

The General Physiological and Therapeutic Action of Hydrotherapy.*

BY CURRAN POPE, M.D.,

Professor of Physiological Therapeutics in the Kentucky School of Medicine, Louisville, Ky.; President American Physio-Therapeutic Association.

(Concluded from page 245).

Upon Muscular Tissue both of the striated and non-striated varieties hot and cold applications have a decided and rapid action. Heat relaxes normal and overcomes spasmodic states while at the same time it produces an enervation, the result of its general relaxing and atonic action. This is true in so far as tepid, warm, and ordinary hot baths are concerned. Very hot baths, such as are constantly employed by the Japanese and which Occidentals stand poorly, have a very stimulating, revivifying and tonic effect resembling in this respect cold applications. Mosso, by means of his Ergograph, and also Vinaj and Maggiora have absolutely demonstrated the fact that cold applications in health as well as in fatigue and pathological states increase muscular activity fully one-third. This enormous increase is taken advantage of by athletes, especially the prizefighter, who always has his cold shower and rubdown prior to entering the squared arena. These statements apply to the brief application of cold water followed by reaction, for where cold applications are long continued, muscular irritability is lessened and lassitude produced. That cold may act in a reflex manner upon the internal viscera is frequently evidenced by the fact that a general cold application or even an application to the feet alone may produce evacuation of the bladder. It is a common clinical observation that the application of cold water to the abdominal surface causes contraction and stimulation of the structures of the intestines and is one of the most satisfactory measures at hand to stimulate secretion and overcome atony and constipation. Upon the muscular structure of the heart cold reflexly influences its action, decreasing its frequency, slowing the pulse, and increasing arterial tension. Where used in conjunction with carbonic acid gas, as in the Nauheim Baths, it decreases the area of dulness in the dilated and atonic heart, and by

the increase of its activity brings about a physical hypertrophy. For these reasons alone hydrotherapeutic methods are among the most valuable means of toning the neurotic and muscularly fatigued people of this strenuous age.

Upon the blood hydrotherapy has a marked influence which I have determined by a large number of personal experiments. It influences both the hemoglobin and corpuscular content, as has been noted by Prof. Winternitz. Heat stimulates leucocytosis and favours somewhat the elimination through skin and kidney, but it is, as a rule, very little beneficial upon the general reconstruction of the blood. Cold, on the contrary, is one of the most valuable means we have of increasing the quantity of hemoglobin and at the same time its oxygen-carrying power. As we have heretofore shown the respiration is deepened and larger quantities of oxygen enter the circulating blood. At the same time the cold drives into the circulation the corpuscular elements that have lain dormant in the interstices of tissues and thus adds a quota to the thickness and composition of the blood. Hot applications diminish, cold increases the alkalinity as well as the density or thickness of the blood stream, as demonstrated by Strasser. As a natural corollary to the above, we find that normal oxidative process and normal terminal waste materials are better prepared and therefore more quickly eliminated under these influences.

It may be stated that following the application of cold, the well-known "therapeutic reaction" must be attained, and that unless this is secured, save in the case of febrile diseases, the object aimed at has been defeated and the application robbed of its more pleasant and beneficial features. Reaction is co-extensive with the structures of the human body, every tissue, cell, and function feeling its influence so that the individual is strengthened, has a buoyancy and activity both mental and physical to which, in many instances, he has long been a stranger.

Judgment, tact, and a comprehensive knowledge of the particular case reduces the contra-indications to a minimum, but we may say that very hot and very cold baths are, as a rule, administered with caution in the extremes of life, youth, and old age. Delicate persons must be trained, and, where this is done with care, very little risk is entailed. Cardiac, vascular, and similar diseases demand caution.

GENERAL THERAPEUTIC APPLICATION.

To attempt within the brief limit of this monograph to describe the general therapeutic uses of water is a physical impossibility, for

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