Physical therapy : the therapeutic application of the various electric modalities / by Albert C. Geyser.

With my compliments
23.
Geyser

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PHYSICAL THERAPY.

THE THERAPEUTIC APPLICATION OF THE VARIOUS ELECTRIC MODALITIES.*

BY ALBERT C. GEYSER, M.D., NEW YORK CITY.

Mr. President, Members and Friends of the New England Electro-Therapeutic Association: It is indeed a privilege and a pleasure to be invited by this association to Boston, the city of learning.

We have just shared the pleasure of listening to a paper that could only be produced by such master minds as that of Dr. M. W. Brinkmann.

I know of no harder task than the unraveling of the laws underlying undulatory vibrations.

Unfortunately, it only too often happens that we are obliged to make therapeutic applications of some of these various modalities without thoroughly comprehending their underlying laws.

The task assigned to me for this evening is, therefore, comparatively simple.

It will be my pleasure to elucidate " The Therapeutic Application of the Various Electric Modalities."

Every form of motion, every form of vibration, is amenable to the law of conservation of energy.

Should we desire then to apply to diseased conditions of the human body the vibrations which are the results of electric modalities, we could do no better than be guided by the principle that " Living means nutrition, nutrition means chemical action, chemical action means an electric current, and, finally, an electric current means vibration."

Vibration originates and perpetuates all motion, force, heat, light, chemical action, and electric currents. Rhythmic and harmonious vibrations are the results of natural laws; arrhythmic and inharmonious vibrations are deviations from natural laws.

Health is a condition corresponding to physiologic rhythm, a sequence of harmonious vibrations.

Disease is discord, or the result of interference with, or arrhythmic, vibrations.

Death is silence, or the cessation or permanent interruption of organic vibrations. Should, therefore, we be able to arrest all vibrations of the universe for even a fraction of a second, silence, death, and destruction would be the inevitable result. Upon the proper appreciation of these factors depends the selection of any particular rate of vibration or the combination of *several* to form a harmonious whole.

* Read at the meeting of the New England Electro-Therapeutic Association, at Boston, December, 1906.

Nothing is easier, nothing is simpler, than to cause response to harmonious rates of vibrations.

Each and every living cell in the human body vibrates, and according to its particular rate of vibration performs its physiological function. The string upon the piano known as the " middle C " vibrates 256 times each second; it is the function of this string to produce a certain note; should this string even by the slightest change either increase or decrease its normal rate, it would at once cause confusion and discord. This analogy applies to the human body; the discordant vibration of a single cell causes more or less confusion in a particular organ; this organ in turn affects the harmony of the whole economy. With inharmonious vibrations, discord or disease are the result.

It is, therefore, natural that we should turn to an agent, the product of nature, giving us the various modalities of the electric current. With this we are enabled to re-establish those rhythmic harmonious vibrations so essential to that state of the body we term " health." Galvani by accident brought to light an electric current since familiarly known by his name. As, however, we worship the rising more than the setting sun this current is now known as the *direct* in contradistinction to the induced current.

As the direct is the progenitor of all other currents let us consider the effects of this current upon the human organism.

Whenever the two poles of the direct current are applied to the body, an action is at once set up in the entire path traversed by this current. A decomposition and a recomposition of all the elements under its influence take place. The acids, oxygen, and chlorine are drawn towards the positive pole, while all the hydrogen and the alkalies collect in the neighborhood of the negative pole.

The intensity of this action depends upon the strength of the current and the time consumed in its application. When the positive pole of the direct current, with a strength of 3 to 5 milliamperes, is placed over a painful nerve, as in a supra-orbital neuralgia, we at once cause a change to take place in the composition of the nerve-structure and the painful area. The nerve, if not brought back to a normal state, is at least incapable of conducting, for the time being, painful sensations.

The negative electrode should be as large as possible in area and applied to any indifferent part of the body. It is, however, good technic to apply the indifferent electrode in such a manner as to cause the current to traverse the entire length of the nerve. This treatment; with modifications, is applicable to all painful conditions of neuritis. Used in this manner this modality becomes an anodyne. If we apply this current with a strength of 10 to 25 milliamperes with one large electrode covering the upper part of the trunk, while the feet are resting in a warm

saline solution, we lose the distinctly polar effect and substitute the interpolar, which again causes a decomposition and recomposition of all intervening molecules. Such an application is indicated where a decided tissue change is desirable as in all chronic states, especially neurasthenia, hysteria, and epilepsy. Here the same agent acts as an alterative.

In a case of facial paralysis where the response to the induced current has been lost and the individual muscle is caused to perform its physiologic function by applying either pole over the motor point or the muscle itself, we have a *tonic* such as no *medicinal* agent can produce.

Let us take the positive metallic electrode of proper size and shape for intra-uterine application with a large pad electrode in the lumbar or abdominal region and with a current of from 20 to 50 milliamperes. We then have the best local hemostatic in a hemorrhagic fibroid uterus known, while the negative pole, intra-uterine with its softening alkaline accumulating effect, is the *absorbent* indicated in a *non*-hemorrhagic fibroid uterus. If we arm the negative pole of this current with a fine needle and apply the opposite pole to any convenient part of the body, with a weak current of one half to two milliamperes, we can destroy warts, moles, birthmarks, and superfluous hair, the negative pole collecting the hydrogen and the alkalies forming thereby an alkaline scar which is soft and quickly absorbed, barely leaving a trace of the lesion or of the operation. This current acts as an escharotic, far better than any caustic or arsenical paste. Should, on the other hand, we have a malignant growth to deal with, we would require the *acid* action of the positive pole for the purpose of diffusing into the tissues either the salts of copper, zinc, or mercury. We also form an acid eschar which is hard and unyielding, thereby limiting the further spread of the disease process. Let us once more take this same current and attach the negative pole to the hydro-electric rectal electrode, allowing the water to flow from an ordinary fountain syringe into the rectum until we have a complete distention of the lower bowel. The positive, consisting of a large abdominal pad, a current of 5 to 15 milliamperes causes at once an out-pouring of mucus from the entire bowel, the water acts as the internal electrode, and in this manner, when indicated, is a *cathartic* of the first order.

We have seen that this one current, according to the manner and method of its application, will take the place of an *anodyne, alterative, hemostatic, absorbent, escharotic,* and *cathartic.* Truly an agent with these demonstrable faculties should recommend itself to any thinking physician.

Another modality and perhaps one of the most valuable in proper condition is the sinusoidal current. We are all agreed upon one fact regarding electric currents, and that is, all currents cause effects upon tissue in exact relation to the *variation* of their *strength, direction,* and their rate.

In the sinusoidal we possess these two factors in a marked degree; there is an ever-varying strength as well as a continuous change of direction. This current has no equal in its power to contract nonstriated muscle fiber; it is, therefore, without a rival in all *atonic* conditions of involuntary muscles. No patients are more grateful when treated with this current than those suffering from atonic dyspepsia, atonic intestinal indigestion, the atonic conditions of bladder and rectum in spinal cord diseases, especially locomotor ataxia.

A very important point, however, is to always bear in mind the normal rhythm of the particular organ under treatment. The alternations of this current should not be more frequent than 10 to 30 per minute.

The static current has excited the wonder and admiration of succeeding generations.

Little did the dwellers by the sea realize, in attempting to impart to the amber a polish by friction, that out of this action would, two thousand years later, evolve the present static machine. A static current is a high potential current; a current that is capable of penetrating every cell of the whole human body at once; it is capable of setting up harmonious rhythmic vibrations that are *incidentally* or *accidentally* in absolute harmony with the *cellular rates* of vibrations.

By no *other* process of reasoning can we explain the effects upon the human body when subjected to any of the numerous modalities of the static current.

With the static machine making about two hundred and fifty revolutions per minute, the sliding rods wide apart, one pole grounded, and the patient connected with the opposite pole placed upon the insulated platform, we make of the patient one side of a Leyden jar, with the air as the dielectric and the ground as the other coating of the dielectric. We know exactly what happens when a Leyden jar is connected to the static or any other high potential current, and from this knowledge we are enabled to say with absolute assurance what is going on in the human tissues when placed in a similar position.

The enormous stress set up in every cell of the whole body causes metabolic changes to take place that never have been equalled by any other agent. Examine the urine of a patient before and after such a treatment, and the most skeptical will become convinced that work has been performed in that body which no drug on earth could accomplish during the same space of time. This is truly an *alterative* agent worthy of the name.

Allow the patient to remain in this same position but simply close the pole pieces, — by gradually opening the spark gap we alternately *charge* and *discharge* the patient.

It is well known that the greater the various changes as to *strength*

and *direction* of currents while passing through living tissue, the *greater* are the manifestations.

From its peculiar filling and emptying effect it has been termed the static wave-current and is recognized as a *tonic* of far-reaching effect.

This current may be placed over any organ or part of the body where especial function-rousing qualities are desired, — in hepatic congestion over the liver, intestinal atony over the bowels, in kidney lesions over the kidney regions and so on *ad infinitum.* Should we desire a *counter-irritating* effect we make use of the static spray or breeze from a metal, wooden, or glass electrode, according to the intensity desired. This may be used over the entire body surface to divert the blood stream by causing an intense *capillary dilatation;* or the effect can be concentrated upon a small area and in a few seconds all grades of a *counter-irritant* may be produced from a *gentle hyperemia* to an *actual blister* or *escharotic.* Such is the enormous range of the static breeze!

In the static sparks, a little more severe, perhaps, but when indicated in chronic congested areas, we have an agent that will relieve stasis *quicker* and remove pain, the result of pressure *surer* than any other agent known.

Last, but not least, the static current furnishes a *perfect* X-ray which for diagnostic purposes supersedes all other instruments known.

The current from a static machine is of *high potential, high frequency,* and *unidirection,* three very essential factors in the production of the X-ray.

The *unidirection* is the element which contributes a large share to the longevity of X-ray tubes when used in connection with static machines.

The high-frequency discharges emanating from a high-frequency apparatus attached to a static machine are especially interesting in the treatment of various skin lesions where a decided yet painless stimulating effect is desired, as in chronic eczema, lichen, psoriasis, and other scaly eruptions.

The faradic or, more properly speaking, *" the secondary induced current,* is perhaps the most interesting, therefore the best known, of all the various electric modalities. Unfortunately for the medical profession this current has been very much neglected, especially in differentiation of nomenclature. We do not know in speaking of the secondary induced current whether we refer to the ordinary high tension coil used upon the patient or whether we mean that ponderous affair which emanates from that still mysterious agent, the X-ray.

For medical purposes the effects of the induced current depend entirely (as it is with most currents) upon the rate of interruption the vibrator is capable of making in a given time. Low interruptions have a stimulating effect while high rates have an inhibitory effect upon tissue.

Again, a current of a high tension is required to overcome the normal resistance of the skin, while this same current, brought into contact with the mucous membrane, would be exceedingly irritating, because the resistance to overcome is out of all proportion to the tension employed. We must, therefore, bear in mind that a current from a high tension coil passed through the skin acts as *an anodyne*, yet when used with a metallic electrode intravaginal it becomes an irritant.

This is the *first* current we make use of in testing for reaction of degeneration of nerve and muscle in paralysis; for if we are able to cause the muscle and nerve to perform their physiological function by the application of this current, then there is hope and our prognosis favorable.

This current has a selective effect upon the striped or voluntary muscle fibers, and when *slowly* interrupted becomes a powerful agent for causing muscular contractions in all voluntary muscles at the same time the high tension, high pitched currents, especially from a multiple ribbon vibrator, causes by its *tetanic* effect a *relaxing* and *soothing* condition of all muscles in states of *reflex spasms.*

Whenever we desire a mechanical effect rather than a chemical one the secondary induced current should be the current of choice.

However *interesting* and useful these qualities are to medical men, this current is also the agent required to furnish those more modern inventions, the X-ray and the high-frequency currents.

Every physician should be more or less acquainted with the marvels of the X-ray, and at the same time thoroughly impressed with the dangers of this truly wonderful agent. Yet it is an open question as to whether the X-ray has suffered more at the hands of man or whether man has suffered more from this agent.

In this, as in all things new, strange, or startling, the pendulum swung far from the center; on the one side the enthusiast knew no bounds, on the other, men with mercenary motives made the most extravagant claims for the curative power of this agent. Soon, however, a reaction set in so strong against them that now, after calm investigation, it has established its proper place in medicine. As a diagnostic agent under certain conditions it has no rival and holds undisputed sway. Fractures, foreign bodies, dislocations, stones, biliary and renal, are among the diagnostic possibilities of the X-ray.

But *above* all and *beyond* all the therapeutic qualities and results still remain as marvels of the present time.

In cases of lupus vulgaris, the happiest results have been recorded; lupus erythematosis, though a little more stubborn, — yet the indications are that even this disease will yield to the emanations of the X-ray; hypertrichosis, favus, sycosis have passed the experimental stage.

This paper would not be complete did it not refer to the X-ray burn

or dermatitis. In my clinical work during the past two years at Cornell College and the New York Polyclinic I have not seen a single burn produced during that time. I have, however, divided the effects of the X-ray into two sharp and well-defined conditions, namely, the constitutional and the local effect. My dictum is, " In lesions of a *local* character *local effect only* and *no* constitutional effects must be produced, while in constitutional diseases, *no* local but *constitutional effect* only must be produced." So long as these two effects are separated a burn will not be possible.

The X-ray, like all other electrical modalities, possesses a wide range of application. I would recommend the following conditions to be considered:

First. Conditions requiring the removal of hair: hypertrichosis, sycosis, favus.

Second. When diminution of functional activity of glandular structure is desired: comedo, acne, vulgaris, indurata, and rosacea; lupus erythematosus; hyperidrosis.

Third. Owing to their destructive effect on bacteria in the tissues: lupus vulgaris, blastomycosis, eczema.

Fourth. Their stimulating effect upon the metabolism of the skin: chronic indurated eczema, lichen planus, psoriasis.

Fifth. Their power of causing the destruction of tissues of low resistance without the destruction of healthy stroma is the theoretical indication for their use in various malignant diseases and in other processes where we have to do with cells of low resistance: carcinoma, epithelioma, tuberculosis; pseudoleukemia, leukemia, and sarcoma.

Sixth. Anodyne effects. In all painful, inflammatory, and inoperable malignant conditions, where no hope for a cure can be maintained, but life prolonged and made comfortable.

Before closing this all too short a review of the various modalities and their therapeutic applications, let us not forget that any one or all of these modalities have their indications, but should not be used to the exclusion of other, especially physical, methods, such as light, heat, air, vibration, water, and diet.

On the contrary, as physicians we must know what natural laws the patient has transgressed, we must recognize the physical changes that have taken place in his system. we must *thoroughly* understand our therapeutic agents, and then, and not until then, are we in a position to judge and select scientifically a particular remedial measure.

Discussion.

During the reading of the minutes of your last meeting the secretary stated that some member had made the applications of the X-ray in cer-

tain lesions as advocated by Dr. Geyser at the last meeting of American Electro-Therapeutic Association in Philadelphia. The result of this method was that he had some very severe burns.

We are not in a position to judge from such meagre information as to the technic employed. I am, however, very safe in saying that had the *Cornell* tube been used there would have resulted no burn.

In Cornell University Medical College, New York, I am using in my clinical work a static machine built to order by Waite and Bartlett, having forty revolving plates. A static machine with that number of plates in motion ought to be a good test; with it during the past two years several thousand applications have been made with the Cornell tube in various skin lesions and never a single burn has resulted.

In the New York Polyclinic my students daily make use of this method with the static as well as with the coil currents. I have yet to see the first burn produced after a few minutes' instruction as to proper technic.

Dr. Lily Owen Burbank, of Boston, has been investigating this method of treatment in both of my clinics since August last.

She has made hundreds of applications in all manners of lesions where indicated, and only the happiest results have been her reward.

Through the courtesy of your president, Dr. Morse, we have here a patient suffering from lupus vulgaris of the entire nose. Dr. Burbank will take pleasure in giving a demonstration of the technic with which she is so thoroughly familiar.

(Dr. Lily Owen Burbank, of Boston, makes demonstration.)

Dr. Burbank. Mr. President and members: I wish to thank Dr. Geyser for his courtesies extended to me during the past half year.

I had an excellent opportunity of studying the various methods employed by him at his clinics in New York.

I was most forcibly impressed, however, with workings and almost never-failing results obtained with the invention of Dr. Geyser to which he has given the name " Cornell tube."

The latest pattern of this tube is an almost perfect instrument, works equally well upon the X-ray coil or the static machine, the high frequency from a coil or the hypostatic from the static current.

The technic is rather simple; the tube is brought into direct and close contact with the lesion. The contact surface should not be much larger than the lesion itself, so that by this method we have the rays only upon the surface of the lesion, and both patient and operator are at one and the same time thoroughly protected. In this particular case of lupus, judging from past experience, I would expect a normal condition in about six to eight weeks' treatment. From three to six minutes are required for an individual treatment.

Dr. M. W. BRINKMANN, of New York. The paper which I read had to be read. It was purely a technical paper but somebody had to do that work. It has been waiting to be done and no one seemed to do it. We have got to have basic principles to start with; we have got to act according to law.

Now I am going to speak to you on another subject, one which is close to all of us. You gentlemen who have formed a society here are individual thinkers; you think things out for yourselves. I am glad to meet a body of this kind and am more than pleased to have been requested to meet you. The society of which I am going to speak is the first society which ever did any work in the broad field to which you are devoting your energies at this time. It was the first society in this country, in the world. It has had a steady growth. By a course of elimination the unhealthful elements have found themselves in an unkindly atmosphere. This has been recognized all over the country by men who are doing anxious work along these lines. I am speaking of the American Electro-Therapeutic Association. We have every year papers which describe the new work and give an account of the work done in therapeutics. We have a publication which is our official organ; also a set of Transactions which is delivered to members and which constitutes the only set of Transactions written and read by men devoted to this work. The development of electro-therapy and physical-therapy as it should appeal to the broad-minded physician is to be taken up in a way by changing the name of this society to the American Physical and Electro-Therapeutic Association, taking in as its members men who are interested in this wide field of therapeutics.

I am going to appeal to you gentlemen to join this society to which you ought to belong. I am going to appeal to you collectively and singly. I don't know that I can do more to appeal to your sense of justice than to suggest that you devote the same zeal which you show in your local society to this general body, and I hope your president will mail our secretary from this society an application for membership from every one of you. I hope to meet you in Boston next year as members of the American Physical and Electro-Therapeutic Association. When the end of your year has come around and you think over the benefits you have received, I believe you will feel that your little fee which you pay annually is as nothing to the profit you have derived. Thank you very much.

I want to thank you for the very kind invitation to meet with you in Boston. It is accepted with a great deal of pleasure and I hope that every man who has anything to say will give us the benefit of his observations. Write a paper on something; we want to know how you do something whereby you get a good result in some certain direction. Tell us how you did it. You will help a whole lot of men.