Fever Therapy

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INDEX

COURTESY OF CITIZENS AID SOCIETY

I. ABSTRACT

FEVER THERAPY

M. M. Cook

While heat has been used as a therapeutic agent since the earliest record of medical history, it was not until 1918 when Wagner Von Jauregg announced his classical work on therapeutic malarial inoculation for the treatment of paresis, that the value of deliberately induced fever was demonstrated. In spite of the immediate, widespread and encouraging application of this principle, certain disadvantages gradually became apparent. The fever was not always subject to direct control, chemotherapy could not be employed during the "chills," and sometimes difficulty was experienced in controlling the therapeutic agent at the end of treatment. Also the frequency and duration of each "chill" was governed by the character of the inoculated disease and not by the individual tolerance of the patient. The use of various other chemical and bacterial agents only partially solved these problems.

In a search for a safer and more easily controlled agent, Neyman and Osbourn, in 1929, and King and Cooke, in 1930, were among the first to advocate the use of high frequency currents, applied directly to the patient's body, by means of powerful diathermy apparatus. This procedure minimized some of the early difficulties but introduced new complications of its own. Close covering of the body to prevent radiation of heat was very oppressive. Imperfect contact of electrodes to the body often caused painful skin burns. Often the induction period was protracted and exhausting.

In 1930, W. R. Whitney of the General Electric Company's Engineering Laboratory developed the ultra short wave "Radiotherm." With this device, a controllable fever could be rapidly induced and comfortably maintained by placing the patient in the electrostatic field of its generator and without metalic contact with his body. In spite of its manifest advantages, two difficulties were at once apparent: first, the high cost and extreme fragility of the Radiotherm generator; and second, the unexpected skin burns resulting from accumulation of perspiration on the skin with consequent local concentration of heating due to moisture.

To combat this problem, Simpson and Kettering, in 1931, devised a cabinet to be used in conjunction with the Radiotherm, in which a blast of hot, dry air evaporated the perspiration and kept the skin dry. The patient's head protruded from the box and no covering or constrictions were used on the body. This refinement added to the comfort and safety of the patient.

Finally, Simpson and Kettering discovered that fever could be induced and maintained with the box alone without recourse to the radiotherm. As a last refinement, a high moisture content was added to the circulating air.

The present type of machine, known as the Kettering Hypertherm, is a large box-like affair similar to a Drinker respirator in which the patient lies with his head protruding. Sliding side doors allow access to the patient's body for checking rectal temperature, inspecting the skin, etc. The temperature, humidity and velocity of the air are under automatic control, but with manual adjustments for regulation. The Kettering apparatus, which is in use at the University of Minnesota Hospitals, is not a commercial product. The machines are built by the C. F. Kettering Foundation and are furnished at a nominal yearly rent to any reputable hospital or medical institution which will undertake accurate investigative work, and render analytical reports in the literature. A clause in the contract stipulates that the physician in charge and the nurse and technicians must receive adequate specialized instruction in fever therapy before undertaking the work. Our department is one of 20 using a total of over 50 Kettering machines for investigative purposes.

Procedure

In use, the patient is covered lightly and the air temperature adjusted to 145 to 155° with a relative humidity of 40 to 50%. In the average subject, a rectal temperature of 105°F can easily be

reached in from 45 min. to 1½ hours. The box temperature is then lowered to maintain the desired fever until the end of the treatment. Rectal temperature is checked every 10 min. or oftener and the pulse and respirations are also observed frequently.

In order to minimize discomfort and allay apprehension, some kind of sedative is administered at the onset of the treatment and repeated as needed. The barbiturates and opiates are the most useful. Water, or usually 0.3% saline is offered during the treatment, 3 to 5 liters being given ordinarily. This maintains normal fluid balance, prevents excessive depletion of body chlorides and fixed base, and quenches thirst. When the treatment is over, the patient is removed from the cabinet and the temperature sinks to normal over a period of 2 to 5 hours. Robust patients may be allowed to go home after a few hours' rest but are cautioned to rest in bed the next day. More debilitated patients are best observed over night.

Contra-indications

Contra-indications for fever therapy are, in the main, similar to those for major surgery. Specifically, subjects with cardiac and advanced renal disease should be excluded. General debility and advanced age are contra-indications. Pulmonary tuberculosis may be adversely affected and pregnancy is often, though not always, interrupted. Well-controlled diabetes is not a contra-indication.

Complications

Certain complications may be observed during fever treatments.

1. Extensive cutaneous erythema or actual vesicle formation may occur with excessively high box temperature or very rapid induction.

2. Vomiting occasionally occurs which, however, is usually relieved by the intravenous administration of normal saline with 10% glucose, 500 to 1,000 cc.

3. Tetany, characterized by spasmodic cramping of the extremities associated with positive Chvostek and Trousseau signs, is probably related to alkalosis from over-ventilating with consequent upset in calcium balance. This condition responds promptly to inhalation of CO_2 (10%), or parenteral calcium injections, or both.

4. Severe painful abdominal cramps, either during or following the treatment, may result from depletion of NaCl in the system. Intravenous sodium chloride injections, either in isotonic or hypertonic form, will terminate this symptom promptly.

5. Occasionally, the patient grows irrational and the temperature rapidly rises above the intended limit. This is thought to be caused by cerebral edema. Hypertonic glucose or sucrose administered, intravenously, is indicated. Meanwhile, the patient must be gradually cooled by tepid sponges, etc., the treatment meanwhile being discontinued.

6. Very rarely, one observes a case of generalized vasomotor collapse. The patient ceases to breathe and the pulse and blood pressure cannot be determined. Prompt cessation of treatment, Trendelenburg's position, cardiac and respiratory stimulants, artificial respiration, with CO_2 inhalations are usually effective in this alarming complication.

Range of Treatment

In general, a course of treatments consists of maintenance of a temperature of 104 to 106 (or over) for 4 to 7 hours, repeated every 3 to 7 days from 3 to 10 times, depending on the condition treated. This may be combined with any other form of therapy, usually used with the disease in question, i.e. chemotherapy in syphilis or deep x-ray in neoplasms.

Application and Therapeutic Results

Statistical tabulation and analysis of results reported, to date by various workers, is impossible, owing to the different procedures employed, the variations in maximum temperature and duration of treatments, the different criteria used in selecting cases and the discrepancies in evaluation of results. Hence, the following paragraphs are in a sense resumes

of representative reports by prominent workers with a few of the most amenable diseases.

Syphilis

Simpson, Kesling and Settler

Manifestation	No. Cases	Remission	Improved	Not Improved
a. Paresis	12	11	1	0
(Improvement in paralysis, improved mentality, better nutrition, gain in weight, subjective "well-being.")				
b. Taboparesis	5	4	1	0
(Abolition of root pains)				
c. Tabes	5	2	3	0
(Recent ataxia improves. All root pains disappeared.)				
d. Diffuse C.N.S. lues	5	3	2	0
(Spinal fluid reverts to normal. Ocular complications improved.)				
e. Asymptomatic neurosyphilis	5	5	0	0
(Wassermann - blood and spinal fluid - negative. Spinal fluid reverts to normal.)				
f. Congenital lues				
Juvenile paresis	2	1	1	0
C.N.S. lues	2	1	1	0
Keratitis	2	2	0	0

(Note: Simpson advocates fever 105 to 106 for 5 hours, once per week for 10 treatments accompanied by chemotherapy.)

General Paresis

Resume to 1933 by Neyman

Author	No. Cases	Remission	Improved	Not Improved	Dead
Neyman and Osbourn	25	16	2	7	0
Cortesi	8	3	3	2	0
Neyman & Koenig	50	12	13	25	0
Perkins	26	13	10	1	2
Wilgus & Lurie	97	10	43	38	6
Hensie & Blalock	68	13	24	29	2
Prior	16	9	3	4	0
Holphen, Auclair & Crozon	15	4	4	7	0
Bauford	13	1	0	12	0
Bishop, Horton & Warren	18	13	1	4	0
Neyman	20	11	2	6	1
Shamberg	9	3	6	0	0
Totals	365	108	111	134	11

Arthritis, Neuritis, Myositis, Bursitis

Condition	No. Cases	Remission	Marked Improvement	Moderate Improvement	No Improvement
Gonorrheal	24	22	0	0	2
Chronic infections (atrophic)	147	15	37	37	58
Senile	74	4	18	18	35
Chronic gouty	1	1	0	0	
Chronic traumatic	2	2	0	0	
Neuritis	6	4	0	2	
Myositis	8	2	0	6	
Bursitis	4	2	0	2	
Totals:	266	52	55	65	95

(Note: Hursch recommends 104 to 105° for 5 hours, every 3 to 5 days, for 4 to 6 treatments.)

Arthritis

Hursch & Slocumb

Gonorrheal (16 cases)

Grade Improvement	Acute	Chronic
4	44%	14%
3	56%	58%
2	0%	14%
1	0%	0%
0	0%	14%
Total Cases	9 cases	7 cases

Chronic infectious (atrophic) (60 cases)

Grade Improvement	Immediate	After 1 Year
4	0%	0
3	17%	18
2	46%	20
1	27%	12
0	10%	50

Arthritis

Stecher, Robert M.

Condition	No. Cases	Remission	Improvement	No Improvement
Gonorrheal	18	11	7	0
Acute infectious	13	6	4	3
Chronic infectious (atrophic)	33	0	20	13

Hefke, Hans W.

Rheumatoid				
Duration less than 1 year	23	14	5	4
Duration more than 1 year	13	3	3	7
Gonorrheal	4	4	0	0

Tenney & Snow

Atrophic rheumatoid	21	0	18	5
Hypertrophic (degenerative)	10	0	4	6
Gonorrheal	6	6	0	0

Neyman, et al

Infectious	13	7	4	2

Bishop, Horton & Warren

Infectious	15	0	15	0

Kendall, Webb & Simpson

Gonorrheal				
Acute	19	15	4	0
Chronic	12	7	5	0

Summary and totals of above 6 groups of arthritis:

Condition	No. Cases	Remission	Improvement	No Improvement
Gonorrheal	59	43	16	0
Acute infectious Chronic infectious	74	13	43	18
Rheumatoid	57	17	26	16
Hypertrophic	10	0	4	6

Note: Kendell advises: 4 to 5 treatments, 106 to 106.8°, 5 to 7 hours every 3 to 5 days.

Moderate percentage has complete restoration of motion and large percentage partial.

Manipulation under anesthesia followed immediately by fever is suggested after inflammation subsides.

Asthma, Chronic, Intractable

Author	No. Cases	Remissions	Improvement	No Improvement
Neyman & Feinberg	44	22	14	8
Auclair	8	8	0	0
Sheldon	14	6	4	4
Total:	66	36	18	12

(Note: Sheldon advises - 104 to 106° for 5 to 6 hours, every 3 to 7 days, for 2 to 8 treatments.)

Miscellaneous Conditions

Many other conditions have been treated by means of fever therapy, some of them with encouraging results. However, due to the small number of cases in all reports, no tabulation or statistical contemplation is practical. Listed below are many diseases which should be investigated further.

Chorea
Sutton and Dodge
Desjardins
Schnabel

Post-encephalitis
Ebaugh

Tuberculosis of kidney
Metz

Bronchiectasis
Simmons

Buerger's disease
Ebaugh

Chronic otitis media
Ebaugh

Toxic psychoses
Simmons

Undulant fever
Simmons

Multiple sclerosis
Schmidt

Osteogenic sarcoma
Doub

Psoriasis
Benjamin

Corneal ulcer, non-specific
Metz

Iritis
Ocular penetration
Non-specific opnthalmitis
Doub

Impressions

Even a cursory perusal of the literature of fever therapy reveals several obvious points.

1. Fever therapy is still in its infancy. Apparatus and technique show vast room for development and improvement.

2. It is important to avoid promiscuous exploitation of fever therapy by

persons who are untrained and unfamiliar with the procedure. A certain mortality undoubtedly must be expected just as in various surgical procedures. Care and diligence in selecting patients and in conducting treatments can reduce the hazards of fever therapy to a point favorably comparable to the surgical risk involved in a similar group of patients.

3. The old and oft repeated question, as to the superiority of fever of some particular origin, is still open and unsettled. Regarding physical appliances, however, most workers feel that equally good results may be attained with any type of apparatus which will produce the desired degree and duration of controllable fever. The choice of equipment seems to be largely a matter of expediency and personal preference.

4. No standardized system of evaluating and reporting cases has as yet been devised. Reports are difficult to analyze statistically due to diversity of method and technique, non-uniformity of terminology, heterogeneous diagnostic criteria, and differences in selection of patients.

5. Attitudes exhibited toward fever therapy vary from blind enthusiasm to bleak indifference. Perhaps, the middle ground is best. An inquisitive attitude and an open mind will undoubtedly arrive at the most accurate ultimate evaluation of fever therapy.

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II. LAST WEEK

Date: February 27, 1936

Place: Recreation Room,
Nurses' Hall

Time: 12:15 - 1:15

Program: Movie: Energy and Its
Transformation
Hematuria

Present: 105

Discussion: C. D. Creevy
Richard M. Johnson
E. L. Meland
Arild Hansen
T. H. Sweetser
I. J. Pass
S. A. Weisman

Gertrude Gunn,
Record Librarian

III. MOVIE

Title: "Le Verrier"

Produced by: Tapernoux -