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HYDROTHERAPY

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RUDIMENTS OF HYDROTHERAPY APPLICATION 1

In hydrotherapy the most common is the application of useful water. In some spas mineral and specific water which does not show aggressive impact on the devices involved is used as well. Water – cure treatments that are used can be divided into general and topical with appropriately adjusted temperature and time of process. The temperature of treatments is usually determined in respect to how it is sensed which includes the range of temperatures of the following parameters:

1. cold 8-20°C
2. cool 20-27°C
3. tepid 28-33°C
4. warm 34-37°C
5. hot 38-44°C

In hydrotherapy a significant importance is put down to the temperature of used water as well as to the individual's reaction to this type of stimulus that can have a topical or general character which can be potently dependent on the time of processing. The strength of stimulating action of hydrotherapeutic treatments depends on the difference between the temperature of the body in respect to the temperature of water and the bigger the difference, the stronger is the stimulating effect. Similar influence show the processing time of treatment as well as different mechanical factors, irritating skin during the bath. In topical treatments, besides the factors previously mentioned, a very important element is the size of body area as well as its vasculature and a number of located there receptors of warmth and coldness due to the fact that the bigger is the area, its vasculature and innervations, the strongest is the effect of a stimulus. Cool and cold treatments should be carried out in a series lasting over a dozen of days without longer break because a break lasting a couple of days wrecks adaptation abilities of an organism. Thermal treatments in hydrotherapy are used in the form of rather gentle warmth as well hot treatments. Water – cure treatments that are used can be divided into general and topical with appropriately adjusted temperature of water.

1.1. Thermoregulation

Keeping stable temperature of a body is possible thanks to the existence of thermoregulative system which main element is thermoregulative centre located in the brain and to the lesser extend other centres. Keeping the balance between heat produced and emitted depends mostly on nervous and humoral systems.

Temperature of body regulated by nervous mechanisms is determined on the grounds of feedback with the help of a centre located in hypothalamus connected with appropriate receptors, detecting biases from given temperature. Thermoregulative centres located in hypothalamus are divided into two functional units: heat production and heat loss centers which are antagonists of each other. Thermoregulative centre is stimulated directly by the warmth of blood and, in a reflexive way, through the impulses coming via afferent nerves from the receptors sensitive to the warmth and coldness. From it, the impulses run directly to thermoregulative executive organs and to other vegetative systems or to relevant endocrine glands. The regulation ob body temperature in humoral way is determined by the system of endocrine glands, especially by adrenal gland, thyroid, pituitary gland and pancreas. These glands to high extend influence on increase or decrease of metabolism, causing increased or decreased production of heat.

The mechanism that regulates the changes of temperature is supported by peripheral thermoreceptors located in skin and mucous membrane. The number and depth of the localization in the skin of receptive organs for warmth and coldness is not uniform. Number of cold receptors, located mostly in the surface layer (0,15 mm), varies around the number of 300 000, while the number of warmth receptors at the level of skin papillas does not extend 25 000. The biggest concentration of external thermodetectors is found in facial area while in the skin of limbs their number is equal only the half of the number of this type of receptors found in the skin of torso. The edge stimulus for cold receptors is the fall in temperature about 0,004°C per second, and for warmth receptors, increase in the temperature by 0,001°C during one second, however the time of change in temperature must be at least three seconds so that the changes could be detected.

Human is a homeothermal species which causes the fact that our temperature is stable and, to great extend, independent from external temperature. The temperature of human body varies in some boundaries, depending on the place where the measurement is taken. The most often, temperature is measured under axilla, in groin, less often in the mouth or anus and despite little differences the temperature measured this way is called average or general. The temperature that is characterized by higher stability than average is called base temperature: it is measured idly, in the morning before getting up, in anus, mouth or in vagina. The temperature in the human body is laminarily distributed, depending on the type of tissue and the depth of its localization in the organism which leads to determining cortex and core parts.

Cortex part is a surface layer of a body with a thickness from 1 to 2,5 cm, making about 20-30% of body's weight that is characterized by limited stability of temperature. Cortex part conditions heat exchange between the inside of the body and environment. The temperature of cortex part is determined largely by the amount of blood flowing through it, the temperature of environment, time of a day, states of activities, having meals, clothes and so on. The temperature of skin is lower than the general internal temperature of organism by 3 to 5°C and can vary in extreme cases from 25°C to 32°C, depending on the place of measurement as well as external temperature. Weighted-average of the temperature of human skin surface is equal 33,2°C and it is an average temperature of a skin of a person wearing light clothes, sitting in a room of a temperature around 21°C, humidity 50% and velocity of air movement about 0,10 m/s.

In normal conditions, bare parts of skin have lower temperature, for example in case of ear's skin it can vary between 23°C and 28°C, hands 28-35°C, and head 34-35,5°C. Under skin, while moving towards the core part of the body, the temperature increases fast. If the skin, however, has direct contact with cold or warm environment, especially if this environment has larger thermic capacity like it is in case of water, the influence of the environment temperature easily causes transferring it to the deeper layers of the body.

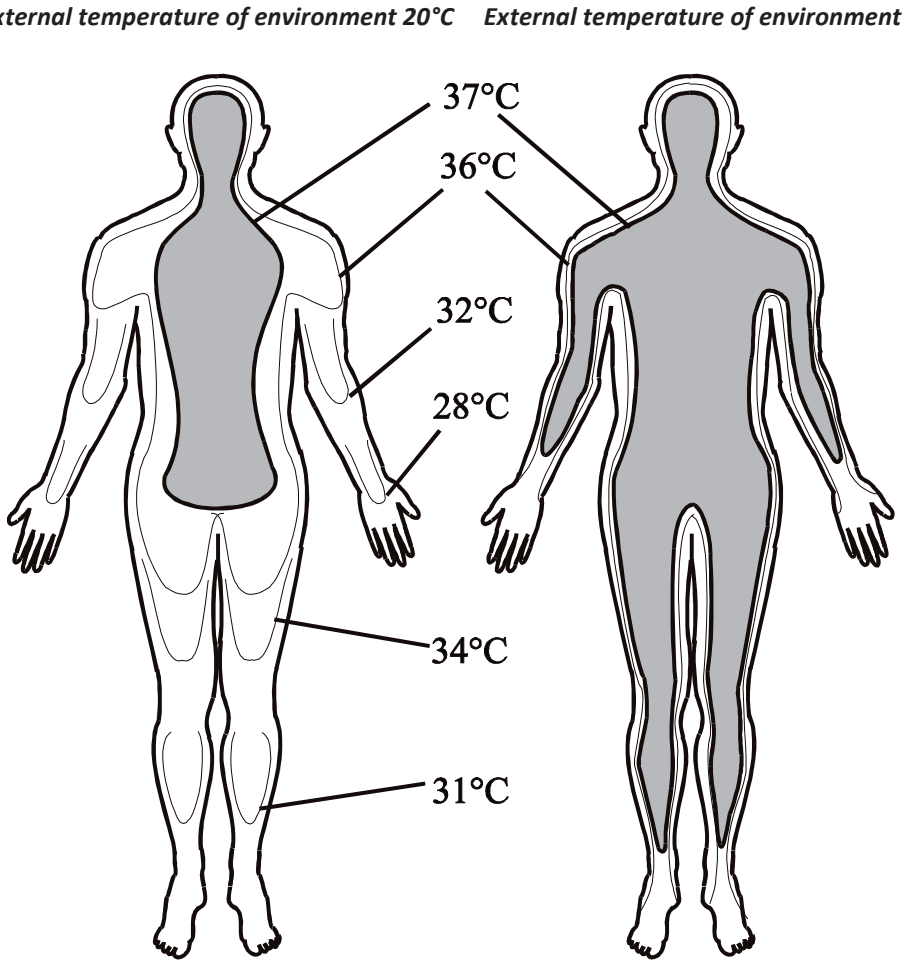

Figure. 1. Isotherms of cortex and core parts of human body according to external temperature of an environment (by J. Aschoff)

Core part, including inside of a body with a temperature kept on relatively stable level of 37°C is independent from the temperature of external environment of a human and is a main condition of a efficient work of homeostasis. The temperature of core part of the body is a result of temperatures of different internal organs which even in thermoneutral conditions may show significant differences in temperature of as much as from 0,2°C to 1,2°C, depending on the place of measurement. The highest temperature usually occurs in the tissues and organs located deeper, in heart, liver, brand and brown fat tissue. Stability of temperature in core part is dependent by far on fat tissue which is a good thermal insulator that separates cortex part from core part. Heat conduction of fat tissue is very small and constitutes about 1/3 of thermal conduction of other tissues.

Exchange of heat between cortex and core parts is carried out mainly through the broking role of blood, running through arteries and veins. The more blood comes from internal parts of the body to surface layers, the biggest amount of heat is delivered from the core to the cortex part. If the flow of blood from core to cortex part, however, is significantly limited, the heat can be delivered mostly via thermal conduction, which is made more difficult by the insulating tissues with fat tissue in the first place.

Individually the level of temperature is very stable, it can undergo, however, some diurnal variation from 0,5°C to 1°C. People who sleep at night and are active during the day, have the lowest temperature around six o'clock in the morning and the highest at about six p.m. People working at night very often have adverse diural rhythm of temperature. The influence of diural rhythm is connected mostly with the rate of metabolism which is the highest at the time of activeness and work.

External conditions can cause significant and sometimes rapid rise in body temperature. Significant increases in temperature are observed after physical efforts. After significant effort the temperature measured in anus can reach for a while even 41°C. The temperature rises also after meals, an increase can reach 0,2-0,4°C. Body temperature is also a little higher at the time of emotional arousal, probably because of unconscious increase of muscles' tension. Fall in temperature of the body, in contrast, can be caused by deep sleep, drunkenness and narcosis. Cold bath can lead to the fall in temperature as well, hot bath has an opposite effect. Stable temperature of inside of the body is one of the most precisely determined elements of homeostasis. Homeostasis is a feature of an organism which enables it keeping relative stability of internal environment against existing external environemntal conditions which provides proper activity of all organs, systems and tissues that are subject to regulatory actions of nervous and humoral systems.

Healthy organism keeps proper level of heat thanks to the balance between heat loss through physical thermoregulation and heat production through chemical thermoregulation with active role of nervous and humoral mechanisms.

1.2. Perceptibility of temperature

Evaluation of environmental temperature by the human organism is subjective and depends by far on the thickness of fat layer, the level of adaptation, individual sensitivity subsequent to getting used to particular temperatures, environmental conditions, season of a year and time of a day as well as the clothes worn. Perception of the changes of environmental temperatures occurs when the temperature of environment differs from the temperature of skin by about 6°C. Simultaneously, sensing the differences by the patient in perceptibility of the real temperature depends on distribution of skin thermoreceptors, with the number of cold receptors few times bigger than the number of warmth receptors, and on thermal conduction of a particular material. For example, if we touch the skin with a metal and expanded polystyrene bars of the same, room temperature, at the touch of metal we feel cold, but the touch of polystyrene seems to be rather warm. The difference in perception is caused by the higher thermal conduction of metal, causing faster reception of skin warmth than in case of polystyrene.

The edge stimulus for cold receptors is the change of temperatures in the range between 10°C to 41°C, and for warmth receptors from 20°C to 45°C. In conditions when the temperatures of environment and skin are equal, the receptors are not aroused and are in so called state of physiological zero. Thermal conduction of water equals 0,0012, while this value for air is 0,00006, hence thermal conduction of water is 20 times bigger than this of air. Therefore, depending on the temperature of water, not only a loss or reception of heat can take place; there is also a significant difference in perception of temperature.

In skin there are also mechanoreceptors and pain receptors which show some reaction for changes in temperature, but this reaction is over ten times weaker. Nonetheless, cooling skin to the temperature below 10°C or its rapid heating over 45°C is a clear factor arousing pain receptors. Distribution of thermal receptors in the skin is not uniform regarding their location and number and it causes the situation where the highest sensitivity for temperature changes show bulbs of fingers, chest, front surface of arms and the skin of abdomen.

Topical and general reaction of an organism after application of water of the temperature different from neutral, usually causes specific symptoms, and the processes taking place in the body

are directed by the thermoregulative centre. Thermoregulation itself relies on balanced adjustment of heat exchange between an organism and its environment with simultaneous keeping organism heat balance, providing stable temperature of inside, which is connected with proper heat production by the body. Regulation of body temperature is provided on chemical and physical ways with the efficient role of nervous mechanisms using feedback as well as humoral mechanisms. Chemical regulation takes place mainly in core part of an organism through the changes regarding metabolism and through activity of muscles while the physical regulation takes mainly place in cortex part of the body, on the way of reception or loss of heat.

During application of cold water, human organism strives to keep heat balance mainly through decrease of heat utilization and increase in heat production. In the first phase of cooling, skin becomes pale in the result of contraction of skin veins, which occurs in result of stimulation of sympathetic system: simultaneously, numerous factors limiting heat loss and increasing heat production start working. The process of sweetening is stopped, which to great extend limits heat loss: later muscles start to shrink, what can be observed as thrills, living a lot of heat, also the mechanism stimulating metabolism starts to act. During this period, blood pressure increases, breath becomes faster and deeper. After a short time, which can be an individual feature of a particular person, an organism enters second phase, where the symptoms and effects are opposite to the first one. Skin slowly becomes redder, the feeling of coldness becomes less apparent, which is an effect of dilating peripheral arteries being a result of stimulation of parasympathetic nervous system. If the cooling is not prolonged, blood pressure becomes lower and breath rate more stable. After skin becomes significantly red, the cooling treatment must be stopped, regardless to the previous predictions or prescriptions of its duration. During cooling of the total body, blood running to limbs is not directed to cortex layers, but to the arteries located deeper inside in the near neighbourhood of deep veins, where the heat is partially exchanged, despite it still remains in the body. Thanks to this the temperature of peripheral parts of limbs is low, which results in small temperature exchange between the body and environment.

After longer cooling of specific part of a body, for example arms or legs, waveform pattern of vasoconstriction and vasodilation occurs, mainly in the lumen of skin vein and arterial anastomoses except for capillaries. Vein and arterial anastomoses are located in a great number in skin, especially in the bulbs of fingers and toes and in auricle; they are specific tools of fast heat exchange between an organism and environment. The waves of increased blood circulation are called Lewis' waves and they prevent tissues from being damaged, especially in case of prolonged ischemia. This circulation is determined by internal temperature of the body and the higher the temperature, the longer, higher and more frequent the waves are; during cooling of the core of the body, the process is much weaker. However, the vessels in head's skin are subject to shrinkage due to the low temperatures in a very limited manner, therefore this area is a source of a significant heat loss, which can be as high as 10% of the whole heat produced by the organism in response. This extremely weak vasomotion in this area of skin is not indifferent in topical and general body processes and therefore application of cold treatment on the skin of head and nape should be limited. Simultaneously, there is a significant heat loss in cold water in the areas of side surface of chest and groins.

Cool and cold treatments should be carried out in series lasting over a dozen of days without longer breaks, because they could wreck the adjustment abilities of an organism. Additionally, it seems more beneficial rather to shorten particular expositions to cold and even to decrease the temperature more than to use longer periods of milder temperatures. The strength of thermal stimulus should be increased gradually, because too low temperature used at the beginning of treatments may worsen state of health and disturb physiological processes of organism. The most beneficial and, at the same

time, the safest way of conducting treatments relies on starting from higher temperatures and short time of application. Every 2-3 days the temperature should be decreased by 1 degree and after a couple or dozen of days of systematic applications, it helps to achieve better effects and easier adaptation to low temperatures, which lasts for a few months after completing treatment. Treatments of this kind cannot be used in small children and older people. Many older people have decreased physical and chemical thermoregulation processes and vasoconstriction due cold application may lead to greater loss of heat than in case of young people. Moreover, increase of heat production is also smaller and slower. Besides, subjective sensing of cold and hot temperatures among older people is very much decreased and it can be three times worse than in case of younger people.

Thermal treatments in hydrotherapy are used in the form of gentile warmth and hot treatments. Mild warmth incerases blood circulation in the skin and in tissues located directly underneath, which is demonstrated through bright reddening of skin, which changes after a while into a bluish shade giving a signal, that active hyperaemia turns into passive. Hot treatments used rapidly may cause short-time pale shade of skin, followed by rapid reddening. Generally, warmth causes fall in blood pressure increasing heart rate in a result of filling with blood dilated peripheral blood vessels. It simultaneously causes a number of other effects such as increase of metabolism, stimulation of sympathetic part of nervous system, relaxation of muscles, reduction of pain and inflammatory oedemas. It also contributes to psychical relaxation. In warm or hot water, blood is rapidly transported to the vessels in skin, causing decrease of its volume in core layers of body. The more intensive and prolonged the process is, the more significant and wider the processes of organism's adjustment must be. The most unfavourable processes include smaller filling of heart chambers with blood. Therefore, hot baths should be used only in case of healthy people; in case of people over 65 years of age and people seriously overweighed, duration and temperature of bath should be limited.

While using topical hot or cold treatments it should be taken into consideration, that local changes can spread to neighbouring areas or to more distant opposite parts of body, and in case of very strong stimulus they can spread, in extreme situations, for all area of skin, causing generalized effects for the body.

Strength of stimulating action of hydrotherapeutic treatments depends on the difference in temperature of the body against the temperature of water and the higher the difference, the stronger stimulatory effect of treatment. Similar impact has time of processes applied and other additional factors teasing skin during the bath. In topical treatments, in contrast, besides all factors mentioned above, quite important are vasculature and innervation of the body surface as well as the number of cold and warmth receptors present due to the fact, that the bigger the number of them and the stronger vasculature and innervation skin are, the stronger the effect of stimulation. Reaction of the body for the stimulus used during the treatment is not always the same, because organism undergoes constant changes, depending on external environmental conditions as well as internal processes. These entire factors, not always predictable, make the process of determining the procedure of treatment using edge temperatures of cold and hot water rather complicated. General reactions of a patient should be always carefully observed and all the changes of skin behaviour should be registered because they are a mirror reflection of the general and topical processes taking place inside the organism.

Hydrotherapeutic treatments can be carried out only in case of patients who are prepared to them and when there are no contraindications. The patient cannot be too cold or too hot and should get used to the humidity and temperature conditions in hydrotherapeutic plant. The treatments should not be carried out fasting or directly after eating; when the meal was abundant it is

necessary to wait for at least 1-1,5 hours. Drinking alcohol is an absolute contraindication. In case of illnesses with a fever as one of symptoms the treatments also should not be performed as far as a physician prescribed them.

Hydrotherapy requires at least proper space for each treatment stand, proper access to cold and hot water, cloakroom, changing room, room to rest, some sanitary room as well as other rooms and equipment necessary to conduct water treatments. These requirements condition not only the quality of treatments provided, but also prevent from body injuries or other health complications.

In hydrotherapy the scope of the treatment that is applied is essential, general water treatments always cause reaction of all organism and the strength of effects is determined by type of treatment. Therefore their application requires careful fulfilling all prescriptions and contraindications, especially if there is a need to prescribe them to older people or to people suffering from different illnesses. In contrast, local treatments cause much smaller effects and, as a rule, should be used as a trial treatment in case of ill or older people, to exclude possibility of occurring of any unpredictable or unfavourable results in case of generalized treatments. Therefore water-treatments should be precisely divided into general and topical treatments, although in many situations they are the same or very much similar, and the only significant difference is the size of surface on which the treatment is performed.

1.3. Hydrostatic pressure in hydrotherapeutic treatments

In human body distribution of blood depends largely on the position of the body. When lying, about 13,5% of all the blood finds itself in the vessel system of lower limbs, but it rises up to 25 % in standing position. This is similar to blood pressure, which in lying position is almost equal in all arteries, but in standing position is higher in lower limbs than in upper limbs by about 50-60 mm Hg. Vein pressure of blood in lying position is on average equal 11 mm Hg, and it increases in sitting position to about 50-60 mm Hg, and while standing to 80-90 mm Hg.

Keeping sitting or even standing position for a longer period of time results in cumulation of fluids in the extravascular area, which leads to decrease of circulating blood and fall in the level of filling vessels with blood, especially in chest and head. As a consequence, even in case of healthy people, it can lead to increase in volume of lower parts of legs as well as feet, and in case of people with some disabilities of circulation system it can result in serious oedemas. The symptoms are especially noticeable if patient remained in the same position without movement or during longer journey.

During the change of position from standing to lying, a gradual movement of blood from lower parts of the body to the chest, especially to the heart and lungs takes place in the volume of about 600 ml, half of which is taken by the lungs vessel system. Lungs vessel system is a large reservoir of blood, which is, however, hardly subject to different regulative mechanisms, besides hydrostatic ones what are, to a great extend, connected with negative pressure in the chest.

In water conditions, however, all these processes look a little bit different. During full immersion in water in horizontal position, in vein part of circulation system it comes to dislocation of 600-800 ml of blood to right vestibule from limbs, skin and stomach. It causes increase in size of right part of the heart and vessel trunk with the increase of values of systolic pressure of right chamber and lungs arteries, protecting the body against collapse during the bath. Hydrostatic action of water on a human body decerases the diameter of legs by 1,5 cm, torso to 5,5, chest up to 3,5 cm after 10 minutes of bath. In all types of water treatments with full immersion of the body in water, we can ob-

serve a phenomenon of illusory loss of weight, that is equal about 9/10 of the real weight of the body. Moreover, this illusory loss increases together with increase of level of water mineralization, which can be an additional element in rehabilitation and balneologic procedures. This phenomenon is especially used in hydrotherapy connected with kinesytherapy because it requires from the patient only 1/10 of muscles strength that must be used normally outside water and additionally the plastic resistance of water provides mild resistance during work of muscles.

Dislocation of blood in the organism immersed in water of neutral temperature is subject to slowing down, but at the same time the mass of dislocated blood increases, and the process becomes more apparent while the temperature of water rises, which is connected with tissue reservoirs getting empty. In warm water heart rate increases, as well as volume and minute capacity of heart and the rate of blood circulation, while peripheral resistance decreases. Ventilation of lungs is the higher, the higher the temperature of water is. In contrast, in the water of a temperature below neutral, the volume of blood circulating decreases, because it is stored in tissues and organs as well as in the dilated vessels in peripheral parts of the body. Heart rate slows down, propulsive volume of the heart decreases and peripheral resistance is higher. During having a bath collapses are very uncommon. Only during first 2-3 minutes some disorders are observed.

2.1. Cold bath

Whole body cold baths are used at temperature 8-20°C, and their duration should be from 5 to maximum 30 seconds, usually between 5-20 seconds. The temperature of air in treatment cabin should be about 26°C, with minimal movement of the air being kept. The rule is that the first treatment starts from higher temperature and shorter duration and another rule says: the lower the temperature of water is, the shorter the time spent by a patient in the water should be.

First treatment should be started from slow immersing of a patent in water, up to the neck, in water of temperature around 20°C for 4 up to 6 seconds, after that a patient should get out of water and energetically rub his body with a towel. Short baths can be used every day, while the baths lasting for about 20 seconds not more frequently than 2-3 times a week. All treatment should consist of 8-15 baths.

This kind of treatment is especially useful for young and middle age people as an element of organism quenching as well as in metabolic diseases, obesity, poisoning with heavy metals but only in case of people with very efficient circulation and breathing systems. It is also recommended for sportsmen, who continuously lose their heat during trainings and tournaments and the duration of baths in this case can be longer, but not exceeding 30 seconds. Better results can be achieved with a greater number of more frequent and shorter treatments.

Contraindication include all illnesses of circulation system, early period of recovery after all illnesses, even a very common, bad tolerance of low temperatures; these baths should not be used in case of small children and old people.

2.2. Cool bath

Whole body cool bath his recommended at the temperature from 20 to 27°C and the duration 5-15 min. The bath should be started with the water of 27°C and than gradually temperature should be decreased. The duration of bath should be determined according to the skin vasculature reaction. It is recommended for young people, in metabolic diseases, especially in mild form of diabetes, in obesity, in chronic poisonings with heavy metals, in tiredness as well as a kind of preparation for cold whole body baths. These baths have relaxing and stimulatory effect on the body.

2.3. Tepid bath

Whole body tepid baths at the temperature of 28-33°C and duration of 10-20 minutes, are a kind of treatment, which does not have many limitations. It is especially recommended in case of people with low blood pressure, during periods of tiredness, in states of significant nervous arousal, in asthma, emphysema because it can significantly improve breathing mechanism in these illnesses. It is a result of relatively mild temperature of water as well as hydrostatic pressure of water, which through pressing on the chest promotes its expiratory position, making the ventilation of lungs easier. Tepid baths should not be used, however, in chronic inflammatory states of urinary system, in rheumatic diseases as well as in oedemas and inflammations of peripheral nerves, and in case of patients very sensitive to lower temperatures.

2.4. Warm bath

Whole body warm baths at the temperature of 36-37°C and duration of 10-30 min, have relaxing, pain relieving, and hypnotic effects, it also reduces tension of muscles, and when the duration of the bath is longer, it can reduce blood arterial pressure. This type of bath is generally safe and can be used in different states of general indisposition and in mild illnesses as well as in recovery period. It is especially recommended in spastic palsy, stiffness of joints, chronic pains of muscles and joinst, Parkinson`s disease, different types of neuralgias and in particular, polyneuropathies.

Figure 2. Medical bath T-MP (Technomex)

2.5. Aromatic bath

Aromatic bat his a specific form of whole body warm bath that is enriched with ether oils or herbal extracts, or other plant products. Special bath salts, cosmetic liquids and bath gels of different indications can be used. Aromatic baths have very complex effects because, besides hydrostatic pressure and the temperature of water, another factors having biological impact are ingredients of plant and mineral products, which can have very complicated biological impact, enabling multidirectional supporting action in many mild illnesses as well as in preventing treatments and in cosmetology.

The temperature of aromatic bath should be 36-38°C and it should last for 10-20 minutes. The amount of oils being added must be precisely dozed, according to the indications of manufacturer, who usually determines number of drops or millilitres that should be used. These indications should be obeyed because dozes are very different, from 5-10-18 drops to 8-10 millilitres. Overdosage can lead to inflammatory states or oedemas of skin. First two baths should be shorter, and last about

8-10 minutes with smaller amount of oils and other products limited by 1/3 of prescribed dose. This kind of baths can be taken 2-3 times a week for a period of 3-4 weeks. Average number of baths per single treatment should not exceed 12. While using aromatic baths for cosmetic purposes, it is recommended to massage the whole body with a rough sponge or a glove for 1 or 2 minutes under hot shower and immediately after this immerse the body in the bath. It helps the skin cells to absorb caring ingredients more easily. Such baths are especially recommended in case of people with dry skin, in case of oedemas, herpes, lichens, as well as insect stings. Whole body bath with addition of special herbs is especially beneficial in states of general exhaustion, in some skin diseases and as a relaxation bath for people with tendencies to nervous reactions and having insomnia problems. It is a very efficient treatment method in psychoneurosis, in mild forms of depression, in the states of physical and psychical tiredness, after exhausting physical activities, and for cosmetic purposes contributing to gain firm and smooth skin.

Before attempting to take aromatic baths, it is necessary to check allergic reaction for a chosen type of oil, that it is very important in case of tendency to allergic reactions. Two different types of tests should be performed. Patch test is done through rubbing a drop of a particular oil in the skin on the inside part of and elbow and later observing it carefully for a period of an hour to notice all possible changes occurring in this area of skin. Normal reaction includes light reddening of skin or light sore, while more serious reaction with an intensive red colour and oedema is a clear contraindication to use such oil. Second test recommended especially in case of allergy is a smell test, in which you pour a few drops on a wipe and later smell it several times during the period on next few hours. If symptoms of hay fever, irritation of eyes, lacrimation of sneezing the reaction occur that means that this particular oil must be excluded from potential application.

2.6. Graduated hot bath

Graduated hot whole body bath is carried out at the temperature from 38°C gradually rising to 42°C, and duration of 10-20 minutes. The bath should be started at the temperature of 37°C and gradually, every 2-3 minutes it should be increased by 1°C, and after reaching the temperature of 42°C the patient should stay in it for 2-4 minutes, after that the temperature should be decreased by 3-4°C in the during the period of 2-3 minutes and the bath should be finished. To this type of treatment, long bath tubs are necessary, giving an opportunity to set down in horizontal position with a support under the head and legs. During the bath, every 3-4 minutes, the face and nape should be wiped with cold water. If during the bath any circulation problems occur, with symptoms of dispnoea, anxiety and increase of heart rate up to 130-140/min, the treatment should be immediately stopped, and patient's nape and chest should be poured with cold water. In case of serious pathologic problems, the patient should be taken out of bath and put down on the couch with an ice bag or a cold thermophore in the heart area.

Graduated hot bath his recommended in all types of muscles and joint pains, increased muscular tension, multi-nerves inflammation after the heaviest phase of illness, in nephrolithiasis and cholelithiasis, urinary system infections, chronic diseases genitourinary tract, upper respiratory tract infections and during common cold as well as to strengthen immunity of an organism. One of types of this bath treatment is overheating of an organism with a purpose to create so called artificial fever. The procedure differs from the previous one mainly in duration, which in this case is about 30-60 minutes. The treatment is finished with covering the patent with blankets, when the temperature oh

his body increases over 40 °C. This type of treatment has numerous contraindications and nowadays it is used only sporadically, it also requires constant supervision of a doctor. These contraindications to use hot graduated bath include: all vaso-circulatory system diseases, higher or lower than normal blood pressure, tendency to bleeding and extravasations, weakened, miserable or older patients.

2.7. Hot immersion bath

Hot immersion bath his carried out in water at temperature 40-42°C for 1-4 minutes. The process of immersion into water should be slow and gradual, and total duration of the bath should not exceed 4 minutes, unless there are any symptoms like sudden and abundant sweetening of face and intensive reddening of skin, then the treatment must be stopped immediately. This type of bath increases feeling of power and energy, arousal, better fettle and vigour. It gives good and fast effects in case of sportsmen after restrained but longer-lasting trainings. Contraindications against using this type of bath are all illnesses or disorders.

2.8. Prolonged warm bath

Whole body prolonged warm baths are conducted in so-called waterbed at the temperature of 34-37°C and it lasts from a few hours to even a dozen of days. The temperature of air in the treatment room should be about 25-26°C, with keeping minimal air circulation. This treatment can be provided in special bath tubs equipped with handles, to which special frames are fixed, giving an opportunity to hang the patient safely in water. The bath must have automatic water exchange system that keep stable temperature of it and provide stable sanitary conditions.

It is recommended in III degree skin burns as well as in case of chronic skin difficult to heal problems and in some dermatologic diseases. The room in which the baths are used should have air conditioning, and the bath should be situated in the centre of it with an easy access to the patient lift used to carry the patient.

Figure 3. Patient lift HOYER (Technomex)

2.9. Pearl bath

Pearl bath can be carried out in many different ways, according to technical solutions used. However, the most important feature of it it is introducing compressed air into water. Basic and the most often used form of this type of bath is placing steal grill on the bottom of a bath, consisting of the row of copper or plastic pipes of diameters about 10 mm, that have a big number of small holes of diameters 1,0-1,5 mm, through which compressed air is blew with the pressure of 200-300 kPa. These forms of pearl baths in manually operated types of bath tubs have some advantages, because every repeated treatment has the same impact on the organism, what may be of significant importance in case of therapeutic series of treatments. Disadvantage of this form of bath is the lack of possibilities of individual setting its technical parameter. Another solution could be the application of electric apparatus pumping the air to plastic mates, having a few separated air pipes, where each pipe has holes, but different pipes have the holes of different dimensions. This type of device is equipped with microcomputer controlled different systems, that has usually over 20 forms of blowing air into water. There are also special types of bathtubs available, usually multifunctional, featured with pearl bath option with great variablity of set parameters of the treatment. These types of baths should be equipped with a sensor of the level of water, which enables the procedure to start only after the nozzles are covered with water. These models of bathtubs are electronically operated via the sensor controls that thanks to special programmes enable changing of parameters of massage during the bath treatment. They usually allow regulation of intensity of the stream, pressure of water, duration of particular changes

of stream, creating pulse or still stream of water, they also enable free choice of temperature of water running out of nozzles as well as regulation of flow and pulsation of air. They are often equipped with additional devices that can be used to cleaning and drying nozzles after the bath is finished and to removing remains after the bath together with disinfection system, some of them have also non-slippery bottom.

The procedure of treatment should be similar regardless to the type of equipment used. Temperature of water should be about 36-37°C, and duration 15-20 minutes. The stream of air should be turned on 2 minutes after the patient lies down in the bath, and at first only for 50% of its power. Full stream is set after next 2 minutes, or the computer starts the full programme of the treatment available. At the end of the bath, the flow of the air should be decreased once again, and turned off 1 or 2 minutes before the patent leaves the bath. In every situation, patent must lie back straight in the bath for 1 minute before the air is turned on, and later, the air flow should be turned off 1 or 2 minutes before the end of entire procedure, and the patent should finish the bath in a half-sitting position. This type of procedure prevents from occurring short term circulation disorders immediately after the bath, which appear sometimes in the result of unfavourable relation between hydrostatic processes and intensive stimulation of almost the whole surface of the body. The problem usually concerns weakened patients or those with low blood pressure.

The staff operating bathtubs used to pearl baths must show real care about hygienic and sanitary condition of all devices. The baths, which are not equipped in automatic sanitary systems, must be cleaned well after every treatment. At the end of every day of work, air pipes should be blown through, all water from the system must be removed and disinfection of all bath and devices, especially of water supply system and air blowing pipes should be carried out frequently.

Figure 4. Pearl bath and underwater mechanical massage tub (automatic) (Technomex)

2.10. Bath with underwater mechanical massage (automatic)

Bath with underwater mechanical massage (automatic), temperature 36-37°C, duration 10-20-30 minutes. There are numerous types of bathtubs designed for this type of massage, but their common feature is that different forms of nozzles are fixed on the bottom and walls of bathtub. The number of nozzles, the diameter of their holes as well as their angular position, especially their system of steering the water flow through nozzles may be different. In the simplest baths water flow is operated manually, with control of pressure and turning on particular parts of nozzles, located in different parts of the bathtub. More complicated bathtubs can be equipped with profiled bottom, with a significant number of nozzles of different diameters, located mainly in the central part of a patient lying in the bath, that is in the lumbar spine and shoulders area. In the bath walls, from both sides, even from the side of feet, there is an additional set of nozzles. Baths of this type very often offer a possibility to flow either clear water or a mixture of water and air through the nozzles. The most important element of this kind of baths is the set of pumps and many sensors controlled by microcomputer, that enables variable usage configurations. Due to the multifunctional character of these baths, the user should chose only a few functions and adjust them to the treatment profile, according to manufacturer's instructions and indications included in the computer program of a device.

2.11. Baths with active underwater massage (with manually operated nozzle)

Time of the bath should be divided into the actual time of massage and the time needed to prepare the patent for the bath and to finish treatment in a proper way. Therefore, the patient should spent at least three minutes in the bath before the massage starts to adapt to the changing conditions of hydrostatic pressure and to the relaxation of muscular system. After finishing the massage, patient should stay in the tub for another two minutes in half-sitting position. Therefore, the time of the treatment should be prescribed in respect to an area of a body surface that is going to perform massage. For example the duration of 15 minutes in case of whole body bath with underwater massage is improper. The time is too short for such a big area of a body that is to be treated. Such treatment is never efficient enough and if there are any positive results, they are usually an effect of thermal action of water or coincidental psychotherapy.

Average temperature of bath is 36-37°C, time of treatment 15-30 minutes. Water to underwater massage is derived from tangentor, that is a set of pumping devices that may be assembled with a tub or be a separate equipment used with different types of baths. Tangentor creates pressure of water stream equal 50-600 kPa (1 atm =1 bar = 98 kPa = 0,1 MPa). It is recommended to use a pressure of 250-300 kPa. Distance between the cap of a nozzle and surface of skin should be kept within 10-30 cm, depending on the pressure of water stream and the diameter of the hole in the cap. Stream of water that is directed perpendicularly to the body has the strongest impact, therefore at the beginning of the treatment it should be carried out with the cap positioned at a sharp angle. At the same sharp angle should be kept for the whole time of treatment in case of massage of delicate or painful arreas. Massages of the tissues located in deeper layers of the body are performed at the right angle; and sharp angle is used in case of massage of superficial areas of the body. During underwater massage the underwater stream creates a pit on the body surface of a particular dimension and shape and the difference of pressure within it. A hypertension is formed in the centre of this pit, and it is surrounded by a red bolster resulting from the increased blood circulation in the skin vessels.

A very important element of a massage is a choice of a proper cap of nozzle in respect with its shape and diameter. The most common are round squeezing caps, caps similar to riddle (rain caps), a cap so called „frog's mouth", whirlpool caps and others, according to manufacturer's invention. Round squeezing caps are produced with different sizes of holes, and their size is determined by the area of the hole given in mm2. The following squeezing caps are used the most often: 30, 40, 60, 80, 100, 120, 140, 180, 240, 300 mm2. In practice, the most common are the ones of 80 or 100 mm2, and the action of water stream is controlled by the changes in the pressure of water, thanks to it the massage is uniform and safe. While in use is a cap of a small diameter, the stream of water acts on a small area of a body and reaches deeper. When the pressure is high it can cause pain, and even extravasations.

Figure 5. Bath to active underwater massage with manually operated nozzle (Technomex)

When using underwater massage, special zones of protection are determined that cannot undergo massage, protected areas of small size are best prevented from unwanted action, when they are covered with a hand of a person that carries out a procedure. The places that can't be massaged include: all parts of bones situated directly under skin, such as bone sides or crests, the zone of armpits and groins, popliteal fossa, and elbow bendings. The areas that must be absolutely omitted during massage include: anus, genital parts, breasts, upper part of abdomen, especially in the area of stomach and gut, varices, new scars, papillas, hemangiomas, trophic changes of skin as well as in case of people suffering from frequent bruises and ecchymoses. In case of very slim subjects it is recommended to resign from the massage in the areas of big blood vessels and nerves. If during carried out properly massage the patient starts feeling pain, the pressure of water should be decreased by 50 kPa and if it does not take an effect, the treatment should be interrupted. In case of patients reporting frequent problems with bruises, massage can be conducted only with the application of rain cap on the nozzle.

Figure 6. Aggregate (tangentor) to underwater massage T-AGRE (Technomex)

Massage of the chest should be started from circular movements of the nozzle, from the sternum along intercostal areas, repeated several times, and later massage pefomed in similar way on the backside, avoiding crests of the spine. In upper and lower limbs we start from the lateral parts of them, moving slowly along long axis of a limb to the upper parts of it, keeping the stream of water on bigger muscular masses. The massage of lower area of abdomen should be done with the use of wide in diameter cap on the nozzle and low pressure however it would be best to use whirling caps. In case of muscle atrophies in subjects with normal musculature, the pressure used should be increased gradually while in case of patients with muscular atrophies and weak musculature only „frog's mouth" caps should be used simultaneously with gradual increase of water pressure. In cases of acute after-injury states, it is best to use rain cap with gradual increase in pressure. In serious pains or joints' oedemas, the joint should not be treated, the massage should be applied to the tissues below and above them. In posttraumatic and post-oedematic states of peripheral nerves as well as in neuralgia, at first the healthy limb is massaged underwater with the use of squeezing cap with mild pressure of water, and later the ill limb is treated, very delicately, with the use of rain cap. In case of women the water pressure used should be by100 kPa lower than in case of men. Indications to apply underwater massage include all types of diseases and disorders of locomotor system taking into consideration basic contraindications.

Every day, after finishing treatment, the water from the bath must be removed, and later poured once again up to 1/3 of bath`s volume; the aggregate should be turned on which will enable to pour through all the system. Moreover, once a month, the riddles preventing the set of pumps against contaminations have to be cleaned carefully

2.12. Kinesytherapeutic bath

Kinesytherapeutic bath should be performed at the temperature 33-38°C and the duration should be between 10 and 30 minutes, in some diseases it can last 45-60 minutes with 2-3 breaks for relaxation. For the patients with arterial hypertension, temperature of 33-35°C and shorter time of treatment are recommended, the temperature for small children should be about 36-37°C while for people with rheumatic problems the best temperature will be 37-38°C. Air temperature in treatment cabin should be about 25-26°C, with keeping minimal air circulation.

The bath is performed in large bathtubs, so called butterfly baths or Hubbard's tanks, or in special pools for individual exercises. Very often this type of bathtubs are equipped with additional devices for underwater massage, pearl bath or other.

This type of tubs is dedicated to medical exercises conducted in water conditions for the patients with significant disorders or difficulties regarding their locomotory skills. This type of treatment is especially indicated in case of small children because of the possibility of a continuous contact between a patient and a therapist. For older people, this type of treatment may have a great value in all kinds of strokes and multifractures of bones. It requires however, a very good system of patients' lifts as well as additional rooms to relax.

Figure 7. Hubbard's butterfly bathtub (Technomex)

2.13. Hydro-electric whole body bath

Hydroelectric whole body bath is conducted in special bathtubs, made of isolative materials. Because of the risk of electric shock of a patent immersed in water, the bathtub should be placed on isolative layer, far from water, waste or heating systems. The bathtub cannot have direct water supply and drain pipe connection because of the risk of its grounding. It is also recommended to remove all items and devices conducting electric current from the floor to the height of 2,5 m above bathtub and to the height of 1,2 m from the side internal edges of bathtub. In the room where the bath is located, any devices creating electromagnetic field must not be placed.

The bath is equipped with 9 flat electrodes, protected with shelters, which exclude the possibility of a contact between electrodes and a patient's body. On the inside surface of longer walls of the bath there are three electrodes on each side, from the side of the feet there are two more electrodes, and one next to the head. The bathtub should be equipped in the microprocessor system of current control as well as possibility of taking immediate action in case of break in current flow and automatic blockade of programmed treatment's parameters, disabling the possibility of incidental change of current parameters during the bath. Metal brackets or other devices are prohibited from being used inside the bath.

Figure 8. Bathtub for electric bath and underwater massage (Technomex)

Accomplishment of a bath

To these types of baths water from public supplies is usually used. It should be kept in mind that electrical current flow depends on electrical conduction of water and therefore water of low mineralization or of high contents of calcium is a very weal conductor, which, in practice, almost abolishes the healing features of the bath. It is assumed that in water from public supplies without any mineral abnormities, about 1/3 of current flows through the patient's body. The most favourable conditions of current flow, however, are baths in water containing 0,1-0,2% of kitchen salt.

Water in the bath must entirely cover the electrodes, and before starting the treatment, a trial test of current flow should be carried out. After the patent is placed in the tub, a special procedure can be started, and the current should be turned off after it is completed. The patent, under any condition, cannot get out and get in the bath while the current is on. The patient must be informed that during the bath he cannot change the position or emerge legs or arms, because it can cause seriously unpleasant sensations. During the time of bath, it is prohibited to pour more water, measurement the temperature and so on – all of these activities can be done after the procedure of electric bath is completed.

Thanks to the microprocessor, a few dozens of different variations of electrical current setiings can be applied, sometimes having a specific impact on particular parts of the body. Manufacturer's instructions always specify which variations of current flow can be used and how the particular programmes shall be turned on. After the patent is located in the tub, the chosen programme is turned on that automatically connects electrodes placed in the different parts of the tub which enables proper direction of current flow after it is started. Next, electricity is turned on and its power is gradually increased, as far as the patient can feel delicate prickling sensations. If this sensation increases too much or the patent can feel unpleasant irritation of skin, the current should be decreased to the value which is well tolerated. At the end, the current must be decreased gradually and then turned off completely.

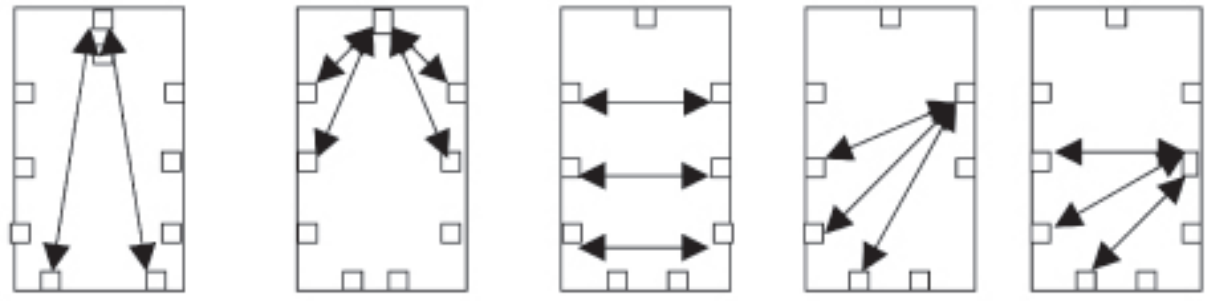

Figure 9. Main directions of electric current in whole body hydroelectric bath

Average treatment parameters

- Current 20-50 mA, with necessary taking into consideration subjective sensations of a patient.
- Time of bath 5-20 min, 2-3 times a week, from 5 to 10 baths per treatment.
- Temperature of water 36-38°C.
- Relax after bath 20-30 min.

Safety regulations

- All metal objects must be taken off before the treatment is started.
- It is also recommended to remove all items and devices conducting electric current from the floor to the height of 2,5 m above bathtub and to the height of 1,2 m from the side internal edges of bathtub. Bathtubs to galvanic baths should be located on isolative material, far away from water supple system, drainpipes as well as central heating system. They cannot have direct connection with water supply or drain pipes.
- In the room in which the bath is located, any devices creating electromagnetic field must not be placed.

Indications

1. Neuralgias and polyneuropathies.
2. Peripheral paralysis.
3. Rheumatic diseases.
4. Arthralgias and back pains.
5. Post-traumatic injuries of joints and muscles.
6. Cardiovascular and vasomotor diseases.
7. Delayed union of fractured bone.
8. Hyperactivity.

Contraindications

1. Inflammations and infections as well as all cases of fever.
2. Heart failure.
3. Respiratory system failure.
4. Implanted heart stimulator.
5. Tissues containing metals.
6. Cancer.
7. Blood coagulation disorders.
8. Purulent processes in the skin, egzemas, sores etc.
9. Blood clots and deep venous thrombosis.
10. Disorders of sensibility.
11. Intolerance for electric current.

2.14. Artificial acid carbonic bath

In natural carbonic baths the contents of CO2 should not be lower than 400 mg/dm3, and in artificial 750 mg/dm3, while the useful contents in both types of water should vary from 1200 to 1400 mg/dm3. Water of the temperature of 32-34°C, containing 1200-1400 mg/dm3 CO2, is received by the organism as neutral (indifferent) due to the impact of CO2 on skin thermoreceptors decreasing sensitivity of cold receptors and increasing sesnitivity of warmth receptors which can also, but to the lesser extend, decrease sensitivity of pain receptors. Hyperaemia of the skin in carbonic bath depends on the contents of CO2 and the temperature of water. In neutral temperature for the human body, which in this type of bath equals 32-34°C, hyperaemia can be caused only by a proper contents of CO2 in water. Mild reddening of skin takes place at the contents of 350 mg/dm3 CO2 in water, at the level of 400 mg/dm3 it becomes significant, while at the amount of 550 mg/dm3 marked erythema on the skin can be observed with very clearly defined boundaries.

In artificial acid-carbonic baths saturation of water with carbon dioxide is performed in ion saturators, thanks to which quite good parameters of saturation can be achieved and with full top blowing and local exhaustive ventilation and monitoring of the bathtub, the contents of CO2 in the air aspirated by a patient is kept within normal ranges. Efficiency of saturator must support supplying in carbon dioxide for a particular number of baths at the same time. To-day used bathtubs have a singular, small saturator mounted inside the covers of a bath, with a possibility of regulation of carbon dioxide level in bathing water.

Whole body bath at the temperature of 32-35°C, average time of treatment 10-30 minutes, depending on the contents of CO2 in aspirated air and on individual indications. Treatments should be repeated 3-4 times a week, while the whole treatment should include 8-12 baths. The bath takes place in a sitting position, and immersion of the body in water should reach the line of nipples. Any rapid movements, intensive self-massage during a bath, and rubbing the body with a towel after a bath should be avoided.

Half-body-bath, temperature and duration the same as in case of whole body bath, but the water reaches only a level of groin. The treatment is carried out 3-4 times a week, or everyday.

Partial bath for upper or lower limbs is conducted in specially modelled utensils, in respect to limbs' shapes. Temperature of water and time of treatment are similar as in case of whole body bath. The treatment is carried out 3-4 times a week, or everyday.

Indications and contraindications for application of artificial carbon baths

Indications

1. Hypertension , period I and II according to WHO.
2. Peripheral veins diseases due to atherosclerosis, diabetes and oedemas.
3. Functional disorders of arterial circulation.
4. Disorders of capillary circulation in skin.
5. Diseases of venous system.
6. Functional disorders of the heart.
7. States after myocarditis.
8. States after myocardial infarction.
9. Heart abnormalities.
10. States after heart, cardiac valves and large blood vessels surgery.
11. Degenerative diseases of heart muscle.
12. Other chronic diseases of the heart muscle.
13. Rheumatic illnesses except for acute and subacute phase.
14. Degenerative illnesses of joints.
15. Extra-articular pain syndromes.
16. Vibration disease.
17. Neurovegetative and posychosomatic diseases.
18. Obesity.

Contraindications

1. Failure of respiratory and circulation systems.
2. Thermoregulation disorders.

HALF-BODY-BATHS (partial baths) 3

Half-body-baths are applied as hydro-therapeutic topical treatments with much milder parameters than most of whole body baths, especially cold and hot ones, which are generally indicated for healthy people. Half-body-baths are indicated in some specific illnesses and disorders and are possible in middle aged and old people. Besides, half-body-baths are enriched in additional elements such as immersion in the water, pouring with water, dubbing, brushing and so on and due to this they can cover the whole surface of the body.

3.1. Cold half-body bath

Cold half-body bath at the temperature of 8-15-20°C, duration up to 10 s. It is best if the first indicated bath has a temperature of about 20°C, that can be repeated every second day with the same time of duration, with the possibility of decreasing the temperature. The patient very slowly immerses in the water, at first half-sitting, and after a while he/she sits on the bottom of a bathtub, where water reaches the line of his navel. First two half-baths should have an immersion character, which enables the patient and therapist evaluation of patient's sensitivity to low temperatures as well as the ability of continuation this type of treatments. It is also a test for people who do not have any experience or do not want to cool their bodies so much.

It is recommended to cover patient's back and shoulders with a cotton towel, which during the bath can keep some kind of thermal comfort and provide general better feeling giving simultaneously a possibility to be used as a tool of drying immediately after leasing the bath. Cold half-body bath is indicated in the states of general tiredness, neuropathies, insomnia as well as in gradual hardening. Contraindications include sensitivity to cold, disorders of urinary system and cardiovascular system diseases.

3.2. Cool half-body bath

Cool half-body bath is indicated at the temperature of 20-27°C and its duration is 4-6 minutes. The bath treatment should be started at the temperature of 27°C, later gradually decreased, and the time should be determined in respect to occurring vascular reaction of skin. This type of bath is recommended in metabolic disorders, obesity, mild form of diabetes; it can be applied also to older people and patients in recovery period, because in this case it has a refreshing and energizing effect. In this half-body bath the patient it is recommended to apply very simple self-massage with the use of water from the bathtub with alternating pouring this areas with water from the bath or cold water from the tap, which should slowly flow into the bath.

3.3. Tepid half-body bath

Tepid half-body bath with the temperature between 28 and 33°C and duration of about 10-20 minutes. It is indicated if there is no possibility to use whole body bath, especially in case of low blood pressure, in tiredness, or emphysema. It is recommended also in case of haemorrhoids because it can decrease pressure of sphincter and makes it less painful. During this type of treatment self-massage is a good idea as well.

3.4. Warm half-body bath

Warm half-body bath at the temperature of 34-37°C and the duration 5-15 minutes, relieves pain and helps in insomnia. It relaxes muscles, and can be used for a longer period of time in case of nephro or cholelithiasis, although the temperature of water must be constantly kept at the level of 37°C. The bath can be also used with the temperatures changing from 34 to 37 degrees, then it has a relaxing influence on the organism, improving general feeling. It is also recommended to use other stimulus factors that be modify this type of warm half-body bath.

3.5. Warm half-body bath with brushing

Warm half-body bath with brushing can be used as a short time half-body bath with simultaneous brushing, the temperature of water should be 37°C, that at the end of the bath it can be decreased by 3-5°C. If, however, prolonged period of a half-bath is intended, it is better to apply water of temperature between 34 and 35°C.

After entering the bathtub, the patient immerses in water entirely for a short period of time and later brushing with a soft brush starts.

Brushing starts at the nape and back, then moves to the front part of the chest and arms and after finishing it, the patent immerses in water once again, and after emergence, his legs and abdomen are brushed. It is possible to repeat brushing similarly, and in case of significant reddening of skin and warmth sensation, the temperature of water can be decreased. Brushing is carried out by a patient himself after prior explanation how it should be done, or it can be completed by trained staff. It is best to use one or two brushings, but no more than three. This type of treatment is indicated for people that have chronic problem with tiredness or weakness, during menopause, in hypotension, and in case of some convalescents. It should not be used in case of elderly people, subjects with significant neural excitability and strong skin reaction.

3.6. Warm half-body bath with rubbing

Warm half-body bath with rubbing is done identically to warm half-body bath with brushing, it is, however, much gentler. Rubbing is carried out with a hand or with a soft, cotton glove at the time of constant pouring the body with water from the bathtub, especially of these parts of the body that are being rubbed. Indications are wide, similar to the previous half-body bath, and there are no actual contraindications.

3.7. Half-body bath with increasing temperature

Half-body bath with increasing temperature starts from 35-38°C and every 2-3 minutes the temperature is increased by 1°C up to 42°C. The treatment is a gentler version of wholebody bath with increasing temperature and therefore it can be used on a wider scale. It should be perfomed as a introductory treatment in case of people with significant sensitivity for higher temperature as well as in case of people that suffered from serious diseases, that required long time recovery and convalescence in the past: this bath can prepare a patient to full hyperthermia treatment.

3.8. Half-body bath with underwater mechanic massage (automatic)

Half-body bath with underwater mechanic massage is performed in a special bathtub, in which a patient takes a sitting position, with water level reaching the line of his ribs. In the bottom part of the tub the nozzles are directed to shanks and in the back upper part of the bathtub there are a few nozzles and a water stream from them can massage the buttocks and lumbar region. The massage can be done simultaneously on shanks and lumbar region or alternate, with the regulation of the pressure and time of lasting of particular phases.

Bathtubs to this type of massage can be equipped with additional devices sucking in the air to mixer which enables to create a stream of a mixture containing water and air and that gives a mild, gentile and very pleasant massage. Temperature of water 36-37°C, time of the bath 10-20-30 minutes. It is indicated in the back pain, sciatica, rheumatic diseases, post-traumatic states of legs and in overload states of joints and muscles of legs. Contraindications to use this type of treatments include: varicose veins, blood clots and deep venous thrombosis.

3.9. Hip-baths

Hip-bath should be carried out in a special bath-tub, formed in a shape of an armchair with a recess in a middle, that enables having a treatment in half-sitting position, with a good support for the back and arms as well as comfortable placing the feet on the floor. Water is hip-bath covers only abdomen to the navel and upper part of thighs. During the hip-bath, a person conducting treatment should place under patient's feet a few layers of a folded towel and if the feet do not reach the floor a special footrest should be used so that the shanks do not hang beside the edge of the bathtub. During the bath, shanks, back and shoulders should be covered with a thick cotton towel. Because of the fact that the volume of baths to hip-baths is small there is very often a need to add water of a certain temperature, which can be achieved via the use of a special mixer of water equipped with a sensitive thermometer.

The treatments are sometimes carried out in provisional conditions, in regular baths, where the patent sits either crosswise the bath or along the tub but with the shanks pulled up over the water: they are usually to rest on special belts or brackets. This position is, however, very uncomfortable for the patent and very often just after 1 or 2 minutes numbness of legs or back pain can occur.

Generally, hip-baths influence on the organs in pelvis and lumbar area and therefore their scope of indications is limited, but they offer a possibility of topical use of temperature. Half-body baths and hip-baths are very similar when we consider their ranges of temperatures used and the time of treatment.

- **Cold hip-bath**, temp. 8-15-20°C, time of treatment 1-3 minutes. Indications: motoric dysfunctions of stomach and intestine, chronic atonic obstruction, skimpy menstruations and aplasia of fertile organs. Contraindications: a cute inflammations in pelvic region, bleedings from fertile organs, acute infections of kidneys and urinary bladder.
- **Cool hip-bath**, temp. 20-27°C, time of treatment 5-20 minutes. Indications: dysfunctions of stomach and intestine, gastroenteritis, obstructions, inflammation and bleeding from haemorrhoids. Contraindications are the same as in case of cold hip-baths.

Figure 10. Hip-bathtubs (Technomex)

- **Tepid hip-bath**, temperature 28-33°C, time of treatment 5-20 minutes. Indications: sucking in exudations from pelvis, myometritis and adnexitis and non-bleeding haemorrhoids.
- **Warm and hot hip-baths**, temp. 34-44°C, time of treatment 5-20 minutes. Indications: chronic diseases of fertile organs, back pains, diseases of urinary system, especially nephrolithiasis and chronic infection of urinary bladder with painful passing the urine. Contraindications: all cardiac as well as blood vessels diseases and possibility of bleedings in this area.

3.10. Partial baths of limbs

Partial baths of limbs are carried out on shanks for knees or only for feet and forearms, covering also 1/2 of an arm.

Whirlpool bath of lower and upper limbs, temp. 36-37°C, time 10-20-30 minutes. There are two types of utensils used: first, there are deep tubs of different dimensions with a rotor, secondly there are shallow bathtubs equipped with a number of nozzles, fixed at a specific angle. Deep bathtubs are especially useful in cases of peripheral nerves diseases as well as oedemas and muscle atrophies on large areas, some of them can be used to the whirlpool massage of either lower or upper limbs through higher positioning of an utensil. Limbs are immersed in the bathtubs, and they cannot rest on the bottom and whirling warm water massages relaxed muscles of shanks or forearms. Shallow bathtubs thanks to the use of nozzles provide stronger stream of water, offering more intensive massage. Some types of bathtubs are additionally equipped in devices that enable sucking the air into nozzles. Therefore they can offer very mild massage thanks to pearling of water. Very often they can have number of nozzles with different diameters and different angular positions. This type of bathtubs is usually equipped in automatic steering system of very differentiated parameters of treatment that can help to diversify the baths. General indications include post-traumatic states of shanks and forearms, rheumatic diseases, all kinds of pains, muscular dystrophies as well as limitations in joint movement in shanks and forearms, diseases of peripheral vessels with considering all the contraindications that include oedematic changes or thrombosis of veins as well as trophic skin changes.

Figure 11. Bathtub to whirlpool massage of lower limbs (Technomex)

Figure 12. Bathtub to whirlpool massage of upper limbs (Technomex)

Figure 13. Bathtub to whirlpool massage of lower and upper limbs (Technomex)

- **Cold bath at the temperature of** 8-20°C, usually about 15°C, lasting 10-30 seconds, can be one time treatment or repeated 2-3 times with short break and short time of immer sion. It has a general and local refreshing effect, especially after a long work in pitting posi tion with arms placed in the same position for a long time, in writer's cramp, tennis elbow, oedemas of of arms and shanks which are a result of prolonged compulsory position of the body.
- **Warm bath at the temperature of** 34-37°C, lasting 15-20 minutes. In rheumatic diseases except for acute phases, in mild pains of joint and muscles, before the exercises of elbows and wrists as well as ankle joint as supporting treatment.
- **Hot bath at the temperature of** 38-44°C, time of treatment 10-15 minutes. It causes significant hyperaemia of limbs and derivative muscular relaxation which can lead to temporary motoric skills of joint, it partially improves heart rate and dilates bronchi.
- Graded temperature bath of upper and lower limbs according to Hauffe can be applied to only one limb if there is such need and then it is a very gentler treatment. . Hauffe's bath consists in increasing of bath's temperature, which is done manually through adding hot water to bathtubs or automatically as a bath with linearly increasing temperature and the use of a set of special utensils. Automatic dosing of water is the best solution which not only makes the treatment easier to conduct, but also provides a chance of gaining more favourable treatment's effects. Usually the Hauffe's bath is applied to upper limbs but it can be used as well as a bath for legs or a hip-bath or a half-body bath. The bath starts at 35°C and the temperature is gradually increased by about 1°C, every 2-3 minutes up to 42°C, and in very special cases to 44°C. Increasing of temperature must always have gradual character and the break between particular rise of temperature cannot be shor ened because it can lead to sudden increase in blood pressure in case of people with mild forms of hypertension. Average time of a single treatment is usually 15-20 minutes. Usually after 10-15 minutes increased sweating is observed and mild rise in pulse rate. If the pulse increases dramatically the treatment must be stopped. After immersion of limbs in water, reddening of skin is observed, later the process of movement of blood from the inside parts of the body to more peripheral areas occurs. It gives not only the effect of dilation of skin vessels in the limbs that are immersed in water but also, but to the lesser extend, in all skin areas. It contributes to the fall of blood pressure and improvement of function of the heart. Blood circulation observed during

the treatment can cause only partial relaxation of coronary vessels of the heart and kidneys and have a dilating impact on the vessels of other organs. The treatment is advised in the first period of hypertension, in cardiac ischemia, in vascular contractions, vascular and motoric neuralgias, disturbed blood circulation in lower limbs, neuropathies, rheumatic pains of limbs, during menopause, insomnia and migraine. Contraindications include: congenital heart defects and atherosclerosis.

- **Alternate bath with marginal temperatures** is done in two separate bathtubs. In the first the water has the temperature of 38-44°C, usually 40°C, and in the second tub there is cold water of temperature 8-20°C, approximately 15°C. The limbs are immersed into hot water for about 5 minutes and then for about 15 seconds into cold water. There are 3-4 alternate baths carried out, with the total lasting time of 10-15 minutes. To these types of baths or other treatments of similar parameters, special, four-chambers bathtubs are used that enable alternate baths of arms and legs. They are equipped in systems that provide a possibility to program the time of a cold and hot bath as well as thermomixer that adjusts the temperature of water. Some of these devices have additionally mounted electrodes to galvanic current therapy that enable conducting so-called electrical four-chamber bath. Alternate baths are indicated in hypotension, but also in hypertension period I and II, in perturbations in blood circulation in arms and legs as well as in tiredness.

3.11. Four-chamber galvanic partial bath

This type of bath is a hydro-therapeutic treatment with simultaneous use of direct current. The treatment is carried out with the use of four-chamber apparatus in which the limbs of a patent are placed. Main healing effect depends on the direction of current flow: ascending or descending, adjusted by a therapist according to physician's indications. During four-chamber bath a special set of four chambers with a control console and a mobile chair is used. Upper chambers are destined for upper limbs and they have a volume of 22 litres, while the lower chambers for legs have the volume of 35 litres. The chambers are filled with water up to 2/3 of their volume, so that the level of water reaches above elbow and below knee. At the sides of each chamber there are electrodes placed in special shelters, protecting the patient's body from a direct contact with them. In the devices to four-chamber baths the flow of current through immersed limbs is almost entire and it also includes side parts of torso. Four-chamber bath in the scope of galvanic electrical action is very similar to hydro-electric whole body bath.

Before conducting a treatment, a test of current must be carried out. It consists in immersing both hands in upper chambers by one person that is responsible for apparatus maintenance, while the second person is gradually increasing the current to the value that had been planned and later comes back to the zero value and turns off the apparatus. In this type of treatments it is forbidden to change the direction of current flow during the bath and use oblique or crossed current flow (poles of opposite parts of the body) as well as connecting three limbs with different polarity because of the possibility of occurring of serious perturbation in heart rate. The floor under device should have a protective layer of insulation.

Using four chambers, depending on the direction of current flow, the bath achieved can have an ascending or descending direction. Depending on the number of chambers connected, it can be a four-chamber, two-chamber or one-chamber bath. To this type of treatment, water at the temperature of 38°C is used.

Figure 14. Four-chamber bathtub for electrical baths (Technomex)

Four-chamber bath

The bath is carried out with the use of current from 10 to 30 mA, depending on patient's tolerance, in time of 10-20 minutes, every day or every second day for the period of 2-4 weeks.

- **Bath with ascending current direction** requires connection of negative pole of current with electrodes located in upper chambers (–), and then with electrodes of lower chambers (+). Such setting of current flow determines increasing excitability of central nervous system. In the vascular system it comes to increased movement of blood, which relies on the outflow of venous blood from lower limbs and internal organs and inflow of arterial blood to lungs and upper limbs. Simultaneously, the inflow of venous blood from the heart to lungs increases.
- **Bath with descending current direction** is set through connecting positive pole with upper chambers (+), and negative pole with lower chambers (–). During descending direction of current flow, inflow of blood from small circulation circuit to the heart increases, there is also a rise in inflow of arterial blood to internal orgasm and lower limbs. Simultaneously, the outflow of venous blood from lungs and upper limbs increases.

Direction of current flow			
ascending		**descending**	
—	—	+	+
+	+	—	—

Table 1. Directions of current flow

Two-chamber bath

- Two-chamber bath on both upper limbs gives current flow through both immersed upper limbs and upper part of the chest. Electrodes are set (+) on the right upper chamber and (-) on the left, or adversely. Current 6-15 mA, time of treatment 10-20 minutes.
- Two-chamber bath on both lower limbs gives current flow through limbs and lower part of abdomen. Electrodes are set (+) on right chamber, on left (–), or adversely. Current 10-20 mA, time of treatment 10-20 minutes.
- Two-chamber bath on both on both left limbs (upper and lower), current 6-15 mA, time of treatment 10-20 minutes.
- Two-chamber bath on both on both right limbs (upper and lower), Current 10-20 mA, time of treatment 10-20 minutes.

One-chamber bath

Average current 6-15 mA, time of treatment 10-15 minutes.

- Unipolar bath relies on connecting both electrodes located in a chamber to one of current's poles and this is an active electrode. Passive electrode is connected with the opposite pole, in case of upper limb it is usually fixed in the area of a shoulder, and in case of lower limbs in buttocks area.
- Bipolar bath consists in connecting two different current's poles to electrodes located in a chamber. Then, the cross flow of current through the limb occurs, because current flows from one electrode to the other. It is less extensive treatment than the previous one. In this type of treatments it is forbidden to change the direction of current flow during the bath and use oblique or crossed current flow (poles of opposite parts of the body) as well as connecting three limbs with different polarity because of the possibility of occurring of serious perturbations in heart function. The floor under device should have a protective layer of insulation.

Wrong current flow							
Wrong		**Wrong**		**Wrong**		**Wrong**	
—	+	—	+		+	+	
—	+	+	+	—	—		—

Table 2. Examples of wrong current flow

Indications

1. Neuralgias and polyneuropathies.
2. Peripheral paralysis.
3. Rheumatic diseases.
4. Arthralgias and back pains.
5. Post-traumatic injuries of joints and muscles.
6. Cardiovascular and vasomotor diseases.
7. Delayed union of fractured bone.
8. Hyperactivity.

Contraindications

1. Inflammations and infections as well as all cases of fever.
2. Heart failure.
3. Respiratory system failure.
4. Implanted heart stimulator.
5. Tissues containing metals.
6. Cancer.
7. Blood coagulation disorders.
8. Purulent processes in the skin, egzemas, sores etc.
9. Blood clots and deep venous thrombosis.
10. Disorders of sensibility.
11. Intolerance for electric current.

Safety regulations

- All metal objects must be taken off before the treatment is started.
- It is also recommended to remove all items and devices conducting electric current from the floor to the height of 2,5 m above bathtub and to the height of 1,2 m from the side internal edges of bathtub. Bathtubs to galvanic baths should be located on isolative material, far away from water supple system, drainpipes as well as central heating system. They cannot have direct connection with water supply or drain pipes.
- In the room in which the bath is located, any devices creating electromagnetic field must not be placed.

3.12. Baths of feet

- **Cold bath of feet with a temperature** 10-20°C, average 15°C, time of the bath from several seconds to 3 minutes. It is recommended in dysfunctions of venous circulation, in varices, in cardiac neurosis, in weakened peristaltic of intestine, headaches, vertigo, epistaxes, sweetening of feet. It has a significant hardening effect, and in case of short baths can have calming and hypnotic action.

- **Floundering in cold water** is carried out in big shallow flounders, which can be used by several patients at the same time. Water in the flounder reaches ankle's level and its temperature is about 15-17°C, the patients in a row walk slowly and rhythmically along the edge of a pool, pulling the feet above the water level, which can look like stork's walk. Time of floundering should be about 1-3 minutes and this type of treatment can be used every day. Indications are the same as in case of cold bath of feet, but patients usually prefer floundering.
- **Warm bath of feet** at the temperature of water about 34-37°C, time of treatment 10-20 minutes, has a very beneficial effect on tired feet.
- **Hot bath of feet**, temperature. 38-46°C, time 5-15 minutes. It is indicated in reduced general immunity, in chronic infections of upper respiratory tract, asthma and in dispnoea, emphysema, heat stroke, menopause, amenorrhea, in chronic sensation of cold feet, in post-traumatic states as well as in increased sweatening of feet.
- **Bath of feet with graded temperature** is a kind of variation of Hauffe's treatment, but it involves only the feet. The bath starts at 35°C and the temperature is gradually increased by about 1°C, every 3-4 minutes up to 42°C and after reaching this temperature the feet should be kept in water for additional 5-10 minutes without adding hot water. Later, after finishing hot bath feet should be immersed for a short time in cool or cold water. Average time of treatment is about 30 minutes. It is much milder treatment comparing to partial Hauffe's bath because it is directed to a very small part of a body, and the temperature increases in a flower pace. Indications and contraindications arte the same as in Hauffe's bath.
- **Alternate bath of feet at edge temperatures.** Feet are immersed in hot water, about 40-42°C for a time of 5-8 minutes, and after that they are moved to a tub with cold water of temperature between 15-20°C, for a period of 15-30 seconds. Treatment finishes with immersing feet in cold water. Usually 3-4 alternate baths are carried out with a total time of treatment 15-25 minutes. It causes local strong hyperthermia, has a beneficial effect in case of pains of feet and can temporary improve elasticity of the joint in this area, it increases blood circulation in feet, reduces tendency to chills, and supports other treatments in menopause. Contraindications against using this type of bath include: varices and vasoconstrictions.

General pouring starts with the use of cool water, and after 2 -3 treatments, cold water can be applied. The treatment lasts 0,5-3 minutes. It can be carried out in two different ways: it can be started from pouring back, shoulders and the chest so that the water could cover all the body and this is rather mild and short-termed method, which can be used as a repeated treatment or as an introductory procedure for more intensive pouring. Second method consists in pouring that starts gradually from the area of lower limbs, at first from outer, then inner side, later torso and upper limbs are poured, similarly to the lower limbs. Regardless to the method that was chosen, it is forbidden to pour water on the head, and in both methods the treatment starts on the backside of the body and later moves to the front. Stream of water must gently flow on the body, therefore very low pressure of water must be used together with a wide diameter of a hose of about 2 cm. This type of treatment is indicated only in case of healthy people in young or middle age to harden organism or stimulate metabolism and to improve general fitness. It is contraindicated in case of elderly people as well as in all heart diseases and vascular dysfunctions.

4.1. Kneipp's method of pouring

This type of pouring consists in application of lasting a dozen of minutes pouring with cold water of different parts of body as well as the whole body. In hydrotherapeutic plant conducted by priest Sebastian Kneipp in Wörishofen, watering cans of volume 13-15 litres were used. To first treatment they usually used two cans, that is 26-30 l, and the series of treatments was finished with the use of about 130-150 l of water.

Dosing of water used to particular pouring treatments was based on the general condition of a patient and if he was weak or of a poor health, the number of catering cans was reduced by 50% and treatment always started with just 1 can. Usually they carried out pouring treatments of knees, thighs and lower pouring, starting it from the feet and directing the stream of water to lumbar region and then, once again to the feet and the same procedure was conducted in the front side of the body. Quite a different method was pouring water on the back, general pouring, upper pouring, pouring of shoulders, pouring of head as well as specific pouring of ears, hands, chin etc. according to the type and location of illness.

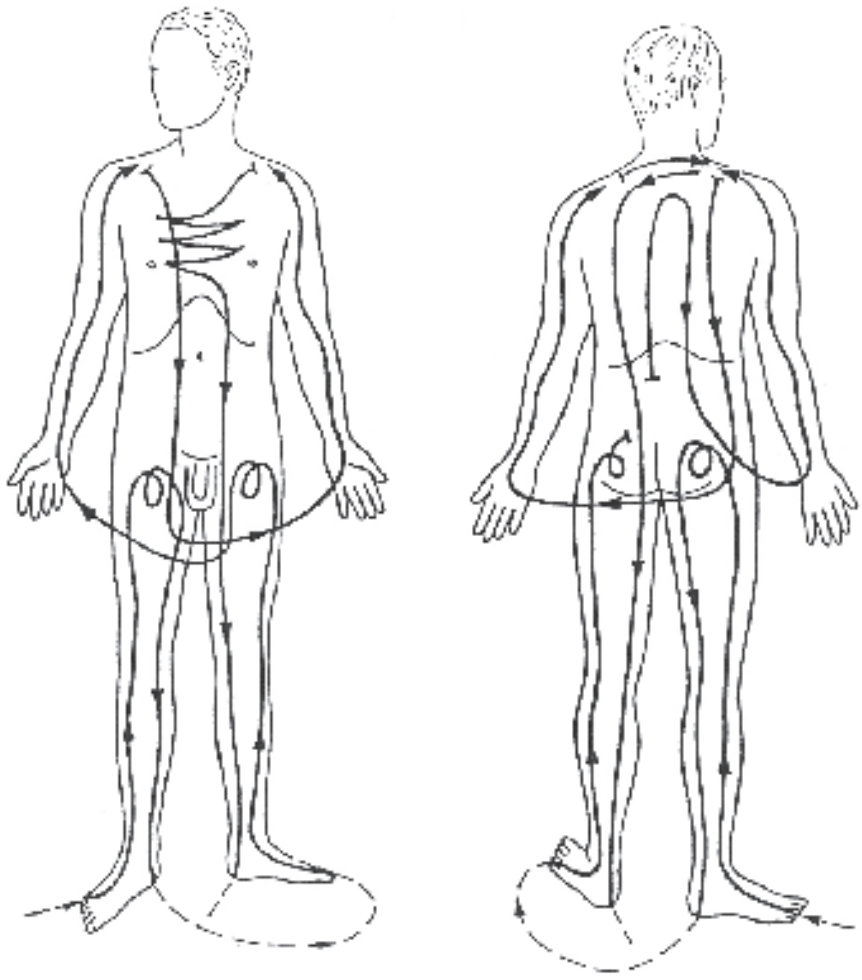

Figure 15. General pouring according to Kneipp's method

Kneipp used, but to a much lesser extend, warm water or changed temperatures of it, but all the effects of strengthening of the organism he used to attribute with hardening character of cold water, used locally on different parts of the body, especially on those, which were the least dexterous.

Partial pouring is generally carried out with the use of cold water. Specific method of this type of treatments was determined, basing on different assumptions, by Kneipp and Żniniewicz. Nowadays partial pouring is used very seldom, and it usually is a modified of version of methods presented by Kneipp and Żniniewicz, without focusing on differences existing between these two variations in original. Very wide range of pouring methods indicated by both authors in different types of diseases has, at the moment, mainly historical meaning.

To partial pouring cold water from public supplies is used and therefore a patient should be specially prepared for the treatment which should not be performed in any inflammatorz states, especially of kidneys and urinary bladder, even if the pouring does not cover strictly this area. This type of treatment should not be used also during menstruation, any types of infections and in case of hypotension. Pouring is carried out with the hose of 2-3 cm in diameter, the chosen part of the body is poured with a stream of water from the hose, when the distance between the hose and the skin is about 2-3 cm with continuous movement of the hose, causing gentle flow of water on the body.

5.1. Pouring of the nape

Pouring of the nape lasts usually about 1,0-1,5 minutes with continuous slow movement of water stream from the nape to the shoulders, with multiple repeating of this movement. This method of pouring has a stimulating effect on the centres located in medulla, which leads to deepening of breath.

5.2. Pouring of the back and shoulders

Pouring of the back and shoulders is carried out in the pitting or kneeling position with the torso delicately bend forward and down so that the water flows only on the back and shoulders. Pouring of the back and shoulders is limited only to these parts of body in contrary to Kneipp's method, where pouring of the back is extended to the entire back area of the body. Pouring starts at the edge of lower ribs and slowly the stream of water moves upwards to the line of shoulders, then moves down to arms and backwards to the place where the treatment was started. This action is repeated several times during 1-2 minutes. Pouring of the back deepens breath in bronchitis and in common colds it can reduce fever and improve immunity.

Figure 16. Bathtubs for partial pouring (Technomex)

5.3. Pouring of the chest

Pouring of the chest is carried out in lying on the back position with the hips slightly lifted. Pouring starts in the area of the right auricula and with rotary movement passes to collar bone, then moves upwards and all the action is repeated on the opposite side of the chest. The procedure is repeated many times in the period of 1-2 minutes and the whole procedure finishes with a few pourings cross the chest. This type of treatment is recommended in chronic upper respiratory tract infactions, in asthma and emphysema.

5.4. Pouring of the abdomen

Pouring of the abdomen is carried out in such position of a patient's body, which limits the treatment only to this part of the body. Pouring starts from the circumference of abdomen and is carried out to the central parts and then once again to the circumference. This action is repeated several times in 1-2 minutes. It provides good therapeutic effects in insufficient motoric action of stomach and intestine.

5.5. Pouring of thighs

Pouring of thighs is carried out in standing position, separately on each of the limbs from the back-side, and later in front of the body. Pouring starts from the outer side of feet, later to the heel and later upwards, following outer side of shank and high up to buttock, which should be poured several times with rotational movement, then moves down to the central part of the limb, finally moving to the other leg. Next, patient turns around, and the pouring starts from a foot, then upwards following the outer side of shank, tight and groin, and goes down. The procedure finishes with pouring both soles of feet.

All the treatment lasts about 1,5-2,0 minutes, and it can be repeated no more than one time. It is recommended in haemorrhoids and lower limbs' varices, in chronic rhinitis and sore throat and during menopause.

5.6. Pouring of knees

Pouring of knees is carried out in sitting position. It starts from the back outer side of an ankle and then the hose is moved upwards, along outer part of shank to the knee, which should be poured for about 5 seconds and then the stream of water should be directed on the inner part of the shank to the inner ankle, and after that it is moved to the other foot. Such treatment should be performed 2 or 4 times on both shanks. This is especially indicated in haemorrhoids, in lower limbs' varices, in light exudations to ankle and knee joint, in so-called cold feet and in migraines as well as in menopause.

GENERAL SPRAY SHOWERS 6

Spray showers have very strong mechanic impact because of the use of pressure of water stream as well as thermal influence and there are treated as a separate form of water massages. Spray showers can be done on the whole surface of the body as general spray showers or on chosen parts of the body as partial treatments that can be divided into stationary and mobile, according to the method applied. Depending on the temperature of water, we can talk about cool, warm, hot and alternate spray showers and according on the pressure of water, there are spray showers of low pressure 50 kPa, middle pressure 50-200 kPa and high pressure 200-400 kPa. The most common are the spray showers of middle pressure.

6.1. Stationary spray showers (rain showers)

Spray showers are carried with the use of a raine cap from which the water pours down at the angle of 45°, while the diameter of the holes should be about 0,5 mm. The bigger the difference between the temperature of water and the temperature of the body and the smaller are the holes in the cap, the more intensive is the douche and the stronger its stimulatory effect.

Showery douche cold or cool, temperature 10-27°C, duration from a few second up to a minute, usually 20-30 seconds, causes fast reddening of skin, and at the end of douche, a warmth sensation. It is very often recommended at the end of superheating procedures to increase blood pressure and as a hardening treatment.

- Rain shower warm, temperature 34-37°C, time 3-5 minutes. It is indicated after longer cooling treatments as a method of fast balancing of the temperature of body. It is also often recommended in mild neuropathies, muscle pains and neuralgias.
- Rain shower hot, 38-42°C, time 2-5 minutes. Long-lasting hot douche has a strong superheating and sweating effect, it leads to dilation of blood vessels with derivative decrease in blood pressure and a feeling of relax; people with hypotension can feel generally weakened.
- Rain shower with alternate temperatures, lasting: 25-40 s, temperature of water 38-42°C, next for 2-5 s temperature of water 8-12°C. The treatment is repeated 5-6 times , finished with a cold douche. It is a generally refreshing treatment and patients usually stand it very well, electrostability of the heart muscle improves and it causes beneficial changes in parasympathetic system.
- Spiky rain shower, water pours down at the angle of 45° from one or a few rain caps of the diameters of the holes of 1-2 mm, time from a few to a dozen of seconds, because it has strong stimulatory effect.

Figure 17. Coat rain shower (Technomex)

6.2. Coat rain shower

Coat lateral douche is carried our in a device made of perpendicular or horizontal pipes in the shape of an open cage. The pipes have numerous small holes directed to the inside of the device, and additionally, at the top of it, there is one big rain douche.

6.3. Ascending rain shower

Ascending showery douche is carried out on a special seat, with cold or warm water spouting from it. It is a method recommended in case of bleeding haemorrhoids, anus prolapse, in functional weakening of fertile organs as well as in gynaecologic diseases.

6.4. Mobile spray showers

Mobile spray showers are carried out with the use of a special apparatus, which gives a possibility to change the temperature of water stream, its diameter and pressure. Douche cathedra is equipped with douche nozzle connected by a special hose with the cathedra as well as with the numerous regulators of water stream that enable fast change of water stream's parameters. Some nozzles have universal caps

that make it possible to change the streams diameter during the treatment from 5 to 20 mm. Older apparatus had disposable caps giving focused stream of water (whip), filamentous or fan-shaped stream. Inflow of cold and hot water to the cathedra must be of the same pressure, no lower than 400 kPa and no higher than 600 kpa. Distance of the cathedral from a place in which the patient is to stand should be something about 3 to 5 m, however the best is the distance of 3,5 m. During the douche, the stream of water can be interrupted and started once again and therefore this type of treatment is called water whip .

Scotch douche, besides the effects caused by the temperature have a significant mechanical impact of different strength and because of that it is absolutely necessary to avoid the head, neck, upper parts of abdomen, and fertile organs. There are several techniques of conducting mobile spray showers. The easiest method consists in leading the stream of water ona person standing back from outer side of a left foot towards ankle and later along outer part of a shank, thigh and buttock and then the stream of water is directed to the spine area and through the crest of blade-bone it goes to a shoulder, arm and forearm, then from a hand it moves to a buttock and goes downwards, onto inner part of a high, shank to the heel, and after that the procedure shall be carried out on the second leg.

Figure 18. Scotch douches T-ALTER (Technomex)

The stream of water is similarly directed on the second limb and after finishing douche on the backside of the body, it is done with as similar method on the front part. Scotch douches are done usually every second day for a period of 2-3 weeks, the hot water whips can be used every day for a period of 1-2 weeks in neuralgias, muscular pains and so on. Cold or hot douches can be applied in case of young and middle ages people suffering for motoric system disorders as a introductory treatment before medical gymnastics, but the time between the douches and gymnastics must be at least 30 minutes.

Scotch douches cannot be used in hypertension, varices of lower limbs and especially in venous thrombosis, in case of very thin and miserable people, in case of significant tendencies to extravasations in haemophilia and in case of different kinds of general and local inflammations.

Cold whip douche (focused), temperature of water 10-20°C, average 15°C, time of lasting 1-3 minutes, pressure 150-300 kPa, diameter of cap's holes about 1 cm. It has a stimulatory effect on circulation and respiratory systems, metabolism and has hardening influence as well as increases blood pressure.

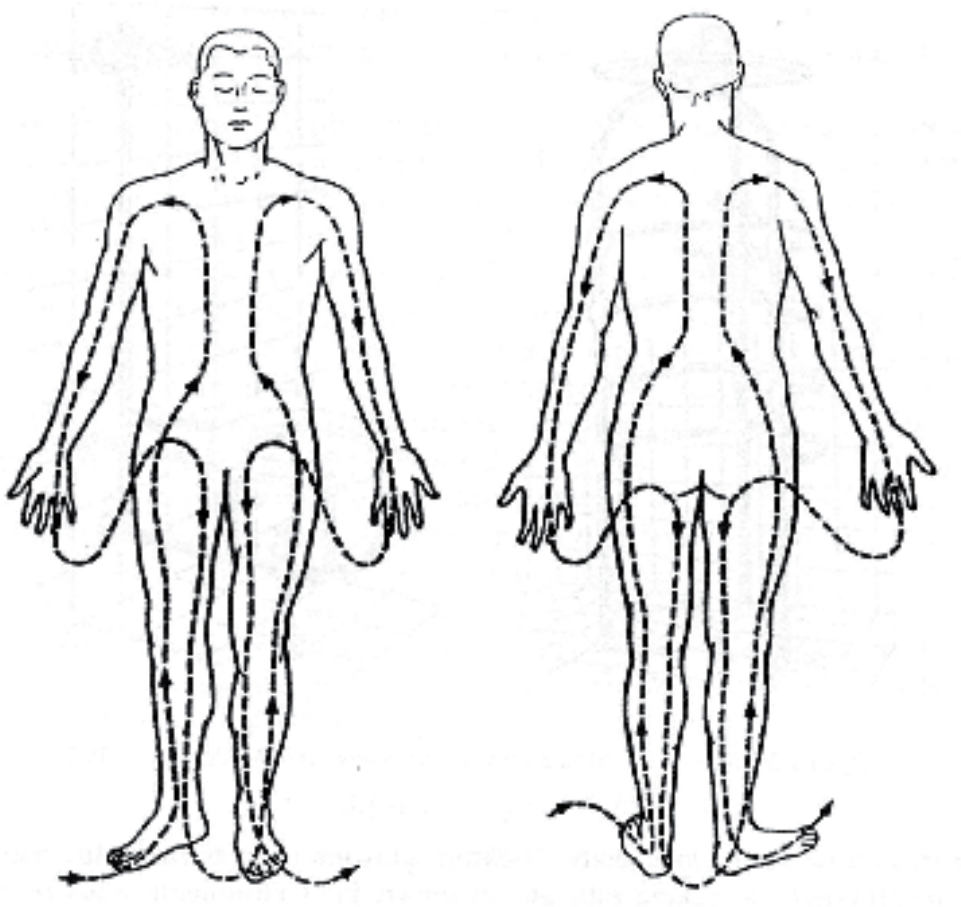

Figure 19. Direction of conducting stream of water in a whip douche

- **Scotch douche (focused) hot, temperature of water** 38-42°C, time 1-3 minutes, pressure 150-300 kPa, diameter of the holes in a cap about 1 cm.It causes fast hyperthermia of an organism.
- **Scotch douche (with alternate temperature)**, pressure of water 200-300 kPa, diameter of the holes in a cap about 1 cm . Douche starts with the use of water at the temperature of. 37-42°C for 0.5-1 minute, later for 5-10 s water has the temperature of 15°C. The treatment is repeated several times, and its total time of lasting should be about 3 minutes. It is a very strongly stimulating kind of douche that contributes to improvement of a general feeling and gives firmer shape of a body.
- **Filiform douche**, diameter of the holes in a cap about 0,5 mm, pressure 300-400 kPa used from a short distance can be painful and can cause temporary changes on skin, however, it is much gentler from a bigger distance, but anyway it should be used alternately with a douche of a bigger diameter of cap's holes or for a very short time as a filiform douche.
- **Fan-shape douche** is carried our with the use of a special cap with a hole in the shape of a narrow slot, it is indicated in muscular system diseases.

PARTIAL SPRAY SHOWERS 7

It is best to carry out this type of spray showers with the use of wall douche low-pressure battery, that consists of water mixer, reducer of the pressure and thermostat with sensor of maximal temperature as well as the set of three elastic hoses, finished with proper caps, giving effect of showery, whip or fan-shaped douche. Douche is carried out manually with the patent standing or lying in a comfortable position, depending on the location that must be subject to the treatment. The stream of water can be regulated in the scope of the temperature, as well as the pressure depending on the distance between the cap of a hose and the body and on sensitiveness of a place that is subject to douche. Usually the treatment is started with showery cap, then whip and is finished with fan-shaped douche; the treatment is repeated with the same order of cap for several times, sometimes the order of them can be changed, or during the treatment only one cap can be used. Time of a singular treatment is usually 1-2-3 minutes depending on the size of the area being subject to douche, the temperature of water is adjusted according to the need of stimulating smaller of bigger skin reaction or overheating the organism.

- Neck spray shower is used in myalgia, neck pain, and to stimulate breathing, motoric and vascular centres.
- Chest spray shower is used in chronic respiratory tract infections.
- Back spray shower is used in back pains and in chronic sciatica, in increased tension of paravertebral area, in muscular atrophies in back, and functional perturbations of fertile organs.
- Abdomen spray shower is used in case of weakened peristaltic, in hepatomegaly, and in atony of sphincter of urinary bladder.
- Joint or limbs spray shower is used in post-traumatic states, muscle atrophies, neuralgias, joint exudations, weakening of excitability of motoric nerves and in case of the patients after operation on varices, the spray showers should be done only with showery cap. Partial whips are used in rheumatic diseases of joints and muscles after acute phase symptoms relieved.
- Eye washer is a device to washing both eyes simultaneously with two streams of water. The stream of water flowing out of douche nozzles should be rather abundant but gentile at the same time, guarantying very careful washing and rinsing of both eyes and face. This type of douche, rinsing eyes and a face, requires a stream of water 15 l/min. The nozzles should be equipped with a special filter stopping all possible contaminants from water supply system. It is a device used mostly in laboratories and chemical workrooms as a tool for immediate rinsing out all the chemicals from the facial area. This device can be used in hydrotherapy in some chronic eye diseases excluding acute phases as well as diseases with increased intraocular pressure.

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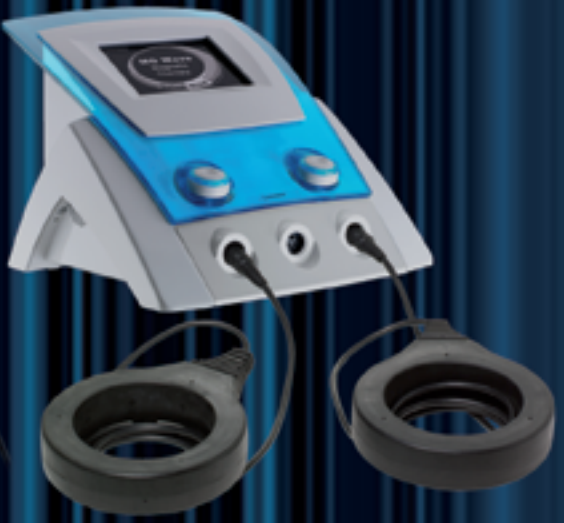

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