

Hydrotherapy

Hot-Cold-Wet-Dry Spa Treatments.

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Theoretical Background Physiology of the Skin

The skin is the 'vegetative nervous sense organ'. Water can account for a heat loss twenty-five times greater than possible through air. Stimuli that act on the skin travel from the skin receptors through the segmental reflex (consensual reaction) to the other side of the body, but also through the autonomic centers of the central nervous system (enlarged or distant consensual reaction).

The cold receptors are more frequent in the skin than the heat receptors; for example, in the face the ratio is 11.3 as against 3.3 per square centimeter, and even in the trunk the ratio is 9.7 for the cold as against 0.6 per square centimeter for the heat. The temperature corpuscles are nets of nerve tissue that develop action currents when there is a fall in temperature, that is, when a cold stimulus is applied to a warm skin. Even in very warm environments, such as an overheated sauna, the cold receptors are excited, with a resultant paradoxical goose flesh response.

The temperature-regulating mechanism in the hypothalamus responds to signals by an attempt to avoid cooling of the interior through reduction of the body shell, particularly the cutaneous organ. In the subcutaneous tissue, arteriovenous anastomoses are closed to reduce the amount of circulation; sympathetic innervation, both central and peripheral, produces an initial constriction. The skin cells, in turn, continue to form substances that act on vessels, since brief, cold stimuli increase cellular metabolism. With a reduced blood supply, these H-substances are not excreted in usual quantities, as in the case of other acid products of metabolism such as carbon dioxide and lactic acid. The histamine-like substances block cholinesterase, which inactivates or destroys newly formed acetylcholine, thus permitting a prologation of acetylcholine action, a dilation (Lewis' phenomenon) that increases the blood flow through arterioles and capillaries.

Reactive hyperemia occurs after a short, cold stimulus if the skin was previously well supplied with blood. When the blood, cooled during its passage in the skin, reaches the hypothalamus, the nervous center marshals the body defenses to prevent further cooling through action currents and by direct action on neighboring nerve centers, which explains the generalized effect of cold-water applications on the autonomic system. We speak of these responses as vascular training through partial hydrotherapy.



The segmental blood shift that follows cold stimulation of the skin is reflected in the other corresponding side (segmental reflex) and elsewhere in the body - brain vessels, pharynx, coronary vessels, and kidneys - a telereaction. We depend upon this reaction to obtain a slight increase in the coronary artery blood flow by stimulation of the left arm, or where this is not desirable, by a warm or contrast foot bath.

The increase in cutaneous circulation also involves the neighboring muscles with a shift from the interior (lungs and abdominal cavity), known as the Dastre-Morat law. We know of no other method that will increase the circulation so much with so mild a lasting and physiologic effect as hydrotherapy.

Brief hydrotherapy applications to a warm body segment will (a) shift blood from the interior to the skin segment (b) stimulate gastric secretion through a histamine effect (c) increase the general metabolism, particularly of the muscles and liver, through the central heat regulator (d) increase general and cardiac muscle tone and minute cardiac volume with lessened pulse rate (e) reinforce breathing by deepening respiration (f) regulate general excitability of the nerves and (g) increase resistance to the common cold.

Minor hydrotherapy also has a hardening effect, by a decreased tendency to upper respiratory infections. A deficient blood supply of the mucosa may result in stasis and even ischemia, which lowers resistance to infection. It is likely that the surface of the bacteria is coated by serum globulin, magnesium, and antibodies, the last of which kills the bacteria. Phagocytosis as well as humoral properdin depend upon adequate tissue blood supply; stasis may be followed by a perivascular edema, which is in effect a favorable nutrient for infectious organisms. The blood supply of the buccal mucosa is easily evaluated by thermocouple temperature measurement. The amount of flow of blood in the buccal cavity is influenced by distant stimuli through the telereaction of Dastre-Morat, according to which, blood vessels in the head and brain react as skin vessels do rather than as deep vessels of the thorax and abdominal cavity.

The uniform room temperatures gained by central heating or air conditioning lead to a diminution in reactivity of the cutaneous organ as opposed to the hardening in outdoor life. We believe this accounts in part for the greater frequency of colds among people with industrial, or indoor jobs.

If people with a tendency to colds immerse their legs in cool water at 15C for one to two minutes, we note that, even while still in the bath, there is telereaction and the oral temperature drops from 0.5 to 2.0C or more. A slowing of the blood flow continues for several minutes in sensitive persons. If a hardened sportsman or those who have completed a hydrotreatment are exposed similarly, there is either no change in the buccal temperature or only a transient lowering of a few seconds.

Water can be applied in any of its three physical states (steam, liquid, or solid) or in any combination of them. Because of its high specific heat and versatility, it is an excellent medium for conductive heating or cooling since it absorbs and gives off heat slowly. While an air environmental temperature of 27C/80F is comfortable for the nude body, a water environment of the same temperature is cool. For most people, the critical level of temperature sensation is about 34C/93F - the average temperature of the skin. Hot and cold are therefore relative terms.

Hot water (up to 40C/104F) has an initial stimulating effect, but, as the body recovers from the first response to immersion at this temperature, there is a general and muscular relaxation.

Cold water, on the other hand, may cause some shivering, goose flesh, increased pulse and respiration, dilation of blood vessels, increased muscle tone and metabolism; these are the responses of most healthy individuals. This may be called 'a tonic' stimulating reaction to cold as compared with the 'atonic' response to heat. The response to hot or cold water varies with the length of application. Cold may be invigorating when used for a short period but is damaging over a longer period. Even in local applications (ice water) the hand may be able to tolerate exposure for more than a minute or two. The skin finds prolonged exposure at 40C/104F uncomfortable for more than a few minutes; water at 50C/102F may destroy mucosa in a short application (vaginal mucosa is an exception) and skin in a few minutes.

Hydrotherapy is the external application of water for therapeutic purposes. The body or any of its parts may be immersed in the water or the water may be applied to the surface with or without the intermediary of absorbent materials. In prescribing hydrotherapy, it should be specified by type, temperature, duration and frequency.

Types of Hydrotherapy

Full Immersion Bath: One of the simplest forms of hydrotherapy, available in nearly every home because of the bathtub, is the immersion bath. Depending on the temperature of the water, these baths are called neutral or cold, cool and hot.

Sitz Bath: A sitz bath is a method of applying water to the mid-portion of the body, especially to the perineum and the areas adjacent to it. The temperature of the water may be as low as 8C/46F and as high as 40C/104F. At these extremes, exposure will be brief. Since one of the chief values of a sitz bath is prolonged application of water at a comfortable temperature, the bath is usually given in the range of 36C to 40C/96F to 104F.

Neutral Bath: Because the temperature of the major part of the body's surface is about 33C/93F, water at a similar temperature produces comparatively little change in the body's physiology. Likewise, a variation of a few degrees either below or above this temperature exerts but little influence on the body's activity. The range of relative thermal indifference lies between about 32C/90F and 36C /97F; within this range, the production and loss of heat is relatively small, and there is no definite impression of heat or cold. For this reason, a bath at these temperatures is particularly suitable for cleansing purposes and also for underwater exercise. Their duration may be 15-30 minutes.

Hot Bath: An immersion bath with the water temperature ranging between 35C /96F and 40C/105F feels decidedly hot. At such temperatures loss of heat from the body's surface is stopped, except from the protruding head. At the same time, the body is heated by conduction and therefore the temperature of the entire body will rise. The immersion bath is a rapid means of producing artificial fever. Its efficiency is so great that it may prove a dangerous method for the maintenance of prolonged temperature elevation. Short periods of immersion may cause comparatively little dislocation of the temperature level. Baths lasting two to fifteen minutes are employed in the treatment of chronic rheumatic manifestations in joints, fibrous tissue and muscles; for the relief of muscle spasm, and of colic in the gastric, intestinal, gall bladder, or urinary tracts.

Excellent results are obtained by hot water baths in clients suffering from chronic arthritis. It is recommended that the client be placed in a tub with the water at about body temperature. After immersion the temperature is increased to the point at which it produces maximum muscle relaxation (about 38C /101F to 40C/104F); it is then gradually lowered to the level found most comfortable for the client (between 35C/96F and 36C/98F). Underwater massage should be applied while the client is in the tub; motion should also be encouraged; first passive, then active and later resistive. Because of its severity, this type of bath should not be administered to clients with diseases, such as those involving the heart and arteries or the central nervous system.

Cold Bath: A cold immersion bath whose temperature varies from 10C/50F to 21C/70F may be used, but for very short periods of time (four seconds to three minutes) during which the body should be briskly rubbed by the client himself or by an attendant. After the bath, the client should be briskly rubbed with a towel and dried quickly. Because of the vigorous reaction which it produces, this bath should be given only to robust individuals. In such persons, it causes a feeling of general exhilaration; the circulation becomes more rapid and the appetite is stimulated. If chills develop, the client should be promptly removed from the bath. The cold bath is used as a metabolic stimulant, for obesity, and for atonic states. It should not be administered to very young or very old persons.

Contrast Bath: One way to influence the peripheral circulation is by applying evocative stimuli to the skin. One of the simplest methods is by surrounding parts of the body with water at different temperatures.

A contrast bath consists of two water containers, each large enough to hold two legs. Into one container is poured enough cold water to cover the immersed leg, and the other container is filled with hot water. Since the total duration of treatment is relatively short, thermostatic control of the water temperature is not required. The cold water may be held at a level of about 10C/50F to 16C/61F and the hot water at 38C/100F to 44C/111F. The leg or legs are first placed in the hot water for four to six minutes and then at once in the cold water for one to two minutes. For the client to end treatment with a feeling of comfort, the final immersion should be in the hot water.

Contrast baths are used to stimulate local circulation in limbs without obstructive vascular pathology.

Chemical Baths

Natural and Artificial Baths; Carbon Dioxide Baths: The immersion bath can be modified by mixing various gases and solid substances with the water. Such mixtures sometimes occur naturally and furnish the *raison d'être* for spas throughout the world. Waters containing large amounts of carbon dioxide are found in certain places; for instance, at Bad Nauheim (FRG) and Saratoga Springs (USA). Effervescing carbon dioxide baths may be made artificially by means of a special carbon dioxide mixing apparatus;

1. by permitting carbon dioxide gas to flow from a cylinder through perforated tubes placed in the bottom of the tub;
2. or by adding chemicals to the water. None of these baths is as effective therapeutically as
3. natural carbon dioxide water.

To make the third type of bath four to eight pounds of salt are placed in a tub containing about 40 gallons of water. One-half pound of sodium bicarbonate is added, then six to eight large tablets of acid sodium sulfate are placed at equal intervals at the bottom of the tub.

The special beneficial action of these baths is attributed to the bubbles of carbon dioxide gas which are liberated in great quantities. The client should lie quietly in the bath, without unnecessary motion, to avoid dissipating the layer of bubbles next to his skin.

Baths are administered every other day, with progressively increasing percentages of carbon dioxide. At the start, 25 percent is used; this is increased to 50, 75 and 100 percent. If dyspnea is relieved, the temperature of the baths is reduced to as low as 86F.

The number and frequency of baths are arranged in accordance with the results achieved. When the cardiac insufficiency is relatively recent or the compensation is good, full-strength saline and carbon dioxide baths are administered in a series of three. The temperature of the first bath is held at 35C/95F. Subsequent bath temperatures are reduced, 26C/80F being the lower limit. The duration of the bath is increased up to a period of 12 minutes. If there is no disturbance of compensation, the first bath may be a combination of carbon dioxide and saline in their strongest concentration, at a temperature of 32C/90F, for a period of 10 minutes. The time may be gradually extended up to 15 minutes.

In cases of high blood pressure, the temperature of the bath should not be reduced below 35C/95F. In "nervous or functional heart conditions", the baths are first administered for five minutes at 33C/93F; thereafter the temperature is reduced at each bath until a level of 29C/85F is reached. The time for taking these baths is in the morning, two hours after a light breakfast. It is important that they be followed by a rest period of two hours; otherwise, much of the benefit is lost.

The carbon dioxide in the bath enters the body through the skin. The skin becomes red, indicating increased circulation not resulting from temperature influence. Corresponding diminution takes place in the circulation of the deeper organs. The heart is slowed, possibly by reflex excitation of the vagus nerve. The carbon dioxide bath has an action similar to digitalis on the blood pressure; if high, the blood pressure is lowered; if low, it is raised. Respiratory and pulse rates are slowed. There is increased elimination of urine. The cardiac muscle becomes trained without increasing the frequency of the heart beat. Contraindication; heart disease with decompensation and marked arteriosclerosis.

Oxygen Bath: Oxygen may be introduced into the water of a bath from perforated tubes lying at the bottom of the tub and connected to an oxygen tub. In an oxygen bath the temperature of the water should be held between 32C/91F and 35C/95F. The duration of the bath should be 10-20 minutes. Its effect is soothing. Its use is in the treatment of hypertension, advanced cardiac disease, nervous irritability and insomnia.

Brine or Salt Bath: Brine waters occur naturally at certain spas. Artificial brine baths can be made by adding from five to eight pounds of sodium chloride to 40 gallons of water. The temperature of the water should be between 32C/90F and 40C/105F; the duration of the bath, 10-20 minutes. Where higher concentrations of salt are employed, the increased buoyancy may make it necessary to hold the client down with weights. Artificial sea water baths are made by mixing seven pounds of sodium chloride, one pound of magnesium chloride and one half pound of magnesium sulfate in 30 gallons of water. Indications for saline baths include osteomyelitis, fractures, dislocations, arthritis, myositis, fibrositis, gout, chronic sciatica, and obesity. Contraindications are arteriosclerosis, cardiac disease, hypertension, and inflammations of the skin.

Hydrotherapy Showers

Shower: It is an application of water by an apparatus that drives or throws water upon the surface of the body or any part of it. It permits variations in the striking pressure, the number of streams of driven water, the total quantity of water and the temperatures of the different streams of water used.

Jet Shower: The simplest form of shower is a single stream of water applied through a device identical to a garden hose and having an adjustable nozzle. The operator stands at a distance of three meters (nine feet) from the back of the client and directs the flow of water between the shoulder blades, up and down the back and up and down the extremities. The operator may start with the water at a neutral temperature and lower or raise the temperature. The operator may also raise or lower the pressure of water or increase his distance from the client for more or less stimulation.

Fan Shower: The fan shower differs from the jet shower only in the shape of the projected stream. Although this can be accomplished with a fan-shaped nozzle, in practice it is usually achieved by placing the thumb over the water as it emerges from the fully opened nozzle opening so that the water "fans" out. Some operators like to alternate the fan and jet shower during its application by using the finger control.

Rain Shower: Water pipes can be arranged in many ways and with many outlets in a circular, triangular, or quadrilateral fashion so that water may be thrown against the body at many different levels and at different intensities and temperatures. Such a shower has been called the horizontal rain or needle shower.

Scotch Shower: this is another way of saying alternate shower. The operator works at a distance of three meters (nine feet) or more from the client near a water control panel. The operator holds a water hose and is able to vary the pressure and the temperature of the water. The usual procedure is to throw hot water at the client from one to three minutes and follow it by cold water for one fourth to one sixth the time of the warm application. The temperature range of the hot water is from 38°C/100°F to 50°C/122°F, and that of the cold water is from 13°C/22°F to 22°C/71°F. The Scotch Shower begins with hot water at only 38°C/100°F applied for one minute, followed by cold water at 27°C/80°F applied for 10 seconds. Each day the hot water can be made a degree hotter until 40°C/104°F is reached and the cold water 11°C/51°F colder until 1.5°C/34°F is reached. The duration and rate of change must be guided by the response of the client.

The Scotch Shower is usually given to persons for whom an increase in mental alertness is desired or to those who feel the need of a "tonic" shower.

Vichy Shower: This is a technique developed in Vichy, France, which is given in the recumbent position (the Aix-les-Bains is given in the sitting position). The client is supine on a canvas cot, which is covered with a sheet of perforated rubber and an air pillow to support the head. The Shower may be prescribed as tonic or sedative. For the tonic shower, a fan spray is applied to the sides of the trunk and the abdomen, avoiding as much as possible the gall bladder area, at a temperature of 36°C/97°F at the beginning, which is raised in three to five minutes to 41°C/105°F. The shower is followed by a short, partial jet spray in the standing position. For the sedative shower, the water is applied to the abdomen at a temperature of 36°C/96°F to 37°C/98°F with virtually no pressure for two to four minutes in a circular or spiral motion. This shower is usually followed by one in the standing position, as mentioned for the stimulating type.

Methods and Recommendations of Spa Therapy

There was a time when the principal treatment at a spa for rheumatic diseases was waters and peloids. This has changed. Spas use all other recommended methods including all forms of physical and drug therapy simultaneously. This complex spa treatment is especially indicated in more serious cases. The term cure (French) and Kur (German) in connection with spa therapy does not mean "healing", but as in Latin, TREATMENT or therapeutic course.

Acute rheumatic diseases are not suitable for spa treatment. A client who suffers an attack of acute rheumatic fever must not be admitted to a spa "cure" until three months after all clinical and laboratory tests show no signs of activity.

The most important **INDICATIONS** for spa treatments are inflammatory and degenerative disorders of the locomotor system. Spa therapy must be considered as a more or less significant part of the overall therapeutic plan and by no means as a medication which can replace or make superfluous all other forms of after-care. Chronic rheumatic diseases usually require medical care for years to avoid deterioration. The spa "cure" must be extended to at least four weeks and some times to seven weeks, shorter periods are usually unrewarding.

Of the inflammatory joint diseases, **RHEUMATOID ARTHRITIS** is most often referred for spa therapy. Its management consists of administration of thermal baths daily or every other day, according to the general condition of the client. Similarly, the duration and temperature of the baths must be adapted to the individual or delayed since vigorous treatment given too early can provoke an exacerbation. The reaction of the rheumatoid arthritis to the first baths must be followed as a guide to prescription changes. The first week of treatment is a kind of touchstone for the entire "cure". The reaction of the client decides whether further treatment will be mild, moderate or intensive. If there is an elevation of temperature, elevation of the sedimentation rate or fatigue, further treatment is at a relatively low temperature for short periods. Dry blanket packs after the bath are shortened or omitted completely and bed rest is prescribed for the whole morning.

On the other hand, when the baths of the first week were for no more 20 minutes at a temperature of about 37°C/99°F, the duration and temperature are increased. Baths are often alternated with peloid applications on a part of the whole of the body. Even if the client tolerates the strongest treatment, at least one day of rest, free of any treatment is ordered. A thermal pool where **REMEDIAL EXERCISES** are done under supervision is indispensable to the program. The integration of all forms of treatment based on clinical and laboratory responses will attest to the skill of the consulting physician.

In spas where only peloids are available, peat or moor baths and topical packs are applied alternately.

THERMAL MUDS ARE FOUND ONLY IN AREAS WHERE THERE ARE NATURAL THERMAL SPRINGS. Ankylosing spondylitis is another inflammatory joint disease which can be benefited by spa treatment. The management of this disease in the spa is similar to that of rheumatoid arthritis, the difference being that even more attention must be devoted to therapeutic exercises in this condition, for these reasons: A. Ankylosis of the spine can be delayed and possibly prevented by exercise, B. Atrophy of the dorsal muscles can be avoided by daily remedial exercise, and C. Dorsal kyphosis can be prevented or halted by a good exercise program. Sufferers of this ailment should be referred only to those spas where there is a competent staff of physical therapists, a pool of the right temperature, size and construction for underwater exercises.

Complex Spa Therapy

Spa therapy is an institutional program which combines regular treatment with the natural remedial resources of a health resort. The sojourn at the watering place is no longer a distraction and relaxation combined with some baths, mud and drinking. It is a serious attempt to enable the man who cannot undergo a systematic course of treatment at home, owing to the haste of 20th century living to devote a period of four weeks to receive thorough medical care. During that period, he is asked to follow a prescribed diet, to take regular meals, walks and in short, to lead a healthy ordered life with sufficient sleep. The client should also learn what to do in the months to follow. The client should accept a schedule of daily exercise, preventive positioning during sleep, and the need for a sensible diet.

SPA PROGRAMMING Spa therapy is a complex procedure resulting in many different stimuli acting on different joints of the body through thermal, chemical, medicinal and last but not least psychological functions.

At every spa there is a variety of material agents supplemented by artificial conditions. The natural factors which are always important are the directic and balneologic. In addition, there are the pools and (physical) spa therapy departments which not only offer hydrotherapy but also all other physical agents. Just as there is no routine prescription for drugs and diet, there is no routine prescription for spa therapy-programming. The program must be adapted to the condition of the client and then modified, depending upon their response to it.

It is often practiced that clients are given a booklet that indicates instructions for the spa program – bath, drinking of water, if any, duration of rest period, the occurrence of bed rest, sleep, a detailed diet, the recommended sports and recreational activities.

The booklet also contains a regimen to be followed at home.

It is not possible to give a general since it is a composite, which is related to the knowledge of the program participant, the person's level of activity, and a thorough understanding of the natural therapeutic agents of the spa combined with the programmer's skills to use them.

Tomado de: HEAT Spa Kur Therapy Development Inc