femoral condyle an abscess cavity the size of a nut.

2.6.31. Plaster changed.

Haematoma present—aspirated. 19.5.31. Skin temperature:—

	<i>Above patella.</i>	<i>Below patella.</i>	<i>Medially.</i>	<i>Laterally.</i>
Right:	31.6°	33.0°	34.4°	33.6°
Left:	31.7°		31.5°	31.4°
Difference:	÷ 0.1°		2.9°	2.2°

Patient No. 33. Johan N. V. Born 15.6.08, fisherman. Admitted to "C-H" 19.8.30. His father had a tuberculous ankle and ?? asthma The patient has had pneumonia, whooping cough, cervical adenitis, tuberculous epididymitis.—Left testicle removed 1930. In 1929 pain in left knee with no history of trauma other than that possibly resulting from the pressure of the motor-boat clutch which he worked with his knee. In the autumn the knee began to swell, chiefly during the daytime. X-ray 29.10.29: No definite pathological change visible. Feb. 1930, do. 30.7.30: changes present at out-side of joint. Treated in the meantime by baths at Vikesund. During this treatment the swelling decreased but pain became more severe, occasional night starts. Temperature rarely raised. On admission to "C-H": Left knee held slightly flexed 15°, flexion could be increased to 90° but was then prevented by pain. Circumference 3 cm greater than right knee. Atrophy of thigh: 5.5 cm, calf: 0.5 cm. Slight tenderness on palpation. Percussion on the head of the fibula

and pressure against the ball of the little toe caused pain at the lateral side of the knee—no tenderness otherwise.

1.9.30: Fluctuation over the fibular epicondyle. Effusion in knee joint +. Thickening of capsule +. Aspiration of abscess over head of fibula. 8.12.30. Good mobility in joint. *X-ray*: changes only slightly marked. Definite tenderness over head of fibula. 12.12.30: Exploratory arthrotomy. Superior recess obliterated. No definite changes in bone or cartilage. Specimen of tissue and effusion inoculated into guinea-pig T.B. +.

20.1.31. Resection of knee joint. Synovia thickened, degeneration of cartilage. Lateral condyle of tibia inflamed, head of fibula eroded, only a thin shell remaining.

30.1.31. Plaster changed. Haematoma 100 cc.

20.4.31. Well healed scar.

25.4.31. New plaster, allowed out of bed.

21.11.30: Skin Temperature:—

	<i>Above patella.</i>	<i>Below patella.</i>	<i>Medially.</i>	<i>Laterally.</i>
Left knee:	34.5°	34.0°	35.9°	36.2°
Right knee:	34.2°	32.2°	33.7°	32.6°
Difference:	0.3°	1.8°	2.2°	3.6°
20.k.31:—				
Difference:	3.4°	6.8°	4.0°	8.5°
21.4.31:—				
Difference:	4.1°	1.3°	4.8°	3.9°

From these patient's histories we see that they had tuberculous knee joints which manifested themselves in some cases after injury, in other cases without injury. Clinically they illustrate various stages in the development of tuberculosis, from effusion and synovial proliferation to bone and cartilage destruction with abscess formation and tracknig of pus.

The differences observed in skin temperature are seen to follow the developmental stages of the disease. The histories of these patients were given in an order corresponding to the different stages, viz:

Patient No. 30 who showed effusion clinically and rarefaction in the radiogram, showed the smallest degrees of difference in skin temperature:

28.2.31: 1.9° , 2.4° , 1.6° , 3.2°

2.7.31: 0.7° , 1.4° , 2.4°

and these differences decreased during treatment.—Patient No. 35 shows a more advanced disease which on 19.8.30 had attacked both synovia and cartilage and which progressed still further, necessitating resection on 23.4.31. Measurement after the resection revealed still higher differences in skin temperature, indicating persistent activity of the disease

18.11.30: Differences: 0.4° , 2.5° , 4.5° , 0.8°

23.4.31: — 2.2° , 4.5° , 3.2° , 3.1°

The increase indicates exacerbation of the disease and after operation there followed a further increase of difference, showing that the disease had not subsided:—

3.6.31: Differences: 4.2° , 3.8° , 2.6° .

Other patients with similar clinical findings in their tuberculous knees and parallel skin temperature readings were No. 8, No. 14 and No. 24, but the effect of the operation was greater in No. 14. *Pat. No. 8.*

Readings: 9.2.31: 3.4° , 4.9° , 3.7° , 4.2°

Exploratory arthrotomy 17.2.31.

Readings: 22.4.36: 3.2° , 2.2° , 2.9° , 4.2°

1.6.31: 1.8° , 3.5° , 2.5° , 5.8°

Patient No. 14.

Readings: 8.12.30 Diff.: 3.0° , 2.3° , 1.5° , 3.2°

13.12.30 Operation

Readings: 30.3.31 : — 0.7° , 1.7° , 1.4° , 0.6°

This shows satisfactory improvement but the disease was hardly quiescent, for new readings on 22.6.31 gave:—

Diff.: 2.0° , — 2.2° , 0.3°

as far as can be recalled the patient had at this stage been out of bed for some time, in plaster.

Pat. No. 24.

Readings 19.3.31 Diff.: 0.7° , 2.1° , 1.0° , 5.7°

Resection 16.4.31.

Patients with more advanced destructive change are seen to have still greater differences in skin temperature (see case note extracts No. 33 and No. 32), and it is clearly seen from these cases that the skin temperature goes hand in hand with the progression of the disease, with differences as great as 4° , 5° , 6° or in a single case, even 8.5° (No. 33). Other patients with advanced disease show similar increase in skin temperature differences, viz: No. 5, No. 7, No. 21, No. 26.

We were also able to test a number of patients with quiescent knee-joint tuberculosis and these as a rule showed quite small differences in skin temperature.

Patient No. 37 is such a case. His right knee was resected for tuberculosis on 12.12.29 and he was tested after having been up for some time

Difference 16.11.30: 1.3° , —, 1.8° , 1.7°

The following day, after 12 hours rest:—

17.11.30: 1.0° , —, 0.6° , 0.8°

The following cases are similar!

No. 6. Resection 1930:—

Difference 14.11.30: 0.4° , —, 0.2° , 0.2°

No. 13. Resection 8.12.30: — Reoperated.

Difference (before operation) 0.6° , 0.2° , 0.8° , 1.1°

No. 17. Resection 28.6.30.

Difference 24.4.31: 0.5° , 0.1° , 0.1° , 0.1°

Other cases that have healed and have low skin temperature differences are: No. 20, No. 31, No. 34.

Patients with tuberculosis of ankle or foot show similar skin temperature differences viz:—

Patient No. 3, Ole H., advanced tuberculosis of left ankle skin temperature 24.2.31:

	<i>Medially</i>	<i>Laterally</i>
Left:	32.4°	34.7°
Right:	29.2°	29.0°
Difference:	3.2°	5.7°
Plantar skin temperature		30.0°
— — —	under anaesthesia	35.0°

Patient No. 28, Anna A. advanced tuberculosis of foot with large abscess.

Difference 4. 5. 31: 4.2°, 6.3°

A patient operated for tuberculosis of the lower end of the tibia showed quite low figures:

No. 36.

Difference 17.11.30: 0.5°, 0.9°, 0.9°, 0.4°

These remained low when the patient was allowed up:

Difference 17.12.30: 0.9°, 1.2°, 0.0°, 0.2°

Thus the skin temperature findings were similar in tuberculosis of the knee and of the ankle.

In tuberculosis of the joints it is thus seen that the skin temperature, measured by the Ipsen—Foged method, is raised and that this increase follows the clinical course of the disease.

In addition it appears that a rise in skin temperature may in some cases presage clinical changes which cannot with certainty be ascertained in any other way. See patient No. 33 and the other cases in the same group. The changes found were more advanced than had been expected after the X-ray, etc. but the skin temperature showed considerable increases.

Definite degrees of temperature difference cannot be assigned to the various stages of the disease but it appears that a difference of 1.5° C. must be regarded as pathological, a difference of 3.0° C. indicates considerable changes and there is pronounced destructive change when temperature differences of 5° to 6° or more are found.

In quiescent disease the skin temperature difference is seen to be less than 1.0° C. when the patient has been at rest for 24 hours, just as in healthy individuals. This is so even when the joint concerned has been resected.

In the last group of patients with joint disease: Arthritis Deformans, Synovitis and Chronic Focal Sepsis, I have included 9 patients. Several of these patients had been regarded as tuberculous until Overlæge Sundt succeeded in placing them in the correct category. The diagnosis was established by careful tuberculin tests, Wassermann reactions, radiography, examination

of effusion with guinea-pig inoculation and, on occasion, by histological examination of excised tissue.

The skin temperature measurements were found to accord with the results of these other investigations. See patients Nos. 1, 2, 9, 12, 23, 27, 19, 10, 29.

Patient No. 2. Alfred D., is referred to in Overlæge Sundt's extensive paper on "Gonitis Incertae Causae" 1932, pp. 150—160. Diagnosis: Synovitis gen. bilat. non tub. Focal sepsis? In the autumn 1930 there were clinical symptoms from the left knee. Skin temperature difference 14.11.30: 0.6°, 0.4°, 0.4°, 0.5°.

" " " 15.11.30: 0.6°, 0.2°, 0.4°, 0.7°.
Biopsy of capsular tissue was carried out on 18.11.30

Difference: 8.12.30: 1.1°, —, 0.6°, 2.8°

There was thus a slight reaction after this interference but the patient completely and rapidly recovered after tonsillectomy.

Patient No. 12, Karl H., also showed small differences despite definite effusion:—

Difference 5.12.30: 1.0°, 1.1°, 1.5°

8.12.30: 1.6°, 0.8°, 1.1°

5.1.31: 0.2°, 1.0°, 0.4°, 0.6°.

Patient No. 27 showed similar small differences, the maximum being 1.6°. Diagnosis: Focal sepsis.

Thus it was seldom that any patient of this group showed even single temperature differences of more than 1.5° and even then measurement at other points showed quite small differences.

It should therefore be permissible to conclude that when small differences of skin temperature are found in joint disease it is unlikely that we are dealing with tuberculosis.

I am fully conscious of the fact that the number of patients examined was not very large but there were no further suitable patients available during my period of service at the hospital. And as there seems to be such a pronounced parallelism between the course of the clinical picture and the increase of skin

temperature in tuberculosis while this increase of skin temperature is lacking in the other types of joint disease examined, it would appear that a constant relation exists.

As the method has been little known in this country I wished to bring it to the attention of more workers here so that they might subject it to further test and with larger numbers of investigations we should have a better basis to build upon.

SUMMARY

Investigations of the skin temperature in about 40 patients with joint diseases are referred. The investigations have been carried out by the method of the Danish physicians Ipsen & Foged.

The skin temperatures under a small piece of felt are measured with special mercury thermometers as recommended by Ipsen. These thermometers are placed in symmetric places above, lateral to, medial to and below the joints. Normally the differences between the temperatures in symmetric places are small from 0 d. of C. to 0,5—1,0—seldom more.

In patients with joint diseases of tuberculous etiology the differences in skin temperature often will be from one degree of C.—2° C.—to 4° C. in a single case up to 8,5° C. (controlled several times). Patients in all stages of tuberculosis and also after all sorts of treatments were observed. The differences in the skin temperature were parallel to the various stages of the disease, the differences being small in quiescent cases, higher in more advanced cases, and on the other hand after treatment the differences decreased. In patients in whom the disease had been cured the differences in the skin temperature were small.

In patients with joint diseases of other etiology the skin temperature showed small differences.

Sometimes pronounced differences in skin temperature were found when other signs of tuberculosis were rather vague. Later X-ray and other examinations proved that there had been an active tuberculous process as indicated by the skin temperature.

So the differences in the skin temperature can be a help

both in the diagnosis of joint disease and in the differential diagnosis of such diseases.

The skin temperature measured against the plantar surface of the foot during anaesthesia rose rapidly several degrees of C. the moment the patient became anaesthetized—in the most cases 5° C. This phenomenon was also observed by Ipsen, and in our cases I cannot recall a case in which this rise of temperature failed to appear.

ZUSAMMENFASSUNG

Es wird berichtet über Untersuchungen über die Hauttemperatur an etwa 40 Patienten mit Gelenkleiden. Die Untersuchungen wurden nach der Methode der dänischen Aerzte Ipsen und Foged durchgeführt.

Die Hauttemperaturen wurden unter einem kleinen Stück Filz mit besonderen Quecksilberthermometern gemessen, wie sie von Ipsen empfohlen werden. Diese Thermometer wurden an symmetrischen Stellen über, lateral, medial und unter den Gelenken angebracht. Normalerweise ist der Unterschied zwischen den Temperaturen an symmetrischen Stellen klein, von 0° C. bis zu 0,5—0,1, selten grösser.

Bei Patienten mit Gelenkleiden mit tuberkulöser Aetiologie beträgt der Unterschied in der Hauttemperatur oft von 1 Grad C. bis zu 2—4° C., in einem einzelnen Falle bis hinauf zu 8,5° C. (mehrmals kontrolliert). Es wurden Patienten in allen Stadien von Tuberkulose und auch nach allen Behandlungsarten beobachtet. Der Unterschied in der Hauttemperatur folgte den verschiedenen Stadien des Leidens, mit einem kleinen Unterschied in stillstehenden Fällen und höherem in fortgeschrittenen Fällen, andererseits mit fallendem Unterschied nach der Behandlung. Bei Patienten mit geheiltem Leiden war der Unterschied in der Hauttemperatur gering.

Bei Patienten mit Gelenkleiden mit anderer Aetiologie zeigte die Hauttemperatur geringe Unterschiede.

Bisweilen konnten ausgesprochene Unterschiede in der Hauttemperatur gefunden werden, wenn andere Zeichen von Tuberkulose ziemlich unsicher waren. Spätere röntgenologische und

andere Untersuchungen bestätigten, dass ein aktiver tuberkulöser Prozess vorlag, wie die Hauttemperatur ihn aufgezeigt hatte.

Die Unterschiede in der Hauttemperatur können also eine Hilfe sein sowohl für die Diagnose von Gelenkleiden wie für ihre Differentialdiagnose.

Die Hauttemperatur, an der Plantarfläche des Fusses während einer Anästhesie gemessen, stieg rapide um mehrere Grade C. in dem Augenblick, in dem der Patient anästhetisch wurde, — in den meisten Fällen um 5° C. Dieses Phänomen ist auch von Ipsen beobachtet worden, und in unseren Fällen kann ich mich keines einzigen Falles entsinnen, in dem diese Temperatursteigerung ausgeblieben ist.

RÉSUMÉ

Il est rendu compte de recherches sur la température de la peau, pratiquées chez environ 40 malades souffrant d'affections articulaires. Ces recherches ont été effectuées d'après la méthode des médecins danois Ipsen et Foged.

La température de la peau a été mesurée sous un petit morceau de fentre avec des thermomètres au mercure spéciaux, comme le recommande Ipsen. Ces thermomètres sont placés symétriquement au-dessus, latéralement, médialement et au-dessous de l'articulation. Normalement la différence de la température mesurée symétriquement est minime, elle varie de 0° C. à 0,5—1°, rarement plus.

Chez les malades souffrant de maladies articulaires à l'étiologie tuberculeuse, la différence de la température de la peau va souvent d'un degré C à 2—4° C.; dans un seul cas elle s'est élevée jusqu'à 8,5° (contrôlé à plusieurs reprises). On a mis en observation des malades se trouvant dans toutes les phases de la tuberculose et soumis à tous genres de traitement. On a constaté que la différence de la température de la peau suit les différentes phases de la maladie, la différence étant moindre dans les cas stationnaires et plus prononcée dans les cas avancés; d'autre part, cette différence s'est atténuée une fois le traitement achevé. Les malades dont l'affection articulaire était guérie ne présen-

taient qu'une très minime différence dans la température de la peau.

Chez les malades dont l'affection articulaire avait une étiologie différente, la température de la peau ne montrait qu'une faible différence.

Par ailleurs, on a pu constater des différences très marquées de la température de la peau, dans des cas où les autres symptômes de la tuberculose étaient assez incertains. Des examens radiologiques et autres effectués ultérieurement confirmèrent l'existence du processus tuberculeux actif, décelé par la température de la peau.

Les différences de la température de la peau sont donc d'un secours précieux, aussi bien pour poser le diagnostic de l'affection articulaire que pour en établir le diagnostic différentiel.

La température de la peau sur la surface plantaire a été mesurée pendant l'anesthésie; elle monta rapidement de plusieurs degrés C. dès le moment où le malade est anesthésié; dans la plupart des cas elle augmenta de 5° C. Ce phénomène a également été constaté par Ipsen. Dans nos observations, je ne puis me souvenir d'aucun cas où cette élévation thermique ne se soit pas manifestée.

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Pat. nr.	Pat. name	Age	Sex	v. Pirquets test.	WR.	Work	Diagnosis	Treatment	Abscess palpable	Abscess radiological	Aspiration
1	Asbj. A.	b. 1925	m.	÷	÷	Sawmill workers son	Arthritis deformans of Knees bilateral Focal sepsis.	Redressement. Plaster Light treatm. Gerson diet Tonsillectomy	÷	÷	÷
2	Alfr. D.	b. 1913	m.	+	÷	Farmer	Arthritis of Knees Effusion. Focal sepsis?	Aspiration Tonsillectomy.	÷	÷	+
3	Ole H.	b. 1872	m.	+	÷	Station master	Tub. ossis tali. Tub. pulm.	Extirpation of Talus	+	+	+
4	Tor H.	b. 1924	m.	+	÷	Son of Galvanic Workman	Tuberculous Knee (right)	Plaster Spica	+	?	+
5	Omar H.	b. 1913	m.	+	÷	Joiners son	Tuberculous Knee (right)	Resection of knee joint	+	+	+
6	Lilly I.	b. 1913	f.	+	÷	Daughter of fisherman	Tuberculous Knee (right) Spinal caries	Resection of Knee joint 1928.	÷	÷	÷

Tempe- rature rectum	Date for Measu- rement of	Skin Temperature before operative Treat- ment				Skin Temperature after operative Treat- ment
						Obs. All Temperatures are measured in degrees of Celsius
norm.	1931 19/1	Knee right	Before knee	Later. al.	Medi. al.	
			33.3 D.C.	32.1	33.9	
		left	35.0	33.9	35.2	
	18/4	Diff.	1.7	1.8	1.3	
		K.r.	33.6	33.8	33.0	
			31.4	33.3	33.8	
norm.	1930 14/11	Diff.	1.8	0.5	0.8	
			Above	Lat.	Med.	
		Knee R.	34.0	35.4	34.5	
	15/11	Knee L.	33.4	35.0	34.8	
		Diff.	0.6	0.4	0.3	
		Diff.	0.6	0.2	0.2	
norm.	1931 24/2		Med.	Lat.	Planta p.	
		Knee l.	35.9	35.5	before	
		right	33.0	32.6	narcose:	
		Diff.	2.9	2.9	30.0	
				Med.	Lat.	
		Tarsal joint left		32.4	34.7	
norm.	1930 17/11	" " right		29.2	29.0	
			Diff.	3.2	5.7	
			Above	Below	Lat.	Med.
		Knee R.	32.2	31.6	33	33
		" L.	32.2	32.6	31.2	30.9
		Diff.	0	1.0	1.8	2.1
norm.	1931 30/3		Before	Below	Lat.	Med.
		Knee R.	35.1	36.5	36.5	36.0
		" L.	32.3	33.8	31.8	32.9
		Diff.	2.8	2.7	4.7	3.1
norm.	1930 14/11					

Pat. nr.	Pat. name	Age	Sex	v. Pirquets test.	W.R.	Work	Diagnosis	Treatment	Abscess palpable	Abscess radiological	Aspiration
7	E. O.	b. 1908	m.	+	÷	Sailor	Tuberculous Knee (right)	Plaster c. X-ray terapi Resection 6/1-31.	÷	+	÷
8	Jenny L.	b. 1904	f.	+	÷	House- maid	Tuberculous Knee.	Exploratory Arthrotomy	+	+	+
9	Sara E.	b. 1883	f.	÷	÷	Nurse	Arthritis Defor- mans Knees (bilat.) Chronic Synovitis (left).	Plaster of Sunlight. Arc. lamp Expl. Arthr. Dental Extraction.	÷	÷	÷
10	Emmy S.	b. 1883	f.	÷	÷	Shopgirl	Arthritis Defor- mans Polyglandu Dysfunction Chr. Synov. L.	Exploratory Arthrotomy Polygl. Tablets (Thyreoid- Ovarian)	÷	÷	÷
11	Helene B.	b. 1895	f.	+	÷	Police- mans Wife	Tuberculous Knee. Left.	Resectio of Left Knee Reoperation 1930-15/7	+	+	+
12	Karl H.	b. 1905	m.	÷	÷	Farmers Son	Synovitis of Knee. Focal sepsis Dental.	Explor. Arthro- tomy. 1930-9/12 Dental Extr. 1931-15/1 Tonsillectomy.	÷	÷	÷
13	Helene E.	b. 1910	f.	+	÷	Sailors Daughter	Recurrent Tuberculosis of Knee	Reoperation Resection 1930-8/12	÷	÷	÷

Temperature rectum	Date for Meas- urement of	Skin Temperature before operative Treatment				After operative Treatment			
						Obs. All Temperatures are measured in degrees of Celsius.			
norm.	1930 15/12	Knee R.	Above 33.4	Lat. 35.2	Med. 35.2	Febr. 3 th:	Above	Lat.	Med.
		" L.	30.5	30.2	30.8	Diff.:	3.3	3.8	3.0
	1931 2/1	Diff.	2.9	5.0	4.4	Febr. 25:	3.4	3.4	2.2
	1931 6/1	Diff.	3.8	4.4	3.5	June 1:	1.6	1.9	2.3
norm.		Resectio gen. dextr.							
	1931 9/2	Diff.:	Above 3.4	Below 4.9	Lat. 4.2				
	23/4	"	3.2	2.2	4.2				
	1/6	"	1.8	3.5	5.8				
norm.	1931 17/4	Knee R.	32.2	30.9	33.7				
		" L.	31.9	33.6	35.3				
		Diff.	0.3	2.7	1.6				
norm.	1931 17/4	Operation.				27/6:	Above 32.7	Knee 32.9	Lat. 33.1
							33.2	34.2	34.1
						Diff.	0.5	1.3	1.0
						1937: Patient in good condition.			
norm.	1930 15/7	Reoperation.							
						1930-	Above 34.2	Before 31.0	Lat. 32.5
						18/11	32.9	29.7	30.5
						Diff.:	1.2	0.3	2.0
norm						1937: Patient in good condition.			
	1930 5/12		Above 31.8	Before 34.0	Lat. 33.8				
			30.8	32.5	32.7	5/1.31	31.9	32.1	32.2
		Diff.	1.0	1.5	1.1		31.7	31.5	31.8
norm.	8/12	"	1.6	2.0	0.8		0.2	0.6	0.4
	1930 8/12		31.0	29.2	29.0	2/3.31	27.6	30.1	27.7
			31.6	30.3	29.8		28.1	27.5	27.0
		Diff.	0.6	1.1	0.8	Diff.	0.5	2.6	0.7

Pat. nr.	Pat. name	Age	Sex	v. Pirquets test.		Work	Diagnosis	Treatment	Abscess palpable	Abscess radiological	Aspiration
14	Reidun K.	b. 1911	f.	+	÷	College girl	Tuberculous Knee	Resectio of Knee joint Sunlight	+	+	÷
15	Arthur R.	b. 1910	m.	+	÷	Worker	Tuberculous Knee (Right) Dermal Tuberculosis.	Sunlight. Biers passive hyperaemia R. Leg	+	+	+
16	Hans Kr. L.	b. 1909	m.	+	÷	Mech. Worker	Pulm. Tuberc. Spinal caries Tuberculous Hip & Knee R.?	Sunlight Plaster bed	+?	÷	÷
17	Alf Just L.	b. 1906	m.	+	÷	Sailor	Spinal caries Tuberc. Knee R.	Sunlight Plaster bed Resection of Knee joint 28/6.30.	+	+	+
18	Einar A.	b. 1924	m.	+	÷	Bakers Son	Knee Disease Sanated.	Sunlight Plaster case.	÷	÷	÷
19	Julius H.	b. 1904	m.	+	÷	Chauffeur	Knee Disease R.	Resection of Knee Explor. Arthro- tomia. 4/5.31	+	+	+
20	Asbjørn S.	b. 1904	m.	+	÷	Clerk	Hip Disease (R) Tub. Knee Ileo-sacr. Tub.	Plaster case Gerson Diet	÷	÷	÷
21	Knut H.	b. 1904	m.	+	÷	Sailor	Tuberculous Knee (R)	Resection of Knee J.R. 17/6-31	+	+	+
22	Thomas H.	b. 1900	m.	+	÷	Painter	Tuberc. Knee R. with Sinus Previously resected	Sunlight Gerson diet	+	+	+

Temperature rectum	Date for Meas- urement of	Skin Temperature before operative Treatment				Skin Temperature after operative Treatment Obs. All Temperatures are measured in degrees of Celsius.					
norm.	8/12 30		35.4	35.0	32.9	34.3	30/3.31 Diff.	Above	Bef.	Lat.	Med.
			32.4	31.8	31.4	32.0		0.7	1.7	1.4	0.6
			3.0	3.2	1.5	2.3	22/6.31	2.0		2.2	0.3
norm.	22/4 31	R. K.	30.0	29.3	33.9	32.8					
		L. K.	30.3	30.1	30.0	31.2					
		Diff.	0.3	0.8	3.9	1.6					
norm.	21/11 30		Above	Before	Lat.	Med.					
		L. Kn.	34.0	32.8	33.5	32.7					
		R. Knee	34.3	31.6	31.7	32.2					
		Diff.	0.3	1.2	1.8	0.5					
norm.	24/4 31 Resect. Knee	R. K.	32.0	31.8	32.5	32.2					
		L. K.	32.5	31.7	32.4	32.3					
			0.5	0.1	0.1	0.1					
norm.	28/6 30										
	29/6 31	R. K.	33.8		34.1	33.5					
		L. K.	33.2		34.1	34.0					
			0.6		0.0	0.5					
norm.	18/8 31	R. K.	32.6	33.9	35.0	34.3					
		L. K.	31.5	29.5	30.1	31.0	10/6.31: After operation.				
	4/5 31	Diff.	1.1	4.4	4.9	3.3	Diff.	1.5		0.8	0.3
		Diff.	1.0	2.3	3.2	2.2					
norm.	7/7 31	R. Knee	30.8		30.8	31.4					
		L. „	31.2		29.6	31.2					
		Diff.	0.4		1.2	0.2					
norm.	16/6 31	R. Knee	31.5		35.2	33.9					
		L. Knee	29.5		29.1	30.0					
		Diff.	2.0		6.1	3.9					
norm.	21/8 31	Measured in reg. Poplitea.					Great Destruction Lateral				
		R. Knee	37.2					Above	Befor.	Lat.	Med.
		L. „	32.8				1/11-30 Dif.	0.8	3.2	0.8	0.7
		Diff.	4.4				8/7.31 Dif.	2.1		2.3	3.0

Pat. nr.	Pat. name	Age	Sex	v. Pirquets test.	WR.	Work	Diagnosis	Treatment	Abscess palpable	Abscess radiological	Aspiration
23	Eivind N.	b. 1911	m.	+	+	Widows Son	Osteochondritis of Knee. Lues.	Explor. Arthro- tomy. 24/3.31 Antiluetic Treatment fr. 18/3.30	÷	÷	÷
24	Erling M.	b. 1917	m.	+	÷	Carpenters Son	Tuberc. Knee	Resection of Knee J. Large abscess along Femur	+	+	+
25	Alf M.	b. 1926	m.	+	÷	Painters Son	Tuberc. Knee Tub. multiplex	Redressement of Knee 21/2.29 Plaster.	+	+	+
26	Signe S.	b. 1926	f.	+	÷	Cottagers Daughter	Tuberc. Knee (L)	Aspirations	+	+	+
27	Halvor- dine T	b. 1906	f.	+	÷	Carpenters Daughter	Knee disease Focal sepsis	Resection of R. Knee for correc- tion of Position.	÷	÷	÷
28	Anna A.	b. 1889	f.	+	÷	Farmers Widow	Tarsal Tuberc.	Resection of medial Tarsal Joint 14/5.31.	+	+	+

Temperature rectum	Date for Measurement of	Skin Temperature before operative Treatment	Skin Temperature after operative Treatment
			Obs. All Temperatures are measured in degrees of Celsius.
norm.	24/3 31	R. Knee 31.6 32.5 31.1 33.5 L. " 32.6 31.6 31.6 32.8 Diff. 1.0 0.7 0.5 0.7	After Arthrotomy: Diff.: 20/4.31: 2.3 0.9 3.6 1.8
norm.	19/3 31	R. Knee 32.8 33.5 35.3 33.2 L. " 32.1 31.4 29.6 32.2 Diff. 0.7 2.1 5.7 1.0 There was a large Abscess along Femur (lateral).	
norm.	19/1 31	L. Knee 32.9 36.2 35.0 34.0 R. " 32.2 31.1 29.5 31.3 Diff. 0.7 5.1 5.5 2.7	
	21/4 31	" 1.2 0.9 0.1 2.7 During March—April the Inflammation was in return.	
norm.	17/11 30	L. Knee 30.6 28.9 30.4 33.1 R. " 33.0 30.1 29.8 29.7 Diff. 2.4 1.2 0.6 3.4	
norm.	2/1 31 Dent. Ext.	R. Knee 31.9 32.5 31.4 32.8 L. " 33.2 31.8 33.0 34.0 Diff. 1.3 0.7 1.6 1.2	
	3/3 & 18/3	Diff. 0.1 1.1 0.7 1.1	
	8/3 31	Diff. 0.2 0.1 1.5 0.7	
	23/4 31		
norm.	4/5 31	Tarsal Joint: Before Behind Medial L. 36.3 33.5 35.5 R. 35.3 29.3 29.2 Diff. 0 4.2 6.3 Abscess on the Medial Side.	

Pat. nr.	Pat. name	Age	Sex	v. Pirquets test.	WR.	Work	Diagnosis	Treatment	Abscess palpable	Abscess radiological	Aspiration
29	Johanne O.	b. 1908	f.	÷	÷	Workers Daughter	Synovitis of Knee non Tuberculosis Development of Effusion. fr. 6/6. Ovarian dysfunction.	Arthrotomia Resection of Synovia 21/5.31 Plaster c. 6/6.31	÷	÷	+
30	Borghild L.	b. 1917	f.	+	÷	Road-Watchers Daughter	Tuberculous Knee Synovitis	Plaster case.	+	+	+
31	Eldbj. J.	b. 1909	f.	+	÷	Dental Nurse	Tuberculous Knee	Explor. Arthrotomy Arthrodesis 8/4.31.	÷	÷	÷
32	Borghild J.	b. 1904	f.	+	÷	Workers Wife	Tuberculous Knee Synovitis	22/5.31. Resection of Knee (R)			
33	Johan W.	b. 1908	m.	+	÷	Fisher-man	Tuberculous Knee (Left) Epididymitis	Aspiration Explor. Arthrotomy Resection of Knee Joint (Left) and Capit. Fibulae	+	+	+
34	Uno V.	b. 1919	m.	+	÷	Brick-layers Son	Tuberculous Knee (R)	Traction Plaster case	+	+	+
35	Finn S. P.	b. 1914	m.	+	÷	Painters Son	Tuberculous Knee (R)	Synoviectomy.	+	+	+

Temperature rectum	Date for Measur- ement of	Skin Temperature before Treatment				Skin Temperature after operative Treatment				
						Obs. All Temperatures in degrees of Celsius.				
norm.	15/5 31	R. Knee	Above 31.6	Before	Lat. 31.3	Med. 33.1	6/6 When the Pat. was allowed to go, the Knee swelled.			
		L. „	30.1		30.5	31.0				
		Diff.	1.5		0.8	2.1				
	22/6 31									
norm.	3/7 31						Diff.	3.4	4.3	5.0
	16/7 31						Diff.	0.1	1.0	1.9
							Diff.	0.3	0.3	0.4
norm.	28/2 31	L. Knee	34.1	34.2	35.5	35.5				
		R. „	32.2	32.8	32.3	33.9				
		Diff.	1.9	1.4	3.2	1.6				
	2/7 31	Diff.	0.7		2.4	1.4				
norm.	18/8 31	R. Knee	32.0	31.2	32.6	32.5				
		L. „	32.6	32.0	31.9	32.4				
		Diff.	0.6	0.8	0.7	0.1				
	29/6 31									
norm.	19/5 31	R. K.	31.6		33.6	34.4	Diff.	Above 0.5	Lat. 0.7	Med. 1.8
		L. K.	31.7		31.4	31.5				
		Diff.	0.1		2.2	2.9				
	21/11 30	R. K.	34.2	32.2	32.6	33.7				
norm.		L. K.	34.5	34.0	36.2	35.9	21/4.31 : Diff.			
		Diff.	0.3	1.8	3.6	2.2				
	20/1 31	R. K.	29.6	29.2	27.0	30.8				
	Abse.	L. K.	33.0	34.0	35.5	34.8				
norm.	Obs. :	Diff.	3.4	4.8	8.5	4.0				
	20/11 30	R. K.	33.5	34.5	34.2	34.5				
		L. K.	34.3	31.9	33.0	33.0				
		Diff.	0.8	2.6	1.2	1.5				
norm.	3/2 31	Diff.	1.4	0.8	1.1	0.6				
	18/11 30	R. K.	35.3	34.3	35.9	34.8				
		L. K.	34.9	31.8	31.4	34.0				
		Diff.	0.4	2.5	4.5	0.8				
norm.	23/4 31	Diff.	2.2	4.5	3.2	3.1	During Narcose : Planta-temp. increased from 27.5 to 33.0.			

Pat. Nr.	Pat. Name	Age	Sex	v. Pirquets test.		Work	Diagnosis	Treatment	Abscess palpable	Abscess radiological	Aspiration
				v.	WR.						
36	Arne P.	b. 1906	m.	+	÷	Student	Tuberculosis of Malleolar Region (L) Spinal caries Renal tub.	Resection of Malleolar Region. (Q)	+	+	÷
37	Gunnar S.	b. 1913	m.	+	÷	Farmers Son	Knee Joint Disease Sanat.	Plaster case Resection of R. Knee J. 12/12. 1929	÷	÷	÷

Temperature rectum	Date for Messu- rement of	Skin Temperature before Treatment	Skin Temperature after operative Treatment				
			Obs. All Temperatures in degrees of Celsius				
norm.	17/11 30		After Treatment:				
	Tarsal		Planta	Pedis	Before	Lat.	Med.
			L.	30.4	30.5	30.6	32.6
			R.	30.9	31.4	29.7	32.2
norm.		The Pat. on Foot. The Pat. in Bed. (24 hours before Measurement.)	Diff.	0.5	0.9	0.9	0.4
	17/12 30		Diff.	0.9	1.2	0.0	0.2
	16/11 30		R. Knee	30.4		32.1	31.0
			L. „	31.7		30.4	32.8
			Diff.	1.3		1.7	1.8
	17/11 30		Diff.	1.0		0.8	0.6