

**Archives of Physical Therapy, X-Ray, Radium with
International Abstract**

Official journal American Congress of Physical Therapy

Vol. XII No. 2

1931 Feb

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with
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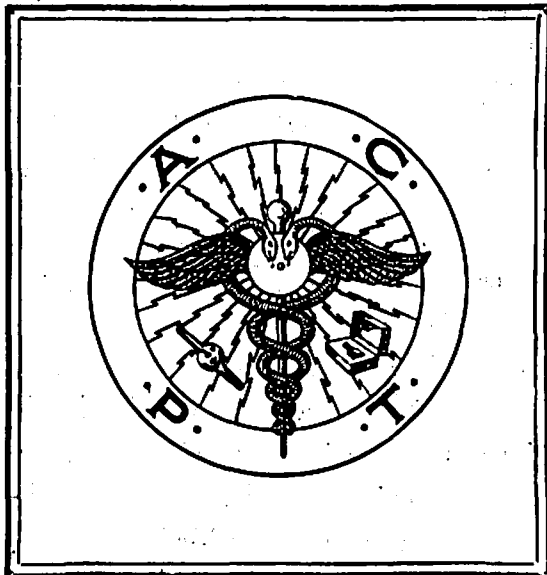
Official Journal American Congress of Physical Therapy



Volume XII

FEBRUARY, 1931

No. 2



ANNOUNCING
Tenth Annual Scientific Session
*American Congress of
Physical Therapy*

October 5, 6, 7, 8, 1931
(Please note correction in dates. See Editorial Page)

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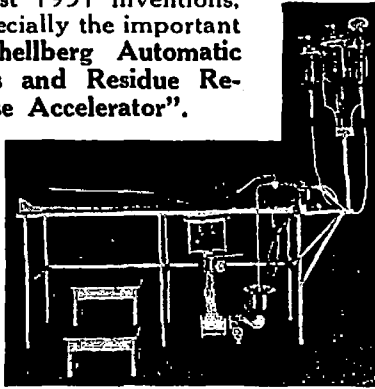
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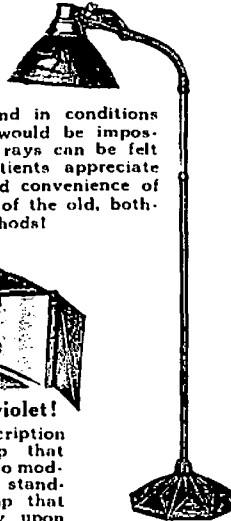
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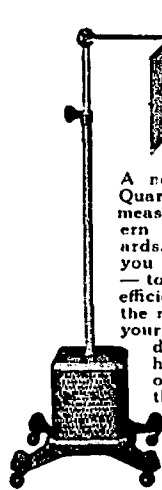
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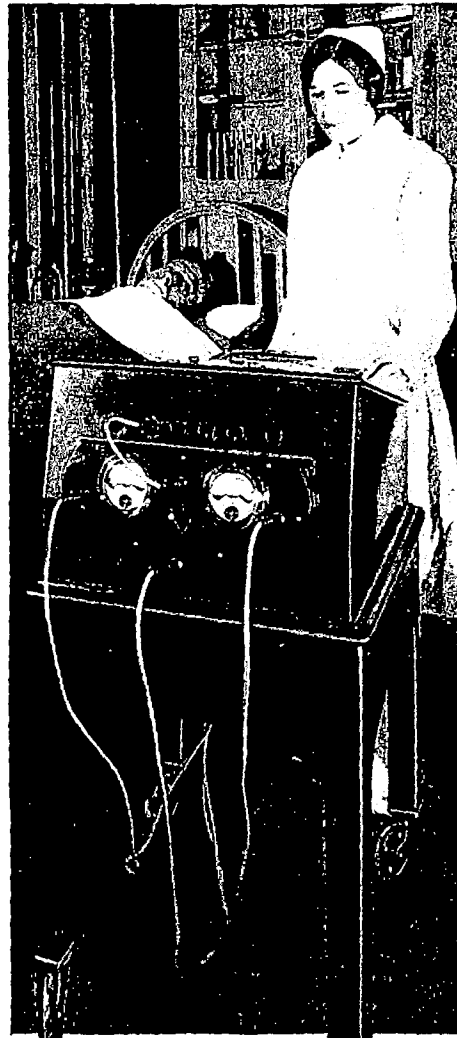
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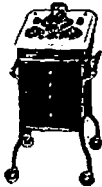
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THE USE OF DIATHERMY IN LOWERING BLOOD CHOLESTEROL *

DISRAELI KOBAK, M.D.

CHICAGO

High frequency currents, used in the form designated as diathermy, have been empirically employed in the clinic in the treatment of a variety of symptoms. In the main, it has been consistently claimed that the currents, traversing the tissues of the body, meet with resistance, in consequence of which there was developed at the point of resistance a rise in temperature. Because of this alleged action, the term high frequency currents has been subdivided, and their use for a supposed production of internal heating has been classed as medical or surgical diathermy.

It must not be overlooked that actual proof, capable of sustaining valid criticism, does not seem to have been adduced in support of the belief that a heating through does in reality take place. Much evidence appears to favor such a view; but still other evidence brings the hypothesis into question.

Pending the academic solution of this controversy, three important considerations are available to the physical therapist. First, it is nowhere indicated that all the effects of diathermy therapy need be the result of engendering a deeply seated heat. Second, the earliest experimenters with high frequency currents, notably d'Arsonval, insisted more on effects not correlated with heat, as for example colloidal phenomena, such as flocculation and precipitation in the destruction of diphtheria toxins by the passage of high frequency currents to the exclusion of heat production. Third, whatever the true explanation may be, there are certain seemingly consistent clinical effects which follow the use of high frequency currents, and for which no physiological explanation has as yet been advanced.

Mainly because of these considerations, the clinician has had to content himself with empirical diathermy therapy; and from the experiences gained from his clinical results, he has had to evaluate diathermy as a physical therapy agent, capable of yielding symptomatic relief in properly selected pathologies. It is needless to point out that this experience

does not differ from similar experiences in the case of many drugs; but, nevertheless, it is strongly suggestive of the advisability that polemical speculations be discarded, and that systematic attempts at the study of the action of these currents be vigorously and intensively pursued.

Typically illustrative of the arguments just presented is my own experience in the case of the treatment of abdominal upper right quadrant symptoms with diathermy currents. It has been my experience that the application of diathermy to the abdominal upper right quadrant has often resulted in symptomatic relief of such symptoms as may properly be ascribed to chronic gall bladder pathology. Assured of the clinical usefulness of diathermy in aiding these conditions, it seemed apparent that the relief could not be ascribed merely to the generation of heat in the region of the gall bladder, unless the generation of such heat in some manner altered the pathological physiology of the part. Inasmuch as the careful clinician will unquestionably obtain favorable therapeutic effects by the use of diathermy in these conditions, the problem presented itself of attempting to discover some physiological evidence that might suggest the nature of the changes provoked by the diathermy currents.

When gall bladder pathology is considered, physiology suggests that the secretions of the liver which are stored in the gall bladder be given some thought. Of the biliary secretions which combine to form bile, an important constituent is cholesterol; and since cholesterol is readily measured in the blood, it is obvious that the study of this blood extractive would be one of the first avenues of approach.

In a study that has elsewhere been submitted for publication, I concluded that diathermy applied to the region of the gall bladder and liver was apparently effective in lowering the blood cholesterol. Such cases as showed hypercholesterolemia tended toward a normal blood cholesterol after diathermy treatment. Such cases as showed an approximately normal cholesterol content, displayed a hypocholesterolemia following a diathermy

* From the Department of Physical Therapy, Rush Medical College, The University of Chicago.

* Read before the joint sections of Medicine and Surgery at the Ninth Annual Meeting, American Congress of Physical Therapy, St. Louis, Mo., September 10, 1930.

treatment. Finally, such cases as already showed a hypocholesterolemia have their blood cholesterol still further lowered by such treatment.

These conclusions were reached from studies on a number of patients with a variety of surgical and other conditions, selected at random from the Cook County Hospital and from the Rush Medical Central Free Dispensary. In general, blood was obtained from the arm in the usual manner; diathermy was applied over the region of the liver and gall bladder; and a second specimen of blood was again collected following the treatment. A D'Arsonval type of current was used. There was nothing unusual in the manner of application, it being essentially that recommended for the treatment of this region by competent workers. With the apparatus used, the milliamperes registered about 1200, the current density was between 60 and 70 milliamperes for each square inch of active electrode surface, and the treatment lasted one-half hour. The blood cholesterol was determined by an established method of known accuracy, for which method it is claimed that the normal range of cholesterol is between 140 and 160 milligrams per 100 cubic centimeters of blood. The results revealed a lowering of the blood cholesterol in each of the 21 cases studied, as shown in the accompanying table;

I

Blood Cholesterol Findings, in Milligrams per 100 Cubic Centimeters of Blood, Before and Immediately After ½ Hour Treatment With Diathermy

Case number	Cholesterol		Percent of change
	before	after	
1	168	140	-17
2	200	168	-16
3	152	140	-8
4	148	136	-8
5	148	124	-17
6	156	140	-10
7	200	160	-20
8	200	180	-10
9	208	192	-8
10	180	160	-11
11	144	128	-11
12	168	160	-5
13	152	132	-13
14*	256	148	-42
15	216	192	-11
16	192	180	-6
17	164	132	-20
18	140	120	-15
19	172	144	-16
20	160	144	-10
21	148	132	-11

* The second sample of this case was incompletely oxalated. The result is probably incorrect owing to the imperfect sampling of the specimen.

The method used to determine the cholesterol, suggests that a variation amounting to 10 per cent may be considered within the limits of normal physiological activity. However, to be certain of this fact, six additional cases were studied, in every manner identical with those mentioned above, excepting that the period of diathermy treatment was replaced with an equivalent period of rest. In these cases the blood cholesterol behaved as follows:

Blood Cholesterol Content, in Milligrams per 100 Cubic Centimeters of Blood, Treated in Every Way as in the Previous Series of Cases Excepting for the Absence of Diathermy

Case number	Cholesterol		Percent of change
	before	after	
1	152	148	-3
2	140	152	+9
3	156	160	+3
4	168	160	-5
5	172	176	+3
6	152	152	± 0

It is important to observe that in the absence of diathermy treatment, the variations in cholesterol were less than 10 per cent, and were as often positive as negative. This suggests that the slight variation, whether due to physiology or the experimental method, may be expected to fluctuate in either direction, above or below the original value. As distinguished from it, it is apparently significant that in the 21 cases treated with diathermy, the blood cholesterol was invariably lowered. It is further significant that 80 per cent of the treated cases were lowered in excess of the 10 per cent physiological limit. This seems to establish beyond doubt that the diathermy treatment was effective in lowering the blood cholesterol.

II

Cholesterol, from a position of physiological obscurity, has risen within the past five years to a position of physiological pre-eminence. This sterol was of unknown physiological significance in the human mechanism, but with the advent of physical therapy, in particular ultraviolet light, it has become linked with the vitally important nutritional substances called vitamins.

Cholesterol has always been considered to take a prominent part in the immunologic defenses of the body. Its function in the reenforcement of antigen in serologic complement fixation tests has strengthened this relation. Its appearance as a concretion in the gall bladder seems to have been linked with an infectious process, most gall stones con-

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taining a nucleus of infectious material,—typhoid bacilli, colon bacilli and the like.

The ability of cholesterol to prevent the hemolysis of red blood cells attacked by hemolytic agents is another important property of the sterol.

The variations in the amount of cholesterol in the blood in various diseases suggests that it cannot be passive and inactive. Arterio-sclerosis involves cholesterol, since the sclerotic deposit in the intima of the blood vessels, and on the endocardium, is largely composed of cholesterol and calcium. The *arcus senilis* is mainly a cholesterol deposit. The apparent fluctuations of cholesterol with the degree of pyrexia is indicative of the susceptibility of the sterol to vary under the influence of fever. Pernicious anemia affects, or is affected by, changes in the cholesterol content of the blood.

These examples, together with many others that are commonly listed in the usual sources of physiological chemical investigations, suggest that the sterol plays an important part in the bodily economy. It is to be emphasized that, no doubt, these variations are not causatively related with the various conditions mentioned, any more than the lowering of the hemoglobin in anemia is causatively related to the etiologic factor producing the anemia. In both instances, however, the clinician must be satisfied in realizing that when he has re-equilibrated the cholesterol or the hemoglobin value, and has succeeded clinically in maintaining this re-equilibration, he may rightfully assume that he has at the same time dispelled the causative factors, or at least made them inoperative.

From the preceding discussion, it follows that blood cholesterol may in a number of instances be used as an index of an existing pathology; and it further follows that any method which will restore the blood cholesterol to a more normal value is a method apparently effective in overcoming the pathogenesis of the condition in question.

With these considerations clearly in mind, it is at once obvious that diathermy may now be expected to assume a new therapeutic role. For the present, we must be content with the fact that when diathermy is applied to the region of the liver, blood cholesterol is lowered. Whether the lowering is due to the heat locally engendered in the liver, if such heat be engendered, or whether it is due to some other

cause, the clinician need not at this time be concerned. This investigation, however, offers an apparently rich opportunity for considerable research.

III

The physical therapist may now establish a new scope of diathermy application, hypothesized on the effect that this energy displays in lowering blood cholesterol.

First, diathermy should prove useful as a prophylactic measure in the treatment of those conditions which lead eventually to a hypercholesterolemia. In this category, the syndrome that goes to make up the digestive disturbances contributing to chronic gall bladder pathology and to gall stones, should be expected to be delayed and perhaps even prevented by such treatment. In practice, the beginning complaint of abdominal upper right quadrant disturbances which are not traceable to reflex pathology, such as appendiceal disease, are at once an indication for diathermy treatment. In our present age, where the symptom of overweight is becoming so obviously ubiquitous, more particularly in women, it is clear that this metabolic aberration may be dependent upon, or may lead to a digestive dysfunction in which the gall bladder will sooner or later be involved. It seems almost axiomatic to believe that obesity, however else treated, and for whatever origin, should not escape a systematic diathermy course of treatment in the hope of preventing the almost inescapable liver and gall bladder pathology which it sooner or later develops. The relation of obesity to impending gall bladder distress has many times been aphorized, as by the surgeon's dictum in the diagnosis of gall bladder disease,—“Fair, Fat and Forty”.

The pathologies that lead to the degenerative changes wherein cholesterol, because of its excess, becomes deposited in the vessels, as in coronary sclerosis, arterio-sclerosis and the allied artheromatous conditions, diathermy should be expected to serve as a restraining, and therefore, preventive influence. Diathermy has been used and recommended in the treatment of angina pectoris and in the treatment of high blood pressure associated with arterio-sclerosis. If a good measure of relief is obtained from the treatment of these conditions when already established, it is obviously more probable that a higher measure of clinical benefit may be anticipated in prevent-

ing these conditions from becoming established.

In the treatment of disease, it would seem much more difficult to expect a resorption of excessive cholesterol already deposited, and of the fibrous changes which this deposit provokes. Obviously, less brilliant results are to be expected.

Just as there are indications for the use of diathermy in the correction of diseases associated with hypercholesterolemia, so are there contra-indications to the use of diathermy in connection with diseases accompanied by hypocholesterolemia. It would seem safe practice to suggest that the individual showing low blood cholesterol should be treated very cautiously, if at all, with diathermy.

IV

The use of diathermy for conditions in which the blood cholesterol is obviously altered by other than purely mechanical means (such as chronic nephritis) is postulated on the basis that, apparently, treatment with diathermy lowers blood cholesterol.

The mechanism involved in this lowering of blood cholesterol is unknown, but merits further attention and investigation. The clinician, however, may make use of blood cholesterol determinations as a guide to treatment and as a measure of response to treatment. Wherever a series of blood cholesterol determinations show that the subject evidences a tendency to increasing hypercholesterolemia, it is reasonable to assume that a pathology is becoming established; and before the pathology has occasioned too many and too gross anatomical changes, a proper course of diathermy treatment is justifiable in checking the advance of the hypercholesterolemia. Specifically, every obese individual, whatever other treatment is being furnished to eradicate the cause of the obesity, may be expected to develop abdominal upper right quadrant symptoms; and since it will most likely be associated with gall bladder disturbances and with changes in cholesterol metabolism, diathermy should be justifiably included in the treatment.

The contra-indications to the use of diathermy are those conditions associated with a marked hypocholesterolemia.

Physiologically, the lowering of blood cholesterol by diathermy seems to offer new therapeutic indications.

[Grateful acknowledgment is here made to Dr.

A. J. Pacini for the valuable suggestions and loyal support in the work of this problem.

For the courtesy and aid lent to the author in the use of their high frequency machines, acknowledgment is hereby made to the High Tension Co. of New York and to the McIntosh Electrical Co., Chicago.]

Discussion

PROF. VICTOR E. LEVINE (Creighton University, Neb.): I want to call attention, before congratulating the speaker on his splendid work, to some interesting things that emanate from tables of his paper.

In the first place, I want to point out the fact that the figures in case 7 give a cholesterol content before diathermy of 280 and a reduction to 160 after treatment. If we compute the percentage, the error of discrepancy is very large. In other words, there was a decrease of 42 per cent. There is also an apparent discrepancy in Case 16. The percentage should be more than minus one. (An error in typing which has been corrected in the final table. Ed.)

Incidentally it goes to show the innate sincerity and honesty of Dr. Kobak, for instead of pushing his data to correspond psychologically to his conclusions, he went to the other side, and his data showed lesser results than they really have given by way of analytical figures.

Another suggestion that this table offers is the fact that the higher the cholesterol, the greater is the lowering of the cholesterol—a very significant point. For example, case 14, 256, 42 per cent; case 17, 164, 20 per cent, and the like. Generally speaking, I suppose if we had more case reports the tendency would be in the same direction.

Conversely, when the cholesterol content was normal, you observe a relatively low reduction. The loss in cholesterol is rather small. I should like to see figures with very low cholesterol, hypocholesterolemia, figures that we would find, let us say, in pernicious anemia.

It is very likely the effect of diathermy may be as follows: that when the cholesterol is high, it tends to be lower. Where the cholesterol is low, it tends to come to normal. That is merely a hypothesis on my part, but we have seen that in the effects of ultraviolet. It may be possible that diathermy behaves in a somewhat similar fashion.

Coming to the speaker directly, Joseph Priestley a long time ago said that whenever he performs an experiment and gets results, it opens up to him new ideas, new visions and new possibilities not thought of, not dreamed of before. I may as well apply this to Dr. Kobak's research. This is a fertile piece of research. It opens up a good many possibilities from the standpoint of abuses and from the standpoint of application.

In the first place, we have in our body pivotal factors. In mineral metabolism we have calcium standing out very prominently, shoulder and head above sodium and potassium and magnesium and other metallic elements.

In the field of lipins we may give this first-hand place to cholesterol, which occupies a pivotal position both in physiology and in pathology. Physiologically speaking, I believe there is more than one cholesterol, probably a series of cholesterols, and the

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results shown here probably give the total of all the cholesterol substances found in the blood.

Physiologically speaking, cholesterol has a good deal to do with the physical-chemical-viscous make-up of protoplasm, for no single cell exists, plant or animal, without having some small quantity of sterol or cholesterol in it. It has a good deal to do with the integrity of the red cell, for without cholesterol hemolysis takes place. We know it produces pernicious anemia when the cholesterol is low, and the hemolysis might be extensive.

It also has to do with the transference of ultraviolet, not merely this cholesterol but some other type found in the blood which travels out of the skin into the blood and into various tissues. It has a good deal to do with digestion, with the enzymes present in the stomach and intestines, especially with reference to digestion of fats. But, pathologically, it assumes a great importance, for some of the most common conditions are bound up directly with cholesterol. For example, arteriosclerosis is one, and gall-bladder disease is another, especially when it leads to the precipitation of gall-stones.

In diseases of the nervous system, as in syphilis of the spinal cord or of the cortex, we find a hypercholesteremia. In diabetes, where we have a disturbance not only of carbohydrate metabolism but the fat metabolism, we find a hypercholesteremia. Consequently, any information that we get on cholesterol is very highly welcomed, especially if that information leads to a method of cutting down, and considerably in some cases, the cholesterol content of the blood.

I wish to congratulate Dr. Kobak for the problem; first, because it is not an easy problem from an analytical standpoint; second, because it is a problem with many possibilities. Incidentally, it enlarges our knowledge with reference to diathermy. We have very little information about the physical and chemical and biological effects of diathermy, and the more information we have, the larger will be our viewpoint and the more satisfactory will be the use with which we apply diathermy in diseases.

PROF. C. I. REED (Chicago, Ill.): I noticed that in Dr. Kobak's results he gives the figures obtained immediately before and immediately after the treatments. I am wondering if he has made any attempt to study the persistence of this condition of lowered cholesterol. It seems to me that might be an important point to investigate. Does this hypocholesteremia persist, or is there restoration within a definite time? If the latter, and there is still an absence of symptoms, then it is obvious that the speaker's point regarding this as an indicator of the effects of diathermy is of still greater importance, because it is then obvious that the abatement of symptoms is not due to the hypocholesteremia but is rather an effect produced in some way not apparent.

It seems to me it might be of great importance to investigate that point if it has not been done. He does not indicate whether any attention was paid to that.

I want to commend particularly his very conservative attitude regarding the way in which this reduction in cholesterol is produced. I must confess from a physiological point of view that I have no suggestion to make other than to fall back upon that much

abused autonomic nervous system. We are finding more and more evidence of the importance of this system in the various methods of physical therapy, and we are also finding more evidence all the time that it plays a part in regulating the contents of the blood. So it would seem a reasonable suggestion that we might fall back upon that as a starting point, at least to determine how the reduction takes place.

Dr. Levine has sufficiently emphasized, I think, the physiological importance of cholesterol, except, possibly, that we might stress still further a point that is now being brought out by a group of German workers, namely, that most of the physical properties of the blood are probably more dependent upon its cholesterol content, even, than its protein content, as has been formerly considered to be the case.

With the importance of cholesterol as a clinical guide, we find it necessary to employ some kind of an indicator of the effects produced. Since we know so little about the mechanism of diathermy, it is obviously unwise to proceed too far in certain directions without some indicator. The importance of this substance as an indicator, I think, cannot be over-emphasized.

I should like to have Dr. Kobak answer the question that I have raised as to whether subsequent determinations were made in any of these cases.

DR. C. H. POLMER (New Orleans, La.): I think all of us should be much interested in Dr. Kobak's experiment on the effect of diathermy on blood cholesterol. All of us have empirically, clinically, used diathermy over the liver and gall-bladder regions for obscure metabolic conditions. We have used it in chronic arthritis, gall-bladder conditions, gall-stones, arteriosclerosis and many other conditions, merely, as we said, for its metabolic effect.

In chronic conditions Grover and others have for a long time recommended autocondensation with a technic that fixes the smaller electrode over the liver and gall-bladder regions. We have in blood cholesterol content, perhaps, a new index for observing our treatment.

Of course, not every fair lady who is "fair, fat and forty" should receive diathermy to the liver region on general principles. But getting such a patient with upper abdominal symptoms, it is but rational to expect us to investigate the blood cholesterol content.

Again, we have many patients who come to us with various complaints. In our examinations of patients we have our internes make routine blood chemistry, and when they find the non-protein nitrogen, urea and blood sugar normal, they think there is no metabolic change. It would be very interesting for us to further investigate the blood cholesterol in our routine blood chemistry. I hope that next year Dr. Kobak will have further things to report and we can substantiate this by further clinical experiments of our own.

This type of work tells us what diathermy actually does. It lowers the cholesterol in most cases. The thing is, how does it do it? A possible explanation has been the sympathetic nervous system. It is undoubtedly true that we cause some increased heat through the region treated. Crile has claimed that for each one degree rise of temperature, we have a

10 per cent acceleration of metabolism. Do we increase the metabolism of the cholesterol content? Do we increase its tissue assimilation and elimination? We certainly must do something to get a lowering of our blood cholesterol.

DR. NORMAN E. TITUS (New York City, N. Y.): I want to congratulate Dr. Kobak on his contribution to our further interest in the physiological action of diathermy. I just want to ask if he won't in his future investigations attempt to find out if the action is due to local effects of the high frequency current on the gall-bladder region and liver, or whether it is due to a general heating of the blood as might be obtained in autocondensation.

He did not say exactly whether the diathermy was always applied to the right upper quadrant, or stipulate that location, which I think he might do. Because it is well known that local diathermy has a general warming action on the blood. I have a feeling that autocondensation might reveal some interesting results if the work was carried out in the same way as the experiments he has done. I just mention that as a suggestion for future work which I leave to him because of his advantages in being able to carry out such interesting studies.

DR. ISRAELI KOBAK (Chicago, Ill.): I want to thank all the gentlemen for their very generous and kind discussion and constructive criticism.

In regard to the very practical question of Dr. Reed, I want to affirm that my first desire in regard to diathermy was to establish if possible a physiological fact. Heretofore, hair-splitting arguments have been raised as to whether diathermy penetrated or not. That penetration does take place is a physical fact solidly established by foreign and local investigators, but in spite of this it still remains an unsettled question in some localities. Our desire has therefore been to establish a physiologic fact, incontrovertible in proof, from which future investigators may step off into researches of a more refined and complicated nature.

I believe these studies may be considered as an attempt, at least, to establish a scientific, physiologic fact.

Dr. Reed has asked me whether I have found if this lowering of cholesterol is constant in patients or in cases treated. I do not know. The purpose of these studies was first to determine whether any changes at all can take place and later to study the effect in greater detail. As you will all appreciate,

this is a problem with many ramifications and will require more than a preliminary report to answer the practical question put to me by Dr. Reed.

I have however found this, Dr. Reed, that in the cases of cholecystitis treated over a period of time, some as high as thirty treatments, that the lowering of cholesterol was consistent with exception of minor fluctuations, but it was consistent in the direction of its lowering.

The cases reported in the present series were only treated once. I have taken the blood before and after, and did not make any follow-up study. It would have been a very interesting observation (I have thought of that very fact myself) to have seen whether the taking of blood, for example, four hours, eight hours and forty-eight hours or a week or month afterwards, to see if any changes were permanently established, but the problem would have assumed larger proportions than I was willing to assume at this time. It was difficult for a clinician to undertake a problem that is strictly physiological in nature, and I am under deep obligation to Dr. Pacini for his guidance and suggestions in the work.

In regard to Dr. Polmer, I want to say that I am also interested at the present time in other phases of the effects of diathermy, such as the urea, sugar and carbon dioxide. We have been studying the ureas. We have also been studying sugars. Dr. Levine has suggested the studying of the calcium and the phosphorus. I feel rather gratified that Dr. Levine has volunteered to work out that phase of the problem with me.

I want to correct a statement made by Dr. Polmer. He has credited Dr. Crile with a law that has been long established by the famous physiologist, van't Hoff.

In regard to Dr. Titus' very practical question, whether the effect was due to a local heating or to generalized heating, my studies were confined to the effect of local heating because I desired to use that viscus, the liver, which contains one-fourth of the volume of blood in the body. I do believe, however, that if you produce generalized heating effects you probably would obtain a similar lowering effect of cholesterol.

Dr. Titus missed part of my remarks wherein I stated that at all times the electrode was applied in the same manner over the upper right quadrant.

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SHORT STATIC CONTRACTIONS AS A METHOD OF CORRECTIVE EXERCISE *

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Medical Director, Director of Graduate Division, International Y. M. C. A. College
SPRINGFIELD, MASS.

We will limit the paper to a discussion of functional poor postures in the antero-posterior plane. The large majority of poor postures fall into this group. They have received less attention than the lateral deviations of the spine. These antero-posterior deviations should receive more attention. School, office and shop all tend to increase this type of poor posture (a) through wrong attitudes in sitting and standing, (b) through loss of strength and decrease of muscle tone from inactivity. The method also has practical application to improvement in strength following surgery.

Problems Involved

Four chief problems present themselves in the matter of good posture.

I. Securing sufficient strength to maintain good posture.

II. Learning good posture.

III. Attainment of right relative lengths of opposing groups of muscles.

IV. Maintenance of habitual good posture, i. e., right habits in posture.

I. STRENGTH

Clinical observation shows several types of weak muscle.

1. Loss of muscle following fevers.

2. Lack of sufficient muscle during the rapidly growing adolescent period.

3. Loss of muscle tone due to inactivity.

II. LEARNING

Good posture is learned through—

1. The visual judgments.

Good posture may be taught visually (a) by demonstration of pupils with good posture; (b) by pictures of pupils with good posture; (c) by original photographs of the pupil in his ordinary and in his corrected position; (d) by silhouettegraphs with Fradd's method; (e) by pupil examination of their own posture in their ordinary and in their corrected posture before a glass, such as is used in clothing stores; (f) by clinical division into types of posture, e. g., excellent, good, average, poor, bad.

* Read at the Ninth Annual Meeting of the American Congress of Physical Therapy, St. Louis, Mo., September 10, 1930.

Patients and pupils should have pointed out to them the important features in a good posture in the method used. This should be emphasized through questions to make sure they see clearly and understand the directions given.

2. Correct muscle sense of good posture.

The training of the sensory impressions of good posture have been too largely neglected. Few people realize the complexity of sensory judgments of posture. Of the nine sensory groups of stimuli six enter into the learning process in posture: tactile sensations of the feet, muscle sensibility, joint sensibility, vibratory sensibility, (periosteal covering of the bones), balance sensibility (semicircular canals) and visual sensibility. The education of these six sensory paths together with their motor components takes time and patience on the part of both physician and patient.

III. RELATIVE MUSCLE LENGTHS.

(1) Forward drooping of head. The post-cervical muscle group are usually too long and the anterior group too short. The forward drooping head is associated with long post-cervical muscles. This often accompanies the general fatigue slump. Eye fatigue is often associated with this drooping of head due to wrong line of vision.

(2) Kyphosis. The shoulder retractors are too long and the pectoral group too short. The round shoulders accompanying these long shoulder retractors may in some cases have structurally short clavicles. This study refers only to the functional cases. Lowman's (p 52) division of round shoulders into three groups—first degree with a three inch separation of the clavicles, second degree with a five inch separation and third degree with more than a five inch separation is a good grouping.

(3) Lordosis. The lumbar and abdominal muscles are in abnormal relation. The lumbar muscles are too short and the abdominal muscles too long. In standing with the side view the hollow back and protruding abdomen are clearly seen. In lying on the back the tip of the pelvis and hollow back are evident. These may be eliminated by flattening the back, by

flexing the knees or by raising the legs. From the exercise standpoint the abdominal muscles may be strengthened by leg or trunk raising. Extreme abdominal contraction also tends to stretch the lumbar muscles. Bending the knees in the supine position or raising the legs 15 to 30 degrees will eliminate this hollow.

(4) Feet. Lowman says, "At least seventy per cent of all school children have modifications or deviations from the normal lines of foot and leg development." Morton (p. 56) calls attention to Cook's statistics of male university students, showing that three-fourths of the 1400 students examined had recognizable weakness (pronation). With rotation of the foot inward the muscles supporting the arch are too weak to be of large service. With the shift of the weight from the tibia inward on the astragalus, the arch is at first held up by the plantar ligaments with the controlling aid of the posterior leg muscles (*flexor hallucis longus*, *flexor digitorum longus*, *tibialis posterior*, *peroneus longus* and *peroneus brevis*). These muscles are too weak when the plantar ligaments stretch to give adequate support to the arch. This correction is better done by shifting the body weight to the outside of the foot by the strong biceps through the outward rotation of the leg bones. The flexors and tibialis posticus aid by helping elevate the inner border of the foot. This function of the biceps is well illustrated by placing the feet parallel and shifting the weight to the outer side of the foot. With the rotation of the legs outward, i. e., heels together and toes out, it is impossible to throw the weight to the same degree on the outside of the foot by the biceps.

The Surgeon General's report (*Bul. No. 11*) for March, 1919, p. 126, points out 159,685 flat foot cases diagnosed. Of the rejections 2.49 per thousand came from cities, and 2.11 from rural districts. In the accepted men with flat foot 206.78 per thousand came from cities, and 157.24 from rural districts. In the severer cases the excess of flat foot in the cities over the rural districts is 20 per cent, and in the slighter cases 38 per cent. The men in the army during 1917 lost 70,817 days from flat foot alone (p. 73). Pronated and flat feet seem to be increasing in both youth and adults. Few defects incapacitate a person more than pronated or flat feet.

IV. HABITUAL POSTURE.

Good standing and walking posture is easier

to attain than good sitting posture. Most school, office and shop work encourage poor posture. Under these conditions it is important to increase short static strength as stated above and to form habitual good postures in standing and walking. School, office and shop conditions should be changed as far as possible to allow better working postures.

Comparison of Methods Used

I. THE ORDINARY METHOD.

Swedish gymnastics has been the common method used. This method has taught successfully good posture. Pupils have learned the method. They pass a good posture test but many of them still have poor habitual posture. The dosage depends upon increased joint resistance. Strong joint resistance brings discomfort or pain. Under these conditions strong motivation by the teacher is difficult. This method has succeeded in teaching good posture to school children. They pass good posture tests. They fail to maintain good habitual posture.

II. THE NEW METHOD OF SHORT STATIC CONTRACTION.

Short static contraction may be defined as the holding with increases of body weight of muscles in the short contracted position. Illustrations of the method are placing increased work upon the posterior neck muscles in the contracted position, increased dosage on the shoulder retractors with the elbows at shoulder level and the arms crowded backward, or placing increased resistance on the thigh flexors in the flexed position. This method differs from the traditional method in six particulars.

1. All exercise is given in the short static position.
2. Dosage is increased through body weight instead of joint resistance dosage increase with ability.
3. Exercises placed on a stunt basis serve as a better method of motivation.
4. Correct mechanical position is secured before the exercise begins.
5. Exercise may be taken individually with the physician as assistant or in groups of ten to thirty pupils with half the pupils acting aids alternately. The first method is adapted to office work, the last to school procedure.
6. The dosage in exercise may be progressively increased by increasing the body weight placed on the muscle group involved.

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Experimental Work

Five studies have been made with this new method by graduate students—three on College students at Springfield, one by Elbel of the University of Kansas, one by Grunberg of the Westholm High School, Tallinn, Esthonia, and one by Gemme of this year's graduate division; one by LaBree of Purdue University and one by Hughes of St. Louis, Mo. The boys in these St. Louis tests were assigned to the corrective group by Dr. Borden S. Veeder, of St. Louis. These tests attempt to find out five things.

1. The normal strength of four groups of muscles—posterior neck, shoulder retractors, abdominal and foot muscles.
2. The improvements in short static

strength which could be made with ordinary practice.

3. Whether the dosage could be increased with the development of the pupils.

4. Whether the stunt method of motivation was of interest to the pupils.

5. What improvements in posture might be made with this method.

Four of these items have been clearly shown as possible. The fifth has not been clearly shown. Improvements in habitual posture seem clinically evident. Objective proof is not yet shown. Patients or pupils may be assuming a learned posture during an examination which is not habitual with them.

Illustration of methods of strength tests and foot impressions:

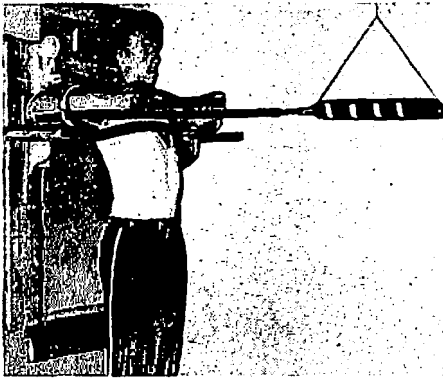


Figure 1. Method of measuring shoulder retractors. The back of neck muscles are measured in a similar way by simply putting a pulling strap above the ears and connecting it with a regular Martin test spring scale.

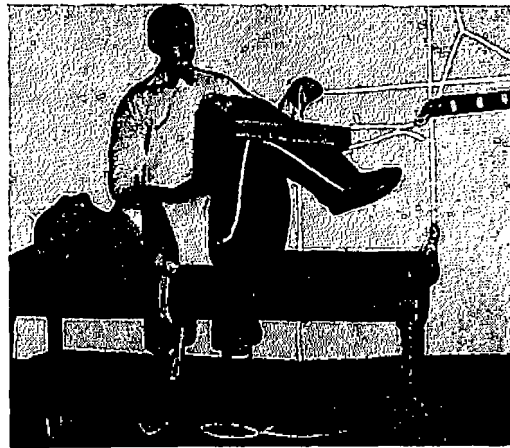


Figure 3. Method of measuring the abdominal strength.



Figure 2. Method of measuring the foot adductors and supinators.



Figure 4. Grunberg's foot impression scale, based on a classification of approximately 1,000 feet.



Illustration of Exercise methods:
Figure 5. One of the exercises in increasing the strength of neck retractors.

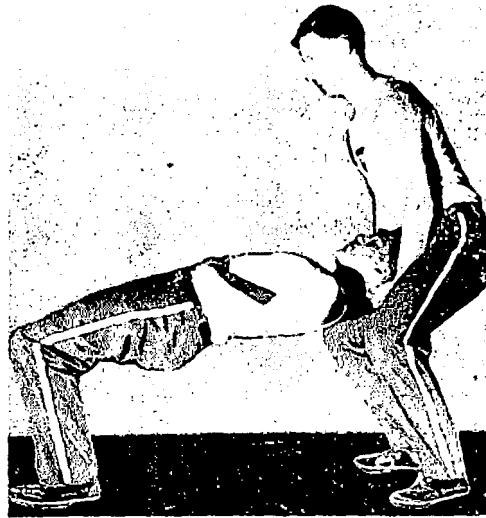


Figure 6. The same individual in the second position.



Figure 7. Method of increasing abdominal strength.

Results of Strength Tests:

A. A. Grunberg

The results of the three tests were carefully recorded and tabulated and comparisons made between the results of Tests I-II, II-III and

I-III. Experimental coefficient and correlations were worked out for the various tests. The following table shows the lowest, the median and the highest measure of strength in pounds in the various muscle groups in Tests I-III in the experimental and in the control groups.

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EXPERIMENTAL GROUP

	Test I					
	Sh.rtr	Neck	Abdm.	R.Ft.	L.Ft.	Flex.
Poorest	15	55	40	20	10	105°
Md.	59	79.7	58.75	43.5	40	126.9°
Best	80	90	70	70	60	135°
Test III						
Poorest	60	60	60	40	30	110°
Md.	85	85	77.5	51.5	52.85	135°
Best	120	100	90	70	65	150°

CONTROL GROUP

	Test I					
	Sh.rtr	Neck	Abdm.	R.Ft.	L.Ft.	Flex.
Poorest	35	40	45	20	20	100°
Md.	56	72.5	61	41.9	40	125°
Best	103	90	90	70	65	140°
Test III						
Poorest	45	55	55	20	25	115°
Md.	80	80	79.3	47.5	46.25	137.5°
Best	130	105	100	75	65	150°

E. R. Elbel
Strengths of neck, shoulders and feet of College students at Springfield.

No. in Group	27		27		10		11	
Muscle	Abdominal		Neck		Shoulder Retractors		Feet	
Test No.	1	3	1	3	1	3	1	3
Poorest	33	61	62	61	32	52	15	24
Median	48	75	75	80	57	73	25	35
Best	75	95	93	110	84	95	45	53

A. L. Gemme
Comparative initial strength of College Freshmen and Seniors at Springfield.

	Mean Strength	
	Freshmen	Seniors
Neck	84.81	84.72
Shoulders	84.16	82.86
Abdomen	103.94	94.28
Right Foot	75.16	67.81
Left Foot	71.4	65.41

LaBree strength tests for Purdue University Students.
Range of strength tests — Quartile Method.

	Experimental Group					
	Neck		Sh.rtr.		Abdm.	
Q	69.2		81.31		68.5	
M	74.14		93.0		75.33	
Q	78.5		99.44		80.33	
Test III						
Q	83.25		112.63		92.25	
M	91.0		133.0		98.0	
Q	99.66		141.38		104.78	
Control Group						
Q	71.75		88.25		71.25	
M	76.25		98.33		80.5	
Q	88.25		114.38		89.13	
Test III						
Q	76.25		94.25		82.4	
M	83.5		111.0		90.33	
Q	92.75		122.19		104.13	
Median	7.		13.		10.	
Increase	7.		13.		14.	

It will be noted that the control group taking regular physical exercise but not the corrective work started with greater strength than the corrective experimental group. It was a source of great encouragement to the inefficient group to outstrip the normal group.

R. P. Hughes

Comparison of the Experimental Group of 21 with the Control Group of 21 as to the average strength of Neck, Abdomen and Shoulder at the St. Louis Country Day School.

Group	Neck			Abdomen			Shoulders		
	Poorest	Median	Best	Poorest	Median	Best	Poorest	Median	Best
Experimental	35.0	39.0	40.0	35.0	38.0	45.1	37.0	45.1	50.1
Control	35.0	39.0	40.0	35.0	38.0	45.1	37.0	45.1	50.1

Table showing the mean amount of grains in the Experimental Group of 21 and the Control Group of 21 at the St. Louis Country Day School.

Experimental Group Neck 12.40 Abdomen 13.26 Shoulders 15.72
Control Group 3.12 3.45 3.60
The short static starting positions and some of the best exercises for strengthening the muscles are given below. These exercises are reproduced from an earlier article by the author.

II.

Short Static Starting Positions.

1. Knee bending one-quarter to one-half. (See *Calisthenic Nomenclature*, McCurdy, p. 31.)
2. Standing position. (See *Cal. Nomenclature*, McCurdy, p. 5.)
3. Sitting position, with alternate supporting of the feet. (See *Cal. Nomenclature*, McCurdy, p. 47.)
4. Sitting position, with hands on floor, fingers forward or on knuckles as aid to erect position. (See *Cal. Nomenclature*, McCurdy, p. 47.)
5. Supine lying position, with knees bent enough to reduce or eliminate lordosis. (See *Cal. Nomenclature*, McCurdy, p. 47.)

With pronated or flat feet use chiefly starting positions 3 to 5 inclusive, avoiding any positions where the weight is supported on the feet during exercise.

III.

Exercises for Strengthening Back of Neck Muscles.

If pupil has badly pronated or flat feet, the sitting exercises should be given preference over the standing exercises in correction of the neck and shoulder retractor muscles.

1. Starting position:

Standing position, with knee bend, or deep knee bend (full squat), with trunk erect.

Elbows sideward bend position.

Feet 12 to 15 inches apart, in stride stand position.

Pupil assistant supports pupil by pressure on back of head.

Exercise:

Backward bending with weight on heels—

- (a) Keeping knees bent.
- (b) With knees extended, at angle of 20 to 45 degrees.

Pupil assistant supports weight, moving backward and forward as pupil exercises, with hands on back of head.

Return to starting position.

Repeat 5 to 10 times.

- 2. Starting position:
 Stride stand position.
 Arms bend position.
 Pupil assistant supports pupil by pressure on back of head.

Exercise:

- (a) Pupil leans backward until body is at an angle of 20 to 45 degrees.
 Arms flinging sideward, 5 to 10 times.
 Return to starting position.
 Pupil must have weight on heels to eliminate lordosis.
- (b) Pupil leans backward until almost touching floor.
 Pupil assistant lowers and then lifts pupil to starting position by pressure against the back of head.
 Repeat 2 to 6 times.

- 3. Starting position:
 Standing position, knees bend, feet 6 to 8 inches apart. Arms held at sides.

Exercise:

With support from the back of the head by pupil aid, student leans backward until trunk and cervical spine are in straight line with the thighs. Pupil then walks forward and backward 6 to 10 steps. Assistant follows supporting head, and noting that pupil's position is correct without lordosis.
 The cervical spine and lumbar region should be flat.

- 4. Starting position:
 Standing position with feet 6 to 8 inches apart. Hands in hip grasp position.
 Exercise (with support as in exercise 3):
 (a) Knee raising alternately beginning with the left, with the trunk in the horizontal or half horizontal position.
 (b) Leg raising with extension of knee and leg simultaneously. Legs alternating in the movement.
 Repeat 2 to 5 times.
- 5. Starting position:
 Standing position with hands in hip grasp position.
 Exercise (with support as in exercise 3):
 Alternate leg raising with extended thighs and cross toe touching, with slight body turning in the direction of leg crossing.
 Repeat 2 to 4 times.
- 6. Starting position:
 Standing position. Stand tall with feet 4 to 6 inches apart.

Exercise:

Backward leaning until the trunk is in horizontal position, then raise thighs alternately.
 Return to erect position, repeating 4 to 6 times.

- 7. Starting position:
 Standing position, legs straight and feet 4 to 6 inches apart. Hands in hip grasp position.

Exercise (with support as in exercise 6):

Alternate leg raising, with body turning, with thighs extended, 2 to 4 times.
 The weight should be on the heels.

- 8. Starting position:
 Sitting position on the floor; hands placed on the floor, with fingers forward or on knuckles, slightly to the rear of hips. Knees flexed, legs crossed, with feet in inverted position. Sitting tall, keeping back straight and chin in.

Pupil assistant supports the back of pupil's head, with hands overlapping in supinated position.

Exercise:

Pupil extends thighs by raising hips until trunk is in horizontal position. If pupil is weak, he may assist by supporting with hands on floor.

Assistant, with hands supporting back of head, lowers pupil and the elbows of the assistant are resting upon his knees or thighs.

Return to starting position and repeat from 5 to 20 times.

- 9. Starting position:
 Sitting position as in Ex. 8 except that legs are not crossed. Feet are placed 6 to 8 inches apart and flat on the floor. Elbows in the sideward bend position.

Exercise:

The same as in Ex. 8 except that when in horizontal position, arm flinging sideward. This flinging may be repeated several times if desired on each exercise.

Repeat whole exercise 5 to 20 times.

- 10. Starting position:
 Sitting position. Knees bent, feet 6 to 8 inches apart, as in Ex. 9. Arms are held at sides.

Exercise:

Pupil extends thighs and raises hips until trunk and cervical spine are in a straight line with the thighs.

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Pupil walks forward and backward 6 to 10 steps, swinging hands as in erect walking.

Assistant follows supporting head and noting that pupil's position is correct. Cervical spine extended and lumbar region flat.

11. Starting position:

Sitting position, with feet 6 to 8 inches apart.

Hands in hip grasp position.

Exercise (with support as in exercise 8):

(a) Hip raising with knee raising, alternately, with the trunk in horizontal position.

(b) Leg raising with extension of knee and leg simultaneously, legs alternating in the movement.

Repeat 2 to 5 times.

12. Starting position:

Sitting position, with hands in hip grasp position.

Exercise (with support as in exercise 8):

Hip raising with alternate leg raising, with extended thighs and cross toe touching, with slight body turning in direction of leg crossing.

Repeat 2 to 4 times.

13. Starting position:

Sitting position. Legs straight in front. Arms at side horizontal position.

Pupil assistant aiding in maintaining the tall sitting position, with hands on rear of pupil's head.

Exercise:

Raise hips; extend thighs until body is in line with thighs in back leaning rest on pupil aid's hands. (Avoid lordosis.)

Return to starting position and repeat 4 to 6 times.

14. Starting position:

Sitting position. Legs straight in front. Hands hip grasp position.

Exercise (with support as in exercise 8):

Raise legs with hips, with alternate body turning, with thighs extended.

Repeat 2 to 4 times.

IV.

Exercises for Strengthening Shoulder Retractors in Short Static Position.

The exercises in the first series should be repeated with the pupil aid's support in

(a) Neck grasp position. The support of the pupil aid is at the elbow joint.

(b) Elbows sideways bending. Support is given at the elbow joint.

In both cases the aid stands behind the pupil.

(c) Arms side horizontal position. In this exercise there should be two aids, one grasping either arm; first in the middle of the upper arm and second at the elbow; third at the middle of the forearm, and fourth at the wrist. The distance from the shoulder dependent upon the strength of the pupil.

All of the exercises in Section III may be done for the shoulder retractors with the new points of support.

V.

Exercises for Abdominal Muscles.

1. Starting position:

Supine lying position.

Arms side horizontal.

Knees flexed.

Feet flat on floor 6 inches apart.

Exercise:

(a) Bend alternate knee vigorously to chest.

(b) Bend both knees vigorously to chest. Return to starting position, keeping knees flexed.

(c) Double knee bending followed by knee extension.

Repeat each exercise 10 to 20 times.

2. Starting position:

Supine lying position.

(a) Hands on floor at hips.

(b) Elbows in side bend position.

(c) Hands in neck grasp position.

(d) Arms over head. Backs of hands on floor.

Pupil assistant supports pupil by pressure on knees to keep the legs down.

Exercise:

Trunk raising.

Return to starting position.

Repeat 5 to 15 times.

3. Starting position:

Supine lying position, with elbows in side-ward bend position; knees bent.

Assistant kneels back of pupil and keeps elbows on the floor.

Exercise:

Pupil raises legs vertically and lowers them from side to side 10 to 20 times.

The return to rest position is always done with the knees bent.

4. Starting position:

Supine lying position, arms resting at side

of body. Knees flexed; feet flat on the floor 6 inches apart.

Assistant faces pupil. Stands feet apart over pupil's knees.

Exercise:

Double knee bending and returning 10 to 20 times. Pupil assistant applies resistant pressure both ways while the pupil exercises.

5. Starting position:

Supine position. Arms at side horizontal. Pupil assistant kneels, supporting pupil's legs 10 to 30 inches from the floor. The support should be high enough to eliminate lordosis. The stall bars may support the legs where there is equipment.

Exercise:

- (a) Alternate leg raising.
- (b) Double leg raising.
- (c) Double leg raising and lowering them from side to side.

Pupil assistant resists slightly at the ankles.

VI.

Exercises for Strengthening Foot Adductors and Supinators.

1. Starting position.

Sitting position. Hands resting on the floor at hips.

Pupil assistant in same position, facing pupil.

Exercise:

- (a) Foot flexion and inversion of feet. Pupil assistant resists by holding ball of the foot, requiring strong adduction and supination.
- (b) Foot flexion and inversion, attempting to keep all of toes and heels touching.
- (c) Foot flexion and inversion, keeping toes together and heels separated.

2. Starting position:

Sitting position, as in Ex. 1.

Exercise:

Pupil holding toes together, heels out, foot in supinated position.

Pupil assistant tries by pulling outward to separate big toes.

3. Starting position:

Supine lying position.

Arms side horizontal position.

Feet resting on assistant's knees in supinated position, toes in and heels out.

Pupil resists pupil assistant's attempt to pull toes apart.

4. Starting position:

Sitting position. Knees flexed.

Feet in inverted position.

Exercise:

Raise toes, heels against floor. Feet in supinated position.

Pupil teacher presses toes down with the hands.

5. Starting position:

Sitting position as in Ex. 4.

Exercise.

Plantar foot flexion, resisting with hands.

6. Starting position:

Standing position, feet 6 inches apart.

Toes turned in; heels out.

Exercise:

Rise on the toes and walk forward and backward 10 to 40 steps, crossing feet and keeping toes turned in.

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Discussion

Dr. J. C. ELSON (Madison, Wis.): They say that when the chair was invented the posture of the human individual began to deteriorate, because when primitive man was fatigued and tired, he threw himself on the ground, perfectly relaxed, in perfectly good posture. But since the chair was invented, we sit down and we rest ourselves in very poor posture. We bring the head forward; the spine is bent; the chest is contracted. So I think we will all agree that some of the conveniences of modern life have very greatly added to our physical disability.

Then, of course, we know that when man first rose on his hind legs, instead of having the four props of the four-legged animal, he had difficulties to overcome immediately, because then, instead of four props, he had only two very insecure ones, and the front props, if you please, instead of being supports, were a positive detriment.

I believe that in physical therapy every physician should know more about corrective exercise and about some of these splendid aphorisms that Dr. McCurdy has given us this afternoon. It is my opinion that it is in this particular branch of education where some of us fall short in physical therapy, because I want to tell you that physical education and physical therapy are intimately connected. I think you will agree with me that the values of posture are very great.

First of all, let me say there are physiological values, because of the fact that in good posture all of the organs of the body are in good position, and, consequently, there is good functioning. I can't dwell on this. The next, I should say, was psychic—psychic values—because of the fact there is a sense, as we know, of self-respect—of exhilaration, if you please—when the extensors of the body are used. Thus, when we throw our heads back and our shoulders up, and do like this (stretching), immediately we invoke a psychological effect which is very good indeed.

On the other hand, a fatigued posture, which has been so well described, is one of psychic depression. That leads me to say that there is a third value in posture, and that I should say was commercial. It is commercial because of the fact that by our physical appearance we can secure a better job. If you take it on that very low plane, I think that is very true, because, as we very well know, one's personality—his physical appearance—has much to do with his success in life. I can't dwell on that.

On the contrary, there are dangers in poor posture. The first of all, I should say, was a hindrance of thoracic activity. We know very well that when the lungs are cramped there is less function, there is less aeration of the blood. Then there is abdominal inactivity. There is a lessening of abdominal function because of the cramped position of the internal organs, and this leads to a development of abdominal weakness which is so common in all of

us. This eventually brings about a state of abdominal ptosis, a condition that we continually contend with in our physical therapy practice. I need not dwell on the dangers of this.

In addition, there is indigestion, constipation, and, last of all, there is a tendency to hernia which, of course, is very, very bad. In women, of course, there is displacement of the various female organs.

With regard to these static contractions that Dr. McCurdy has spoken of, I thought possibly when this physical therapy meeting heard something about static, they would immediately think of the static machine. Dr. McCurdy does not refer to anything related to the static machine. He means a static contraction or a constant contraction of the muscle itself which, as you know, produces a shortening of the muscle. We know very well that a static contraction may be very injurious. Dr. McCurdy will tell you that if you hold your arm to the side, there is a static contraction of the deltoid. If you should continue to hold that position for five or ten minutes, you would not benefit the muscle at all. You would injure the muscle, because of the fact that, first of all, there is hindrance to circulation and, next, there is a steady innervation which is injurious.

So Dr. McCurdy does not speak of static contraction as long static contraction. He says short static contraction. That, to my mind, is the crux of the whole situation—short static contractions in the shortened position. We all know that most of the things we do are in front of us. Consequently, the pectoral muscles are subject to a great amount of work: the big pectorals tend to pull us over, and the shoulder retractors lengthen. Consequently, there is an abnormal difference between the length of the muscles, if you please, which has a very great effect.

I think poor posture in children is sometimes due to general muscular weakness because many of the muscles of the body participate in posture. Sometimes I have had a round-shouldered child come to me for treatment. I have given to that child no specific exercise for posture, but general exercise on the playground and in the normal activity of childhood. When the general muscular development of the body increases, the shoulder retractors in turn increase. Consequently we may correct poor posture sometimes, in the weakened children, by general muscular exercise. We tell them "Shoulders back." I can get my shoulders back and be in tremendously bad posture. Dr. McCurdy says, "Stand tall; chest out. Never mind the shoulders, they will assume the right posture anyhow." If you take the tall standing position, if you carry a brick on your head or carry a watermelon on your head or do as the Egyptian women, carry a water pot on your head, I assure you that you will have remarkably fine posture.

I remember an old negro man that I knew very well in the South where I was raised. This old fellow used to go to the spring, which was down at the foot of the hill, with three empty pails. He would fill the three pails. The first one he would put on his head. Then he would reach down with his left hand and take the second pail, and with his right hand he would take the third pail. Then

he would walk up the hill like a Greek god. If you don't believe that is true, you try it yourself. I think it would be a very splendid exercise for every one of us.

In conclusion let me say that one of the things that happens to us in this day of our civilization, our so-called civilization (I sometimes doubt whether it is civilization or not), is the decreasing need of muscular work. There never was a time in the history of the world when there was so little need, actual need, for muscular work, as there is today. What is the consequence? The consequence is that every one of our bodily organs is suffering. We have become so unable to do routine exercise that it has become objectionable for us to go around the corner without our car, and we prefer to take the elevator (lift) to go up to the second floor.

Every civilization has risen and fallen. I sometimes wonder whether this civilization of ours isn't due to a decline because of the physical reasons and because of the fact that none of us gets the proper amount of exercise, for upon exercise depends the vitality of every one of the bodily organs, including the brain, the nervous system, the whole body.

DR. F. H. EWERHARDT (St. Louis, Mo.): I have for a long time been in accord with the ideas that Dr. McCurdy has expressed this afternoon, and I was therefore extremely gratified to find that some of my theories have been independently applied by one who is a master in this work. Dr. McCurdy is the recognized master in this field of endeavor.

I have long held the theory that posture was not necessarily the result of weak musculature but rather an almost primary result of poor habit. As a result of this poor habit we decline into poor posture, and develop the short pectorals and elongated muscles of the back. That that is true can be verified by observing the healthy posture of our very strong athletes in college and in the gymnasium. Particularly in the gymnasium do we find men who are extremely strong.

Picture in your mind's eye some of the men you know or have known:—strong individuals but with very poor posture. It is not because the muscles are weak, but it is a matter of poor postural habit. Invariably we find that this develops a situation with shortened muscles and long muscles.

In the earlier days we were accustomed to think that if we could influence the individual to do a good deal of the "pump-handle" exercise, it would improve posture. It does not do any such thing. There is just one way to improve posture and that is by short static exercise. That means, as Dr. Elsom has emphasized and as Dr. McCurdy first mentioned, an exercise which is taken in a certain position, the effort of which is directed to promote maximum contraction to be maintained for a short period of time. That does three things. First, it increases the strength of that muscle group. It increases the strength of the short muscle group which needs to be not only strengthened but, as Dr. McCurdy said, shortened as well. Second, it lengthens the shortened muscles on the opposite side. Third, it awakens the sensory impulses, mentioned by the speaker, in the skin and in the organ and in the joint surfaces and in the muscles. It awakens these organs which I sometimes refer to as postural cells.

For that reason I frequently prescribe an exercise that over-emphasizes the posture and in that way to awaken dormant impulses. I purposely do this in order to stimulate an appreciation of how it feels to stand in the correct position.

DR. CAROLINI HILBORN (Battle Creek, Michigan): I should like to ask Dr. McCurdy if anything has been done in the home or community with the home interest, to help these children understand the home posture. It has been my experience that the home undoes a great deal that the physician is trying to do in the school. For that reason, at Battle Creek we have started community work, and we are trying to educate the women as well as the men. We are getting them into classes and teaching them correct posture and the reason for correct posture. Our teachers are telling us that because of this the students are maintaining better posture, if not the correct posture.

In the home, at the table, many of the mothers that are in our classes will say, "Erect posture, please." Even when the family is sitting about or relaxed in the position of reading the position of the members are better maintained than heretofore. When interest is awakened in the elders of the family to the value of good posture, the education of the child is usually assured. It is for this reason that our efforts at Battle Creek have been centered in the education of the mothers to the necessity of proper educational exercise and all it stands for.

DR. A. E. KINDERVATER (Supervisor of Physical Education, St. Louis, Mo.): I am the head of physical education in the public schools and have been for twenty-seven years. During the last ten years, we in our public school work, from the third grade up, have emphasized the value and necessity of good posture.

We are and have been using since that time, in our physical training courses, posture as one of the fundamental principles of our work in the school. I try to get around to the schools once or twice a year. We have 153 schools, and I have seven assistants who visit each teacher once in five weeks to assist in the physical training work and to preach good posture. As I say, we have been making that the main feature of our physical training work. That is continued in the high schools.

I feel just as enthused for good posture as does Dr. McCurdy, and we are using similar exercises that he demonstrated here. I hope that with our efforts we will help to raise straight boys and girls.

DR. JAMES H. MCCURDY (Springfield, Mass.): There are just two points that I should like to emphasize, that I didn't think of in summarizing. It is with reference to the feet. I was going over the army statistics recently. There are certain things that stood out in the 1917 statistics of the first draft group. First, in that year there were 70,000 days lost from bad feet alone, of those that were accepted in the army. The next thing that stood out with reference to the feet in the army study, that I think is very important is that there were nearly twice as many bad feet in the cities as in the country, showing that when you take the city group they are less and less able to stand on their own pins.

One other thing, if I may use an illustration that General Ireland gave me recently, which applies to

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all of us in a very definite way. He said, "It fills me with great sorrow to see men slipping ten to fifteen years earlier than they ought to slip."

"What do you mean, General Ireland?" I asked. "As Chief Surgeon you evidently have thought of it."

"I attended a dinner in Washington," he replied. "As the people stood up around the table for a toast it was evident that here was a whole group deteriorating ten to fifteen years earlier than they should."

"What was the trouble?"

"To put it very bluntly, medically speaking, they couldn't hold their guts up."

That is, the pendulous abdomen was very preva-

lent. I had a doctor about forty years of age come to me recently. He said, "I don't know what is the matter with me."

"I do," I replied; "you can't even hold your legs up like this (indicating). What do you do when you are not working at your profession?"

"I read the papers, get my legs up on a chair and sit comfortably at home," he explained.

"If you are going to have good muscle tone," I said to him, "one good place to begin is with your abdominal muscles."

I think that applies to all of us who are sitting around so much or traveling in automobiles. We have lost out particularly in trunk muscle strength and in foot strength.

CANCER OF THE STOMACH *

Intraperitoneal Insertion of Capillary Tubes of Radon

ISAAC LEVIN, M.D.

NEW YORK

The latest available mortality statistics show the following percentage of frequency of the occurrence of cancer in the various organs. In the male, cancer of the stomach and liver occur in 50.5 per cent of all cases, the rectum, intestines and peritoneum in 12.1 per cent, buccal cavity in 7.3 per cent, skin in 6.3 per cent and other organs 23.8 per cent. In the female, cancer of the stomach and liver occur in 32.6 per cent of all cases, generative organs in 23.1 per cent, breast in 14.4 per cent, rectum, intestines and peritoneum in 10.9 per cent, skin in 2.1 per cent, buccal cavity in 1.0 per cent and other organs in 15.9 per cent.

The analysis of these statistics shows that cancer of the stomach represents more than one-third of all the cancers in the human. Cancer of the stomach is thus the most frequent type of cancer and therefore an improvement in the diagnosis and therapy of this condition means a solution of a major portion of the cancer problem.

The method generally employed to obtain a permanent therapeutic result in cancer of the stomach is to remove the involved part of the organ or the whole organ, i. e., to do a partial or total gastrectomy. However, even the latest clinical statistics show that only 16 per cent of the patients suffering from cancer of the stomach present themselves in a stage of the disease in which radical surgery may still be attempted. Furthermore, even in most skillful hands, gastrectomy gives 25 per cent

of operative mortality and only 25 per cent of cure. Thus, at the best to date only 2 per cent of all patients suffering from cancer of the stomach may expect to be cured by aid of radical surgery, and even this percentage would be diminished if the period of post-operative observation would extend beyond the five-year period.

It is self-evident that there is an urgent necessity to improve on these results. There are two directions in which such improvement may be accomplished. The first is to obtain an *earlier diagnosis* and the second is to *devise additional methods of therapy*.

Diagnosis in Cancer of the Stomach

The symptom-complex of carcinoma of the stomach is very vague and varies considerably in different individuals. The symptoms consist mainly in anorexia, pressure and distress in the gastric region, nausea, loss of appetite and strength. If these symptoms do not disappear in the patient who has reached the cancer age within a few weeks after onset, under general dietetic and medical treatment, and, particularly, if the symptoms are followed by progressive loss of weight, it is imperative to immediately make a complete and thorough search for malignancy. Such an analysis should include a *general physical examination, chemical and microscopic analysis of gastric contents, a complete Roentgen analysis of the gastro-intestinal tract* and, if a definite diagnosis cannot be made by these means, an *exploratory laparotomy*.

The physical examination must attempt to

* Read at the Ninth Annual Meeting of the American Congress of Physical Therapy, St. Louis, Mo., September 11, 1930.

rule out other conditions which may simulate gastric cancer. The most essential part of the physical examination is abdominal palpation. When a hard and nodular tumor-mass is palpated in the region of the stomach, and particularly when such a mass shows the configuration of the greater curvature of the stomach, the diagnosis of a gastric cancer is easily made. However, a palpable tumor always indicates an advanced cancer and, furthermore, such a tumor may be contiguous with and not a part of the gastric wall. On the other hand, an extensive cancer of the lesser curvature, and even of the pylorus, may be indicated only by muscular rigidity and tenderness on pressure in the epigastrium. Again, such rigidity and tenderness may be due to pathology in neighboring organs (duodenum or gall bladder). Thus there is nothing in the symptomatology or clinical findings of the patient which is distinctly pathognomonic for cancer of the stomach.

The results obtained by the *chemical* analysis of the gastric contents are not very encouraging. Van den Velden, in 1879, discovered the absence of *free hydrochloric acid* in gastric carcinoma. This was thought to be of greatest importance in the diagnosis of this disease, since it is found in nearly 80 per cent of cases. However, the absence of free hydrochloric acid is found in gastric conditions other than cancer and in cancer of other regions of the body not involving the stomach. The presence of *lactic acid* in gastric contents is frequent in carcinoma of the stomach. Therefore, the combination of complete absence of hydrochloric acid with the presence of lactic acid may be of some diagnostic significance. However, this combination is found only in the advanced stages of the disease, and even then it is not constant.

Microscopical analysis of the gastric contents, and search for occult blood in the feces, are of still less value for the determination of the presence of malignancy in the stomach.

The advent of the method of the *Roentgen examination* of the gastro-intestinal tract, after an ingestion of an opaque meal, represents the greatest advance in the diagnosis of gastric malignancy.

In order to evaluate the significance as well as the limitations of the Roentgenological methods in diagnosis of gastric cancer, it is necessary to understand the mechanism by which the results are obtained.

When a normal stomach is filled with an opaque medium, the Roentgenogram shows the contour of a filled stomach. On the fluoroscopic screen the peristaltic movements of the musculature of the gastric wall are also observed. When a part of the gastric wall is replaced by a malignant tumor the involved part of the stomach is not filled with an opaque meal, becomes transparent to the rays and consequently shows a *defect in the contour* of the stomach. Furthermore, since the musculature of the stomach wall is replaced by the tumor, there is noted on the screen a lack of peristalsis in the involved part of the stomach. Pressure by the hand of the roentgenologist may also show on the screen whether the condition is constant.

The advantages of the roentgen method over the clinical investigation are thus self-evident. The palpation of a tumor in the region of the stomach does not show the relationship of the tumor to the uninvolved part of the stomach, while the Roentgen analysis shows clearly the location and the extent of the tumor and its topographic relation to the rest of the organ.

However, when the carcinoma is located on the posterior wall of the stomach, or even if it is located on the curvatures or in the pylorus, but is small and does not invade the submucosa and muscularis, then it will show neither defect nor an abnormality in peristalsis. In other words, a *negative roentgenologic finding* does not preclude the presence of a gastric cancer.

Moreover, even positive finding of a filling defect does not necessarily imply the presence of a carcinoma of the stomach. When such filling defects are caused by bands of adhesions to other organs, the differences in the character of the filling defects are easy to observe. On the other hand, when these defects are caused by tumors of neighboring organs pressing or adherent to or even invading the gastric wall, then the configuration of the filling defect is such that a differential diagnosis cannot be made by a Roentgen analysis. The following two cases illustrate well this condition.

Case 1—T. H., female, age 85. For the past two years the patient complained of general gastric disturbance with occasional nausea and vomiting but without pain or haematemesis.

On clinical examination the abdomen was distended but soft. A diffuse tumor mass was felt in right hypochondrium. The configuration and loca-

tion of the stomach. Roentgen picture of the level of visualization. Two hours emptying meal still three-four stomach. slight respiration. Th obstructive

In things diagnosed. While condition possibility laparotomy creases.

Case 2 prior to the abdominal epigastrium after eating

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tion of the tumor did not indicate a carcinoma of the stomach.

Roentgen examination showed the greater curvature of the stomach to be situated 8 cm. below the level of the iliac crests. There was a failure of visualization of the duodenal cap with indefinite irregularity of the pyloric portion of the stomach. Two hours p. c. there was noted only a very slight emptying of the stomach, the greater portion of the meal still remaining. Six hours p. c. more than three-fourths of the meal still remained in the stomach. Twenty-four hours p. c. there was still a slight residue in the stomach at the greater curvature. Therefore a provisional diagnosis of pyloric obstruction probably neoplastic in origin was made.

In this case the history and the clinical findings did not tally with the x-ray findings. While the former favored an extra-gastric condition, the x-ray analysis indicated the possibility of carcinoma of the pylorus. I did a laparotomy and found a tumor of the pancreas. The stomach was normal.

Case 2—N. B., female, age 73. About five months prior to admission, the patient noticed distention of the abdomen with great discomfort and pain in the epigastrium. The pain appeared about one hour after eating and was not accompanied by vomiting.

Examination of the abdomen showed the presence of free fluid and a diffuse mass in the upper abdomen. The mass appeared to be rather smooth and fixed to the underlying structures. A satisfactory gynecological examination could not be made on account of the distention of the abdomen and the presence of free fluid.

Roentgen examination of the stomach showed a narrowing of the lumen of the gastric canal in the pyloric area with an irregular defect in the greater curvature without six hour residue. Provisional diagnosis on x-ray analysis was carcinoma of the *pars pylorica* at the greater curvature. The patient's condition became progressively worse and six weeks after admission she died in coma.

Autopsy findings were as follows: The abdominal cavity contained a large amount of turbid, straw-colored fluid. The peritoneum was studded with yellowish white small masses. The liver surface was grayish white in color and abdominal viscera were matted together with tumor masses covering the peritoneum. The omentum was replaced with a tumor mass which was firmly adherent to and had apparently invaded the greater curvature of the stomach. The right ovary was normal, while the left ovary showed a large tumor mass measuring about 5x3 cm. On opening the stomach, it was found that the omental tumor which invaded the wall of the stomach did not reach the mucous membrane, and the latter was entirely free throughout the whole extent of the stomach. Microscopical analysis of the tumor mass near the stomach and other abdominal masses showed it to be *ovarian carcinoma*.

The analysis of these two cases clearly indicates the difficulties in attempts to interpret the roentgenograms of the stomach and the

consequent limitations of the method. The first case should have been easier to differentiate. A tumor of the pancreas may be firmly adherent to the gastric wall, and hence will distort the picture of the stomach. The lines of the filling defect caused by a pancreatic tumor, however, are usually smooth and not as ragged as the picture caused by a gastric carcinoma.

The differentiation is a great deal more difficult in the second case. Here the filling defect of the gastric wall was caused by a metastatic ovarian carcinoma which invaded the wall of the stomach. The invasive growth, in both instances, penetrated the muscularis of the gastric wall and grew irregularly into the lumen of the stomach, pushing up the gastric mucosa. The irregularity of the walls of the filling defect by barium emulsion is identical with an intragastric tumor which destroys the mucous membrane and then invades the muscularis.

It was stated above that a negative x-ray finding does not preclude the presence of a gastric cancer. Thus neither the Roentgen analysis nor the clinical and chemical investigation is capable of determining the presence of carcinoma of the stomach. Particularly is this true of the early stages of the disease.

The question arises, then, what should be the next step in determining the true clinical condition in this class of cases? When a patient who has reached the cancer age and suddenly begins to suffer from gastric distress, anorexia, loss of strength and weight, which is progressive, and does not yield to ordinary medical treatment, then my plan of action is as follows: The patient is submitted to a complete clinical and Roentgen analysis. If the findings are completely negative, then the general medical treatment is continued for a certain length of time. If the symptoms and particularly the loss of weight continue, then a second complete diagnostic analysis is made. If no decision can be reached, an exploratory laparotomy is performed. The risk of such an operation is slight as compared with the possibility of overlooking gastric malignancy in its early and therapeutically most promising stage.

Surgery in Cancer of the Stomach

As was stated above surgery alone as a therapeutic measure is successful in only 2 per cent of the patients who come for treat-

ment. In what manner can surgery be made to be more efficient?

In the first place, surgery in cancer of the stomach should be not only a therapeutic but a diagnostic procedure. The sooner the profession will realize that an exploratory incision is the best means to establish the diagnosis in cancer of the stomach, the sooner will we be able to increase the number of cases in which it will be possible to do a radical removal of the growth.

The next step is to broaden the borderline of operability. The surgeon should not consider the quality of his surgical statistics but the welfare of the patients suffering from cancer of the stomach as a whole. It may increase the 25 per cent of postoperative mortality and diminish the 25 per cent of the three years' cure if instead of 16 per cent, say 50 per cent of all the patients were submitted to an exploratory laparotomy; but the total number of patients helped will be increased.

This is particularly true since as will be seen later, palliative surgical measures with addition of correct methods of radiotherapy will undoubtedly serve to help the patient. If it is found on exploration that the tumor cannot be radically removed, then the wound should not be closed without any further procedure, but an attempt should be made to give the patient the best possible palliative relief even at the risk of the patient's life.

Three-fifths of all gastric cancers originate in the pyloric region. A *gastroenterostomy* in this type of case both prolongs life and makes life more comfortable. The therapeutic value of the insertion of capillaries of radon in cancer of the stomach will be discussed at length later. Only when a generalized peritoneal carcinomatosis is found on exploration may the abdomen be closed without further procedure.

Radiotherapy in Cancer of the Stomach

While radical surgery is to date undoubtedly the best single method of treatment in cancer of the stomach, not more than 25 per cent of the cases in which a partial or total gastrectomy is done remain without recurrence. This means that in over 75 per cent of the cases minute islands of carcinoma are left behind somewhere in the organism after the operation. *Post-operative radiotherapy* in these cases is employed not prophylactically, as we conceive it in bacterial diseases, but in

order to inhibit or destroy the remaining minute nodules of carcinoma left after the operation. There has accumulated a sufficient amount of clinical evidence during the last two decades to prove that fully developed primary and metastatic nodules may be destroyed by the aid of radiotherapy. It is undoubtedly much easier to accomplish such a destruction when each nodule is so minute that it cannot be discovered by any means at our command.

For post-operative irradiation either high voltage x-ray therapy or surface and distance application of radium may be employed. Intratumoral insertion of capillaries of radon as will be shown later destroys the major portion of the tumor, and the subsequent surface radiotherapy acts in a manner similar to post-operative irradiation.

Advanced cases of cancer of the stomach in which neither a surgical removal nor an intratumoral insertion of radon was done, are in my experience generally not influenced by either high voltage x-ray therapy or by surface or distance radium application. I have also frequently noted the development of cachexia or the recrudescence of a previously present cachexia following such treatment. This phenomenon may be due to the necrotization of the tumor masses through the action of the irradiation and the absorption of such material.

Intratumoral Insertion of Capillary Tubes of Radon

Intratumoral insertion of capillary tubes of radon is to date the most efficient single method of radium therapy in cancer. The technic of this method consists in the following:

Radon (Radium Emanation) with which the capillaries are filled, is an elementary body in the state of a heavy gas, and represents the first active product of the decomposition of radium. Radium emanation is further decomposed in a manner identical with the decay of the radium element itself, and as a result of this process emits alpha, beta and gamma rays. The capillaries are built either of glass or gold, but those which I use exclusively in treating cancer of the skin are built of glass, from 1 to 3 mm. long, 0.25 mm. in diameter and contain usually from 0.2 to 0.3 millicuries of radon. The thin glass wall of the capillaries filters off the alpha rays and soft beta rays and allows the free passage of both the hard beta and all gamma rays of radium. Conse-

quently, both be therapy.

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quently, when glass capillaries are employed both beta and gamma rays are used for the therapy.

I have investigated experimentally the biological action of glass capillaries of radon on plant and animal tissues.

Action on plant tissues. In previous publications, I have shown that neoplasia of plants presents an ideal tissue for the study of the biologic action of the roentgen rays and radium, since the results are not obscured by blood, lymph and connective tissue, as in cases of animal tumors.

Adult, normal plant tissue, and particularly young growing tips of plants—crown gall and club root tissues were the materials used for the investigation. The normal tissues used consisted of young and adult roots of the purple-top turnip and the growing tips of the tobacco plant. The main neoplastic tissue used was the crown gall. Crown gall is a disease of plants, tumor-like in nature.

The method of inserting the glass capillaries was as follows: A pin-hole opening was made in the desired part of the plant by means of a sterile needle, and the glass capillary was then introduced into the canal. The tube of radium emanation was left in the plant tissue for from one to fifteen days, and the plants were observed at regular intervals. Empty tubes, equal in size to those containing the radon, were inserted in identical tissues as controls. The plant which received an insertion of radium showed a necrotized area surrounding the tube, while the plant which received the insertion of an empty control tube showed an unchanged canal wall.

Microscopic studies of irradiated crown gall tissue were done from one to fifteen days after irradiation. The examination showed that the tissue immediately surrounding the glass capillary is necrotized and drawn away from the capillary; the radial cell walls have collapsed to form a more or less compact layer of cell walls or cellulose around the capillary; the cells immediately surrounding the cellulose capsule have disintegrated. The layer of cells beyond this zone was unaffected.

Action on animal tissues. The animal tissues used for the investigation were normal liver, spleen, and bone marrow of rabbits, muscles and testes of white rats and mice, sarcoma of the white rat and carcinoma of the white mouse.

Insertion of the capillaries of radium eman-

ation into the liver, spleen and bone of a rabbit were done in the following manner: A laparotomy was performed and from two to four capillaries were inserted by the aid of a trocar into the organ.

In a series of rabbits, an opening was drilled into the shaft of the long bone and two or four radium emanation capillaries were placed in the bone marrow, the opening in the bone sealed with surgical wax, and the skin opening sutured. All the operations on the rabbits described above were done under ether anaesthesia.

Microscopical study of animal as well as human material showed the following condition. In tissues examined about two weeks after irradiation the zone nearest to the capillary showed necrosis and the second zone showed a degenerative process in the tumor cells. From six to eight weeks after irradiation, an entirely different picture presented itself. The necrotic tissue was absorbed and replaced by dense connective tissue, with occasional scattered small islands of degenerated carcinoma cells. The cellulose cushion found in the plant tissues seems to play a similar role to the connective tissue in animal and human material.

A superficial analysis of the results obtained may produce the impression that the beta rays which act on the first zone of tissues are a simple caustic agent. A closer study of the phenomena involved, however, shows that the mechanism of the action of beta rays differs from the caustic effect of heat or chemical agents and is qualitatively analagous to the action of the gamma rays. Indeed, the same sequence of the tissue changes may be obtained by large amounts of gamma rays.

To understand the biological action of the radioactive substances it is necessary to appreciate the physical laws governing this action. The tissue changes produced by the action of the Roentgen rays and beta and gamma rays of radium must depend in the ultimate analysis on the intra-atomic changes produced by these rays. This action, in accordance with the present day conception of radioactivity, is as follows:

Gamma rays and roentgen rays are rays of light of very small wave lengths. When they enter an atom of matter, they disturb the electronic equilibrium and free a certain number of electrons from the influence of the positive nucleus of the atom. These free elec-

trons travel in a certain direction with a given velocity, and as a result, produce secondary scattered or characteristic roentgen rays. The results will be the same whether the original agents were the gamma rays or the roentgen rays.

A biologic effect of the rays on tissues means a change in the structure of the tissues and must be a result of changes in the atoms of the tissues. A gamma ray entering the tissues sets in motion a number of electrons. The latter produce secondary roentgen rays which influence the other component parts of the tissue. Beta rays are themselves electrons in motion and when they enter the tissue they must produce analogous secondary roentgen rays. Consequently, biologic action of the gamma and beta rays must be analogous. The difference is quantitative and is due to the fact that the ratio of beta and gamma rays in a unit of radium is about 100 to 1.

The latest conception of Louis de Broglie that electrons have not only to be conceived as particles but also as waves bring the beta and gamma rays even in closer relationship. The beta rays have less penetration than the gamma rays and in large quantities would act as a caustic to the superficial layer of tissue. In the glass capillaries, however, the quantity of rays is small and the layer of tissue to be influenced is very thin.

Intraperitoneal Insertion of Capillary Tubes of Radon

The advantages of the intratumoral insertion of capillaries of radon over surface application of radium are that the method allows an even distribution of small quantities of radiations throughout the tumor, and that, on account of the intimate contact of the radioactive substance with the tumor cells, the total amounts are small and local results are obtained without any general effect on the organism.

In a great number of cases of epithelioma of the skin treated by this method, I have observed that within from two to six weeks after the insertion, the ulcer is healed and replaced by smooth and pliable skin. I have also obtained highly satisfactory results in carcinoma of the cervix, intra-oral cancer, and cancer of the urinary bladder, the prostate and the breast.

I have observed that when the insertion is made into a solid non-ulcerated tumor sit-

uated subcutaneously and covered by a normal skin, and when the capillaries are placed at correct distances from each other, the tumor shrinks without sloughing or ulceration of the tumor. It seemed, then, reasonable to presume *a priori* that an insertion may be made into a tumor covered by peritoneum without causing sloughing of the tumor and consequent peritonitis.

For a decade I have used this method extensively in intraperitoneal tumors of the stomach, the colon, the rectum, the uterus, the ovaries and in retroperitoneal tumors. An exploratory laparotomy is first performed, and when it is found that the tumor itself is inoperable, i. e., cannot be completely removed surgically, the capillaries of radon are inserted into the tumor. This is followed by the necessary palliative, surgical procedures. The laparotomy incision is immediately closed. I have never observed any sloughing or ulceration of the tumor or any abscess formation. No drainage is used and the laparotomy wound always heals by primary union. In one case following such an insertion, a pan-hysterectomy was performed, and the patient remained well after both operations.

There has appeared two weeks ago a news item in the general press, in connection with the meeting of the British Medical Association, quoting Dr. Malcolm Donaldson of London. Dr. Donaldson outlined a method of radium treatment devised by himself. The great drawback to the plan, he mentioned, was that it involved two operations within a week.

I presume this statement refers to an intraperitoneal insertion of removable radium which Dr. Donaldson reported in the *British Medical Journal* in 1929. He apparently did not notice my publication beginning in 1921 which appeared in the *Journal of the American Medical Association* and in other journals. A second operation to remove the radium as was shown above is an unnecessary procedure.

Intraperitoneal Insertion of Radon in Cancer of the Stomach

Carcinoma at the cardiac end of the stomach is generally very far advanced when it reaches the surgeon, and the insertion of radon is extremely difficult. Carcinoma of the mid-portion of the stomach is symptomless and therefore also reaches the surgeon when it is beyond any therapy.

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Fortunately, as was stated above, the most frequent type is carcinoma of the pylorus; and in this type I have obtained excellent therapeutic results by a gastroenterostomy and insertion of radon.

The following cases may serve to illustrate this method of therapy:

Case 3—History—A white man, aged 50, was admitted to the hospital, August 11, 1925, complaining of pains in the stomach and back for two years; vomiting, anorexia and loss of weight. About two years prior to admission, the patient developed a pain in the epigastrium radiating to the back. A diagnosis of gastric ulcer was made. Lately, however, he noticed a marked loss in weight (about 45 pounds or 20 Kg.) and felt quite weak.

Examination—The abdomen was slightly scaphoid in contour. The liver was felt 1 inch below the costal margin; it was of normal consistency and not nodular. Midway between the umbilicus and the xiphoid process to the right of the midline could be felt a rounded firm mass irregularly round in outline about 8 cm. in diameter, quite nodular and apparently not attached to the abdominal wall. It was not tender on pressure. No other masses were palpated anywhere. A provisional diagnosis of carcinoma of the pylorus was made.

A roentgen examination showed the stomach markedly atonic in type and dilated. Even in the prone position the stomach lay 7 cm. below the iliac crests. No filling defect of the stomach or duodenum was observed. Two and six hours after eating, more than half the meal was still retained in the stomach. Twenty-four and fifty-four hours after eating, more than one-third of the meal was still retained in the stomach. A provisional diagnosis of marked pyloric obstruction was made; the etiology could not be determined from the roentgenograms.

The patient was in fair general condition and in view of the complete obstruction, a laparotomy was indicated.

Operation and Result. On September 21, I performed a laparotomy. An upper right rectus incision was made. A very dense neoplasm involving principally the anterior gastric wall in the prepyloric and pyloric regions was found. It extended up to the lesser curvature and was deep enough to cause pyloric obstruction. The lesser omentum with the regional lymph nodes were also involved. The liver and gall bladder were free grossly. A biopsy was done on a small redundant part of the neoplasm in the central and upper part of the lesion; radon capillaries were inserted into the neoplasm transperitoneally. Then a posterior gastroenterostomy was done. The wound healed by primary union and without any rise in temperature. The patient's general condition improved continually.

October 11, the abdomen was soft throughout. The pyloric tumor was not palpable. The general condition of the patient seemed to be very good. In three months, the patient gained 23 pounds (10 Kg.). January 10, 1926, the mass was not palpable, indicating a diminution in the size of the tumor. The general condition of the patient was such that

I decided to attempt a removal of the pylorus. The patient had in the meantime received a complete course of high voltage roentgen-ray treatment.

On February 3, I did a partial gastrectomy. An incision was made parallel to the old incision and the abdomen exposed. The stomach was found slightly adherent, particularly to the pancreas. No glands were felt in the abdomen. Two intestinal clamps were applied to stomach proximal to tumor, and an incision was made between them. The tumor was removed with a portion of the duodenum and pancreas. A great deal of bleeding was encountered at the pancreatic surface which could not be controlled by ordinary methods. Clamps were allowed to remain on the vessels and Mikulicz's tampon was applied to the oozing surface. Four hundred and fifty cubic centimeters of saline intravenously was administered at close of operation. Clysis was given again during the following two days. On February 5, 1926, all the clamps were removed together with the compression drains and secondary sutures of the skin. On February 8, there was noted a diffuse drainage of bile and some necrotic tissue caused by the pressure of the clamps. The rest of the wound was in good shape and the general condition of the patient was fair. The patient, however, refused to take nourishment consistently and died on February 27, 1926, of marked asthenia.

The pathologic examination of the removed pylorus showed adenocarcinoma. The tissue showed extensive connective tissue formation, with scattered islands of degenerated carcinoma cells.

Case 4, History—White female, aged 58, was admitted to the hospital on October 31, 1925, complaining of pain, which she first noticed five years ago in the vicinity of a laparotomy scar. There had been an operation for ovarian cyst eighteen years before. This pain would disappear for two or three months and then return. It was very slight and was neglected until it returned in the summer of 1925, accompanied by indigestion and a loss of 15 pounds (6.8 Kg.) in weight.

Examination. There was a scar in the median line, running from the umbilicus to the pubis. A slight protrusion of the abdomen was noted in the region of the epigastrium 10 cm. below the xiphoid and 10 cm. in diameter. On palpation, a mass could be made out. It was not tender. The liver, spleen and kidneys were not palpated. There was an area of moderate tenderness in the left iliac region.

Roentgen examination prior to operation disclosed an irregularity in the pars media, along the greater curvature, at a distance of 3 cm., with a failure of visualization of the pyloric end of the stomach for a distance of 5 cm. which was constantly present in all films. Two and six hours after eating the residue of one-fourth of the meal was seen proximal to the apparent lesion. Twenty-four hours after eating, the stomach was empty. Stasis was present throughout the colon.

A provisional diagnosis was made of carcinoma of the pyloric portion of the stomach, including both the greater and the lesser curvatures.

On examination on November 8, the patient appeared fairly well nourished, not anemic nor cachectic. The abdomen was soft and not distended. In the upper half of the abdomen there was noted a

hard, nodular mass 1 cm. above the umbilicus in the midline, and extending over to the right 4 cm. from the linea alba. On the left, it disappeared below the costal margin at a distance of 1 cm. from the linea alba. The relation of that mass to the liver could be defined clearly.

Bimanual vaginal examination showed a small, freely movable uterus. The adnexa could not be made out. The right ovary was felt indistinctly. No abnormal masses were felt anywhere.

The size and appearance of the mass, together with the roentgenographic analysis, showed that the involvement of the gastric wall was extensive and that the tumor was inoperable. I decided to do an exploratory laparotomy with the aim of following it by a gastroenterostomy and insertion of radium into the tumor.

Operation and Result. On November 10, I performed a gastroenterostomy and radium insertion. An upper right rectus incision about 5 inches long was made. It was found that the area of neoplastic involvement was in the prepyloric portion of the stomach. Biopsy was done by incising into the serosa of the stomach; four capillaries of 0.3 millicurie each were immediately inserted into the bed of the resulting opening, and the latter was closed with plain gut. Eleven capillaries of 0.3 millicurie were inserted into the neoplastic area. The usual posterior gastroenterostomy was done. The wound healed by primary union, and symptoms disappeared. The patient's general condition improved.

Roentgen examination three months after operation showed a rapid filling of the proximal small intestines through a gastroenterostomy stoma. There was some irregularity of the greater curvature adjacent to the stoma.

Two hours after eating, a minute residue was present in the region of the stomach.

Six hours after eating, the stomach was empty.

The patient's general condition appeared to be improved. The patient received local applications of radium over the epigastrium after the operation. She also received a course of high voltage roentgen-ray treatment over the abdomen. She had been on a soft diet. So far, she had more than maintained her weight, and her general condition was, in the main, satisfactory.

The patient was last seen December 16, 1926. The tumor mass had not increased in size since the last examination. The general condition of the patient seemed to be fairly satisfactory.

Case 5, History. A white woman, aged 44, was admitted to the hospital, October 27, 1926. About two years before, the patient had had slight pain in the epigastrium independently of meals; there was no vomiting. This condition persisted until six months before admission, when the pains increased in severity and the patient began to vomit, at times, independent of the intake of food. The vomitus was coffee colored. On July 28, she vomited blood. She began losing weight, and when seen had lost 20 pounds (9 Kg.).

Examination. The patient was fairly well developed but poorly nourished; she appeared to have lost weight and was very anemic. The abdomen was not distended, but was soft and flabby. The

liver and spleen could not be felt. In the epigastrium a mass could be felt extending from the umbilicus upward 5 cm. to each side of the linea alba. The mass was hard and movable on respiration and palpation, and was tender to touch.

Rectal and vaginal examination did not show any abnormalities. A provisional diagnosis of carcinoma of the stomach was made.

Roentgen examination of the gastro-intestinal tract on October 29, showed the greater curvature of the stomach 9 cm. below the intercostal line. The stomach was atonic in type and dilated with an inconstant type of irregularity and filling defect in the region of the pylorus.

2 hrs. p. c. most of the meal still present in the stomach.

6 hrs. p. c. most of the meal still present in the stomach.

24 hrs. p. c. one-half of the meal still present in the stomach.

48 hrs. p. c. one-third of the meal still present in the stomach.

72 hrs. p. c. one-sixth of the meal still present in the stomach.

A provisional diagnosis of marked pyloric obstruction was made. The origin of this could not be roentgenologically determined with certainty.

An exploratory operation with a possible gastroenterostomy and radium insertion was decided on.

Operation and Result. On November 1, I inserted radon in the tumor, excised a lymph node for diagnosis and performed a posterior gastroenterostomy. A left upper mid-rectus incision was made. The stomach was found to be involved in the prepyloric and pyloric regions, chiefly over the lesser curvature, the involvement causing stenosis of the pylorus. Bands of adhesions were found all about the stomach. The involved portion of the stomach was hard and nodular to palpation. Many hard and nodular mesenteric and retroperitoneal lymph nodes of all sizes were found, and one was removed for pathologic examination. Capillaries of radon were inserted throughout the tumor mass, but chiefly in the proximal portion of the stomach.

A posterior gastroenterostomy was then performed and the abdomen was closed without drainage.

The pathologic examination of the lymph node removed at operation showed adenocarcinoma.

The patient made an uneventful recovery. She gained about 35 pounds (16 Kg.) and at the last roentgenographic examination on May 14, 1927, the gastroenterostomy was functioning perfectly. The general condition of the patient was satisfactory.

Case 6. A. M., female, aged 65, entered the hospital on October 30, 1926, complaining of epigastric pain for the three months previous to admission and a loss of 23 pounds (10.4 Kg.) during the past six months. There had not been any nausea, vomiting, hemoptysis, bloody stools or jaundice.

Examination. The patient was somewhat emaciated and anemic; the abdomen was soft and relaxed and no fluid was noted. In the epigastrium, there was felt a firm, slightly tender mass, irregularly round in outline measuring about 5 cm. in diameter. This mass was movable within certain limits. No other masses were palpable, and no other

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abnormality was found anywhere. A clinical diagnosis of carcinoma of the stomach was made.

Röntgen examination showed a distinct narrowing in the pyloric portion of the stomach involving the greater curvature for a distance of about 3 cm.

7 hrs. p. c. there was a moderate residue in the stomach proximal to the narrowing.

24 hrs. p. c. the stomach was empty.

A provisional diagnosis of carcinoma of the pyloric portion of the stomach was made.

Operation and Result. On October 31, I opened the abdomen by a median incision. The stomach was exposed, and a tumor mass was found involving the pyloric end of the stomach; the condition was found to be inoperable and therefore I inserted capillaries of radon throughout the tumor and then performed a posterior gastroenterostomy.

The patient made an uneventful recovery. There was no rise in temperature throughout the post-operative course, and the wound healed by primary union. At present, the patient is in good general condition.

Comment

The analysis of the cases presented here shows that gastroenterostomy plus radium insertion was followed in all the patients by an uneventful recovery. There was no rise in temperature, and no peritoneal irritation or subsequent sloughing of tissue. In a word, the insertion of radon did not add in the least to the surgical hazard of the gastro-enterostomy. In case 3, I made an attempt to follow this subsequently with a radical removal of the pyloric tumor. The patient died 24 days after the second operation of general asthenia. I do not favor any attempt at a radical removal of the tumor in cases of advanced carcinoma in which a palliative gastroenterostomy and radium insertion has been done. However, the findings in this case were very instructive and of great practical value. The gross inspection of the pyloric tumor at the second operation showed distinctly that the tumor had shrunk in size and the microscopic analysis showed that while there were remnants of carcinomatous tissue present, there was also an extensive newly formed connective tissue surrounding all the islands of carcinoma. Patient 4 is doing well, sixteen months after the operation.

The type of therapy presented here is not a radical method of treatment of cancer of the stomach, but is a palliative procedure which may prolong life more than a gastroenterostomy alone and, what is possibly of greater importance, will check for a time the peripheral growth of the pyloric tumor and therefore may prevent the closure of the gastroenterostomy stoma.

Conclusion

The immediate results obtained in the series of cases here reported as well as in numerous other cases which I have treated in the same manner, indicate that an intraperitoneal insertion of capillaries of radon can be performed in the course of an exploratory laparotomy, or in the course of an exploratory laparotomy plus palliative surgery of any type, without adding to the hazard of the operation and at the same time causing, in a number of cases, a shrinkage of the tumor growth and subsequent prolongation of life and comfort.

All this concerns very advanced cases of carcinoma of the stomach. Much better results can certainly be obtained in earlier cases bordering between the operable and the inoperable ones.

Cancer of the stomach must remain a surgical domain but the orientation of the surgeon must change. He must operate more frequently and less radically. He must either be an expert radiologist himself or must operate only in close cooperation with an expert radiologist.

Discussion

DR. JOHN H. VAUGHAN (Amarillo, Texas): I have listened with deep appreciation to the presentation of Dr. Levin's research work and his report of cases. Certainly, when such a large percentage of people are dying of cancer and when we remember the large part of that percentage are dying of cancer of the stomach, it certainly behooves us to do intensive research in order to find some form of relief for those suffering from this hopeless malady.

It is my opinion that in the South, in Texas I believe, we do not encounter such a large percentage of cancer of the stomach. This may be due to our slower methods of living, or the eating of a better balanced diet or perhaps our climate has some inexplicable influence.

We very often find in our cases oppression after eating, pain influenced by diet, loss of flesh, regurgitation of food and other symptoms that are not associated with classical cancer and it makes our cases more difficult to diagnose. When they have reached the stage where we can detect shreds of cancer tissue in the stomach washings, or we can detect large cancer masses, the chances are we are going to be able to do much for the patient by means of surgery. Where the diagnosis is made early, surgery may be helpful; but this is seldom the case.

I am hoping the intragastric photography may do something for us in making possible early diagnosis of stomach ulcers and stomach cancer. If we are unable to make these, or until we learn better when to make early diagnosis, certainly the treatment of choice is as Dr. Levin has outlined. We can't do much in the way of cure with external radiation,

but I am inclined to disagree with the doctor's view that it is absolutely useless. I have had a few cases of cardiac cancer who were unable to swallow any kind of food (except some hot drink) for a period of two or three weeks' time, and following external radiation I have seen those patients, inside of forty-eight hours, swallow soft diet with comparative ease. I don't know on what basis to explain this. I feel, however, that radiation offers these patients at least a temporary form of relief.

The treatment as outlined by Dr. Levin—make your incision in the pyloric and pre-pyloric cases, do your gastroenterostomy and your radium implants—certainly gives the best hopes for these unfortunates.

DR. C. F. VOYLES (Indianapolis, Ind.): I have in mind one case that occurred in my practice that might be reported in connection with the present discussion. A man about forty-five years old developed symptoms suggesting cancer of some abdominal organ. We could not determine just before the operation in which organ it was primarily located. An exploratory operation was done by an experienced and competent surgeon who found extensive lymphatic involvement. The laboratory reported that it was lymphosarcoma. The surgeon closed the abdomen. We gave a hopeless prognosis. The patient recovered from the operation and left the hospital. Shortly afterwards he went to a neighboring city and a surgeon reopened the abdomen, drained the gall-bladder, used radium and closed the abdomen. The patient recovered from the operation. He symptomatically recovered from his disease. I lost track of him about two years after that, at which time he was in a very good state of health.

CHAIRMAN KOLISCHER: It is, of course, impossible to criticize any method or the results of any method without having it done yourself or without having watched the results. However, in judging the results of the insertion of radium, I would like to call attention to two facts. What we accomplished by inserting radium needles or needles carrying radium emanations is necrosis of the adjacent parts. Any transmitted action is excluded because there isn't enough quantity there. We know even if we have a solid mass of radium salts, the penetration limit is about three centimeters.

The doctor is to be congratulated on his success by inserting radium needles or needles that carry the emanation of radium, because everywhere else in the body the attempt at curing a cancer by placing radium needles or needles carrying radon is a miserable failure. For instance, in a cancer of the bladder, we not only fail to cure the patient, but the bladder is transformed on account of the necrosis into a little leathery cup. Thereafter even cystostomy will not cure the patient. In cancer of the prostate, the patient doesn't die one death; he dies a thousand deaths.

There evidently must be a particular sensibility of cancer of the stomach towards the insertion of radium needles in order to accomplish the results the doctor has reported.

The occasional improvement of cancers after radiation is a very well known fact. Often enormous

tumors will disappear. In the next one hundred cases you don't make any impression at all. Why? We don't know. But we can't draw conclusions from one case.

As to the possibility of chemotherapy in cancer, I doubt the statement of the doctor that if it would find substances that would cure cancer by chemotherapy, there would be a perforation of the bowels. We know differently. We know that occasionally after radiotherapy (and I speak of rational radiotherapy) the tumor will disappear and there is nothing left, no scar tissue, no fibrous tissue, and there is restitution of the original tissue. The disappearance of a cancer cell doesn't mean necessarily necrosis. Other cells disappear by gradual necrobiosis and are supplanted by normal tissue.

I still maintain the future of cancer is not surgery, but chemotherapy. We operate now because we can't help ourselves, and we use radium and we use x-ray therapy because we can't help ourselves, but it is certainly not the ideal.

The cancer therapy ideal would be to be able to treat tumors the same as we treat syphilitic tumors. We don't perforate anywhere when treating syphilitic gumma. The gumma disappears. It becomes absorbed and is substituted by other tissue.

DR. ISAAC LEVIN (New York City): Unfortunately, Mr. Chairman, ladies and gentlemen, I prepared my paper under a misconception. It was stated in your announcements that while it is usual for a speaker to have twenty minutes, the courtesy of extra time is extended to an invited guest. Under the circumstances I was able to present only a portion of my thesis. I therefore beg your indulgence to delay your verdict until you have further opportunity to read it when published.

To answer the gentleman who discussed my paper, the intragastric photography is something of which I have done quite a bit and I find it is efficient in the cases where I can make any diagnosis without it—in advanced cases. In the early cases it doesn't tell us anything.

As far as carcinoma of the esophagus and the cardiac end of the stomach is concerned, it is a different situation from the condition I discussed, because there the tumor is always comparatively speaking small, particularly in the esophagus and the cardiac end. Any therapy or no therapy at all gives the patient an occasional widening of the opening and the patient can eat. It is due to necrobiosis of the tumor but in a short while it closes up again. I generally don't treat them unless they have a gastroenterostomy done.

Lymphosarcoma and Hodgkin's disease of the peritoneus is a different disease entirely from cancer, and if the diagnosis can be made, it requires no operation at all because if radio therapy is specific anywhere, it certainly is specific for leukemias, Hodgkin's and lymphosarcomas.

I desire to leave with the Chairman, at least if I understood him right, that any method of treatment is good if it is properly done, and is wrong if it is improperly done. I believe that radium therapy requires at least as much expert technic and knowledge as surgery or any other type of therapeutic measure.

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dreds of cases where I did nothing else but the insertion of a capillary, not even a filtered gold capillary, but a glass capillary.

I was going to explain to you chemically why in the latest theories of physics, radio therapy and chemo-therapy really do not differ from each other. As I said, I didn't have time to go into that. I can tell you that a case of epithelioma of the skin is treated this way: I do one insertion of glass capillaries and in from two to six weeks, you will see nothing but the fine, flexible, white scar, no necrotization of any kind. In solid tumors, in large bulky tumors, I insert radium, gold or glass seeds, and I get no necrotization, simply disappearance.

I brought with me two slides I wanted to show in discussing the carcinoma of the breast in a case of tremendous ulcerated cancer of the breast, about fifteen centimeters in diameter, a tremendous ulcer, inoperable naturally, with lymph nodes in the axilla, with fluid in the lung. I took out of it the first day of treatment 1,000 cc. of fluid. I then inserted glass capillaries twice within a period of two weeks. The wall is today covered with the skin. Since the first of June there has been no further need of paracentesis. No fluid accumulates. On the x-ray film you can see two-thirds of that lung free, while in the first film it was covered with fluid throughout. It wasn't a case where I created ulceration and sloughing. I cured ulceration and sloughing by a method of insertion of the glass capillaries.

I have done intra-peritoneal insertion in carcinoma of the stomach, in carcinoma of the colon, in carcinoma of the rectum, in carcinoma of the cervix, into the broad ligament, in tumors—in retroperitoneal tumors. I did not have a single death. I did not have a single ulceration or sloughing or peritonitis or pus formation.

In one case, I followed the operation with gastroenterostomy, in another I followed it with a panhysterectomy and the operation was perfectly easy to perform.

I was going to show you by my experiments on plants, on animals, on the human, that what you get when you insert a capillary is a minute area of necrotization. It is very minute, no more than about two millimeters around, then similar minute areas of degenerative carcinoma and next perfectly normal tissue. If you will insert the capillaries in the first place with the proper amount, no more than .2 or .3 of one millicurie in each, if you will place them at the proper distance from each other, in other words if you will gain your experience to do this thing right, Mr. Chairman, you will get the proof of the pudding. It is not going to ulcerate and it is not going to give anything like a "hell of a death" any more than the cancer does. I have seen the results from the same methods of therapy done by younger men, and you are right, but that was not because of the wrong method, but of a technic wrongly applied.

THE TREATMENT OF ARTHRITIS *†

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Arthritis is probably the oldest known disease. Moodie⁽¹⁾ found evidence of arthritis in the tails of giant reptiles of the cretaceous age. This is probably our earliest knowledge concerning the disease. References follow down through the ages, including that of Hippocrates⁽²⁾ and in more recent times, Shakespeare, in *Midsummer Night's Dream*, quotes King James I as saying, "rheumatic diseases do abound", down to our present day, where, because of its importance and international character, it has aroused widespread interest and a growing spirit of investigation.

This interest has resulted in the formation of the International League for the Control of Rheumatism, in which America is represented by twelve physicians. The fruit of such a league should properly be an interna-

tional classification based on etiology and pathology. Such a classification should prove a distinct advance in our concept of the disease, as present day literature is full of conflicting opinions and nomenclatures.

Classification

In the absence of international concordance, I wish to present a classification that has met modern demands, one that embraces arthritis *per se* and excludes syphilis and tuberculosis.

We are all familiar with the classification of Nichols and Richardson,⁽³⁾ which divides arthritis into two groups, namely: proliferative and degenerative arthritis. The British Health Ministries Classification,⁽⁴⁾ recently published, includes gout, fibrositis, myositis, lumbago, sciatica, rheumatic fever, rheumatoid arthritis, osteoarthritis and unclassified joint conditions. In America, particularly in the East and Middle West, the classification of Goldthwait⁽⁵⁾ has gained many adherents. In Chicago, three clinics, including the au-

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thor's at Loyola University, use Goldthwait's classification, which is as follows:

A. Infectious arthritis.

- 1) Acute.
- 2) Subacute.
- 3) Chronic.

B. Atrophic arthritis (true arthritis deformans).

C. Hypertrophic arthritis (including senescent and menopausal arthritis).

This classification is an excellent one as it permits of accurate diagnosis and prognosis.

Diagnosis

A correct diagnosis is absolutely necessary before treatment is begun in order to avoid using treatments designed for other classes. Free interchange of treatments for the different types sometimes results in disaster. A diagnosis based on Goldthwait's classification becomes an easy matter after some experience. For a detailed description of this classification Schaufler's⁽⁶⁾ excellent article, which appeared in the *Journal of the American Medical Association*, in 1927, will be found to be very instructive reading.

Etiology

Brief attention is drawn to the question of etiology. Cecil, Nichols and Stainsby,⁽⁷⁾ in a recent report emphasized the high incidence of positive blood cultures found in arthritics. The streptococcus was found in most cases. These authors believe in the infectious etiology of arthritis. The theory has not been proved. We must, however, also consider the roles played by heredity,⁽⁸⁾ occupation,⁽⁹⁾ metabolic imbalance,⁽¹⁰⁾ chill and exposure,⁽¹¹⁾ infections,⁽¹²⁾ posture,⁽¹³⁾ intestinal protozoa,⁽¹⁴⁾ mental stress, trauma, toxic causes, etc.

General Treatment

In order to treat patients successfully, they must be told that their condition is the result of longstanding changes, and that complete cooperation and continued attendance for months is necessary if a cure or arrest of the disease is to be expected. The exceptions are certain cases of acute infectious arthritis. The patient must also be warned that the course will not always be smooth, that remissions will result from neglect, and that complete submission to, and confidence in the physician, are prime requisites.

Hygiene: The question of general hygiene is an important one. Many of the hypertrophic

patients are heavy and constipated, whereas many of the atrophic types are slender, viscerotropic and neurotic. In the infectious type we may expect to meet any picture. Every possible means to improve the general hygiene must be considered.

Avoidance of chill and exposure is important, as is also the question of proper clothing. A proper amount of sleep and frequent rest should be obtained. The best treatment is bed rest, but this is an impossibility with those who must earn their daily bread—and these are in the majority.

Every attempt must be made to eliminate constipation, and this can be done by increasing fruits, vegetables, liquids and establishing a "habit time." In certain cases of constipation it will be well to attempt a change in intestinal flora. This is done by use of buttermilk, lactic acid cultures, acidophilus milk or cubes, or by the use of lacto-dextrin combined with psyllium seeds. Elimination should be made physiologic and catharsis avoided.

The obese should be placed on a low caloric diet, whereas the thin, undernourished individual should be given a high caloric diet with an excess of minerals and vitamins. Swaim,⁽¹⁵⁾ advises that in general, meats, meat extracts, cheese, white bread, syrups and candy should be avoided. On the other hand, sunshine, cod liver oil, irradiated ergosterol, fruits and vegetables are desired in all cases.

Focal Infection: The question of focal infection has been an important one ever since Billings drew attention to it. Since that time a great mass of literature has been published dealing with its various phases. Certainly we know that focal infection plays a most important part in relation to arthritis. It can either incite an original attack, cause an exacerbation of a quiescent case, or prevent the resolution of an arthritis that was caused by entirely different factors.⁽¹⁶⁾

The teeth, tonsils and sinuses are, perhaps, the worst offenders. An important question is the handling of the devitalized teeth. In my experience and that of professional friends, both in Chicago clinics and elsewhere, the devitalized tooth that is negative on x-ray is still considered a potentially dangerous focus. In many cases, after all therapeutic measures had failed, removal of these hitherto unsuspected teeth revealed infectious apices which on culture proved to be streptococcal. The results,

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of course, were happy ones. Remember, these teeth were negative to repeated x-rays.

Henry,⁽¹⁷⁾ calls our attention to the importance of careful reading of dental radiograms and to the technical mistakes in faulty filming that simulate organic disease. These mistakes result from incorrect angulation so that the teeth appear fore-shortened. In this event the apices frequently appear diseased. This is especially true for the upper incisors and the lower bicuspid. Needless to say, new films should be taken when these mistakes are seen. He also stresses the importance of filming edentulous spaces, as residual infection may lurk there. Finally, he emphasizes the importance of complete cooperation between dentist and physician in order to prevent needless dental extractions. Numberless persons are toothless today because of a hurried glance at the x-ray, followed by an edict to extract, when a conference with the dentist might frequently have failed to reveal disease.

Mellanby,⁽¹⁸⁾ has shown that dental caries is due to a deficiency in the fat-soluble vitamin D, and that the administration of irradiated ergosterol to children prevented the onset of dental caries and checked processes already begun. This important discovery should bear great fruit in the future as it definitely points the way for elimination of this focus.

Symptomless gallbladders, the large and small bowel, skin lesions, lymph nodes, the appendix, genito-urinary tract, female pelvic organs, sinuses, tonsils and the mediastinum—all these must also be carefully investigated. This will, of course, mean consultation with specialists in these various branches.

All known foci should be eradicated,⁽¹⁹⁾ the exceptions being surgery in the acute stages and in those cases where the patient is very old and the disease advanced. In the latter, operation often causes more discomfort than the arthritis.⁽²⁰⁾

Professional Cooperation

The management of arthritis must be made rational and not radical. Action must be prompt and "vigilance eternal," or the mistakes that result from carelessness—namely, deformities—will result. Therefore, the problem of cooperation becomes paramount in importance. The matter of arthritic management has been said by Stoner⁽²¹⁾ to be almost that of a specialty in itself. O'Reilly⁽²²⁾ has called it a medical problem primarily, with the internist as a clearing house and the orthopedist

and other specialties as necessary adjuncts. Baer⁽²³⁾ believes in a four-day period of hospitalization with conferences of all the specialties. Although the problem of successful treatment may result ultimately in what Glover⁽²⁴⁾ chooses to call "arthritic units," the present day treatment will devolve particularly upon the internist, orthopedist and physiotherapist, with the other specialties playing important, though lesser parts.

Rolé of Internist: The internist should obtain a careful history and physical examination, supervise joint and mouth x-rays, do blood counts and urinalyses as well as draw blood for chemistries and, when necessary, for cultures. He should also advise the type of treatment, send the patient to the necessary consultants, and cooperate with the orthopedist in the prevention of deformities and in the problem of treating those already formed. It should be part of the internist's problem to consult with the dentist, to advise physiotherapy and carefully check on all matters of massage, exercise, light, heat, etc., as well as prescribe the necessary medicinal treatment, and diet. He should constantly keep his eye on the patient's progress, from the beginning to the very cure, or arrest.

Rolé of the Orthopedist: The orthopedist plays his great rôle in preventing deformities. Recently, Swaim and Kuhns,⁽²⁵⁾ published three excellent articles on the management and prevention of deformities in acute and chronic arthritis. Use of bed rest, proper position of extremities, correct posture, gentle manipulations, physiotherapy, splints, casts, straps, bandages, braces, exercising apparatus, postural exercises, etc., were given special emphasis. Let me repeat again, that proper preventive treatment in the future will greatly lessen the number of active cases and increase the benefits these patients should receive. Joints that ankylose despite treatment should be made to do so in the most useful positions, many of which have been described by Steindler.⁽²⁶⁾

Gentleness must be the keynote in all manipulations. Bed rest is utterly important in the active stages. Flexion deformities must be prevented, rather than catering to the whims of the patient. This means causing the patient occasional discomforts in order to gain an end.

Surgical measures such as arthroplasties and arthrodeses, should be reserved for the

orthopedic surgeon, as should synovectomies. All three operations must be performed in the inactive stage and the indications for such procedures must be definite. Allison and Coonse⁽²⁷⁾ reported excellent results in cases of chronic arthritis from synovectomy. Best results were achieved in monarticular cases and especially in the knee. Operation in the active stage is contraindicated.

Rolé of Physiotherapist: Physiotherapy plays a large and important part in the management of arthritis. The physiotherapist should first of all be a physician particularly skilled and fitted for this important work, and any and all treatments carried out by his subordinates should be only by those that he—the physiotherapist—has trained. They should at all times be under his supervision while the patient is being treated. The internist, through frequent consultation with the physiotherapist, can obtain important knowledge of curative measures from a physiotherapeutic standpoint.

Physiotherapeutics

What physical measures are best in the treatment of arthritis? A survey of the literature gives us interesting information. According to Fox,⁽²⁸⁾ the trend of continental Europe, today, is to leave the light modalities and to return to the older methods, especially hydrotherapy. In England large physiotherapeutic clinics are under construction, as are artificial spas. In Holland, where arthritis is a national problem, hydrotherapy plays an important part in its treatment. Fox, as president of the *League Internationale Contre Rheumatisme* has compiled a comprehensive list of the physiotherapeutic measures for use in treating arthritis, which includes all forms of light, heat, water, massage, exercise and electricity.

Heat: It is well known that heat has a beneficial effect in most cases of arthritis. In acute cases, however, it is rarely well borne, but becomes of great value after this stage has passed. In chronic cases it is of the greatest value, tending to relax muscle spasm, relieve pain and to improve joint circulation. The effect of heat is frequently accentuated when used locally with counter-irritant lotions or ointments. It should precede all massage and manipulative measures, when not contraindicated.

Baking: The electric baker has proved in my experience to be the best physiotherapeutic

measure in all chronic cases of arthritis where the active process has passed the acute stage. The best results were obtained when these treatments were given frequently and, as this involved many visits and a rather large financial outlay, it was necessary to devise some apparatus so that the patient could have treatment in the home. Dr. Coulter designed a baker — a modification of the Mayo home baker — containing four ordinary light bulbs, reflected from a hood of burnished tin which covers the dome of an ordinary metal cradle, such as is in common hospital use. This simple device can be used for almost any joint in the body by merely changing the patient's position, and it can be made at a small cost. With this means of administering home treatment the patient can make weekly or semi-weekly visits to the physiotherapist for ultraviolet light, or advice regarding exercise and massage and a general check-up on his progress. By adopting this dual plan the patient gets an ample amount of treatment which many could not afford were they to make daily visits. This baker can either be sold outright or rented for a moderate fee. It is best to sell the baker at cost to dispensary patients.

Radiant heat and infra-red irradiations are excellent for the back and shoulders, as well as for the hands. It is especially useful when combined with tonic doses of ultraviolet light.

Ultraviolet Light: Eidenow⁽²⁹⁾ has shown that the best tonic effect is obtained from ultraviolet light when minimal erythema doses are used over fractional body areas. Aside from its tonic effect we must consider the calcium-phosphorus balance which it certainly influences. Its use, therefore, is especially desired in the undernourished and atrophic cases where there is a calcium depletion.

Massage and Exercise: Another point of prime importance is the matter of massage and exercise. Massage, over the joint, is absolutely contraindicated in acute arthritis. Failure to heed this warning will result in contractures and ankyloses. Gentle massage proximal and distal to the joint, is indicated after the acute process has subsided. For stiff joints—in quiescent cases—a deep, stroking and kneading massage, preceded by heat, will give good results. Traction or stretching exercises are frequently necessary.⁽³⁰⁾ Mimeographed exercises can be printed for the different joints and these be given to each patient. Thus

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it is possible for the physician to refer his patient to the physiotherapist with a prescription of the exercises needed. From time to time, when necessary, exercises should be added or subtracted.

An important procedure for exercising muscles is the following: The patient is placed on his side and a large cardboard—made smooth by applying talcum—is then placed between the legs or arms, depending on the joint to be exercised. The cardboard is supported underneath by pillows. The arm or leg to be exercised is then placed on this polished plane and is exercised actively or passively, in flexion or extension. These early supportive measures are of great aid in preventing contractures and should be used increasingly, several times daily, always remembering the importance of gentle manipulations. As the tonus of the spastic or atrophied muscles⁽³¹⁾ improves, the cardboard is dispensed with and more strenuous exercises are substituted.

The treatment will differ in cases of spinal arthritis. Here, certain postural exercises in bed are necessary. Swaim⁽³²⁾ has described two exercises, as follows: The patient is placed in bed and a pillow is slipped under his back, so that each shoulder just touches the sheet. The head is left unsupported. Another pillow is then placed under the flexed knees, the hands are clasped under the head and the arms abducted down to the sheet. This position extends and flattens the spine, squares the shoulders, increases the chest cavity and, through the dropping away of the viscera from the diaphragm, easy breathing is permitted and circulation stimulated. This exercise exerts a tonic effect throughout the body, as well as correcting faulty posture. If ankylosis is inevitable despite treatment, an excellent position in ankylosis will result from the use of this exercise. This first exercise should consume one-half hour after each meal. The second exercise consists in the patient lying prone over the long axis of a pillow with both arms held at the sides or outstretched. The second exercise should follow immediately after the first for an additional half hour. By use of these two exercises physiologic circulation and posture are restored with a resultant improvement in general physiology and hygiene. The two exercises are synergistic to each other. If persistently employed for months a surprising

improvement in posture will result, thereby eliminating an important predisposing factor of etiology, namely, poor posture. I consider these exercises so important that I use them in all types of arthritis where the posture is poor.

Diathermy: Diathermy has frequently been suggested in the treatment of arthritis. In my experience, even in the hands of experts, it has proved itself entirely ineffective, with the exception of gonorrheal arthritis. Here, in the acute stage, excellent results are obtained from use of diathermy locally to the joint.⁽³³⁾ In the subacute stage and in case of recurrent gonorrheal arthritis, the combination of local and general or Cumberbatch treatment gives the best results. However, in forms of arthritis other than gonorrheal, the results are disappointing and many joints are made worse. Stoner and Brookhart,⁽³⁴⁾ along with others, have reported unfavorably on the use of diathermy in arthritis.

Cabinet Baths: Electric cabinet and steam baths are excellent in the obese and in chronic, low grade forms of arthritis. The beneficial results are obtained from vasodilatation and perspiration. This is a popular form of therapy in Europe.

Contrast Baths: Contrast baths are recommended in healing cases of arthritis, especially where there is some residual soreness. These treatments can also be given in the home. This method of alternate hot and cold immersions, causing alternate vasodilatation and vasoconstriction, is of great value in arthritis of the extremities, especially the upper. The physiotherapeutic laboratory—rather than the home—is, of course, the ideal place to give these treatments.

The majority of chronic arthritics have sluggish joint circulations. Pemberton⁽³⁵⁾ calls particular attention to this fact. Our objective in these baths, therefore, is to improve the circulatory tone of the blood vessels and this is brought about by the contrasting temperatures, at the same time relieving muscle spasm.

Bode and Scholtz⁽³⁶⁾ recently reported a series of forty cases, including arthritis, sciatica and lumbago, in which baths containing brine salts at a temperature of 102 to 106 degrees Fahrenheit, were given each patient for a period of ten minutes. The baths varied from two to twelve in number, depending on the rapidity of result. Relief was obtained in every case, varying from complete symptoma-

tic cure to moderate improvement. The brine salt immersion was preceded by a preliminary immersion in water for ten minutes, the temperature being slowly raised from 96 to 102 degrees Fahrenheit. By gradually increasing the temperature, complete vasodilatation was obtained, for it has been shown that sudden immersion in hot solutions frequently causes reflex vasoconstriction. The brine salt baths produced this result through a prolonged and intense period of sweating.

Mineral Springs and Spas: Most of us are acquainted with the excellent results derived by patients who visit American springs and baths, as well as the European watering places such as the spas in Holland, Austria and Germany. This method of treatment has been known to us for centuries but dates authoritatively back to the time of Winternitz, who first described and classified this method. The treatment in these places consists chiefly in baths, massage and the drinking of various mineral waters. From a psychotherapeutic standpoint the change in environment at the spas, freedom from worry and complete rest, are highly desirable ends. An additional advantage is the laxative effect of the mineral waters. It helps to overcome obstinate constipation, a condition of which many complain. While we must all admit the efficacy of the visits, it is sheer folly to rely upon them alone for a cure.

Medicinal Treatment

Each year new remedies, analgesics and "sure cures" appear on the market and are frequently accompanied by a fanfare of data and enthusiastic claims. It is not strange, therefore, that experience has taught us to be wary of such claims, lest we be gullible in their use. Were we to apply all these medicaments indiscriminately—as, no doubt, some do—we would be guilty of practicing "shot-gun therapy."

To many, the use of salicylates is the best treatment for analgesia in all cases of arthritis. However, experience with a large number of cases has proved to me that salicylates should be used only in acute infectious arthritis, and then only in combination with iodides for the best results. In the subacute and chronic stages, salicylates should be discontinued and other analgesics used.

For this period of treatment I know of no other analgesic so efficacious as mono-iodo-

cinchopen.⁽³⁷⁾ This drug contains cinchophen linked with iodine which is supposedly liberated as nascent iodine when ingested. Thus the analgesic power of cinchophen is obtained, plus the anabolizing effect of the iodine. Metabolism is speeded up, thereby producing a dual effect. The dose is one or two capsules after each meal. Mono-iodo-cinchophen possesses the added advantage in being non-toxic and it is easily tolerated by almost all patients, the exceptions being idiosyncratics. The effects of this drug are pronounced in all types of arthritis but especially in the menopausal form of hypertrophic arthritis. Here the patient is usually one with bad posture, poor circulation, vicarious aches and sluggish metabolism. The iodine acts to stimulate metabolism and the cinchophen to control the pain. Frequently there are other metabolic dysfunctions and in these cases the addition of thyroid extract or ovarian extracts—as the symptoms indicate—will give surprising results.

Thyroid⁽³⁸⁾ extract in small doses and over long periods of time is also extremely good in those cases of slow pulse, dry skin, cold extremities and glandular adiposity. The use of this drug increases metabolism, speeds the pulse, controls weight gain, and improves the joint and joint circulation through vasodilatation. There is no danger in its administration if small doses are used. The usual precautions must be observed, however.

Ovarian extracts in cases of menopausal arthritis or menopause complicating arthritis, especially those with moderate or severe vasomotor disturbances, prove helpful in overcoming these distressing symptoms and greatly aid in relaxing the patient, nervously and otherwise.

The ammonium salt of o-iodoxy-benzoic acid has been used with good results by Young and Youmans,⁽³⁹⁾ Smith⁽⁴⁰⁾ and many others. Most reports are favorable. The author has used this drug intravenously as amiodoxyl benzoate, in a number of cases, with generally good results. Two drawbacks to the use of this drug are the time consumed and the amount of sterile material needed. It is essentially a home or hospital treatment, although many injections have been given in the clinic. I believe that the drug is worthy of a trial in cases of subacute and chronic infectious arthritis. The effects, in my experience, have not been permanent, but the immediate relief from pain and swelling has been of de-

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cided value. Atrophic and hypertrophic cases do not seem to respond well. Untoward effects during or after the injection will usually be found due to errors in technique or too much haste. The drug should be given in sterile, normal saline solution, and at least ten minutes should be allotted for each injection.

In many cases of gonorrheal, hypertrophic, as well as a few cases of atrophic arthritis, deep gluteal injections of solutions containing iodine in colloidal gelatin suspension are used with splendid results. The analgesia produced is often decided, and in the case of gonorrheal arthritis the added action of the iodide is especially desired and effective. The dose is the contents of a three or five cc. ampoule, once or twice weekly for six to eight injections. An interval period of three weeks should follow before resuming this treatment.

Sulpharsphenamine in .3 gram doses is given in aqueous solution intramuscularly into the buttocks in most cases of hypertrophic arthritis, using weekly injections in alternate buttocks. Series of six to eight injections, with an intervening rest period of three weeks before resumption, is advised. The hematinic action of arsenic is obtained here, but far more interesting is the muscle-spasm-relaxing action of the injection. It is the common thing in practice to see patients, who prior to treatment were completely stiffened, return after one or two injections greatly relieved and executing movements and maneuvers that heretofore were not only extremely difficult but often impossible. As many of these patients are elderly persons, rest should be judiciously prescribed.

The atrophic cases are benefited by this same treatment, with the exception that a lesser degree of muscle-spasm-relaxation is obtained. A dietary excess of vitamins and minerals, plus irradiated ergosterol or cod liver oil orally, with the addition of ultraviolet light, is also very important in atrophic arthritis.

The infectious types are benefited by bed rest, use of salicylates and iodides early, mono-iodo-cinchophen later, physiotherapy, preventive orthopedics and the concomitant use of foreign or non-specific therapy. The best vaccine is the usual stock typhoid. Many other types are known, including autogenous, but their use is unnecessary as the same result can be obtained without them. The curative ef-

fect seems to be a matter of protein stimulation and not of specificity. We, however, must withhold dogmatic assertion until the biological results of vaccines and serums from specific blood cultures—such as have recently been reported—are seen. Unless the patient is bedridden, the intravenous route of injection is not used, but the simpler subcutaneous one is chosen. Thus chill and high temperature are not obtained, but the reaction is low-grade and continuous. In using the vaccine one should begin with 100,000,000 killed bacteria and increase by that amount—giving injections bi-weekly or weekly—until a total of ten doses or 1,000,000,000 killed bacteria have been given. A rest period of two weeks should follow before repeating this treatment. It is not necessary to use large amounts of vaccine and it appears that steadily increasing, minimal doses, gives the best results.

Miller⁽⁴¹⁾ reports excellent results in the treatment of acute infectious arthritis after using typhoid vaccine intravenously. A few cases of chronic atrophic arthritis were also benefited. These cases, of course, were confined to bed. It would be rash practice to give intravenous injections to office or clinic patients without providing for care during the period of chill.

The subcutaneous method has also produced spectacular cures in early cases of infectious arthritis, but its results, though excellent, are delayed in the more chronic cases.

The author is experimenting with a new form of protein injection—a metaprotein—which is an extract from the angiospermous group of plants and so modified by the addition of minerals and other substances as to closely resemble cell phytoplasm. Although no definite report can be made as yet, we have experienced results just as effective as with the nonspecific vaccine, and, in addition, have noted a roborant action.

Vaccines are used in cases of atrophic and hypertrophic arthritis only from a psychotherapeutic standpoint, and it is surprising how well psychotherapy helps in certain cases. The physician who fails to avail himself of every psychotherapeutic opportunity, does both patient and self an injustice.

Neurosurgery

Attention should be called to the subject of neurosurgery as a treatment for arthritis. Rowntree, Adson and Hench⁽⁴²⁾ have reported brilliant results from cervical and lumbar

sympathetic ganglionectomy and ramisection in cases of advanced chronic infectious arthritis. These cases were all well advanced and the operation resorted to only after all other curative measures had failed. They reported fifteen cases. Coughlin⁽⁴³⁾ has reported similar success in a series of twelve cases.

This form of therapy opens up a new, though necessarily restricted field, for these cases must be, first, inactive; second, the symptoms must justify the radical procedure, and last, the operation must be performed by a skilled neurosurgeon only after the gamut of treatment has been run. The future years will give proof of the efficacy of this particular form of treatment.

Comment

In conclusion and review we have noted the historical importance of arthritis, its incidence and growing economic importance. We have seen the latter emphasized by the fact that in Great Britain, alone, in 1927, approximately \$20,000,000 were paid in insurance benefits to arthritics.⁽⁴⁴⁾ Interest in the problem has been evidenced by the recent erection in Sweden of four arthritic hospitals. A classification possessing prognostic value has been presented. We have noted that improvement in hygiene by mobilizing systemic forces, was a start in the right direction toward combating the disease. We have emphasized the part played by focal infection, indications for its removal and the necessity of relying on factors other than the x-ray alone. Next we have noted the opinions regarding the field in which arthritis should rest, the importance of close cooperation between internist, orthopedist, physiotherapist and other specialists. While anticipating the possibilities of the future treatment of arthritis, we concerned ourselves with the problem of present-day treatment. We have delineated the parts played by the cooperating units and have emphasized the need for prompt treatment in order to prevent deformities, without which we would not be concerned with this problem. We have listed the physiotherapeutic measures which have proved their value and have introduced a means to lighten the financial burden of the unfortunate patient, while improving his treatment. An effective medicinal regime has been outlined and several important works on our subject have been suggested for study. We have emphasized the extreme importance of gaining the patient's absolute confidence if we

were even to attempt treatment, for as Galen aptly said, "he cures most in whom most have confidence."

Finally, having faith in our own methods and exacting faith from our patients, we can look forward to an increase in our knowledge of arthritis and to an eventual solution of this dreaded malady.

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Discussion

DR. L. S. BROOKHART (Cleveland, Ohio): First of all I want to congratulate Dr. Fahlstrom on the scholarly manner in which he has handled this extremely intricate subject. No essayist could possibly cover all of the facts of a subject so vast and complicated as arthritis without including personal experiences or even prejudices. The topic has been handled in such a masterly, impersonal manner that it remains for me only to offer a few comments. I am wholly in sympathy with the author's management of these cases. Nevertheless, his paper reminds me a bit of a road map that looks so nice and smooth on inspection, but which turns out rough on traveling.

Arthritis is such a large economic problem that it seems to me that any organization which is associated to deal with the question must feel itself obligated to educate the public to a realization of its economic importance. Their educational forces should be directed against the apparent indifference of society and to teach cooperation in order to prevent the crippling effect of this disease.

For instance, there is the indifference about growing pains in children. You know that even nowadays you hear mothers and fathers say that the child has growing pains, and they just pass it over lightly. That child may be at the cross-road of developing a condition that will eventually make a cripple of him.

There is the insidious type of chronic nasopharyngeal infection and the group of gastro-intestinal disorders. All of that should be brought to the public's attention through such organizations as Dr. Fahlstrom has mentioned. Then, too, watchfulness on the part of the physician with children, careful history taking, will sometimes show that many of the onsets of our chronic arthritides began in very early childhood.

Thus it seems to me that when we are thinking in terms of prevention we can use many examples in the education of the public by showing them that these ailments began years and years before they really knew anything about it.

A rather rough place in the road that Dr. Fahlstrom went over so smoothly was this subject of hygiene, and I particularly have in mind the neurotic type of patient that is shunted about from one doctor's office to another until finally he ends up in the hands of the charlatan. We must pay better attention to that type of person. In many cases the doctor allows the neurotic element of the patient to overshadow the real trouble. The doctor frequently loses sight of the basic trouble and diagnoses the condition as one of those difficulties often found in neurotics.

Proper clothing was also mentioned as a part of hygienic management. Well, now, what is proper clothing? There are many opinions about clothing which an organization for the study of arthritis might well have data upon. The matter of clothing seems to me nowadays to fall into two great classes: those who wear too much and those who do not wear enough. There is some middle ground that probably is the correct one and there is a need for more information in this direction.

I want to dwell a moment on what Dr. Fahl-

strom said about focal infection. I feel that we should have a better appreciation of the importance of infections that are latent in nature and their influence on arthritis. It happens often that the exciting cause may have been thoroughly eliminated, either spontaneously or by treatment, and at a later date the latent and hidden effect of this earlier infection may blossom out as a real arthritis. Therefore in our search for focal infection, as we analyze the possibilities and as we sometimes fail to find any, it becomes quite reasonable to assume that a focus of infection did exist at one time and probably doesn't exist now.

I want to say a word about treatment in the acute inflammatory arthritis and the use of diathermy. In the acute state diathermy will often increase the pain. This is an experience commented on by many authorities and has been verified in my own practice. In this type of infection I recommend infra-red or radiant light or medicinal counter-irritants or hydrotherapy. Diathermy is, however, well tolerated in the chronic and sub-acute types and especially in the gonorrhoeal conditions. The method recommended by Cumberbatch appeals to me to be the most rational, i. e., treatment of both the focal point and the metastatic involvement where gonorrhoea is the cause of infection.

In regard to salicylates and iodides, I believe that there is a larger field for its use than mentioned by the doctor. One can use the combined administration of salicylates and iodides even earlier than the acute inflammatory stage or the acute onset of arthritis with good effect. There are many cases which give us a hint that an arthritis will eventually develop, such as tenderness along nerve trunks, muscle spasms, and indications of myositis. With the use of salicylates and iodides given intravenously in those earlier cases, before actual joint dysfunction has occurred, we can often arrest a severe state of arthritis.

The nature of the clinical benefits derived from vaccine therapy is still a mystery. Whether its main effect is due to physiologic "shock" or the rise in fever is still a debatable question. If its main effect is dependent upon the stimulation of general temperature, one can improve upon this method by use of general diathermy because of its better control under most circumstances. Personally, I think it is reasonable to assume that the protein effect comes from a rise of temperature, and in some of my cases in the clinic we have been producing temperature by means of diathermy. This is only in a very early stage of experiment and I am not reporting it as conclusive progress, but we may have some definite information in the near future. I believe it is important in the treatment of arthritis to work along the line of producing a protein reaction, and if we can obtain a protein reaction without the injection of vaccines it will obviate some of the rather distressing symptoms associated with vaccine therapy.

Dr. J. C. ELSON (Madison, Wisconsin): I think we will all agree that this subject is one of the most perplexing and baffling ones with which we have to deal. I sometimes wonder whether we really know very much more about arthritis than the ancient people who lived several thousand

years ago. We know, certainly, that the disease existed among the ancients because the x-rays of mummies recently unearthed show degenerative changes present in the joints of these people. From the beginning of time people have had what the ancients called rheumatism. They called it rheumatism because "rheum" was one of those supposedly mysterious fluids that circulated in the body. We still hold to that term because of want of better understanding.

At any rate, I think we all agree that arthritis is not a disease so much in itself as it is a whole train of diseases. It is an infectious process, we agree, that manifests itself in a great many different ways—very baffling ways. We speak very glibly of these infections. We speak of the infected teeth and tonsils and most of the internal glands of the body and everything else, and yet we know that we can't locate this very definite infection. Sometimes we find that the patient hasn't any arthritis at all, and we know the trouble isn't an infection of the teeth. We are positive that certain infectious processes of the teeth seem to bring about this particular process, and yet we know, on the other hand, that people with definitely decayed teeth haven't had it and probably never will have it.

What is the reason? I don't think anybody knows. The whole theory of exposure to cold and resistance is coming to have renewed attention because of the fact that a disturbance in the person's circulation, especially, seems to predispose one to rheumatic conditions.

All of you perhaps know of the important experiments of immersing the hind quarters of rabbits in ice water. Such experiment was performed not long ago. I think 160 rabbits were immersed in ice water for variable periods with certain controls. Those rabbits were injected with certain streptococcal serums. After that was done all of the rabbits that had been submerged in ice water developed arthritic symptoms, every one of them and none of the controls. I suppose that lowered resistance played a part of more than passing importance.

Pemberton I think stresses the desirability of peripheral circulation. Heat in some form should be thought of. Some writers disagree altogether with the classification of climacteric or menopausal attrition, saying there is no such thing, and when arthritis does occur at this particular age, perhaps, it is due to some other modality changes that are likely to occur at this age.

I want to stress the application of hydrotherapy because we find it a very potent agent and of some value in certain rheumatic conditions. And not only that when generally applied, but when drinking of liberal quantities of water. I believe that is one of the deficiencies that is sure to occur in a great many cases. Arthritic individuals perhaps from their enforced inactivity have very little appetite, as a rule, and consequently little thirst, and yet it is very essential that they take liberal quantities of water. I think we should insist that the patient gets at least that.

Rest, of course, is necessary in the acute stages. I want to say that I think exercise is very essential

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in order that certain contractures and atrophy may not occur. I believe that the rheumatic individuals who "carry on" should do so as much as possible. It seems to me that some individuals who develop arthritis determine to give up all forms of activity and decide to sit in the corner ever after. They never will get any better.

Manipulation and stimulation of muscles around the affected joint is often of value. Either galvanic or faradic currents have a very definite place, I believe, for stimulation of flabby muscles.

I want to partially disagree with the essayist in regard to the use of diathermy. I agree with him that diathermy should not be given in acute stages of arthritic disease. I believe we all agree on that. In many cases treated in our clinic we have found that when the conditions were sub-acute and chronic, diathermy produced remarkable results in certain instances. Some cases, however, did not seem to be improved by diathermy, yet there were others which were very greatly benefited. It therefore behooves us to search and differentiate the types so variably effected.

General ultraviolet radiation should be more often exploited in the chronic types of arthritis than heretofore. I believe that the action of ultraviolet and heat rays, because of their stimulating effect on the endocrines and other metabolic processes, are desirable adjuvants. The benefits of these rays have long been appreciated and should not be neglected. They are perhaps nature's best remedies, and fortunately, we have at our disposal artificial agents that can take the place of sunshine that is absent in certain seasons and permits the treatment of those that cannot afford to visit southern winter resorts because of economic distress or other reasons.

The value of massage is unquestioned. Pemberton, I think, stresses this very largely. Even in the rather acute cases he recommends massage, not generally over the joint but in the vicinity of the joint. Because of its stimulating effect on circulation and its pain-relieving effect, massage certainly seems to us who are practicing these agencies in physiotherapy as one of the most beneficial methods.

Dr. Roy W. Fouts (Omaha, Nebraska): There are one or two points which have impressed themselves upon me during my experience in the treatment of arthritis. One is the matter of focal infection and particularly that related to extraction of teeth. From my experience I have become almost a crank, you might say, on the extraction, particularly, of devitalized teeth. I have had quite a few experiences in which some cases showed evidences by the x-ray and in which the dentist could or could not find devitalized teeth. Sometimes the teeth had appearances that looked suspicious to the dentist but the x-ray brought out very little of a confirmatory nature. I have come to the conclusion based on a larger experience that when teeth are devitalized and the patient has arthritis, we are justified in having those teeth extracted. I have seen quite a few cases clear up or the conditions improved by extraction of teeth, and, of course, I have seen plenty of cases where it was of no value.

In regard to diet, I think it is of some help. I think the high protein diets, especially meats, might tend to bring about an excess of uric acid, and al-

low the excessive manufacture of uric acid crystals. I think that a rational diet made up of plenty of fluids and fruits, and low in protein is of value in some cases. However, the problem of diet is merely one of the many factors that must be studied and individualized to the special need of the particular case under observation.

When thought is given to the uses of ultraviolet radiation one should remember that ignorant or careless treatment will frequently have an exhausting and deleterious effect. The physician should realize that he is using an agent whose power for harm is as great as its power for good. The patient should not be permitted to supervise his own treatment, and I support the attitude of the essayist in stressing the point that these patients with the intricacy of their complaints should always be under the constant supervision of a regular physician who is particularly interested in the problem of arthritis.

Dr. Walter P. Grimes (Kansas City, Missouri): I agree with the rest of the speakers that we know very little as yet about arthritis, especially when we begin to hunt the microorganism that provokes it. Our difficulties are as great if not more provoking in the treatment of this disease.

I think it was Barber and Armstrong in the Yearbook of 1926-1927 that reported studies of 245 cases of arthritis deformans in which 235 of them were found to have associated definite intestinal difficulties; that is, about 96 per cent. In the examination of these patients, it was found that most of them had their teeth extracted and their tonsils removed. It made no appreciable difference in the course of the disease. Only one or two said they had been benefited by it. It is therefore apparent that the treatment of arthritis is by no means an easy task even under the best of conditions. It is my impression that the weakest part in the chain of our therapy is that of diet of these patients. The average physician seems to have a very faint appreciation of its value and hence it is the most neglected part of our treatment. The colon as a source of infection has come in for greater emphasis in recent years. In the orthopedic service of Professor Osgood of Harvard, the guilty colon comes in for vigorous treatment. Cases so treated have made a favorable response in contrast to the more sluggish recoveries with other forms of treatment. At the present time we know of no specific treatment for arthritis. It is in the intelligent combination of all known measures that will give us the best results.

Dr. Stanley Fahlstrom (Chicago, Illinois): Arthritis is such a huge subject that one can hardly cover even the outstanding facts in the short period allotted to its discussion. I fully appreciate the shortcomings of my paper and hence appreciate your courtesy and liberal discussion all the more.

I like to look at arthritis in the same way as Dr. John B. Murphy once described gall bladders. He spoke of it as the hub, the spokes and the rim, every variation making a continuous connection. The ramifications of this disease, Arthritis, is so far-reaching that we must view it as an ensemble of many symptoms—symptoms that are at times apparently not related; and yet the relationship becomes apparent on closer study.

There are so many variations to this disease that it has to be studied from every individual viewpoint and from every single country. The time has come for a common understanding of the basic facts regarding this disease. Since it is endemic and is not limited to any particular country, there should be a common agreement on the essential nature of the disease and a report of the most favorable methods of treatment employed in various countries. I believe that this is actually the attitude adopted by representative bodies studying the question of arthritis.

In the matter of focal infection I am reminded

of a statement made by Baer of Johns Hopkins, who said that the streptococcus was so commonly found in arthritis that he developed a formula that x plus streptococcus equals rheumatism. Without x there is no rheumatism, because numerous persons have had streptococci but no rheumatism. Unfortunately, the x quantity in arthritis still remains an unsolved mystery. In conclusion I should like to say that all our viewpoints on arthritis must not be radical; they must be conservative, and each one of us must use his quota of common sense in the management of this disease.

GLEANINGS FROM SCIENCE*

Carotin, the stuff that makes some foods yellow, is important for nutrition as well as the green chlorophyll, because vitamin A is associated with this color in vegetables, butter, and egg yolk, it was discovered by S. M. Hauge and J. F. Trost of the Purdue University Agricultural Experiment Station.

The theory that cosmic rays consist of high-velocity particles, like tiny bullets, was supported by experiments conducted by Dr. L. F. Curtis of the U. S. Bureau of Standards in which he used two electrons counters.

The final value for the most accurate measurement ever made of the constant of gravitation was announced after seven years' work by Dr. Paul Heyl, physicist of the U. S. Bureau of Standards, to be the fraction 6.670 over 100,000,000.

A new instrument, a modification of the interferometer, was devised by Prof. K. W. Meissner of Frankfort, Germany, making it possible for the first time to see a plant grow.

The method by which the diameters of stars have been measured through the interference of light waves was applied to the extremely accurate measurement of terrestrial distances in an instrument developed by Stuart H. Chamberlain of Michigan State College.

* *Science News Letter* (Dec. 27), 1930.

The theory that cosmic rays are not rays at all but high velocity particles was advanced by two German physicists, Dr. Walter Bothe of Berlin and Dr. Werner Kolhoerster of Potsdam, as a result of experiments they have conducted with a specially built adaptation of the electron counter, but researches of Dr. R. A. Millikan on the intensity of cosmic rays near the north magnetic pole, provide evidence against the theory.

Dr. Ernest O. Lawrence of the University of California, with his associate, Dr. N. E. Edlefsen, devised a method for increasing the speed and energy of the protons or hearts of hydrogen atoms so that it may be possible when the method is further perfected to use them as atomic projectiles for smashing the hearts of other atoms, transmuting them into other substances or releasing enormous quantities of atomic energy.

A new type of clock controlled electrically by a vibrating crystal, thus dispensing with a pendulum, has been developed under the direction of Dr. W. A. Marrison, of the Bell Telephone Laboratories.

A method of taking photomicrographs by long wave ultraviolet light through an ordinary glass lens, was discovered by Dr. A. P. H. Trivelli, of the Eastman Kodak Co., and Leon V. Foster, of the Bausch and Lomb Optical Co.

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ARCHIVES of PHYSICAL THERAPY, X-RAY, RADIUM

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EDITORIALS

CORRECTION OF SPINAL CURVATURES AND FLAT FEET

Faulty posture is a common, neglected condition which is frequently overlooked by the general practitioner. Lateral and antero-posterior curvatures of the body are intimately related to general health. Since the organs in the trunk are attached to the spinal column, it is obvious that functional poor posture has an important influence on the general state of health. By far the larger group of poor posture is associated with the variation in the antero-posterior plane. Functional variation in the foregoing position influences, for example, the post-cervical muscle group which tends to produce forward drooping of the head, consequent fatigue, eye strain and interference of vision. When the shoulder muscles—the retractors—become too long and the pectoral group short, a condition recognized as *kyphosis* ensues. This has an untoward effect on the organs in the thoracic cavity. Respiratory and cardiac symptoms frequently are the result of such a functional variation.

When the lumbar muscles become shortened and the abdominal muscles elongated, a condition known as *lordosis* results. Vague symptoms of pain, dragging, heaviness and indigestion may be associated with this condition, due to the tendency of the viscera to slip down and become ptotic. The patient usually shows signs of a lowered body resistance. The effect is often communicated to the pelvic viscera and may result in painful menstrual cycles. Disturbances in the male sex function is also known to occur.

Pronation, or flat feet, has often been caused by poor posture associated with deviation from the normal antero-posterior plane. When the center of gravity has been shifted from the normal mid-plane, the body rests on the heels and accentuates all of the normal curves of the spine as a defense to abnormal posture. We find here the lumbar curve more pronounced, the abdominal wall more prominent, the chest more sunken and narrow, and the head assumes a forward drooping position. The feet gradually become fatigued due

to hyperextension of the knees to shifting of the center of gravity toward the heels and to the loss of tone of the supporting muscles.

The complexity of human ailments is probably better appreciated today because of our greater wealth of information and of more facile methods in diagnoses. Our therapy has made parallel progress and, as a result, humanity has been better able to combat its variations in health than ever before in the history of mankind. Unfortunately, the strides in modern therapeutics have been so rapid that the practitioner has not often been able to keep pace with it, and he has frequently lost sight of his perspective because of the detail in front of him. It is perhaps because of this that differences still exist in regard to our conception of what is best for the patient. Our therapy has become more involved and the patient has become the shuttle upon which medical opinion has played with intermittent success.

Our attitude toward that large group of functional disturbances designated as poor posture is a case in point. The average practitioner usually views poor functional posture with an apathy due to lack of appreciation of its seriousness. His therapeutic resourcefulness is here usually at a low ebb because of a faulty orientation in the methods most useful in the control of these disturbances. Poor postural conditions are, therefore, either dismissed from our responsibilities by advice that is frankly useless when carried out, or the patient is vaguely admonished to correct the condition by voluntary effort. Failure is usually the result because no constructive progress can be expected from such procedure.

A better understanding of this neglected field is important. Our responsibility toward these patients cannot be dismissed by indifference, ignorance or substitution methods. Treatment in the form of specific therapeutic exercise is the only corrective measure that has proven beneficial in these conditions. In spite of its recognized usefulness, it is probably the least understood form of therapy in modern medicine. Like massage, manipulation and hydrotherapeutic measures it has been replaced by newer methods whose spectacular qualities were more intriguing to our imagination.

In a paper published elsewhere in this issue,

McCurdy* has emphasized the specific value of "Short Static Contractions as a Method of Corrective Exercise" for functional poor postures in the antero-posterior plane. This contribution has the authoritative background of a student who has devoted the most active period of a full life to the exposition of this specialized subject. It is timely and stimulating. McCurdy offers the short static contraction formula as the most rational measure for the relief of this large and neglected group of patients. It is a special form of therapeutic or corrective exercise which stresses the ability of educational gymnastics to invoke short, voluntary contractions. The purpose of these exercises is to strengthen and re-educate certain groups of muscles and to maintain good posture by a balancing of the relative lengths of the opposing groups. Modern civilization with its complexities, stresses and artificialities is daily increasing the large number of these patients. McCurdy's method of controlling these postural disturbances is a rational advance in the right direction.

MEDICAL DIATHERMY IN OTOLARYNGOLOGY

There is definite need at the present time for a scientific evaluation of medical diathermy in diseases of the nose, throat and ear. The articles which have appeared in recent years and the vague consideration which this subject has been accorded in some of the newer books emphasize this need all the more.

It is true that improved methods have been suggested, and that good results are constantly being achieved with medical diathermy in a variety of nose, throat and ear affections. Yet, in spite of this, general acceptance of this agent as a therapeutic aid has been slow because sufficient, accurate, scientific data is not available. Nor have the indications been well defined. Many of the investigations which have been performed are clinical in nature. The basis for the use of the therapy has in all but a few instances been ascribed to empiricism.

While the clinician is content to accept experience and good results as a basis for the application of a certain method, the skeptic and the uninformed continue to observe with an air of doubt. The more scientific workers

* McCurdy, James H. "Short Static Contractions as a Method of Corrective Exercise." *Arch. Phy. Ther. X-Ray and Rad.*, Vol. 12 (Feb.) 1931.

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require a comprehensive explanation and demonstration of physiologic effects and are unwilling to add any therapeutic aids in their practice until their value has been thoroughly proved. The modern otolaryngologist is well satisfied with the accomplishment of surgical diathermy. In it he sees a means by which pathologic tissues can be destroyed or removed *en masse*. He recognizes the properties of this agent particularly because of the scientific explanations which have been advanced in favor of it. But not so for medical diathermy.

Are we to say that the chief reasons for this unsettled state are due to the failure of intensive research in the field of otolaryngology, or is the reason more specifically the limited knowledge which we possess of diathermy as a physical agent? It is difficult to answer satisfactorily. The fault is probably in both. But, assuming that our knowledge of medical diathermy is limited, certain physiologic effects are known to occur. If these be borne in mind by earnest workers, convincing data should now be available to overcome the prejudices of those specialists who are unwilling to delve into the problem themselves but await the achievements of others.

Diathermy, correctly applied in selected cases, is analgesic. It is a means of deep heating. The transformation of electrical energy into heat always occurs when a current flows in a conductor. Joule's law teaches that (1), the heat produced is proportional to the square of the current strength; (2) the heat produced is proportional to the resistance; and that (3) the heat produced is proportional to the time for which the current flows. The practical uses which are made of this heating effect are many. The clinical uses of medical diathermy have this law as a working basis.

When one considers too, that erroneous comparisons are frequently made of the heating properties of diathermy, one must conclude that ignorance rather than correct information on the subject is the rule. This is not the place to discuss the history of high frequency currents nor those responsible for demonstrating their therapeutic value. Suffice it to say that machines for *heating through* tissues were available as far back as 1907. It was from this *heating through* action that the term *diathermy* has come into medical usage.

It was recognized that heat was generated in the tissues, that the effect was not superficial, and that in this way it differs from all other methods of heat application for surface effects.

There is evidence to substantiate the work of early investigators who attempted to show the effects of diathermy as a means of deep heating of tissues. That there is some other action other than heat is at present controversial. The effect of heat on inflammation is well established. It, therefore, should be an ideal method for dealing with chronic inflammation and congestion. The added effect of increased blood and lymph flow with the consequent absorption of the products of inflammation must of necessity aid in the reparative process.

With mention of these properties of medical diathermy one must appreciate the possibilities with its clinical application in properly diagnosed and selected conditions. There is every reasonable belief that a field exists in otolaryngology for physical therapy, and in particular, for diathermy. The work already done by the pioneers, while not adequate or completed, should serve as a good inspiration for those who wish to continue the work in this field. Apparatus has been improved, technicians have been trained, but more important, the specialist has become interested. He is seeking more and more information. The situation is now ideal for further progress. The soil is fertile for every form of laboratory and clinical research.

The purpose of this writing is to stimulate renewed interest in the use of medical diathermy in ear, nose and throat diseases. Another purpose is the suggestion that accurate data be maintained, so that adequate evidence, either positive or negative, can be submitted at the completion of some particular problem of research. This is just as important in the clinic as in the laboratory. With a systematic plan of operation, the accomplishments will speak for themselves. It will not be long before we will be able to sieve the wheat from the chaff—in a word, to know the rational uses of medical diathermy in the specialty of otolaryngology.

PHYSICAL MEASURES IN THE TREATMENT OF HEMORRHOIDS

The modern treatment of hemorrhoids is a subject which has attracted the attention of physicians not alone because of attempts to simplify technical procedures, but in particular, to show a regard for the time which patients are required to spend in hospitalization for a comparatively minor ailment. The tendency is to lean to methods which offer good results without breaking into the daily routine of patients. In other words, an effort is being made to arrive at a treatment which obviates unusual preparations, general anesthesia, and a prolonged stay in the hospital.

Of the older procedures, surgery is, of course, the one which has been depended upon. Excision is still being employed, and will continue to be, for there is always a certain class of cases which cannot be cared for adequately in any other way. The galvano-cautery is popular with the older surgeons. It has been discarded by others because it requires all the care and detail of surgery and bed confinement. Recently, the injection method has met with some favor, and rightly so, because in some hands it has given very satisfactory results. In general, however, when one analyzes the results of the more recent therapeutic methods, one is led to believe that physical measures have contributed in no small way to the modern management of hemorrhoids.

Attention has been directed to the use of medical diathermy in the treatment of hemorrhoids. Kobak,⁽¹⁾ in a recent paper on this subject, points out that the advantages of medical diathermy in certain selected forms of internal hemorrhoids have been repeatedly demonstrated. "Experience in a comparatively large series of cases has been in accord with that of other workers. While it is appreciated that surgery must be frequently resorted to, careful selection of cases for treatment with medical diathermy will often avert or defer surgical interference." Thus a non-surgical plan of treatment is advanced. A sufficiently large number of patients has been treated and the results observed over a period

1. Kobak, Disraeli. Medical Diathermy in the Treatment of Hemorrhoids. *Arch. Phy. Ther., X-Ray, Rad.*, Vol. XI, No. 12. (Dec.) 1930.

2. Warsaw, David. Electrothermic Hemorrhoidectomy. *The Amer. Jr. Surgery*, Vol. XI, No. 1. (Jan.) 1931.

of time to attest to the merits of this newer therapy.

Electrosurgical destruction of hemorrhoids has been adopted as a routine plan of treatment by many surgeons. Numerous advantages are cited which tend to show the superiority of electrothermic hemorrhoidectomy over other procedures, medical and surgical. Warsaw⁽²⁾ reviews the subject at length and illustrates the technic in detail. This worker has operated over 200 cases in this manner and claims that under suitable circumstances, it may be performed in the office. There is no loss of blood, no complications and no recurrences. Convalescence is shorter and more comfortable and the total disability rarely exceeds four days.

It is quite obvious that the modern surgeon recognizes the value of physical measures in the treatment of hemorrhoids. On the one side the medical treatment is evaluated and its indications clearly defined. On the other, the electrosurgical technic is detailed and its advantages enumerated. Both of these methods are rational, and only the experience of the surgeon can determine the specific advantages of one over the other. Both represent a therapeutic advance based on modern scientific clinical investigation.

CORRECTION

TENTH ANNUAL SCIENTIFIC SESSION

Through an error, the dates of the tenth annual scientific session which will be held at Omaha this year, were announced as of the week of October 12th. The session will be held during the week of October 5th and the dates should read, October 5, 6, 7 and 8.

Unusual preparations are being made for the clinical side of the program. The clinics will consume more than half the time of the sectional meetings.

Some time ago a request was made of the fellows who desire to take an active part in the program to send in the titles of their papers and short abstracts. This request is made again as the program is now well on the way to completion. Correspondence should be addressed to the Chairman, Convention Committee, Suite 716, 30 North Michigan Avenue, Chicago. The Omaha Chairman is Dr. A. F. Tyler and he will be assisted by several of the leading physicians of his city.



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PHYSICAL THERAPY CLINICS

PHYSICAL MEASURES IN DISEASES OF THE EYE, EAR, NOSE, AND THROAT *

F. L. WAHRER, M.D.
MARSHALLTOWN, IOWA

Physical agents are of definite value in many diseases of the eye, ear, nose and throat. It is my purpose in this clinic to discuss some of the more pronounced indications which have responded favorably to such agents as light, heat and electricity. The eye does not lend itself to physical therapy as readily as the ear, nose and throat. In general, however, the experience of the clinician will govern the case at hand and will at once determine whether physical methods should be employed exclusively or as adjuvants to other accepted procedures.

Eye Affections

Radiant heat is indicated in inflammatory processes of the eye, and is a valuable therapeutic aid. Conjunctivitis, both acute and chronic responds favorably when radiant heat is used. As a supplement to other treatment methods, it hastens the curative result. Following iridectomy and cataract extraction, radiant heat reduces inflammation and relieves pain. Good effects have been reported on the use of radiant heat-light in inflammatory glaucoma, and, in fact this method has been heralded as a nonsurgical treatment of considerable merit.

It is in the treatment of corneal ulcer that physical agents have shown to best advantage in eye diseases. Ultraviolet, applied for from thirty seconds to one minute and followed by radiant heat for twenty to thirty minutes has given encouraging results. The reports of some ophthalmologists suggest that ultraviolet is one of the best advances in the modern therapy of corneal ulcers. Its superiority to the thermophore is questioned by some, but this can only be proved by extensive work in this field. Those of you who are interested are referred to the work of Birch-Hirschfeld.

Furniss, Nugent and others who have contributed to the literature on this important subject.

Diseases of the Ear

There are several indications in otologic diseases for which physical agents act as valuable therapeutic aids. The reports of American and foreign otologists are encouraging for those workers who are attempting to evaluate physical therapy in this field.

Acute Purulent Otitis Media

In the treatment of acute purulent otitis media, radiant heat, or infra-red and suction are the physical agents upon which we depend for results. The suction is used to facilitate drainage and to keep the middle ear free of pus. The heat, applied for twenty minutes to one hour, has a marked phagocytic and germicidal action, and is markedly analgesic. I wish to warn against the use of heavy or prolonged suction. Suction should always be used very gently for obvious reasons.

The following is the history of a case of acute mastoiditis following scarlet fever:

R. V., aged 19 months. Scarlet fever for past two weeks. Right ear began to discharge six days ago. Examination shows child very thin and emaciated. Both canals filled with thick pus. Mastoid tenderness and swelling present to a marked degree. Temperature, 105.6. Pulse, 130. Diagnosis of double acute mastoiditis confirmed by x-ray. Treatment was started at once, using irrigation, suction, 25 per cent silvol and infra-red every hour. At the end of forty-eight hours, the temperature was 100.4, the pulse 96 and the general condition was markedly improved. At the end of the fourth day the temperature was 100 and the pulse 94. The baby had gained two pounds and the general condition showed improvement. At this time, the right mastoid was opened and drained under gas anesthesia. The cells were extremely soft and necrotic and the operation was completed in less than five minutes. Two days later, the left mastoid was opened and drained in the same manner. The child made an uneventful recovery.

* Clinic conducted at the eighth annual meeting, American Congress of Physical Therapy at Chicago, November 13, 1929.

Comment: The reason this case is brought to your attention is because of the preliminary treatment. I do not believe this child could have survived a mastoid operation when first seen. On the other hand, the routine ear treatment had failed to check the mastoid infection. With the aid of suction and heat, it was possible to postpone surgical intervention until the child's condition was greatly improved.

Chronic Purulent Otitis Media

Chronic purulent otitis media is not always amenable to the classical methods of treatment. Radiant heat, suction, diathermy and zinc ionization as adjuvants to these methods have made it possible to cure a fair percentage of these cases without resorting to radical surgery. Radiant heat and suction accomplish the same purpose in the chronic as in the acute purulent otitis media. Diathermy, in conjunction with radiant heat, has a decided stimulatory effect on the middle ear and produces a heating effect in the middle ear region. Zinc ionization is serviceable in the chronic purulent otitis, uncomplicated with other pathology. The cases must be carefully selected for this therapy.

Miss G. G., age 21. Gives history of both ears discharging most of the time since childhood and worse during past two months. The amount of pus has increased and the right ear has been painful. She has had a bad cold for the past six weeks.

Examination shows a small amount of thick pus in each ear canal. Very little odor. Both drums have moderate sized peripheral perforations. Hearing, watch, right, 12 inches; left, 15 inches. Tuning forks, right C 512 air, 14; bone, 45. Left air, 15; bone 42. Right C 64 air, 5; bone, 28. Left air, 5; Bone, 30. Examination of nose, septum thick and deflected to right, high and posteriorly. Both middle turbinates enlarged and in apposition with septum. Examination of throat shows tonsils contain large crypts filled with liquid pus.

Diagnosis: Acute exacerbation of chronic purulent otitis media. Advised submucous resection, tonsillectomy, and treatment. February 16, 1924, performed submucous resection with removal of one-third of each middle turbinate, and curettment of right anterior ethmoid cells, which were necrotic. February 28, removed tonsils. March 6, started diathermy treatments every fourth day. Suction, 25 per cent silvol, and radiant heat used every second day. April 1, both ears were dry. May 5, examination showed hearing watch, 50 inches. Tuning forks, right C 512 air, 64; bone, 26; C 64 air, 18; bone 12. Left C 512 air, 60; bone, 30; C 64 air, 16; bone, 14. Both ears dry. Perforations very small. Patient dismissed. Examination two years later showed no change in condition.

Comment: Before starting the use of suction and radiant heat on these cases I was successful in clearing up about 20 per cent of them. At present, I am getting clinical cures in about 40 per cent of my cases.

Zinc Ionization

Zinc ionization has given satisfactory results in a selected group of chronic cases. In the absence of cholesteatoma, polypus, and extensive bone destruction, and in the presence of a large central drum opening, the prognosis with zinc ionization is usually good.

Chronic Catarrhal Otitis Media

Chronic catarrhal otitis media which resists available treatment methods is offered further aid by the utilization of physical agents. This is particularly true in those cases in which the hearing is impaired and in which inflations fail to bring about a restoration of the hearing even after due attention to the nose, throat, teeth and the general health. These results are obtained by the use of diathermy. The technic consists in applying the active electrode over the region of the mastoid on the involved ear, and the indifferent electrode over the malar region on the opposite side. The current should be up to tolerance and will vary on different machines from one hundred to four hundred m. a. The duration of a single treatment is about twenty minutes, but this may be prolonged depending on the indications present.

The following cases illustrate the results that can be obtained in chronic catarrhal otitis media.

Miss A. M., aged 49. Gives history of many colds the past few years. Has frequent headaches. Ears feel stopped up most of the time. History of abscess in right ear, ten years ago. No hearing in right ear since then. Post nasal discharge present every morning.

Examination shows both ear drums thickened and retracted. Hearing, watch right, 0 inches; left, 30 inches. Tuning forks, right C 512, air, 4; bone, 60; C 64, air, 0; bone, 18. Left C 512, air, 40; bone, 60; C 64, air, 12; bone, 19. After Politzer, watch, right, 0 inches; left, 40 inches. Examination of nose shows septum thick and deflected to right. Both middle turbinates large and bony, and in apposition with septum. Examination of throat shows tonsils are large with pus in the crypts. The posterior pillars are congested and thick.

Diagnosis: Otitis media, chronic catarrhal. Advised tonsillectomy, submucous resection and diathermy treatments.

September 4, a submucous resection was done and one-half of each middle turbinate was removed. September 10, the tonsils were removed. Diathermy

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treatment to the ears was started September 16. October 4, the hearing with watch was, right, 6 inches; left, 48 inches. Tuning forks, right C 512, air, 3; bone, 60. C 64, air, 0; bone, 16; left C 512, air, 46; bone, 50; C 64, air, 15; bone, 15. November 10, watch, right, 30 inches; left, 50 inches. Tuning forks, right, C 512, air, 40; bone, 36; C 64, air, 10; bone, 14; left, C 512, air, 62; bone, 28; C 64, air, 20; bone, 11. One month later, there was no change in hearing and patient was dismissed. Her hearing was increased in right ear from 0 to 65 per cent and in the left ear from 65 per cent to 100 per cent. Examination three years later showed no change in hearing.

Comment: In this case, I feel that the very favorable result obtained in the right ear was due mostly to the diathermy. Certainly, I never have been able to secure such an extreme improvement in my cases with surgery of the nose and throat in itself. I have in several instances attempted to use surgery alone, but the results were never as satisfactory.

Miss E. M., age 26. Gives history of gradually losing hearing in both ears for the past two years. The left ear has been getting rapidly worse the past two months. Frequent colds and sore throat. Hearing is worse after each sore throat.

Examination shows both ear drums thickened and retracted. Several calcified areas in Shrapnel's membrane, left ear. Rinne test negative, each ear. Tuning forks, right, C 512, air, 20; bone, 60; C 64, air, 6; bone, 34; left, C 512, air, 16; bone, 62; C 64, air, 4; bone, 36. Watch right, 6; left, 4. After Politzer, right, 10; left, 6. Examination of nose negative. Examination of throat shows tonsils badly diseased. Posterior pillars thick and inflamed. Considerable adenoid tissue around opening of each Eustachian tube.

Diagnosis: Otitis media, chronic catarrhal. Advised removal of tonsils and adenoids by diathermy. Tonsils and adenoids were removed August 1, 1927. Started diathermy August 6, 1927, and treatments were continued at three-day intervals. August 16, the hearing with watch was right, 16; left, 12. Tuning forks, right, C 512, air, 38; bone, 40; C 64, air, 10; bone, 30; left, C 512, air, 27; bone, 45; C 64, air, 7; bone, 30. September 15, watch, right, 48; left, 46. Tuning forks, right, C 512, air, 58; bone, 30; C 64, air, 20; bone, 12; left, C 512, air, 58; bone, 30; C 64, air, 18; bone, 14. Normal hearing with this test watch is 45. Patient dismissed at this time. October 15, she returned for examination and showed a slight increase in hearing in each ear. The hearing was increased in the right ear from 12 per cent to 100 per cent and in the left from 8 per cent to 100 per cent.

Comment: This is an extreme example of what diathermy will do after the surgical removal of all nose and throat pathology. While it is granted that surgery plays an important part in the therapeutic régime of a case like this, diathermy is an indispensable aid.

Nerve deafness in the early stages has been treated by diathermy with varying reports of success. In my hands it has been used simply on an experimental basis and thus far I have not been convinced of its value.

Otosclerosis

Otosclerosis has not proved amenable to any treatment by physical agents. In fact, most men feel that the symptoms may be aggravated. I feel that this is one of the few instances in which diathermy is probably contra-indicated as experimental evidence has been disappointing.

Radiant Heat and Diathermy in Nasal Affections

All inflammatory processes of the nasal mucous membrane are benefited by the use of radiant heat and infra-red radiation. Acute colds, sinus infections, and post-operative cases yield more promptly to local heat therapy. Subacute and chronic conditions are better treated by ultraviolet, or ultraviolet in combination with local heat.

The following history shows the benefit of radiant heat.

Miss H. C. Submucous resection at 9 a. m. Nasal splints removed at 4 p. m. Infra-red heat applied for twenty minutes at 6 p. m. The following morning, heat was applied at 8 a. m. and 10 a. m. Patient seen at office at 2 p. m., at which time, she was breathing easily through the right side and partially through the left side. Another infra-red heat treatment was given at this time. The following day, forty-eight hours after the operation, both sides of the nose were open. Before using this method of after-treatment, it usually took from five to seven days before a patient could breathe through the nose following a submucous resection.

Comment: This may seem like a trivial matter, but the inconvenience and discomfort of some of these postoperative cases is quite marked. As I do not believe in active treatment in these cases, aside from carbolated vaseline, the convalescence is sometimes delayed for many days. The use of infra-red promotes a more expeditious recovery.

Diathermy is of benefit in subacute and chronic diseases of the accessory nasal sinuses. Adequate drainage is a prerequisite. In the absence of good drainage there may occur an exacerbation of all symptoms. Radiant heat or infra-red is always used following diathermic application.

Ozena

Ozena is one of the stubborn nasal condi-

tions that we are called upon to treat. It has been refractory to treatment of all kinds. While a cure is not possible physical agents have relieved the symptoms in quite a few cases. The nasal mucous membrane is carefully gone over with a high frequency spark, after which, ultraviolet is used gradually increasing the treatments for rather long periods.

Physical Agents in the Pharynx

The use of physical agents in the pharynx has not developed anything of unusual value with the possible exception of electrocoagulation of the tonsils. Acute tonsillitis is sometimes benefited by ultraviolet applications. Following tonsillectomy, I have found the use of radiant heat or infra-red of considerable benefit for the relief of pain. Electrocoagulation of the tonsils is indicated for the extirpation of tonsils in older adults and in the presence of certain coexisting systemic diseases. This method is not suitable routinely. It is, however, the most valuable contribution to tonsil surgery that has been made in recent years. It should be the method of choice in removing pieces of tonsil resulting from incomplete operations.

Mr. E. K., age 52, merchant. Diagnosis of angina pectoris with lack of compensation. Advised in two large clinics that tonsils were a source of infection and should be removed. He was, however, warned that surgical removal might be dangerous. Several throat specialists verified the diagnosis, but none of them were willing to take the responsibility of performing the operation. Examination shows submerged tonsils containing a large amount of pus and tonsillar debris. Advised removal of tonsils by electro-coagulation. This was done over a period of two months. During this time, the patient did not lose a single day's work or experience any shock or untoward symptoms or reaction of any kind. Although accustomed to having a heart attack about

once a month, it has now been four months since he has had any trouble.

Comment: This patient is now working every day without discomfort or fatigue. It is in this type of case that we find electrocoagulation really worthwhile.

Mr. R., age 74. Diagnosis, chronic arthritis, blood pressure 190. Examination shows large tonsils containing liquid pus. This patient made a thirty-mile trip once a week to have his tonsils removed by electrocoagulation. At no time did he exhibit any symptoms of shock or undue reaction. Three months later he reported his arthritis was practically gone.

Comment: A man of this age with high blood pressure and arthritis would be a very poor risk for any type of surgical procedure. His resistance was low and he was much under weight. I am sure I would not have advised tonsillectomy in this case if I had to do it surgically.

The use of ultraviolet for one minute in acute laryngitis shows fair results, and is of sufficiently proven value to use as routine. Chronic laryngitis, however, shows no benefit from ultraviolet. It does, however, sometimes respond to diathermy, in conjunction with other treatment.

I would like to emphasize the following points:

1. Physical agents should be used only as adjuncts in the treatment of diseases of the ear, nose and throat.
2. Physical measures should be employed only when accepted procedures are inadequate or unsatisfactory in the production of desired results.
3. Chronic catarrhal otitis media gives uniform and consistent results when diathermy is scientifically used over a period of time.
4. Radiant heat and infra-red have the greatest range of usefulness of any of the physical agents.



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QUERIES AND CLINICAL NOTES

Q. What is the rationale of Diathermy in Asthma?

A. Probably the most cogent explanation of the value of diathermy in Asthma has come from the pen of the Russian scientist, Gassul, of Leningrad. This author has rendered a highly interesting report on the successful treatment of severe bronchial asthma by diathermization of the spleen. As a scientific basis for this procedure Gassul points out that in the light of modern research of anaphylaxis, bronchial asthma must be regarded as a syndrome of hypersensitiveness and increased reaction on the part of the respiratory apparatus to varying foreign substances or even to psychic influences. Behind this lies a constitutional toxic idiopathy of the area controlled by the vegetative nervous system. As a general rule so-called asthmagenic substances, such as furs, hair, feathers, dust from plants, cereals, dyes, animal excretions and the like, introduced into the human body through the air, by mouth or parenterally repeated by small doses are directly responsible for the asthmatic attacks. Such anaphylactogenous substances if injected intradermally even in a dilution of 1:100,000 produce a wheal of urticaria in allergic asthmatics. In other cases there exists a multiple hypersensitivity—a polyvalence—of a constitutional character. It is a clinical fact, proven also by experiment, that anaphylaxis and asthma attacks in man (and in animals) show similar phenomena. Modern treatment of asthma is based on this viewpoint. One endeavors to find the anaphylactogen by cutaneous vaccinations, and, if this is impossible, to produce active immunization by serial and progressive vaccinations. Unfortunately this is extremely difficult in most instances.

We know from the contributions of photo-physiologists that in the presence of antigens, antibodies are formed principally in the spleen; we also know that increased flooding of the spleen (active hyperemia) increases this function of the spleen.

The author and his collaborator (Dr. S. Jakowlewa) applied diathermy in sixty cases

of severe asthma. The method of treatment was simple. Dry electrodes were applied to the region of the spleen and behind over the course of the ninth and tenth ribs. The dose averaged between 800 to 2,500 ma per treatment; the time was approximately 30 minutes. About 15 to 30 seances were necessary to produce lasting effects. At first the treatments produced violent asthmatic attacks, and the patient should be warned about this possibility. After a few seances the attacks either grew remarkably lighter in character or ceased completely.

Q. Is Diathermy of value in Bronchopneumonia?

A. The current conception that diathermy is only efficient in the lobar pneumonia type of affection has been dispelled by the recent published report of Pritchard and Tarbell ["The Combined Use of Diathermy and Oxygen in the Treatment of Bronchopneumonia," (*Bull. Battle Creek San. and Hosp. Clinic*, 25:47 (Jan.) 1930)]. These authors state that in the past three years they have studied a series of 211 cases of advanced pneumonia and 114 cases of borderline variety in which diathermy was routinely employed. The more advanced cases also received oxygen administration. The following technic was employed: The instrument was usually a portable type of diathermy, employed at the bedside. Bare, flexible metal electrodes, well moistened, are applied in the antero-posterior position, except in cases of severe pleural pains when the electrodes are attached laterally. For convenience the smaller electrode is usually placed anteriorly and both overlap beyond the affected area. If the disease is in the right side, the electrodes are shaped so as to extend partly over the cardiac region. They found this to give much relief to the patient. In the more severe types they gave treatments as often as every three to four hours, duration 30 minutes. The following deductions were drawn from their experience:

1. Relief from pleuritic pain;
2. Respiratory rate may be lessened;

3. A general soothing and quieting effect is often experienced during the treatment, frequently provoking sleep;

4. Cough may be subdued;

5. Expectoration or mucous may be loosened and the bronchial secretion is cleared, relieving cough and producing rest;

6. Perspiration is induced;

7. Fever in most cases is temporarily lowered;

8. Patient is more comfortable and the pulse more stabilized;

9. Cyanosis is often the first objective sign of the favorable influence of diathermy.

Q. What is the status of the use of diathermy in salpingitis?

A. Diathermy in salpingitis is considered by Foveau de Courmelles (*Jour. de Med.*, Paris, April 4, 1929), in a treatise on this subject. Briefly the essential details are: Diathermy was found to be more effective than were other methods of electric treatment. Two metal electrodes are placed in perfect contact with the skin, the active electrode being applied over the region affected, and the passive electrode held against the back or the side. The period varies from a quarter of an hour to one hour, depending upon the individual case; the author claims to have obtained cures clinically in all the 53 cases he treated exclusively with diathermy. The pain and other symptoms disappeared, and the vaginal discharge became more watery and eventually also disappeared.

Q. What is the experience with X-Ray treatment of microbic diseases of the skin?

A. Higgins [*Brit. M. J.*, 2:1152 (Dec. 21), 1929], reviews this subject at length in a recent article. The effects of x-rays on tissues are stated. Then the general conditions are considered. "The patients in thirty-seven cases of acne were treated by the fractional method of dosage. From three to ten treatments of 0.5 skin unit each were given. The first three consisted of unfiltered rays; the remaining contained a 0.5 mm. of aluminum filter. Of the thirty-seven cases, there was failure in one; indefinite results in four, and cure in the remaining cases. The author states emphatically that the roentgen treatment of acne vulgaris is the method of choice.

"Of thirty-six patients with sycosis treated

with x-rays, ten received single epilating doses, nine of whom were cured, while the average total duration of treatment was two months. Of the remaining twenty-six, fifteen received half skin doses and six one-third skin doses. No filter was used. The author feels that mild stimulation of the infected beard produces marked improvement in the majority of cases.

"Paronychias did not respond well to roentgen therapy, and with furunculosis the author has had no experience. He comments briefly on the effects of Grenz rays and concludes that they will never replace entirely the x-rays as used at the present time."

Q. Is radium of value in the treatment of angiomas?

A. While numerous reports are prevalent in the current literature, the following abstract will give a comprehensive answer to this question. The original article is by J. Nielsen and appeared in the *Ugesk f. Laeger*, 91:795 (Sept. 19), 1929.

"Nielsen's material consisted of 415 angiomas treated at the Copenhagen radium station and examined from one to fifteen years later. Most of the patients were children, 261 under one year. Of the 354 cavernous angiomas, cure was effected in 90 per cent; also in an additional 7 per cent with results more or less compromised by secondary effects, the doses having been stronger than elective. Of the fifty-five telangiectases, four coin-size were cured; of the fifty-one extensive capillary angiomas, improvement was noted in only 40 per cent. The author believes that if the treatment was begun as early as possible (days or weeks) after birth, the results might be improved. In the six venous cirroid angiomas there was improvement in only one. The fundamental principles of the method used are: always suberythematous, elective doses and never new treatment until the effect of the preceding treatment is surely past. The excellent cosmetic results are emphasized. The radiosensitivity of angiomas is greatest at birth. No disturbances of development were observed even in the very young. Except in small and superficial, mainly stationary angiomas, radium therapy must be considered the method of choice in the treatment of angiomas. In plane nevi, radium therapy is only partly successful."



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CURRENT NEWS AND COMMENT

In the *J. A. M. A.* (December 13, 1930), Archer and Peterson call attention to the characteristic roentgen observations present in a high percentage of children with intestinal ascariasis, as shown by a barium cereal meal. These observations are: (1) soon after ingestion, a cylindrical filling defect in the jejunum; (2) later a string-like shadow, representing the barium-filled enteric canal of the parasite. Roentgen evidence is occasionally definite in the absence of ova in the stool.

Mitchell and Nelson (*J. A. M. A.*, December 20, 1930), have collected data indicating that the bone growth of well fed, rapidly growing, active infants is not necessarily symmetrical during the first year of life and fails to conform to the standard conception of non-ricketic bone development. Whether this is due to the absence of a sufficient quantity of vitamin D or to the present conception of the character of ricketic bone changes is a subject for further investigation.

A group of 109 unselected cases of carcinoma of the bladder was studied by Herman L. Kretschmer, Chicago (*Journal A. M. A.*, Dec. 6, 1930). All of the cases were treated with a single agent, namely, surgical diathermy. In seventy cases, or practically two-thirds of the cases seen, the condition was far advanced and the results from the standpoint of cure were highly unsatisfactory and the mortality rate was high. In twenty-three cases seen, relatively early, without much involvement of the bladder wall, the results were unusually good.

The November-December (1930) issue of the *Physiotherapy Review* contains numerous interesting articles by well known contributors. Of special interest is an article by Helen M. Moore on "Where Physiotherapy and Education Meet." It is well worth perusal by those in the physical therapy field.

Aspects of Radium Treatment of Carcinoma

Cheattle reports on cytologic examination of irradiated tissues. There is comparative freedom from the effects of irradiation of the normal epithelium, although it was in the area of 1 cm. round a needle containing 2 mg. of radium for eight days. The irradiations appear to have a specific action on the malignant cells. All the cells were within an area of 1 cm. of the source of radiation. A large proportion of malignant cells are not actually destroyed. Many of the undestroyed cells are so degenerated that they may not recover. There are other malignant cells which may either recover or may never become capable of multiplication, having lost their malignant character. It cannot be said that irradiation increased the number of lymphocytes polymorphonuclears or macrophages in the irradiated area, since precisely similar pictures can be seen in unirradiated squamous epitheliomas of the lip. The type of degeneration induced by irradiation of the malignant cells is an unusual one. Abnormal mitosis has actually occurred during their irradiation.—*J. A. M. A.*, 95:1623 (November), 1930 ab.

Prize Award of the American Association for the Study of Goiter

The American Association for the Study of Goiter again offers an award of three hundred dollars (\$300.00) for the best essay based upon original research work on any phase of goiter presented at their annual meeting in Kansas City, Mo., April 7, 8 and 9, 1931. It is hoped this offer will stimulate valuable research work, especially in regard to the basic cause of goiter.

Competing manuscripts must be in the hands of the Corresponding Secretary, J. R. Yung, M.D., Terre Haute, not later than April 1, 1931, to permit the award committee sufficient time to examine all data. Manuscripts arriving after this date will be held for the next year or returned at the author's request.

The Radiological Review Radium Number
The March, 1931 issue of *The Radiological Review* will be entirely devoted to Radium Therapy, this being the fourth annual "Radium Number." Short original articles on clinical radium therapy that will be of interest to the general profession are solicited. All contributions should be in the hands of the editor not later than February 20, 1931, (P. O. Box No. 152, Quincy, Illinois.)

Pohle and Tenney (*Jour. M. S. M. S.*, July, 1930) write on the present status of radiation therapy in pediatrics and review the subject rather comprehensively. The biophysical principles of radiation are briefly given by way of introduction, and later the clinical aspects are stressed under the following headings: *glands of internal secretion, tuberculosis, blood diseases, skin diseases, and inflammatory conditions.* These include the more important conditions in children amenable to Roentgen or radium therapy. Accurate measurement of the dose and a conservative attitude in the administration of Roentgen rays or radium in children are urged.

Missouri Chemists Refine Radium From Watch Paint

Chemists at the University of Missouri, Columbia, Mo., under supervision of Dr. Herman Schlundt, have started in operation the only known factory in the United States for refining radium from the paint off luminous dials of old watches and clocks. Already several thousands of dollars' worth of the precious element has been recovered in this manner.

Out of several hundred pounds of paint about one-hundredth part of an ounce is radium. At the present market price this element is nearly \$70 a milligram, or almost \$2,000,000 an ounce.

A refining plant for mesothorium, another commonly used radioactive element, was also established by Dr. Schlundt at the University of Missouri and has been in operation several years. Last year between \$25,000 and \$50,000 worth of mesothorium was refined.

By way of comparison it has been pointed out that mesothorium is worth about \$40 a milligram while radium is worth nearly twice that amount. Radium endures thousands of years but its substitute loses one-half its

strength in seven.—(*Science News Letter*, Dec. 27, 1930.)

PHYSICAL THERAPY IN THE MODERN HOSPITAL

The relation of the attending physician to the physical therapy department of the hospital is a problem which has come forth for considerable comment. This is due to the fact that hospitals are now more cognizant of the value of physical therapy departments to their institution, and probably also to the recognition which attending physicians are showing to the use of physical therapy for their patients who are hospitalized. In point, Hibben in the (Sept.) 1930 issue of the ARCHIVES, writes:

"After we have equipped the physical therapy department with an approved personnel, the next step is to obtain the patronage of the doctor. This can be done by employing a physician well known for his work in physical therapy. It would be good publicity to have the local medical society invite him to its regular meetings, which often are held in the hospital, and adjourn at the end of the scientific program to the physical therapy department for clinical demonstration. Many queries will suggest themselves to the members and this will in the end lead to patients being sent for treatment. This will provide an opportunity to demonstrate the value of this special field of therapeutics. It will also give the director the opportunity to come into intimate relationship with the various members of the hospital staff."

A movement is now afoot to have hospital curricula for nurses' training include a definite course of instruction in physical therapy for undergraduate nurses. The unfortunate phase of this very desirable innovation is that very few hospitals have complete departments of physical therapy. A good way to stimulate hospital administrators on the need of a physical therapy section as an integral part of their respective institutions is a universal trend on the part of nurses' organizations that the undergraduate nurse know something about the therapeutics of light, heat and electricity before she receives her diploma of graduation.

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The medical school is now teaching physical therapeutics to their undergraduate students, why not the hospital? It is true that some hospitals are already performing this function. Special lectures and demonstrations are arranged and the nurse is given an opportunity to assist in treatments. The keen interest displayed by nurses in these institutions is in itself inspiring. Furthermore, the nurse who seeks her training as a background for specialization sees in physical therapy an opportunity for a life's work. There is little need to comment on a subject such as this although action would speak louder than words. The movement should be encouraged. The hospital staff physician should lend his influence in this direction.

Good news for the physicians who visit the large cities and desire to witness physical therapy departments in operation is entailed in a directory which is now being compiled by the central office of the Congress. Questionnaires are being sent to all hospitals and teaching institutions and as soon as the data are collected the same will be published in these columns. In the meantime physicians or technicians seeking information are invited to correspond with the Executive Secretary of the American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago. The office is in a position to give out authentic advice on clinics in physical therapy and also on hospitals which do a considerable amount of physical therapy.

The following notes are made from "Physical Therapy and Radiotherapy During 1930," in the (Feb.) 1931, issue of *Medical Times and Long Island Medical Journal*:

"Before the War, physical therapy was not generally accepted by the profession, in fact was frowned upon and those employing these measures were not held in the highest esteem of their fellow practitioners. However, in this connection we must not forget the efforts of the pioneer workers in this field for their discoveries of the fundamental principles and basic facts, that made it possible to perfect its application. The treatment and management of many thousands of War disabilities furnished a vast material for observation and analysis, the result of which gave us many new and sounder views in the use of physical measures, and in many instances broadly observed facts were substituted for narrowly

conceived ideas. The widespread use of physical therapy in government hospitals and clinics, in the rehabilitation of the injured, paved the way to the development of accurate clinical applications of the various physical modalities at our disposal."

The Problem of Venereal Disease

In a survey conducted by the United States Public Health Service and reported by T. Par- ran, Jr.* and L. J. Usilton, they determined in spite of the attention devoted to the problem during the last few years, the incidence is still alarmingly great. Their survey was made in selected communities involving a population of over 17 million, in which there were 20 thousand physicians and 940 clinics. On a basis of a survey over this area they figured there were nearly 650 thousand active cases of syphilis and nearly 500 thousand cases of gonorrhea constantly under medical care in the United States. Their estimate indicates the incidence for gonorrhea is 4.88 for males and 1.78 for females. For syphilis the returns given are 4.77 for males and 3.08 for females. They have determined the peak age group for both diseases is between 20 and 25 years.

It is interesting to note that in the navy the official venereal disease rate is given at 13.23 per cent and in the army 4.97 per cent. Since the rate indicated for the army is but slightly higher than that for the population at large, while that for the navy is nearly three times as great, it is safe to presume that other factors are significant in the latter group. In the second million men drafted during the World War casual clinical examination revealed a venereal incidence rate of 5.67 per cent.

From the standpoint of morbidity it is interesting to note that on a basis of this survey they have considered that the number of non-effective days lost through venereal disease by the general male population between the ages of 15 and 45 would approximate 21 million days per year.

On a basis of the territorial survey they estimated that approximately 31 per cent of the total number of venereal cases now under treatment, are being treated at public expense.

* *Amer. Journ. of Syphilis*, (April), 1930.

THE STUDENT'S LIBRARY

DISEASES OF METABOLISM TREATED AT THE CARLSBAD OF AMERICA. By *William Edward Fitch*, M.D. Cloth. Second Edition. 302 Pp. Bedford, Pa. Bedford Springs Co. 1931.

This is a treatise of medical hydrology and the diseases amenable to it. The chief purpose is to emphasize the advantages of the Bedford Springs resort as a health and recreation center. A large part of the book is given over to a consideration of certain diseases such as gout, obesity, arteriosclerosis, neurasthenia, intestinal states, and others. Attention is directed to the renewed interest in medical hydrology. The author calls the Bedford spa the American Carlsbad and cites the diseases treated there. Practically every branch of resort therapy is discussed including croutotherapy, balneotherapy, dietotherapy, massage, etc.

The subject of *Myofasciitis* is taken up in a separate section in the latter part of the book. This term is defined as an inflammation of the voluntary muscles and fascia at their insertion into the periosteum and the bony structures to which they are attached. "In reality it is a 'toxic myalgia'—an inflammatory reaction of the fibrous supporting tissue to extraneous poison which may be 'bacterial or toxic' absorbed from the colon." In connection with this special section such subjects as medical treatment, mechano-therapy, colonic irrigation, dietotherapy, croutotherapy and balneotherapy are elaborated upon in some detail.

The reaction which follows the one on myofasciitis is entitled, *putrefactive intestinal toxæmia*. After the general consideration, definition, etiology and symptomatology, the treatment is detailed. Here again the importance of dietotherapy, colonic irrigation, croutotherapy and balneotherapy are stressed.

The views expressed in this writing are in many instances supported by authorities. In general, however, the reviewer is somewhat reluctant to acquiesce in all that is stated. A center such as is described is well worth knowing about since occasions arise frequently when certain patients can be referred for beneficial treatment. The renewed interest in medical hydrology and balneotherapy is not at all surprising since the value of these branches of therapy have been underestimated by American physicians. This has been due to a lack of knowledge of the subject. Foreign articles have contained such encouraging reports that we can no longer ignore the fact that spa therapy has a definite place in the management of some chronic diseases.

AFFECTIONS OF THE EYE IN GENERAL PRACTICE. By *R. Lindsay Rea*, B.Sc., M.D., M.Ch., F.R.C.S. Surgeon to Western Ophthalmic Hospital; Ophthalmic Surgeon to West End Hospital for Nervous Diseases; Ophthalmic Surgeon to

London Lock Hospitals; Consulting Ophthalmic Surgeon to Finchley Memorial Hospital and to British Hospital for Mental Disorders and Nervous Diseases. Cloth. Price, \$3.50 net. 155 Pp. With 7 colored plates and 33 other illustrations. Philadelphia. Lea & Febiger. 1930.

The author frankly admits that this is not a text-book on ophthalmology. It is, as its title indicates, merely an effort to help the general practitioner whose ophthalmic training has necessarily been somewhat limited. The various diseases of the eye are systematically considered. In view of the limited number of pages only brief references are made to anatomy and bacteriology. Such diseases as glaucoma and cataract are handled in a practical manner and at once demonstrate a vast experience as the background of the author. It is quite evident that a special interest is manifested in examination of the eye in diseases of the nervous system. A chapter is devoted to this subject.

There is no general practitioner who can afford to entirely disregard some knowledge of the eye and its diseases. The average book dealing with this subject is quite large and detailed serving its purpose more for the specialist than for the doctor who does general practice. This little volume of less than two hundred pages can be read in a comparatively short space of time. It therefore affords an opportunity for a review of ophthalmic diseases for the physician who must keep posted in all the specialties of medicine. While numerous illustrations are utilized, more of them would have added greatly to the descriptions of various conditions. The chapter on refraction is an important one and unfortunately too brief. Few general practitioners have a sufficient knowledge of refraction and refractive errors to advise patients in the correct course to pursue when symptoms are present.

A MANUAL OF DISEASES OF THE NOSE AND THROAT. By *Cornelius G. Coakley*, A.M., M.D., F.A.C.S. Professor of Laryngology and Otology in the College of Physicians and Surgeons, Columbia University; Attending Surgeon, Bellevue Hospital, in Charge of Laryngological and Otological Service; Consulting Laryngologist and Otologist to the Presbyterian Hospital, etc., etc. Seventh edition, revised and enlarged. 672 Pp. Illustrated with 153 engravings and 7 colored plates. \$4.50. Philadelphia. Lea & Febiger. 1930.

When a book on any subject reaches its seventh edition, it would be presumptuous on the part of any reviewer to fine-comb its contents. It is pleasing to read in the preface: "Many additions have been made to outline established advances in Examination, Diagnosis and Treatment. The value of Physical Therapy has been established and such aids

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as it affords in this department have been indicated." In spite of this statement comparatively few references are found pertaining to such physical agents as diathermy, ultraviolet and infra-red. The use of the galvano-cautery is mentioned as of value for various indications. Frequent reference is also noted to the application of radium and x-rays, but in general, some of the more recent developments and advances in modern physical therapeutics as applied to diseases of the nose and throat are wanting. Whether this is due to the fact that the author is not yet convinced of their merit or whether he considers them still in the experimental stage cannot be determined from any statements in the text.

The book is up-to-date in information on classical methods of therapy. The subject of diagnosis is always stressed as important and detailed information given for differentiation. If the author believes, as indicated in the preface, that the value of physical therapy has been established, certainly more indications exist for the use of some of our electro-physical methods that have been included in these pages. Perusal of the index confirms this statement, as no reference can be found to diathermy, ultraviolet and infra-red. While the reviewer appreciates the authority of the text-material, he is of the opinion that sufficient progress has been made for the addition or at least mention of these newer physical measures. The desire for information on physical therapeutics as applied to rhinology and laryngology calls for an expression of opinion from authors who are either writing new texts or revising older ones. The reader is disappointed when he finds little or no material on a subject which has attracted more than average attention.

DIE STRAHLENBEHANDLUNG DER WEIBLICHEN GENITALCARCINOME, METHODEN UND ERGEBNISSE. *Von Prof. Dr. Friedrich Voltz*, Leiter der Strahlenabteilung der Universitäts-Frauen Klinik München. Paper. Pp. 206, 57 illustrations, 8 colored plates and 40 tables. Leipzig: Georg Thieme, 1930.

This excellent book is an outgrowth of Voltz's experience and association with the radiologic commission, who aimed to standardize and internationally improve radiation therapy in female genital carcinoma. It contains an introduction by Professor Albert Döderlein which expresses the views and trend of modern gynecologic treatment of cancer. Döderlein has definitely discontinued radical surgery in favor of the simpler and less dangerous procedure associated with irradiation methods. The major thesis of the subject is developed by an historical review of the development of radiation therapy, and is followed by a review of the aim and function of the Radiologic Commission.

A section was written by Karl Stricker which classifies genital carcinoma from an anatomical standpoint and places cervical carcinoma into four prognostic groups. These are later used as a working basis for a comprehensive evaluation of the statistics and results obtained throughout the world, and, upon which a comparison of the merits of radiation and surgery is made. An obvious conclu-

sion to be drawn from this section is that all genital carcinomata may be exclusively irradiated except those of the ovaries, tubes and breast; in the latter, radiation supplements surgery. Both Döderlein and the publishers must be congratulated for the marvelous color-plate reproduction of cancer histology.

The apparatus and methods of irradiation therapy at the Munich clinic are completely described in an interesting manner. Over three thousand cases have been irradiated at this clinic. The treatment is arranged into two series, eight weeks apart. The hypophyseal fields are irradiated, and dextroside injection (10 cc.) are given preceding or in conjunction with local deep x-ray and radium treatment. The dextroside medication is believed to render the carcinoma cells more sensitive and susceptible to the irradiation. Carcinoma of the cervix or uterus is treated through six fields. Radium, however, as used at this clinic is small in dosage as compared to others in Europe and in America.

It is noteworthy that biopsies, cautery, and fulguration are withheld for five days or until the patient has been irradiated through the hypophysis and pelvis, and has received a first injection of dextroside. The measures of irradiation employed at the Radium Heimat, at Stockholm, and at the Radium Institute of Paris, are described and their equipment outlined. The book is a scholarly contribution to the therapy of radiation in carcinoma of the female genitalia for it represents the experiences of some of the outstanding members of the profession in central European countries. We highly recommend it to the profession.

THERAPEUTIC USES OF INFRA-RED RAYS. By *W. Anandale Troup*, M.C., M.B., Ch.B. (St. And.). With foreword by Sir William Willcox, K.C.I.E., C.B., C.M.G., M.D., F.R.C.P. 57 Pp. \$1.50. London. The Actinic Press, Limited, 1930.

Although their use as a separate method of treatment is comparatively new, infra-red rays are now regarded as a valuable means of combating a variety of acute and chronic conditions. That scientific explanation is not always possible for the results achieved with this irradiation are due to the fact that extended research in this field has only recently been begun.

The present little volume has been written by a general practitioner, who, the author believes, is more able to assess the value of this treatment in different conditions.

Important subjects considered are the therapeutics and sources of infra-red rays and the indications and technique of treatment. The combined use of infra-red and ultraviolet radiations has always been subject to a great deal of controversy. Here an attempt is made to correlate what knowledge we have of the subject. A brief but valuable chapter is devoted to a comparison of infra-red and ultraviolet rays. This is in no way superfluous in view of the limited knowledge and experience of clinicians in general.

The apparatus now marketed for infra-red therapy differ in the types of generators. The author's experience is based chiefly on a particular type of

low-temperature generator which he has used for several years. The thought is expressed that more than a superficial reaction is effected and that by this second reaction the beneficial results are obtained.

The foreword is by Sir William Wilcox, K.C.I.E., C.B., M.D., who refers to infra-red radiation as "one of the most important remedial agents which can be put into the hands of medical practitioners."

DIE RONTGENBEHANDLUNG DER NERVENKRANKHEITEN (Roentgen Treatment of Diseases of the Nervous System). *Prof. Dr. Otto Marburg, and Doz. Dr. Max Sgalitzer*, Wiener Universität. Pp. 213 with 4 illustrations. Publishers, Urban & Schwarzenberg, Berlin and Wien. 1930. Price, 15 gold marks, paper binding; 17.40, cloth binding.

A text of 213 pages bound in paper with the perfection in mechanical make-up characteristic of German medical books, dealing with Roentgen Treatment of Diseases of the Nervous System.

The authors call attention in the preface to the need of clarifying the technique in methods of application of Roentgen rays in the various diseases. They have searched the literature and have drawn upon their own experience.

In the earlier chapters they discuss the physical principles and biological effects of Roentgen rays in general then as applied to the treatment of the central and peripheral nervous systems. Immediately following this the authors give their own technique and dosage for the various diseases. All organic diseases as well as the psychoses are covered.

HANDBOOK OF ROENTGEN THERAPY. By *Prof. Dr. Paul Krause* (and collaborators), Direktor der Medizinische Universitäts-klinik in Münster i. Westfalen; Geh. Medizinalrat. Two volumes. Price broschiert G. M. 24. Pp. 1032. Leipzig: Georg Thieme, Verlag.

These two volumes are a part of a system of books on the subject of medical uses of electricity, conceived by Prof. Dr. Bowlton and Prof. Dr. Mann. The two volumes mentioned above were started in 1919 and brought up to the present date. In surveying these volumes one is struck by the enormous amount of material offered and the

amount of ground covered. Every known phase of roentgen therapy is discussed in detail. Even the roentgen ray effects upon plants have been given a special section for the first time in published text books. This section is written by Prof. Koernicke of Bonn and the detailed work reflects very well the previous work of this scientist.

About one-third of the first volume is given over to the study of the apparatus. All the different kinds of tubes are discussed with their advantages and disadvantages. The different types of machines are next taken up. Dosimetry is given a prominent place and the different methods for calculating doses are reviewed.

A special section on the pathological anatomical aspect of roentgen therapy is worthy of special mention. Here for the first time an attempt is made to study the microscopical changes in tissues following treatment. Many sections are photographed to show the effect of the x-rays. Sensitivity of tumors, distant effect of x-rays, destructive doses, activating doses—all these are fully discussed and surveys of the world literature are added to the author's opinions.

Well over one-third of one book is devoted to gynecology alone. This is perhaps the largest section. The subject matter is divided into:

- I. Benign lesions.
- II. Malignant lesions.
- III. Miscellaneous, as sterility, amenorrhea, etc.

The section on myoma is particularly good in its indications and contra-indications for treatment.

Carcinoma of the cervix is, of course, treated with detail. The different techniques of treatment are accurately described and the results discussed when the partial and single dose methods are used.

In the second volume comprehensive sections are given over to skin diseases, x-ray in ear, nose and throat, a chapter on teeth, mouth and jaw, and lastly, x-ray treatment of veterinary diseases.

Too much praise cannot be given to the editor and his co-workers for the completion of these two volumes. These should be in the hands of every roentgenologist who attempts to treat cases. As reference books they have no equal. In the words of Prof. Krause the editor:

Roentgen ray treatment is like a sharp knife and only those should use it who are experienced and well acquainted with the latest developments.

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INTERNATIONAL ABSTRACTS

The Effect of Combinations of Vitamins on Experimental Infection. W. Pfannenstiel and B. Scharlau.

München. med. Wchnschr. 77:619 (April 11) 1930.

The authors studied the effect of vitamins D and B separately and combined on experimental tuberculosis and skin infection with staphylococci. Rabbits, the diets of which had been supplemented by the addition of both vitamins in the form of irradiated ergosterol and dried yeast showed a greater resistance to infection with tubercle bacilli and staphylococci than rabbits fed a diet without any additional vitamin or those receiving a diet containing only one additional vitamin.—*Ab. Amer. Jr. Dis. Chil.*, 40:1101 (Nov.) 1930.

Open-Air Schools in Montevideo. Americo Mola.
Bol. Inst. Internac. am. de protec. a la inf. 3:707 (April) 1930.

There are three open air schools in Montevideo. During 1929, 1,516 pupils (773 boys and 743 girls) attended these schools. On entering, 80 per cent of these children had a lower weight than normal, and 67.74 per cent a lower height; 76.71 per cent were deficient in their chest measurements.

In order to admit all the weak children of the city schools, their regular stay in the open air school has been limited to four months. The author estimates that this period is insufficient and that it would be necessary to create other similar institutions so as to permit a regular stay of six months for every child; one of the periods would extend from February to July, and the other from August to January.

The need of special visiting nurses and of dental clinics for each of these schools is expressed. Among 1,516 pupils, 1,228 were found to suffer from tooth decay.

The families of 64.64 per cent of these pupils are destitute, and 27.96 per cent half destitute; this explains how 49.27 per cent of them live in lodging houses (*casas de inquilinato*) and 35.34 per cent in poor apartments. The number of children who live in an only room with the other members of the family, numbering eight, nine or even more persons, reaches a rate of 45.97 per cent. Of the total number, 9.23 per cent are children of tuberculous parents, which means a contagion peril since the open air schools are only day schools.

The children who were found normal on entering, were thus distributed: normal weight, 20 per cent; normal height, 32.25, and normal chest measurements, 23.28 per cent. On leaving, they showed the following increase: in weight, 87.6 per cent; in height, 79.28 per cent, and in chest measurements, 73.35 per cent. These figures show the favorable results of the schools mentioned, which can hardly be surpassed.—*Ab. Amer. Jr. Dis. Chil.*, 40:1113 (Nov.) 1930.

Rheumatic Diseases—Paraffin Packs. H. J. Broichmann.

Med. Univ. Clinic, Münster, Westphalia. (Deutsche medizinische Wochenschrift, No. 29, 1930.)

The local and general treatment by heat used for rheumatic diseases in the form of baths, hot air procedures, Fango packs, etc., is far from satisfactory as the means used are fairly good conductors and therefore lose their efficacy quickly. It is to the credit of the French Doctor *Barthe de Sandfort* that, years ago, he called attention to the suitability of paraffin for this purpose. The author very favorably reports on his experience with the method. Paraffin is a bad conductor of heat and absolutely free from water so that it is tolerated by the skin at very high temperatures. Its melting point is about 132° and its boiling point 482°. Its point of indifference, i. e., the temperature at which its application to the skin is felt as neither hot nor cold is 136° to 144° (that of water is 90° to 96°). If the temperature of the paraffin covering is measured by putting a thermometer inside the pack, it can be demonstrated that it does not fall to the temperature of the skin for 5 to 6 hours (with mud packs, within 2 hours). No great hyperaemia of the skin results but a thorough warming through of the deep tissues. The preparations used were the officinal *paraffinum solidum* (*Zeresin*), the modern preparation *Paraffinasum* and, with preference, the preparation on the market under the name of *Ambrine* which consists of paraffin with the addition of tar and resins for the purpose of reducing the specific heat; the practical results were the same with all three. Technique: the skin of the affected region is shaved, dried by rubbing with alcohol or ether, and after a time, the paraffin which has been heated to 158° to 160° is painted on. This layer of paraffin is covered with a layer of cotton-wool ½ cm. thick which is then saturated with paraffin that has been heated to 176–184° (at 194° slight burns of the skin occurred). Another layer of cotton-wool is wrapped round this, the whole being finally fixed with a gauze or, better still, a flannelette bandage. All the manipulations should be carried out as quickly as possible from the beginning of the procedure. The dressing should be left on for 12 to 24 hours, the patient being at rest meanwhile, and the procedure should not be repeated on the same part of the skin until at least a day has elapsed. The dressing is removed simply by pulling it off; should remnants of paraffin adhere to the skin, they can be dissolved by washing with Xylol. — The author has treated 82 sufferers from rheumatism with from 2 to 15 packs each; altogether 650 packs have been given. They were cases of arthritis, peri-arthritis, neuritis and myalgia; feverish arthritic infections were excluded from the beginning. The results achieved were particularly good in cases of pure

myalgia and neuralgia, in primary and secondary chronic articular rheumatism, but a strikingly good effect was also observed in arthritis deformans in which the treatment was followed by an improvement of the movement in the affected joints and a decrease or disappearance of the pain. The treatment was never found unpleasant subjectively; the patients have only a feeling of intensive heat owing to which the pain usually abates or disappears even while the pack is on. Special emphasis is laid on the cleanliness of the method, a fact which has always been appreciated by the patients themselves.—*Ab. Ars. Medici*, 12:550 (Dec.) 1930.

The Treatment of Cavernous Angiomas Covered with Healthy Skin. William H. Schmidt.
Am. J. Roentgenol. 19:271 (March) 1928.

Angiomas are grouped as (1) port wine mark or nevus flammeus, (2) nevus vasculosus or strawberry mark and (3) nevus cavernosus or cavernous angioma, some of which are covered with healthy skin while others present a small area showing discoloration and enlarged elevated vessels. In the cases studied, 5 or 10 mg. radium needles were inserted through the healthy skin into the depths of the angioma. The angioma began to shrink within a week and usually disappeared completely in from four to six weeks. The end-result showed no effect on the skin.—*Ab. Amer. Jr. Dis. Chil.*, 40:1129 (Nov.) 1930.

Radiation Therapy of Tonsils. Leila Charlton Knox.
J. A. M. A. 94:705 (March 8) 1930.

The author concludes that roentgen irradiation of the tonsils should not replace tonsillectomy in the rheumatic child except in patients who, because of some complication or because of the severity of their cardiac condition, are poor operative risks. This treatment should not be used in acute follicular tonsillitis, sepsis, mononucleosis, syphilis, diphtheria, scarlet fever or abscess of any type and it is contraindicated in acute sinusitis. It is a useful and important agent in the treatment for recurrent tonsils and adenoids, hypertrophic pharyngitis and bronchitis. No injury to the endocrine glands in these children has been demonstrated.—*Ab. Amer. Jr. Dis. Chil.*, 40:1127 (Nov.) 1930.

Marine Climatotherapy in Diseases of Childhood. Georges Barraud.
Arch. de méd. d. enf. 33:284 (May) 1930.

Barraud reviews the advantages of sea air in certain debilities incident to early life and discusses at considerable length the special attractions of that portion of the French Atlantic littoral in the department of Charente-Inférieure. Here the moderate temperatures, the inviting sea beaches, the moderate rain fall, tempered winds and particularly the preponderance of sunny days combine to provide an ideal climate the year round for children suffering from surgical tuberculosis, rickets, anemia and the various dystrophies associated with defective development.—*Ab. Amer. Jr. Dis. Chil.*, 40:1134 (Nov.) 1930.

Report of a Case of Megacolon Treated by Diathermy. S. Amber.

Proceedings of the Staff Meeting of Mayo Clinic, 5:224 (August 13), 1930.

Drs. Brown and Allen have shown that certain measures, such as injection of typhoid vaccine and other foreign proteins, may have the same effect, at least in part, as the cutting of the sympathetic nerves. Dr. Rowntree has shown that diathermy can have the same effect. It is applied over the parts of the body from which the sympathetic nerves to a given part take their origin. In cases of megacolon the problem is approached in another way without cutting. It has been shown that cutting the sympathetic nerves to the large intestine may have good results. Drs. Adson, Learmonth and Rankin have treated cases of megacolon successfully by cutting the rami or the hypergastric plexus, and it was thought possible that diathermy could simulate this effect.

In the case of a boy, aged 10 years, who had never had a normal passage, diathermy was tried once a day for thirty minutes, with one electrode over the lower dorsal and the lumbar vertebrae, and one over the lower part of the abdomen. The patient experienced the sensation of the desire to defecate which he never had experienced before. At the beginning when treatment was omitted he had no stool. After two weeks it could be omitted for one or two days at a time.

The results obtained do not prove that an effect was exercised on the sympathetic nerves.—*Ab. Int. Med. Dig.* (December) 1930.

Experiences with Artificial Heliotherapy. Henry Stuart Willis.

Bulletin Johns Hopkins Hospital, 47:186 (September) 1930.

In the first place the treated group of patients with adenitis (mostly tuberculosis) showed improvement in general. Several individuals of this group showed a remarkable degree of improvement. This was particularly true in those who had a sinus tract.

Secondly: A large percentage of the treated patients experienced a definite tonic effect in the way of subjective well being, improvement in appetite, and increase in weight. This was not a feature in the control group.

Thirdly: Pigmentation seemed to depend upon the size of the initial or early doses and the rate of increase of exposure (*i. e.*, on the degree of erythema). It appeared to have nothing to do with the degree of improvement or lack of improvement. There was no material difference in response among white and colored people.

Fourthly: Plate glass screens out the short ultraviolet waves—those which produce pigmentation and those which are specific in preventing and curing rickets—but it transmits the longer ultraviolet waves, the visible waves and some of the infra-red waves. The effect of these waves upon disease is entirely unknown and should be studied. It is

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Finally: It should be noted that these are impressions only, and not conclusions, that the few cases studied do not represent a cross section of disease as it is seen in the dispensaries, and that much more must yet be done on the question before definite conclusions are forthcoming. Many of the cutaneous diseases, granulating wounds, etc., which are said to respond favorably to ultraviolet light treatment have not been studied.—*Ab. Int. Med. Dig.* (December) 1930.

Nauheim Treatment and Carbon Dioxide Foam Baths. L. Shillito.

Canadian Medical Association Journal, 23:423 (September) 1930.

The so-called "foam bath" apparatus has only been introduced into this country within the last year, and so far has not met with the serious consideration that it deserves.

The distributor consists of three parallel pipes held together in a frame and perforated along their length with a series of holes. Over these apertures are a number of porous blocks of wood. The pipes are joined at either end and connected with the cylinder of gas, which escapes through the porous wood as very fine bubbles.

Baths are given on two or three successive days, followed by a day's respite, and then repeated.

The principal indication is myocardial weakness—for example, the dilated, feeble, and irritable heart following influenza and other fevers. Cardiac toxemia or enfeeblement caused by excessive smoking or a prolonged illness such as typhoid or malaria, angina pectoris, and cardiac asthma, are all benefited by this treatment, as may be also anemia with dilated heart and high blood pressure.

The treatment is not suitable in heart cases with broken compensation, in very marked arteriosclerosis, or in the very old.

Chronic nephritis may often be benefited, as in this disease the kidneys are likely to suffer serious injury from the temporary congestion resulting from the contraction of surface blood vessels caused by very hot or very cold applications.

Neutral effervescent baths are also valuable in insomnia and mental excitement generally.

To conclude, the special advantages of the carbon dioxide foam baths are their simplicity, low cost, and the fact that the air-foam cover entirely conceals the patient's body from view, a practical point of some importance. They can be given in a patient's own home, and the distributor can also be used to give a sweating type of foam bath most useful in rheumatic affections.—*Ab. Int. Med. Dig.* (December) 1930.

The Action of X and Gamma Radiation Upon Aqueous Solutions of Iodine and Potassium Iodide. G. Harker, D.Sc.

The Medical Journal of Australia, Vol. II, No. 25, Dec. 20, 1930.

This interesting study was carried out under the

control of the Cancer Research Committee of the University of Sydney and with the aid of the Cancer Research and Treatment Fund.

The conclusions of the research are:

1. Bordier's statement that aqueous solutions of iodine are decomposed by x-rays is disproved.

2. Gamma rays also have been found without effect.

3. The decomposition of potassium iodide in neutral and acidified solutions first studied by Kailan with γ rays has been examined in detail with both γ and x-rays. Attention is drawn to the marked acceleration of the action of the rays by the addition of small amounts of acid.

Vitamin D Administration in Parathyroid Deficiency Following Thyroidectomy. F. S. Hansman, M.B., Ch.M. (Sydney), M. R. C. P. (London).

The Medical Journal of Australia, Vol. II, No. 25, Dec. 20, 1930.

After a careful and comprehensive review of this subject, the author summarizes his findings under four headings:

1. Subsequent to thyroidectomy or to excessive radiotherapy to the thyroid gland the following symptoms may develop as a manifestation of parathyroid imbalance: Tetany, cramps, numbness, tingling sensation, a feeling of "pins and needles," grave depression, pronounced irritability, cravings for food, excessive appetite, marked gain in weight, pallor, undue fatigue.

2. Control experiments definitely rule out the possibility of these symptoms being due to hypothyroidism.

3. All these symptoms disappear on the administration of relatively large doses of irradiated ergosterol.

4. Six cases are recorded which illustrate the remarkable response to vitamin D given as "Radiostol."

Ueber Die Wirkung Kleiner Roentgenstrahlenmengen. (Effect of Small Amounts of Roentgen Rays.) K. Kurt Kirschmann.

Fortschr. d. Med., 1930, Jg. 48, Nr. 16, (Aug.), p. 655-657.

Suberythema doses have been found to be biologically effective and, therefore, desirable in our armamentarium. Small dosages are of value in the irradiation of acute inflammations as suggested by Heidenhain and Fried. One is sometimes impressed by the fact of how readily the entire morbid picture is modified under the influence of a unique irradiation of about from 8 to 12 per cent S. U. D. Inflammatory foci such as are located within connective tissue respond best to this treatment. Especially is this true of abscesses of the axillary sweat glands which run an exceedingly protracted course in surgical treatment and often require complete removal of the glands. Here the author gives first one or two irradiations, the dosage of which when referred to the skin, amounts to from 6 to 12 per cent of the S. U. D. The individual must be considered as to the amount of the single dose, the indications for repetition of irradiation, and the time when they

should be given. In some cases infiltration recedes promptly after roentgen ray treatment; more often it results in regression of the purulent products. When there are such signs, irradiation with red light may further hasten the process and at the same time improve the soothing effect of roentgen ray therapy. Medication applied with a well fitting bandage and immobilization of the arm by a sling are indispensable. In the presence of fluctuation, an incision is recommended. The inflammation is usually controlled within 10 to 14 days. It should, however, be borne in mind that virulent organisms still remain in some gland lobules, thus pointing to the necessity of applying a full S. U. D. in fractional doses after the acute inflammatory phenomena have subsided in order to obliterate the sweat glands and recurrences.

Weak irradiations of the spleen are, no doubt, of advantage in meno- and metrorrhagiae.

Therapeutic Use of Cold Clay. Kern Wilhelm.

Mediz. Klinik, 1930, 36, Nr. 10, (March), p. 338-339.

Cold clay is an exceptionally valuable means of withdrawing the heat from inflamed tissues especially in acute or subacute cases.

Compared with aluminum acetate it has the following advantages: its effect is much slower, more uniform, of longer duration, and there is in addition the mechanical adjustability on easy pressure; furthermore, the frequent changing of the packings is not necessary.

Technic of application to a large joint: 3,000 grams of clay are prepared with 500 grams of cold water in the same way as hot clay packings on a piece of impermeable cloth 60x28 cm. square; the clay is plastered in a thickness of 1½ cm. around the inflamed part. The time of the application is usually one hour.

Erythroedema Polyneuritis. A review of the disease and report of two cases. Frank W. Messer.

Ind. State Med Jr., 23:576 (December) 1930.

The author reports two cases of erythroedema

polyneuritis in which the symptoms showed little improvement until a special diet "consisting of one pint skimmed raw cow's milk with the addition of the yolks of three eggs, one ounce of finely ground lean beef, various vegetables, one tomato and one orange. In addition, two drops of irradiated ergosterol and a quarter cake of yeast were administered with the first, second and third feedings. Heliotherapy was also administered." The clinical results were very gratifying and from this the author draws the following conclusions:

1. Erythroedema polyneuritis is so marked in its clinical manifestations that it should be easily diagnosed by the general practitioner.

2. It appears to be due to or closely related to a deficiency in Vitamin D.

3. Clinical experience seems to prove that irradiated ergosterol with yeast is a valuable therapeutic agent in hastening recovery.

Low Back Pain. Elias Margo.

Jour. Okla. St. Med. Assoc., 24:16 (January) 1931.

After discussing the pathogenesis, symptoms and classification of low back pain, the author divides the management of these cases into conservative, i. e., recumbent, ambulatory and operative. Physical Therapy is advocated as a form of ambulatory treatment and is considered as a part of the general scheme. The author's views are as follows:

Most cases of back sprain become dissatisfied because the average physician will only treat them by strapping. With physical therapeutic agents, you not only do something for the individual but when carried out properly it is our best method of relief. When prescribed, it must be carried out by a well trained technician. The usual method is heat, either infra-red or diathermy. Usually the latter is most effective, and is then followed by massage. The massage should be of a scientific nature and not a rub-down. This should be given for at least 10 minutes following the application of heat. Medical gymnastics may also be indicated in subacute and chronic cases. With well supervised physical measures, the period of disability in low back pain is greatly decreased as well as the degree of discomfort.



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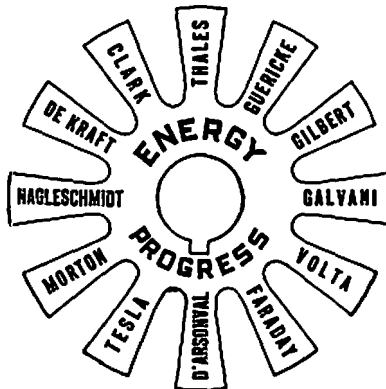
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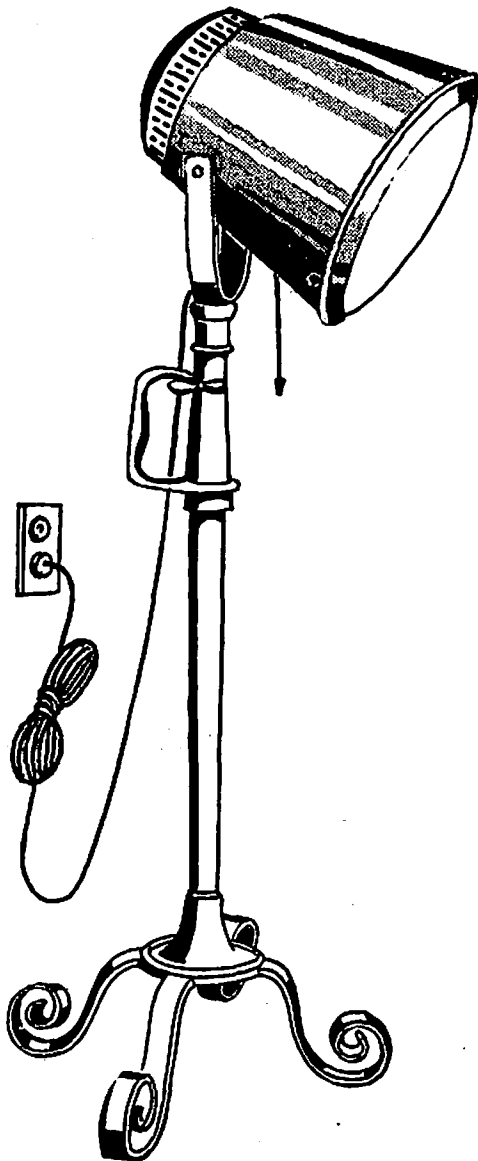
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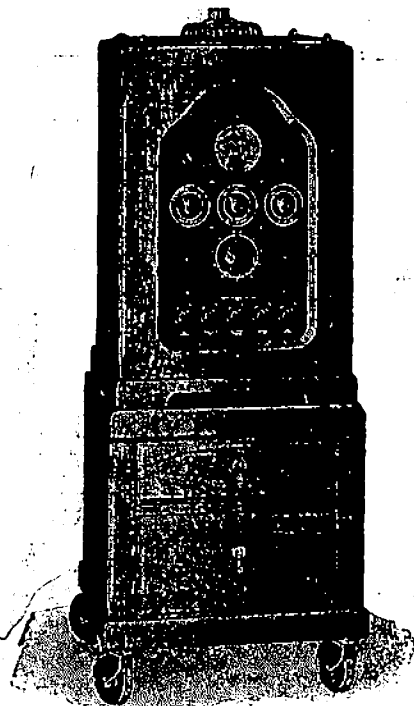
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