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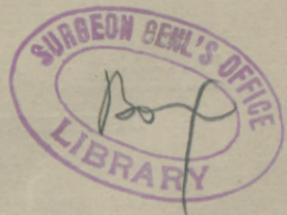
IN

ELECTRO-THERAPEUTICS.

BY

GEORGE M. BEARD, M. D.

[REPRINTED FROM THE N. Y. MEDICAL JOURNAL, OCTOBER, 1872.]



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## RECENT RESEARCHES IN ELECTRO-THERAPEUTICS.<sup>1</sup>

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FIVE years ago, in a paper before the Medical Society of the County of New York, I had the pleasure of formally introducing electro-therapeutics to the profession of America. What was then sown in weakness has now been raised in power. The progress made in these five years is certainly greater than in the whole century preceding. The gospel of electro-therapeutics is now preached not only in all the great centres of science, but in all lands, from Russia to Japan, where men attempt the scientific treatment of disease, and in no other land has the advance been so rapid, original research so active and successful, and popularization so wide and so generous, as in America. The stone which the scientific builders rejected has become the head of the corner. Like a fire on the prairie, it has spread over the land, until what was a by-word and reproach, has become the rage and the fashion. It seems eminently fitting that the nation which first brought lightning from the sky, and which first made it the fleet messenger of civilization, should also be the foremost in applying this great force to the treatment of disease. Already an electro-therapeutical society has been started in New York; Boston and Philadelphia will very likely soon follow, and then one for the nation will be a necessary sequence. The exhibition of apparatus at this meeting of the American Medical Association would bear the palm over any country, and every month brings new improvements in our instruments and increasing skill in those who use them.

<sup>1</sup> Portion of a paper read before the Medical and Obstetrical Section of the American Medical Association, Philadelphia, May 8, 1872.

In the brief time that can be allotted to a single paper on an occasion like the present, it will be useless to attempt any exhaustive *résumé* of the broad and growing subject of electro-therapeutics. I shall not even succeed in exhausting the subject of my paper, the "Recent Researches in Electro-Therapeutics." My hope is simply to present as tersely as possible a few points in electro-therapeutics to which my own personal experience has been specially directed during the last two or three years.

I must confine myself by necessity and by preference to what is new, or difficult, or doubtful and disputed, giving a wide berth to all propositions of general acceptance.

*A New Method of using Electricity; Central Galvanization.*—During the past two years and more, I have been gradually systematizing and perfecting a novel method of electrization, to which I have given the name *central galvanization*.

The results obtained by this method are so brilliant and important—in many cases over other methods are so decided—that I have thought best to here describe it in detail.

In *central galvanization* the negative pole is applied to the *epigastrium* (the patient holding it by an insulated electrode), while the positive is applied over the head, around the sympathetic, and down the whole length of the spine, in such a way as to bring the brain, the pneumogastric, the spinal cord, and all the prominent plexuses of the sympathetic, indeed, the whole central nervous system, under the influence of the current. I began to work up the method of *central galvanization* as early as 1869, but did not fully systematize the method, in all its details and in its completeness, until the following year. The method, as I now employ it, is a growth from small beginnings—a result of long and various experimenting.

*Theoretical Considerations in favor of the Method.*—Quite early in my electro-therapeutical experience, I saw that the single process of galvanizing the sympathetic in the neck, useful as it was in some cases, did not fully meet a large variety of the indications for which it was recommended and employed. I found the same difficulty with the special meth-

ods of galvanizing the brain, spinal cord, and pneumogastric.

Besides this, two other considerations induced me to seek for some more satisfactory method of galvanizing the central nervous system than had yet been devised.

1. The impossibility of *exclusively* localizing the current in the cervical sympathetic suggested the view that very likely the good results that in some instances followed the usual method of galvanizing the sympathetic in the neck were due as much or more to the effect of the current on the spinal cord or pneumogastric as on the cervical ganglia of the sympathetic. That the beneficial effects of galvanizing the neck in cases of nausea, dyspepsia, and gastralgia, were due in part if not entirely to the effect of the current on the pneumogastric, was more than probable.

Conversely, I found it impossible to tell how far my attempts to localize the current in the pneumogastric, by placing one pole at the pit of the stomach and the other by the inner border of the sterno-cleido-mastoid muscle, was successful; and whether the benefit derived took place through the pneumogastric, the sympathetic alone, or through both combined, seemed beyond the power of mortal skill to determine.

Similar difficulties were experienced in the attempt to differentiate the effects of the galvanizing the brain; how much the results of applications to the head were due to the direct or reflex action of the current on the brain itself, how much to its action on the cephalic ganglia of the sympathetic, and how much to its action on the roots of the pneumogastric and the after-part of the spinal cord, seemed in the present state of the sciences of anatomy and physiology absolutely impossible to determine.

In galvanizing the spine we were puzzled by the same complications. The cervical, thoracic, and abdominal ganglia of the sympathetic, with their enormous plexuses, are all liable to be affected by the current whenever it is applied up and down the spine; and how far the beneficial results of galvanization are due to the effect of the current on the cord itself, and how far to its effect on these ganglia and plexuses, only a special revelation can determine.

Still further, the subject is complicated by the considera-

tion that electricity works powerfully by reflex action, and in galvanizing the brain, the cervical sympathetic, or the spine, reflex action must continually take place through the nerve-centres, and the therapeutical results produced by such treatment must be in part attributable to such reflex action.

2. A large proportion of the most frequent and distressing chronic diseases, as hysteria, hypochondria, neurasthenia, chorea, epilepsy, nervous dyspepsia, neuralgia, and many forms of insanity, are so obscure and subtle in their pathology that it is impossible to determine the precise seat of the disease in general or in any given case, and consequently we can never know just where the current should be localized. Even when the seat of the disease is, or is supposed to be, accurately known, if a special revelation should kindly inform us whether epilepsy, for example, takes its origin in the brain or in the sympathetic, and should point out to us just where the lesion occurred, we should still be in the dark in regard to the best method of localizing the current, for, without another and still more complex revelation we could not determine the extent to which all other parts of the nervous system had been affected by the local disease.

The force of this objection to the use of the accepted method of galvanizing the brain and cervical sympathetic is seen when we attempt to give the complete pathology of any of the diseases I have just mentioned, and, indeed, of almost any nervous disease that can be mentioned. Where is the precise seat of the disease in nervous dyspepsia? We know that the stomach is weak, and we prescribe galvanization of the pneumogastric; but what has the solar plexus and the spinal cord to say in the matter? Who can tell just how not only they, but the brain itself, may be the origin of nervous dyspepsia, or how much it shares in the pathological disturbance, and consequently how much it needs treatment? After eleven centuries of medical study, who can tell the precise and exclusive seat of the disease in epilepsy, hysteria, and neurasthenia? Is not the probability continually growing stronger with the advance of science, that in these and many other diseases the whole or a large part of the central nervous system shares as a cause, or result, or concomitant? Even in those diseases

where the lesion is understood, is there not much more of the unknown than of the known? In locomotor ataxy, progressive muscular atrophy, spinal congestion and irritation, is the spine only at fault? Do the sympathetic and brain wholly escape the infection? "Evil communications corrupt good manners" in pathology as well as in morals, and the communications between the sympathetic, and cord, and brain, of the nerves that branch from all these are so varied, and intimate, and complex, that when the cord is known to be diseased we very naturally incline to consider the other parts of the nervous system, like "poor dog Tray," in bad company, and we become very justly suspicious of their character. In this suspicion we are justified by the accepted views of the functions of the sympathetic, and by the clinical signs and symptoms of these diseases.

In cerebral hæmorrhage we always know the general if not the precise root of the disease. The spinal cord, through disuse, becomes affected with secondary degenerations, and the organs of digestion also more or less sympathize.

Moved by these two considerations, and encouraged by some good results that followed the treatment of cases of gastralgia by placing one pole at the back of the neck and the other over the pit of the stomach, and at the inner border of the sterno-cleido-mastoid muscle, I extended the applications to the head and spine, and thus gradually systematized and perfected the method which I here call *central galvanization*.<sup>1</sup>

*Details of the Method.*—The negative pole is placed on the pit of the stomach, for the twofold reason that it is well borne there, and that a descending current seems to act better in most cases than the ascending. Whether the differential action of the ascending and descending currents is due to the *direction* of the current, or to the poles, I am unable to say. The positive pole is less sensitively felt than the negative, and is less irritating, and it is not unlikely that this fact may explain the more satisfactory results of the descending currents in central galvanization.

<sup>1</sup> I first called the attention of the profession to central galvanization, in an article on "Electricity and the Sphygmograph," in the Medical Record, December 15, 1871.

It will be seen that the reasons here given for generally placing the negative pole at the pit of the stomach are the same that we have elsewhere given for placing the negative at the feet or at the coccyx in general faradization.<sup>1</sup>

In some systematic comparative observations that I made at Demilt Dispensary, the reverse method—placing the positive pole at the pit of the stomach—did not seem to be satisfactory, and similar experiments with the positive pole at the coccyx or at the feet in general faradization led to a like conclusion. The only way to determine a question of this kind is by comparing many applications on a variety of patients; in individual cases, no difference can be traced in the effects of the ascending or descending currents.

I do not always make the applications all over the head, but merely on the forehead, gently passing the electrode from one side to the other; then baptize the patient on the *cranial centre*, at the top of the head, and rest the pole there for about one minute, and sometimes longer. To the head I apply from two to six or eight cells—for patients vary in their susceptibility—and beginning with a weak current, and gradually increasing until a sour or *metallic taste* is perceived in the mouth. The *cranial centre*—the summit between the ears—I regard as the most important region of the head in all electrical applications, and especially in central galvanization. A current passing from that point to the epigastrium, traverses the centre of life—if life has any centre—and affects the sympathetic, and the roots of the facial nerves. The sensation produced by this application is different from that of any other application to the head, and is sometimes indefinable.

An application to this point for one or two minutes is usually about as much galvanization as the brain needs. In exceptional cases, where the hair is thin, or the head is bald, I make the applications all over the surface, back and front. In applications to the head, care should be taken to avoid sudden interruptions, or shocks that cause dizziness; the flashes of light before the eyes are of little account, but nothing is gained by producing them, and they are annoying to the patient.

<sup>1</sup> Beard and Rockwell's "Medical and Surgical Electricity."

The electrode is then passed down the inner border of the sterno-cleido-mastoid muscle, from the auriculo-maxillary fossa to the clavicle, for the purpose of affecting the pneumogastric and sympathetic. I usually make the application on both sides, and from one to five minutes.

In galvanizing the spine, especial attention is given to the *cilio-spinal* centre, below the first and seventh cervical vertebrae, which is to the spine what the cervical centre is to the brain. The cervical sympathetic and pneumogastric, as well as the spinal cord, are affected by the current. The electrode should also be passed the entire length of the cord by *labile* applications up and down. The back is not usually sensitive, and strong currents, from ten to thirty cells, can be borne without any more discomfort than a burning or pricking sensation beneath both electrodes.

The back may be treated from three to six minutes, and the whole length of the *séance* of central galvanization ranges from five to fifteen minutes.

*Preparation of the Patient.*—All the preparation a *male* patient requires for central galvanization is to unbutton the collar, remove the coat and vest, and slip ~~off~~ <sup>up</sup> the whole clothing, so that free access can be had to the spine.

A *female* patient may remove her corsets and slip up her under-clothing, or merely loosen the clothing at the neck and waist, so as to make room for an electrode to be passed down to the epigastrium, and for a spinal electrode to be passed up and down the back.

*Electrodes.*—For the negative electrode at the pit of the stomach any electrode with a broad surface, so as not to be too painful, and an insulated handle that the patient can hold, will answer.

For the positive pole, I prefer my *adjustable* electrodes, of different sizes. These can be passed under the clothing with great ease, and are wonderfully convenient for many of the purposes of electrization. They can also be provided with flannel covers, that may be washed as often as necessary.

*Central Galvanization compared with Localized Electrization of the Nerve-Centres.*—Before I had perfected the method of central galvanization, I had endeavored to fulfil

the same indications for which it is required, by successfully localizing the galvanic current in the brain, the cervical sympathetic, the pneumogastric, and the spinal cord, by the usual methods of galvanizing these parts. The results, though sometimes all that could be expected, are ~~not~~ very far inferior to those obtained from central galvanization, and for these two reasons: 1. In their localized applications, both poles are brought to bear on the different parts of the nerve centres, and the irritating effect of the negative is very frequently injurious. 2. The successive localizations in the nerve-centres are very inconvenient for the patient, and very laborious for the operator, since they require constant change of the position of the patient and of both electrodes.

*Central Galvanization compared with General Faradization.*—General faradization is the method of all other with which central galvanization would be most naturally compared, since it is used for very many of the same general indications as well as for the same special affections.

The leading difference between them is, that *central galvanization chiefly affects the central nervous system*, while in general faradization *a large part of the muscular surface of the body is acted on*. All other conditions being the same, central galvanization is differentially and specially indicated in those nervous diseases by whatever symptoms expressed, or by whatever name indicated, where, in spite of the nervous exhaustion or perturbation, the *muscular strength and the general nutrition* are comparatively undisturbed. In many forms of aneuric disease, such for example as neurasthenia, hysteria, insanity, neuralgia, sick-headache, etc., the muscular development and capacity may not only be impaired, but *positively increased*, so that the patient can take very long walks and undergo a vast amount of physical toil without fatigue; such cases are most benefited by *central galvanization*.

On the other hand, when these or other diseases are accompanied or followed by loss of body weight, and by muscular flabbiness and feebleness, *general faradization* is indicated for the obvious reason that it is the most powerful method now known of developing the muscular system. In general faradization the central nervous system is, of course, affected, but

to a less degree than in central galvanization. The practical difference between the two currents—faradic and galvanic—is mainly a difference of degree, due to the same difference that there is between bromide of potassium and hydrate of chloral, the faradic current being the bromide of potassium, and the galvanic the hydrate of chloral.

Bromide of potassium is a safer remedy than hydrate of chloral, fulfils a wider range of indications, but there are very many cases where it is powerless, and the hydrate of chloral acts as a specific; so the faradic current is safer than the galvanic, and therefore better adapted for general use, and, for those who use but one current, fulfils a larger requirement; and yet there are many cases when it fails and the more powerful galvanic is demanded.

It is this superiority of *degree* that makes the effects of central galvanization so much more positive and certain than faradization, however administered, in cases of nervous diseases of all kinds, and especially in gastralgia, angina pectoris, neurasthenia, and spinal irritation.

Central galvanization is indicated in very many of the same diseases as general faradization, but is differentially indicated in those conditions where the brain, spinal cord and sympathetic, pneumogastric and the large plexuses are involved. Thus in hysteria, hypochondria, insanity, gastralgia, angina pectoris, chorea, and spasmodic affections, nervous dyspepsia, where the system has not been greatly debilitated; in spinal and cerebral exhaustion, spinal irritation and congestion, and in certain diseases of the skin, central galvanization I have found, on the whole, more efficacious than general faradization. In some cases of hysteria, neurasthenia, anæmia, and in nervous dyspepsia when the weight of body has been greatly reduced, and\*in general debility of various kinds, I have found general faradization, on the whole, superior to central galvanization. Some of the very best results have been obtained by *alternating general faradization with central galvanization*. In some cases it happens that a change from one method to the other is of great advantage. Some patients, with strange caprice, act better under the one than under the other at one stage of their disease, whatever it may be, and at some other stage the conditions are reversed.

I have judged of these methods by the statements of the patients during the *séance* or directly after the *séance*, in the intervals and at the end of a course of treatment. I have judged by the appearance of the patients, by their changes in weight, size, and color, by the variations in the pulse, the temperature, the general circulation, the vascularity of the retina, by the relief of pain, the improvement in sleep and digestion, by the increased capacity for muscular and cerebral toil, and by the local effect on the tissue as manifested to the ear of the observer.<sup>1</sup>

In general, it may be said that *powerful stimulating tonic effects* are produced by both methods. The improvement in sleep and appetite, and in capacity for muscular and mental toil, and exhilaration, temporary and permanent, are observed either at the close or in connection with central galvanization, as after general faradization. *Increase of body-weight* is, I think, more marked after general faradization.

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