XVII.

PHYSICAL THERAPY

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I N D E X

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"Physical therapy" is the modern term for the collective use of all nature's forces of healing. The word "therapy" derived from the Greek, means, simply, treatment of disease.

Nature's forces furnish the basis of all life on earth. The warming rays of the sun, the pressure of the water, the electrical charge contained in all bodies around us; these elements form part of nature's inexhaustible and all powerful array of forces. The same powers of nature, if properly mastered, are of inestimable value in the art of healing. They help to repair the tissues of the body, relieve pain, quiet inflammation, destroy infectious germs, restore normal function and improve the condition of the entire body.

Krusen tells us, "The first primitive man to crawl into the sunshine for its warmth and vitalizing effects, unwittingly instituted heliotherapy, or sun treatment; the first man who bathed a wound in some woodland stream unknowingly instituted hydrotherapy, or water treatment; and the first man who rubbed a bruised muscle unconsciously instituted massage."

The present day widespread recognition and extended use of physical measures dates back only to the time of the World War, when the war hospitals contained many thousands of disabled and injured men who had to be comforted and brought back to full functional activity in the shortest possible time.

For the first time large departments for physical measures of known beneficial effect were established in each hospital. Under the direction of competent physicians and carried on by a well trained technical personnel, these physio-therapy departments proved of very great value in the treatment of disabilities caused by disease and injury.

From these early developments of treatment we also developed other forms of treatment of the greatest being Mineral Springs which have been used by mankind for better health since the beginning of history. In ancient Egypt, India, Persia, and Greece, temples were erected near springs, and they were under the control of priests. The Romans developed magnificent bathing establishments, and hot springs discovered by them on the continent of Europe became places of pilgrimage for the sick and disabled. The nature of the healing powers of the springs was a mystery until recent times. An invocation of the fourth century reads: "Hail thee, Oh spring, whose origin is unknown to us, holy, beneficent, inexhaustible, clear as crystal, azure-hued, murmuring in the shadows. Hail thee, Oh genius of the city, giving us health bringing drink."

The far-reaching discoveries of modern medical science brought on a new era of usefulness for the ancient fountains of health. The word "spa" as employed now has a wider meaning. It means a health resort developed at a mineral spring or a group of springs, which uses the spring water at its source in

conjunction with all other recognized means for the treatment of disease. The modern "Spring of Health" occupies a unique position between the home and hospital environments. It possesses some advantages of both without many of their disadvantages. It cares for people who should be away from home and business but who do not need the confining enameled walls of the hospital. In its working scheme, the sun, air, and water are the chief allies of the ministering physician.

The inscription over one of the remnants of the famous bath of Emporer Caracalla of Rome reads as follows:

"Light of heart approach the shrine of health,
So shalt thou leave with body free of pain
For here is no cure
For him who is full of care."

This sentence is as valid today as it was 2,000 years ago. In the chronic invalid's life, no matter from ailment he may be suffering, the visit to a health resort opens a new and hopeful chapter. It is generally recognized that the pleasant setting, the change of atmosphere, the life free from business and household worries, the abscense of the don'ts of one's nagging relatives, the entertainments contribute as much to the result of the "cure" as the mineral springs of the resort.

Exhaustive studies are still needed to describe the effect of the delicate chemical constitution of the various mineral springs on human beings when imbibed at their source.

Generally speaking, the chief importance of drinking copius drafts of water is that drinking open the eliminating channels in the bowels and kidneys; bathing open those of the skin, and outdoor exercise, walking usually adds to the general health building effects. The heat of the baths relieves rheumatic pains and softens deposits around the joints. In addition, in the ideal health resort the diet is regulated; simple, well-cooked meals are offered; languorous music is played; lights are out at 9:30 or 10 P.M., thus giving a much needed rest to shaken nerves and to the throat, stomach and intestines of some persons long a prey to high powered rye, Scotch and gin.

The health resorts on the continent of Europe and England have developed into a fine art the blending of all factors potent in the success of a spa. Most of the spas have specialized in handling one condition or one group of diseases. A trained and supervised technical staff administers the treatment; the patients are seen regularly by the spa physician and at the end of their stay are referred back with a complete report to their own physician. In past years, millions of dollars of American money were spent in these resorts, and patients cheerfully returned yearly for more treatment.

The recent upheaval in travel to Europe and the lack of sympathy with the tendencies of some of the continental countries has very appropriately focused interest on the abundant and

splendid natural healing resources of our own country. There are over 2,000 places boasting of health springs in the United States. Unfortunately, the status of some of our health resorts is far different from those of Europe. Part of this is due to the fact that state and municipal authorities as a rule do not cooperate with the resorts. The public in turn has acquired the unfortunate habit of patronizing these places without consulting a physician before going there and not undergoing examination by a competent local physician before taking baths. Some of these resorts require a doctor's prescription for the taking of baths, but in many of them there are no medical men capable of properly diagnosing the nature of the chronic ailment and prescribing an effective treatment. It is evident that any bath or treatment that can be taken indiscriminately is of no value; similarly if the water has value and its use is indiscriminate, it will do harm just as often as it will ever do good.

Fortunately, on the other side of the picture, there are also a number of health resorts available in the various parts of our country that compare favorably with the best of continental spas. In Hot Springs, Arkansas, for instance, a branch of the United States Department of the Interior, the National Park Service, effectively supervises the operation of all bath houses, cooperates with the medical profession to insure high class medical service and provides free baths to a large number of indigents from all parts of the country; it properly restricts admission for only such diseases as may be reasonably benefited

by the baths. There are many problems, medical, economical and legislative, to be solved before the American spa system as a whole can come up, for instance, to the high standards of our hospital system, which insures skilled and dependable care to rich and poor alike.

It is most desirable that our health resorts be strengthened and further developed as a part of our health system and that some of the large sums of money heretofore expended in Europe be conserved for home use. Fortunately, the signs of improvement all along this line are unmistakable.

Hydrotherapy

The application of pure water in or upon any part of the human body for remedial purposes is known as hydrotherapy. Hydrotherapy combined with diet, may undoubtedly bring about, or aid in the cure of numberless acute and chronic diseases.

Hippocrates, the father of systemic medicine, in his tract on the use of fluids laid down rules for the treatment of acute and chronic diseases by water, which are today followed by empirics as well as physicians, and which, together with subsequent developments, place hydrotherapy among orthodox and scientific methods of treatment.

During the dark ages of medical history we find the men who approached most nearly the spirit which governs the therapeusis of the present enlightened era--these were the men who were

invariably pronounced advocates of water as a remedy. Asclepiades was so well known as an advocate of baths and douches that he was dubbed "Psychrolutus." Through him hydrotherapy was popularized in Rome.

Paulus AEginita, who is regarded as the greatest physician of the seventh and eighth centuries, was an enthusiastic advocate of water, and he it was who first advised the cold douche for sunstroke and anuria. The next prominent figure in the history of hydrotherapy is Savanarala, who recommended baths in fevers, dysentery, leucorrhoea and debility. Hoa, a Chinese, used hydrotherapy by sweating and cold water.

But, despite all of the eminent and enthusiastic advocates, hydrotherapy did not become popular until the appearance of the peasant Priessnity. In 1840 he had treated over 1,500 patients from all parts of the world by methods he had invented; and when he died, twelve years later, he had amassed several millions. A copius literature sprang up in all parts of the world, and many institutions were modeled after his. The government built roads to facilitate access to his establishment; monuments and fountains were erected to his memory.

In 1839, two French physicians, Engel and Wertheim, asked permission of the French government for permission to open a hydropathic institution. After the authorities investigated hydrotherapy in hospitals, the institution was begun.

Just as among the ancients, we find the most renowned physicians of modern times become active advocates of water as

a remedy. The broad Catholicism has liberated hydrotherapy from the absurd stigma of its empirical relationship. Before the invention of chemical antipyretics, water was the only reliable agent for reducing temperatures, against which quinine struggled in vain for rivalry.

Today, the best clinical teachers are making an effort to prevent water from sharing the fate of chemical antipyretics.

The internal use of water is distinct in effect from the external use, as in the case with any other therapeutic agent.

The importance of water as a constituent of all secretions and excretions, as well as of all tissues, is it shows the effect of changes which may be produced in these by its increased inhibitions.

Water internally reduces temperature, flushes out toxins, acts upon the vaso-motor nerves, acts as a diuretic and prevents dehydration.

The external use of water is the most important made of application in hydrotherapy. This may be divided into two divisions: that evolved by its temperature effects and by its mechanical impact.

The technique of external use of water is very important, the first element of success in all hydriatic procedures is precision in executing them with regard to method, duration, temperature, etc. Water is so simple, so readily obtainable, and so easily applied that it would seem an unnecessary

refinement of therapeutics to enlarge upon the methods of its application. On the other hand, too, the empirical hydropaths and water-cure doctors have divided and subdivided their procedures into numerous baths and douches, etc., each one infalliably adapted to certain conditions.

The first step in this direction is the appreciation of the fact, that while there is no slight-of-hand or mystery in the hydrotherapeutic methods, there does exist a necessity for absolute precision in the application of water, simple and universally applicable though it be.

A few of the external water treatments will be given here to demonstrate the widespread use of hydrotherapy in the modern use of medicine.

Cold applications are among the most simple modes of treatment. Included are cold compresses; ice bags; cold sponges and wet packs. The wet pack has been found extremely useful in acute and chronic disease. In the use of the wet pack the most important result is the interchange of temperature, due to the cooled blood driven from the surface to the subjacent structures, but very soon the warmed blood from the interior takes its place, and dilation of the vessels is the result.

The tub bath is the most complete method of bathing resorted to, consisting of an entire submersion of the body,

with the exception of the head, the chin just barely touching the upper surface of the water. This method has been successfully employed in the treatment of typhoid fever and other infectious diseases. The warm tub bath was found, by Max Schüller, to contract the pia mater, thus producing a hypnotic effect. Medicated baths are not common, but are of great value in many cases. Examples of these are: electric baths; carbonated baths and many prescribed medicated baths.

Mechanical effects of water are illustrated by the douche; the sitz bath, hot-air bath; and the whirlpool bath.

The douche is a method of applying water in a more or less concentrated form, its chief element being the use of certain amount of force derived from atmospheric pressure. The effect of the douche is widespread. The nervous centers are aroused; the respiration is deepened; the circulation invigorated, and the secretions increased. In the form of the Scotch douche, which consists of alternating streams of hot and cold water, it is especially applicable in the treatment of excitation of the neuro-vascular structures.

The sitz-bath is a partial submersion of the pelvic portion of the body in water, including the lower portion

of the abdomen. It is used in influencing the circulation of the immense vascular area comprised in the intra abdominal muscles.

The hot-air bath is an apparatus which is surrounded by hot air. The temperature rises and after the desired amount of perspiration, the patient is cooled by cooling douche. Obesity, chronic rheumatism, gout, and certain cases of anaemia offer indications for valuable therapeutic results from these baths.

From this historical summary and examples of types of hydrotherapy, we show the importance of hydrotherapy in the past and the present.

Heliotherapy

Heliotherapy, the art of healing disease by means of the sun's rays, one of the oldest, if not the oldest of the physiotherapeutic measures employed by man, has gained the recognition it deserves only during the past twenty years. Heliotherapy has been employed for over 2,500 years. Herodotus, 431 B.C. mentions sunbath and advises it to restore muscle tone, also warns against its use during the summer in very weak individuals. Cave dwellings in the old world faced toward the east or south. Excavations at the temple of AEsculapius at Epidaunus have shown a large

gallery facing south and adjoining the hospital; there is every reason to believe that this was used for sun baths.

The Dark Ages saw the practice fall entirely into oblivion with other pagan-seeming customs, and not until in the eighteenth century did it in any measure revive. In 1774, Faure treated ulcers by solar heat; in 1776, LePeyre and LeCompte focused sunlight on to "wounds and tumours" by means of a lens with good results. Bonnet, Ollier and Poncet employed heliotherapy for tuberculosis joint affections in a manner similar to the method employed today.

The advent of the operative era in the later years of the nineteenth century directed attention away from heliotherapy and other conservative measures; the ideas of Bonnet were not, however, entirely dead at Lyons, where they were taken up again by his successors, notably by Poncet, who advocated exclusively local exposure to the sun for certain cases of tuberculosis, arthritis, and tried to apply this form of treatment as far as it was possible on the balconies of the General Hospital at Lyons.

In 1902, Bernhard of Samaden, having been impressed by the absence of putrefaction in meat exposed to the sun in a high mountain atmosphere, treated a large operation wound by exposure of the affected part to the sun; the result was so satisfactory that he was led to extend the application of sunlight to tuberculous lesions. Although he made this

great discovery, he did not publish his results until 1914. Rollier, an assistant to Professor Kocher, convinced that surgery was not the treatment for external tuberculosis established the first sanitarium for the systematic treatment of so-called surgical tuberculosis by means of sun's rays. Rollier of Leysin and Bernhard deserve the credit for establishing heliotherapy as a therapeutic measure of value. Fesin, by his great work, established many scientific facts in regard to light and its effect on the body cell and micro-organisms.

Technic of Heliotherapy

Rollier, who laid down the rules for the technic of heliotherapy says, "If we are to cure the patient, if we are to prevent recurrences, we must aim to overcome the disease as a whole and not only the visible manifestations." The sanitarium treatment is really a combination of light and fresh air. On arrival the patient is put to bed for a few days, even those whose local condition does not make this imperative. After three or five days they are moved to the verandas. After three to ten days the patient receives his first sun exposure. The head is covered with a white cap, eyes protected with glasses, and white garment worn over the body. On the first day the feet are exposed three times for five minutes; on the second day, three times

for ten minutes, and the legs to the knees three times five minutes; on the third day the exposures are increased five minutes; on the fourth day, thighs are included; on the fifth day the the arms; on the sixth day the back, and on the seventh the abdomen and chest, so that at the end of the first week some parts of the body are exposed for one and one-half hours per day. The exposures are increased five minutes three times daily until the patient gets a full sun-bath for from three to five hours daily. This is the maximum, as a rule, although some bear the treatment for seven hours. Pulse and temperature are closely watched and used as an indicator of the patient's tolerance. Careful check is made of each patient during the entire time of exposure to prevent shock, fainting.

Rollier emphasizes his interest in heliotherapy by saying, "Now, just as we are rehabilitating our wounded soldiers, we should rehabilitate our sick children. I believe this is best accomplished by the systemic use of heliotherapy, because it aims to cure the disease and not merely treat one of the symptoms; and because it so often results in restoration of funtion to such a degree that the little infividual will be self supporting in later life and will not be dependent upon the state or community."

Heliotherapy has been used through out the ages by lay people as well as physicians. In many cases through general experience, people have found the benefit derived from the warming rays of the sun; therefore helio-therapy has become one of the greatest means of medical treatment.

The History of Massage

I. Three thousand years before the Christian Era, the Chinese had a system of gymnastic and massage, records of which are found in the ancient writings of Kong Fu, and it is also mentioned in the sacred books of the Hindus. Among the ancient Greeks and Romans, massage was in an advanced stage of development. Homer, about the year 1,000 B.C., tells us in the Odyssey that beautiful women rubbed and anointed war-worn heroes to rest and refresh them.

The Greeks used gymnastics to develop the body, finding such practices an aid to health and causing improvement in mental culture. They had a regular system, combining baths, gymnastics, massage, and exposure to air and sunshine. Eventually there arose a school of gymnast physicians who used these means as therapeutic remedies.

Games were also of great importance, and before and after these we read of anointing the skin with oil and covering the body with powder and fine sand.

The writings of Hippocrates 380 B.C. may well be followed at the present day. He said "A physician must be experienced in many things, but assuredly also in rubbing, for things that have the same name have not always the

same effect. For rubbing can bind a joint that is too loose, and loosen a joint which is too tight. Rubbing can bind and loosen; can make flesh, and cause parts to waste. Hard rubbing binds, soft rubbing loosens; much rubbing causes parts to waste, moderate rubbing makes them grow." In his writings Hippocrates uses the term "Anatripsis" which means the art of rubbing up and not down. In those days the circulation of the blood was not understood, but Hippocrates must have made careful and persistent observations to discover that rubbing upwards in the case of limbs had a more favorable effect than rubbing down, and we may conclude he produced the same effects we are achieving today, with regard to the absorption of effusion, the relief of blood stosis, and the carrying away of morbid products in the system.

Towards the Middle Ages massage seems to have fallen into disuse, at all events in Europe, but we hear of it again being used about the year 1580 by the great Ambroise Pare', the renowned French surgeon of the sixteenth century. In the year 1812 the whole system was revived and rearranged by Peter Henry Ling, a Swede. He established a school in Stockholm, which continues to the present day as the Central Gymnastic Institute. The Ling System comprises the use of gymnastics as well as massage, and is adapted

for the use of those in health as well as the sick.

Within the last thirty years massage has gradually been adopted as a therapeutic agent in England. Before that time it was used, but those who practised it were people holding a somewhat anomalous position. There were few opportunities for training, and doctors had difficulty in finding competent workers to whom they might entrust their cases.

In the year 1894 a body of women joined in forming a Society of Trained Masseuses with the object of safe-guarding the interests of the profession, and of furthering the science, study, and practice of massage. In 1900 the Society was incorporated by permission of the Board of Trade, and became known from that date as the "Incorporated Society of Trained Masseuses." This Society gradually increased the number of its members and the scope of its work until 1920, when it amalgamated with another society formed at a much later date. The same year the two together were granted incorporation by Royal Charter and have since been known as the Chartered Society of Massage and Medical Gymnastics.

The aims of the Society are as follows:

1. To improve the status and training of Masseuses.

2. To provide for the examination of and the granting of certificates to masseuses.

3. To keep a roll of members.

4. To establish a registry for members, and a centre of information for the public on matters connected with massage.

5. To arrange lectures and to provide a library for masseuses.

The rules of the Society are as follows:

1. Not to undertake any cases of massage except under the direction of a registered medical practitoner.

2. Not to advertise, except in recognized medical and nursing papers.

3. Not to sell goods to patients in a professional capacity, or to accept secret commissions on the sale of goods.

Successful candidates at examinations do not become members until elected as such by the Society's Council. The Society publishes its own journal, containing articles of general interest to masseuses, and all official notices of the Society. There is also a valuable medical lending library for the use of members.

II. Technique of Massage.

Massage may be described as a scientific way of treating some forms of disease, by external manipulations,

applied in a variety of ways to the soft tissues of the body.

Manipulations in general use may be classified as follows:

1. Effleurage - a stroking movement, done with the whole surface of one or both hands, or with the thumbs, in a centripetal direction.
2. Petrissage, to knead, is a movement performed by grasping the tissues to be worked upon, with the whole hand, or with the thumb and fingers. The movement is done on special muscle groups. Kneading, wringing, and picking up are all forms of petrissage.
3. Friction, a small circular movement performed with last phalanx of the thumb, with the tips of the three fingers, or with the knuckles. It is given with varying degrees of pressure upon the soft tissue.
4. Tapotement is sometimes called percussion. There are several kinds: hacking, clapping, beating, and pounding.
5. Vibrations were first scientifically employed by Ling at the beginning of the nineteenth century, but they have been further elaborated by others since that time.

III. Effects of Massage

The first effect of massage is upon the skin. It is to remove any excretory products which may embarrass its function. It then increases the cutaneous circulation, and has a beneficial influence upon the sensory nerve endings.

It must be remembered that respiration is carried out to a slight degree by means of the skin. This process may be accelerated when the skin is kept in a good condition by massage.

The effect of massage upon the muscle tissue is of vast importance.

The result of forced inactivity is loss of tone, wasting and impaired nutrition generally. Such condition may be remedied by massage. If the manipulations are applied regularly, the affected part will increase in size, strength, and firmness; the circulation will improve, and the limb return to its normal size and condition.

The influence of massage upon the circulation of fluids is of great importance. Deep manipulations cause the veins and lymphatics to be mechanically emptied, and the fluid cannot return, on account of the valves within the vessels. More space is thus made for blood

returning from the deeper parts. The massage may be said to act both by suction and by pressure.

Massage also greatly effects the nervous system and the metabolism of the body.

From this brief history and summary of massage, we can see how important it is to the well body as well as a sick body.

Electro-therapeutics

I. History

Electro-therapeutics dates back to the legendary age. The women of Africa bathed their sick children in waters frequented by the electric eel or torpedo. In the year 500 B.C. Actius states that those suffering from gout or convulsions found great relief by holding a magnet in the hand.

Electro therapy passed through four great eras. Each one brought more knowledge about the use and advantages of the use of electricity in the treatment of disease.

The era of franklinization was the first. At this time when the medical faculty were inclined to despise electricity and underrate its value, Wesley claimed that electricity was indicated in a wide range of disorders, and with the list of ailments which he drew up as suitable for electrical treatment the more modern physician who has studied electricity will find little fault.

The era of Galvanism began in the year 1786, when a paper "Electricity of Metals" written by Galvani was published. In this paper Galvani describes the contraction that occurred in the legs of a recently killed frog when the muscles and nerves were touched by an arc

formed by two dissimilar metals. Galvani at first maintained that the electricity came directly from the muscles and nerves themselves, and in the flush of his initial success he is stated to have believed he had discovered the origin of life. As early as 1792 Galvanism was recommended as a means of distinguishing real from apparent death. But through continuous studies and experimentation Galvanism has become widely used in testing and strengthening of muscles; continuous heating of tissue and testing of nerve fibres.

In 1831, the discovery of the induction coil by Faraday, brought the Era of Faradization. The faradic current may hence be regarded for therapeutic purposes mainly as a means for the artificial stimulation of muscular contraction and muscular exercise. Its use is indicated in that large class of cases where muscular exercise is likely to be beneficial: in cases of obesity; of wasted or flabby muscles; of dilated hearts, in rheumatism and a variety of similar conditions.

The last period of this age of development was x-ray. In 1895, Professor Rontgen was experimenting with Lenard and Crookes tubes when an unusual phenomenon met his gaze. His tube was completely enveloped in an opaque cover, when

a near by paper containing a fluorescent substance exhibited a most pronounced visible glow! The rays offered a triumphant resistance to the action of the magnet. These were the rays so indispensable to the photographer's art; the rays that were destined to revolutionize many preconceived notions in medicine and surgery. A new radiation had burst forth at the touch of genius; a new science had come into being. Hundreds of men took up the future experimentation of x-ray, and from their laborous studies we now have the indispensable developed x-ray.

II. High Frequency

High frequency currents for the cure of disease was introduced by D'Arsonval in 1842. In 1891 Tulsa, aroused greatest enthusiasm by the employment of alternaters with a multiplicity of poles, and, by the introduction of transformers, he was enabled to increase the potential to an almost incredible number of volts, making possible the assertion and proof that high-frequency could be made to pass through the human body, with sufficient energy to light up several incandiscent lamps, without the slightest danger to the person through whom the current was passing.

Diseases successfully treated by high frequency are: gout; rheumatism; obesity; hysteria; epilepsy, and other similar diseases.

III. Static Electricity

Static electricity is produced by means of friction on glass or other non-conducting materials; by rubbing fur or flannel against a revolving plate of glass or against sealing wax.

For therapeutic purposes special apparatuses have been constructed which supply current with high voltage, but small ampuage. The apparatus mostly used in America is sixteen to twenty-four plate Halty machine. The current produced flows always from one pole to the other in one direction, though the polarity may change from one day to another when the apparatus takes on a new charge.

The various static modalities can be classified as:

1. Conductive discharges
2. Disruptive discharges
3. Convective discharges

According to Snow the constitutional effect of static electricity administered to a healthy individual is practically nil. So far no effect on the general metabolism or the general circulation has been demonstrated to follow the application of static electricity. On the other hand, a strong contraction of the tissues under and near the point of application can be observed. This

effect cannot help but affect strongly the organs in the regions treated, if they are subject to such influence. We may expect results on all contractile organs, like the liver, spleen and muscles.

The static spark is a strong sensory stimulus and acts as such, causing local contractions, local hyperemia evidenced by reddening of the skin, and has a distinct, at least temporary, analgesic effect.

On account of the small amperage practically no chemical action is exerted by the static current.

IV. Diathermy

A. Introduction

An electric current, whether direct or alternating, produces heat in the conductor in proportion to the resistance encountered. The amount of heat energy is determined by the square of the current, multiplied by the resistance.

The electric current also produces chemical changes in the tissue it passes in direct proportion to the strength of the current and its duration. The chemical action of the electric current consists, as has been said

before, in a migration of the disassociated parts of the molecules, the ions, from one pole to the other and produces chemical changes in the tissue through which it passes in direct proportion to the strength of the current and its duration.

B. Surgical

Surgical diathermy is used as the term embracing all forms of applications in which the diathermy current is applied for destructive purposes.

The method may be varied in essentially four different ways. These are:

1. Fulguration - the current is permitted to arc from the point of the needle to the surface which is to be destroyed. The action of this procedure is only superficial. Only a very thin layer is destroyed. In order to cause the current to create a spark between the tip of the needle and the treated surface

of the body, two different technics may be used. The most common is by attaching a metal plate to one terminal of the d'arsonval salenoid and placing it upon some area of the body while the other terminal is connected to the needle. The usual distance for holding the needle to make the arc is about 1/8 inch.

Fulguration may be used in the treatment of conditions where dermatologic practice of today employs medical solutions for the superficial destructive purposes. The advantage of employing fulguration instead of these medical eschartics is that the area to be destroyed can be much more limited. The cosmetic results are excellent. It is usually impossible to detect where the destructive action of the fulgurating current has been applied after the destroyed layer is separated off, which is about ten days.

2. Electrodesication is particularly well suited for the destruction of small growths in various parts of the body. The essential difference in the technic of the application of desication as compared with fulguration is in the fact that in desication, the needle is inserted into the growth to be destroyed before the current is turned on. As a matter of fact, some degree of fulguration also occurs at the same time because as the area becomes dehydrated arcing occurs between the needle and the tissue immediately surrounding it.

3. Electrocoagulation causes more intensive destruction than electrodesication. It is, therefore, the type of current best applied for the destruction of a malignant tissue. Essentially, the same hook-up is used as in medical diathermy. The major difference consists in the fact that the current is strongly concentrated at the area which one desires to destroy.

4. Electric cutting current is a modification of the high frequency current secured from diathermy machines which permits cutting of the tissue.

C. Medical diathermy was defined by Zimmern as "a form of thermotherapy which utilizes electrical energy for the production of thermal effects in the depth of the tissues."

It was not until 1910 that the therapeutic value of diathermy was brought out by Nagelschmidt, through the agency of an apparatus designed by himself. During the same year Doyden reported his experiments with high-frequency currents in the treatment of cancer.

He found that normal cells of the body are able to withstand a temperature of 140° F, while cancer cells are destroyed by a temperature of between 122-131° F.

The passage of an electrical current through the tissues of the body will always produce heat. By means of diathermy, we are now, in a way, able to apply an internal poultice to the organ itself.

Dr. DeKroft says: "Venous congestion wherever present, is relieved because of the marked activity of the arterial circulation. Anemia of the splanchnic area ensues, vesical congestion is relieved. The liver, the intestines and other organs within the abdominal cavity are made to disgorge the stagnant pools of blood which bathes their structures. When

the action of the diathermic current has subsided and the blood stream returns again to its normal channels, freshly oxygenated arterial blood enters in great abundance into the previously anemic and venously congested area. The parts are placed in a better state of defense against invasion of toxins and bacterial colonies."

Thus, from this statement we can understand why diathermy is used in the treatment of diseases of the liver, chest, and other internal organs.

V. Ultra Violet Ray

The earliest papers to allude to the lethal action of the actinic or chemical rays, i.e, the ultra violet rays, appeared in the "Proceedings of the Royal Society" of December 26, 1877. The experiments therein described were performed chiefly to show the retarding effect of sunlight on the development of hay baccilli placed in thin glass test-tubes. The authors made the significant observation "We have invariably found it a difficult matter to sterilize an ordinary cultivation liquid, when a second screen of glass was placed between it and the light."

This led on to further experimentation and development of facts of the use of ultra violet rays.

Fever therapy has become one of the greatest types of electrical treatment since the discovery and use of electricity in medicine.

The first means of instituting fever in the body was by malaria, next came typhoid, but because these were so dangerous to the patient and were so exhausting the use of these diseases to produce fever were gradually reduced and replaced by electrical treatment.

The infra red cabinet was the first treatment and about the same time humid hot air came into use. Gradually, fever therapy has developed until we have the most modern type of inducto-therapy, the new "fever cabinet."

The fever cabinet is a large cabinet made of aluminum and is heated by an inductotherm cable. The single loop of the cable distributes the energy input throughout the patient's body so that excessive heating is not developed in any restricted zone. A fan heater is provided with three heats--low, medium, and high. The heated air strikes the water in the stainless steel humidifying pan at proper angles to assure adequate circulation of warm humidified air over the patient. The instruction and preparation of the patient should be started as soon as hyperpyrexia has been decided upon.

Instructions include:

1. Adequate fluid intake during the

twenty-four hours before treatment.

2. Must have a good night's rest before treatment.
3. Medications should include the bromide groups because they are tolerated better and productive of fewer untoward effects.

"As soon as the patient arrives, he should be put into the cabinet, because patients beccome nervous and fearful, and are likely to exhibit undue restlessness during the induction period."

The management of the patient during the treatment is the sole responsibility of the nurse. Fluids should be given frequently and in small quantities. From two to four liters of water should be given during a treatment.

For restlessness and extreme uncomfort the patient should be given pantopon grains 1/3.

The temperature, pulse, and respiration should be recorded every fifteen minutes. Any sudden change should be recorded and immediately reported to the physician in charge.

From the termination of the period of hyperthermia approximately half an hour is necessary for reduction of

temperature. After about thirty minutes the temperature has dropped sufficiently so the patient can be bathed, given an alcohol sponge and taken to his room for the night.

Indications for inducto-pyrexia are numerous.

1. Arthritis - fever therapy is not a positive cure, but rather is presented as a new method which offers much more hope for intractable cases.
2. Asthma - has been found to relieve 50% of all cases treated.
3. Chorea - twenty-five cases of chorea were treated by artificial fever produced by electromagnetic induction. In all cases, the choreiform movements ceased promptly.
4. Gonorrhea - in six months, thirty-three patients suffering from simple urethritis or from urethritis complicated by cervicitis, salpingitis, or arthritis were referred for fever therapy. Twenty-nine of these patients received systemic treatment and were cured.

5. Syphilis - fourteen cases early syphilis were treated with hyperpyrexia. This therapy was combined with neoarsphen amine and bismuth salicylate in half of this number. All of the seven cases treated with hyperpyrexia alone developed further clinical or serologic signs of syphilis after treatment ceased. All of the seven cases treated with combined therapy became serologically negative and showed no clinical signs of syphilis for periods ranging between five and eighteen months.

6. Other cases treated by hyperpyrexia are: General paresis; gonorrheal apthalmia; multiple sclerasis; and tabes.

Through this general summary and the use of hyperpyrexia, we can see why fever therapy has become so important in modern treatments.

Conclusion

The principles and practice of physio-therapy have become as widespread and recognized and the general practice of medicine. True enough, just as in the practice of medicine, there are many quacks and many fakes, but in the past century physio-therapy has become one of the most developed methods of treatment.

In 1925, the Council of Physio-Therapists was organized. This council passes the rules and gives examination to all those participating in physical therapy. An examination is given each year to all registered physio therapists, in order to continue practicing they must pass this examination; therefore a registered physio therapists, when carrying out doctor's orders can be very beneficial to a patient.

Let us not discourage this practice, but educate the people to the benefits which may be derived from it, if it is carried out properly and under a physician's care.

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