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A CONSIDERATION OF THE RELATIVE FREQUENCY OF THE VARIOUS FORMS OF COMA

WITH SPECIAL REFERENCE TO UREMIA *

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Not only has the differential diagnosis of the various types of coma occupied a conspicuous place in routine medical instruction for a long period, but this topic year after year is the subject of contributions to medical literature so numerous that many pages would be required to enumerate the references to articles quite generally accessible.

One phase of these many considerations has been quite generally ignored, the relative frequency with which the different causes of coma bring it about. With this in mind, the following study of the clinical and anatomic conditions attending 200 deaths in coma or semi-consciousness has been made.¹ It is believed that various factors, such as the degree of medical skill, methods of hospital practice, etc., pertaining to the clinical examinations, as well as to the diagnoses, may not be very unlike those existing in hospitals of other large communities like Chicago receiving a great deal of so-called emergency work.

It is obvious that any estimate of the value of present-day methods of determining the causes of coma should in all fairness take into consideration the periods under clinical observation, and for this reason the results of our study are presented as charts. The 200 deaths all occurred in a period of about three and one-half years. The deaths in coma developing in the hospital or those in which the cause was well understood, such as illuminating gas, phenol (carbolic acid) or other poisons are not included.

We have accepted as the clinician's conclusion the diagnosis entered on the first page of the clinical record in the place provided for such entry, notwithstanding that this entry has in some instances been made after death and possibly with a knowledge of the conditions found at the post-mortem examination. This element of error we do not believe is a large one, and whatever its size there still remains

enough of interest to illustrate the results attained in the practical recognition clinically of the causes of coma.

Chart 1 deals with all 200 deaths, with the exception of 17 which took place between the fifth and the seventeenth days, inclusive. The heavier upper line indicates the times when deaths occurred as well as their number, the lower lighter line the number correctly diagnosed. From this it can be seen that of 200 deaths in coma, 47 occurred within four hours of admission, and of these, 20, or 42.5 per cent. were correctly diagnosed. Both curves take an abrupt descent to the 8-hour period, and of the 18 deaths falling in the period of four to eight hours, 10, or 55.5 per cent. were correctly diagnosed. In the third period (eight to twelve hours), 19 died, 10, or 52.6 per cent. with correct diagnoses.

It follows, then, that 116 deaths occurred within twenty-four hours of admission, and 59, or 50.7 per cent., with correct diagnoses. Thirty-five died on the second day, and 13, or 37 per cent., of these were correctly diagnosed. Of 14 dying on the third day, 6, or 42.8 per cent., were correctly diagnosed; on the fourth day, 4 (44.4 per cent.) of 9, and of the remaining 26 deaths occurring from the fifth to the seventeenth day, inclusive, the diseased conditions of 18, or 70 per cent., were correctly diagnosed.

From this chart it seems reasonable to conclude that of the patients entering the Cook County Hospital in coma and dying without regaining consciousness, over half of them die within twenty-four hours of admission, that few live longer than five days, and of those dying within four days, at least the accuracy of the clinical diagnosis is little affected by the element of time.

Some of the reasons for these conditions, as well as another already mentioned, the higher percentage of correct diagnoses of diseases causing death during the first twenty-four hours than for those which terminate fatally in the following three days, will be evident from study of this and the other charts.

The gradual increase in the number of correct diagnoses with lengthening of the period of observation is obviously what might be expected. In two recent attempts to emphasize the large number of incorrect clinical diagnoses, the absence of any reference to the length of time clinicians had to study the diseases they failed to recognize, we believe, has deprived these contributions of some of the attention they justly merit.²

* From the Pathological Department of the Cook County Hospital.

* Report made to the attending staff of the Cook County Hospital, Chicago, at its regular monthly meeting, March 11, 1915.

1. For many years at the Cook County Hospital, deaths in coma or conditions closely approaching coma have been the subject of medico-legal inquiry, and one of us (E. R. L.) as coroner's physician made the post-mortem examinations discussed here.

2. Cabot, R. C.: Diagnostic Pitfalls Identified During a Study of Three Thousand Autopsies, *THE JOURNAL A. M. A.*, Dec. 28, 1912, p. 2295. Summary of Findings, Conclusions and Recommendations with Regard to Autopsy Findings, Section III of the Report of the Committee on Inquiry into the Department of Health, Charities and Bellevue and Allied Hospitals in the City of New York, 1913.

Without assuming that other equally advantageous methods might not be employed, we have been impressed with the value, as a measure of hospital efficiency or of standardization, of the rate of ascent of curves for correct diagnoses when charted with ordinates for time under observation and abscissae, the percentage of such correct diagnoses.

Chart 2 deals with the conditions which, from the clinical examinations, were supposed to be responsible for the deaths of 85 persons who all in reality died from skull fracture. It is at once noticeable that the lower light line of correct clinical diagnoses is much closer to the heavy black line of anatomic diagnoses (skull fracture), meaning, of course, that the percentage of correct clinical diagnoses is relatively much higher for skull fracture than it is for the entire group of 200 deaths in coma from various causes.

During the first twenty-four hours, 45 died and 35, or 77.7 per cent., were correctly diagnosed. . Thirteen died on the second day with 8, or 61.5 per cent., correct diagnoses. Five, or 71.4 per cent. of 7 deaths on the third day, were correctly diagnosed. The remaining 20 died on the fourth to the twelfth day inclusive, and of these, 13, or 65 per cent., were correctly diagnosed.

Comparing this chart with Chart 1, it seems reasonable to conclude that the clinical diagnosis of skull fracture is made with relatively greater accuracy than are the diagnoses of the various other causes of coma, and that the greatest accuracy of diagnosis is obtained in those instances of skull fracture in which the patients

died within twenty-four hours of admission. As a possible explanation, it may be suggested that marks of injury very frequently give a definite clue to skull fracture; and assuming that the extent of injury to the skull, brain and external soft parts is measured directly by the severity of the external violence, we might well expect the greatest accuracy of diagnosis of skull fracture to obtain with severe injury and early death. Confirmatory of this, we find that in every history of the 61 correctly diagnosed instances of skull fracture, some injury to the head is mentioned: in 11 instances, hemorrhages from the ear or nostrils or from both places, hemorrhages into the orbital tissues from deep injuries ("black eyes") in 5, contusions of the scalp or other scalp wounds in 33, and in 12, injuries revealed by operations.

In Chart 3 we have considered 53 deaths from cerebral hemorrhage, 27, or 51 per cent., having been diagnosed correctly. Five, or 41.6 per cent., of the 12 dying during the first four hours under observation, received proper diagnoses. Of the 6 dying in the period of four to eight hours after admission, 3, or 50 per cent., were correctly diagnosed, while during the entire first day 37 died, 18, or 48.6 per cent., with correct diagnoses. Of the 9 dying on the second day, 6, or 66.6 per cent., received correct diagnoses, whereas of the 5 dying on the third day, only 1, or 20 per cent., received a correct clinical diagnosis. Six, or 75 per cent., of the 8 dying from the fourth to the tenth day were correctly diagnosed.

One of the noteworthy features of Chart 3 is the frequency of the diagnosis of uremic coma. Of the 53 instances of cerebral hemorrhage, 16, or 30 per cent., were called uremia; or, to state it in another way, of the 26 mistaken diagnoses of cerebral hemorrhage, uremia was the clinician's conclusion in 61.5

per cent. of these errors. This frequent selection of uremia from all the causes of coma as a diagnosis for spontaneous cerebral hemorrhage has led us to the review of conditions indicated in Chart 4, in which the 46 deaths in coma diagnosed uremia are dealt with. In this chart, the upper heavy line represents the number of deaths and the time when they occurred, the lower lighter line the number correctly diagnosed. One death from cerebral hemorrhage occurring on the seventeenth day is not charted. One of the interesting features of these deaths supposedly from uremia is the correctness of 5

Chart 1.—Correct and incorrect diagnoses in 200 deaths from coma. Heavy line, deaths; light line, number correctly diagnosed. In this chart, seventeen deaths in coma are not plotted. They occurred as follows: One on the fifth day, 4 on the sixth day, 5 on the seventh day, 2 on the eighth day, 2 on the ninth day, 1 on the tenth day, 1 on the twelfth day, 1 on the seventeenth day. The clinical diagnoses were correct in twelve of these.

diagnoses of this form of death on patients under observation four hours or less, 62.5 per cent. of all the correct clinical diagnoses of uremic coma.

The following brief summaries pertaining to deaths from uremia correctly diagnosed and to conditions incorrectly regarded as uremia are presented because uremia is a clinical conception for a variety of anatomic alterations and so different in this regard from some of the other causes of coma, such as fractured skull or apoplexy; these summaries also illustrate how the conclusions used in the charts have been arrived at. Only the pertinent changes found at the post-mortem examination are mentioned.

CORRECTLY DIAGNOSED UREMIA

CASE 1.—A. N., a man aged 56, entered the hospital in a dying condition with a history of frequent urination and

alcoholism. Examination of a catheterized specimen of urine revealed a large amount of albumin and many pus cells. Death occurred after fifty minutes. The clinical diagnosis was uremia and alcoholism.

Anatomic Diagnosis.—Old pyelonephritis and pyelitis; right nephrolithiasis; extensive replacement of renal parenchyma by perirenal adipose tissue; marked edema of the brain and lungs.

CASE 2.—E. N., a young man of 19, entered the hospital in deep coma. There was a general subcutaneous anasarca,

Anatomic Diagnosis.—Chronic diffuse nephritis with marked so-called secondary contraction of the kidneys; marked edema of the brain; generalized anemia; edema of the right leg and ankle; emaciation; thrombo-ulcerative endocarditis; slight mitral stenosis; hypertrophy of the heart; fibrous myocarditis.

CASE 6.—M. B., a bricklayer of middle age, entered in coma. He was cyanotic and there was some edema of the face and a marked hypostatic edema of the lungs. The clinical diagnosis was uremia. Death occurred one hour after entrance.

Anatomic Diagnosis.—Chronic parenchymatous nephritis, large white kidneys; hypertrophy of the left ventricle; edema of the brain and lungs; anasarca.

CASE 7.—W. L., a teamster, aged 68, entered the hospital in a semicomatose condition with indefinite complaint of pain and tenderness in the abdomen. Attempts at catheterization were unsuccessful and accompanied by bleeding from the urethra. He died in thirty-six hours. The diagnosis was uremia.

Anatomic Diagnosis.—Stricture of the urethra; false passages of the urethra; ascending urethro-cysto-ureto-pyelo-nephritis; chronic interstitial nephritis; large retention cyst of the lower pole of the right kidney; marked edema of the lungs and brain.

CASE 8.—S. B., a housewife, aged 54, entered the hospital apparently in alcoholic coma. No evidence of uremia presented itself aside from the presence of a large amount of albumin and pus cells in the urine. Death occurred in four hours. The diagnosis was alcoholism and uremia.

Anatomic Diagnosis.—Stones and suppurative pyelitis of the left kidney; acute fatty changes in the right kidney; indurative paranephritis and para-ureteritis; edema of the lungs; moderate edema of the brain.

INCORRECTLY DIAGNOSED AS UREMIA

CASE 9.—M. L., a laborer, aged 60, entered the hospital with the diagnosis of uremia. A suggestion of right facial palsy was noticed. The left pupil was dilated, irregular and larger than the right. Neither pupil reacted to light. There was a bilateral Babinski reflex and increased patellar reflexes, especially on the left side. The urine contained some albumin and a few hyaline and granular casts. The

Chart 2.—Conditions which clinically were supposed to be responsible for the deaths of eighty-five persons who died from skull fracture. Heavy line, anatomic diagnoses; light line, correct clinical diagnoses. In this chart, twelve deaths from skull fracture are not plotted. They occurred as follows: 1 on the fifth day, 3 on the sixth day, 5 on the seventh day, 2 on the ninth day, 1 on the twelfth day. The clinical diagnoses were all correct except three (two cerebral hemorrhage, one dementia).

a urinous breath, high-tension pulse, muscular twitchings, and the urine contained albumin in considerable amount. He died in seventy minutes. The clinical diagnosis was uremia.

Anatomic Diagnosis.—Chronic diffuse nephritis, "mottled kidneys"; marked hypertrophy of the left ventricle; anasarca.

CASE 3.—M. K., a woman, aged 29, entered the hospital in an unconscious condition with general convulsions and a history of having been ill one day. No noteworthy clinical observations were recorded aside from the diagnosis of uremia. Death occurred in three hours.

Anatomic Diagnosis.—Chronic diffuse nephritis; "small red kidneys"; edema of the brain; acute edema of the lining of the stomach, small bowel and rectum; ulcerative tuberculosis of the left lung with miliary tuberculosis of the cervical lymph nodes.

CASE 4.—P. S., a housewife, aged 44, entered the hospital with a diagnosis of uremia. From the husband it was learned that she had complained of pain in the abdomen, back and shoulders and a headache for two weeks. She was confined to her bed with chilliness and some fever and frequent attacks of vomiting. While formerly she had been obliged to urinate four or five times a night, she had not urinated for a week previous to admission, and four days previous she had passed into coma. The husband stated that a stone had been removed from the right kidney eight years before. There was some enlargement of the heart to the left. No urine was obtainable by catheterization. The blood pressure was 148. Death occurred in two hours with a diagnosis of uremia.

Anatomic Diagnosis.—Absent right kidney; old nephrectomy scar; compensatory hypertrophy of the left kidney; nephrolithiasis; purulent cystitis; ascending infection of the urinary tract; left hydronephrosis; edema of the brain and lungs.

CASE 5.—J. S., an emaciated man apparently past middle life, and in coma, had continuous clonic and tonic generalized convulsions. His blood pressure was 155 and his urine contained abundant albumin, many pus cells and a few casts. Aside from the enlargement of the heart to the left there were no other noteworthy clinical observations. The diagnosis was uremia, and death occurred twenty-nine hours after admission.

Chart 3.—Correct and incorrect diagnoses in fifty-three deaths from cerebral hemorrhage. Heavy line, anatomic diagnoses; light line, correct clinical diagnoses. In this chart, two deaths from cerebral hemorrhage are not plotted. They occurred as follows: 1 on the sixth day, 1 on the tenth day. A clinical diagnosis of tuberculous meningitis was made in the first; in the second, the clinical diagnosis was correct.

spinal fluid was under increased pressure but otherwise apparently normal. There was a polymorphonuclear leukocytosis of 11,000, and the temperature was as high as 101.4 F. Death occurred in twenty-six hours with a diagnosis of uremia and chronic nephritis.

Anatomic Diagnosis.—Marked edema of the brain; marked emaciation; cloudy swelling and fatty changes of the liver and kidneys; catarrhal prostatitis and (left) spermatoecystitis; nodular hyperplasia of the prostate gland; gummatous scars in the leptomeninges.

No hemorrhages or other gross lesions were found when the hardened brain was sectioned, and the only gross change in the kidneys was "slight fetal lobation markings."

CASE 10.—H. H., a middle-aged man, entered the hospital in coma and convulsions. After entering the ward the convulsions ceased, and he presented no noteworthy physical signs which would lead one to a diagnosis. His blood pressure was 220, the urine contained abundant albumin and many hyaline and granular casts. Without regaining consciousness he died in seventy-two hours with a diagnosis of chronic interstitial nephritis, uremia, mitral insufficiency and myocarditis.

Anatomic Diagnosis.—Gummas of the liver; syphilitic aortitis; beginning aneurysm of the arch and thoracic aorta; marked edema of the brain; turbid cerebrospinal fluid; sclerosis of the coronary arteries; fibrous myocarditis; left ventricular hypertrophy; marked fatty liver; slight edema and minute gummatous scars in the leptomeninges; bronchopneumonia of the dependent portions of both lungs.

CASE 11.—J. N., a laborer, aged 45, entered the hospital with a diagnosis of nephritis, myocarditis and alcoholism. From an attendant it was learned that he had been ill for nearly ten days and had become unconscious two hours previous to entrance. The pupils were inactive to light. There was marked anasarca of the lower extremities as high as the knees. The urine contained albumin, many epithelial cells, erythrocytes and leukocytes and epithelial casts. There was a polymorphonuclear leukocytosis of 24,600. The blood pressure was 218. No spinal puncture was done. The temperature rose to a height of 104 F. rectally, and death occurred in twenty-eight hours. The clinical diagnosis was chronic interstitial nephritis with exacerbation and uremia, edema of the lungs, tertiary syphilis and delirium tremens.

Anatomic Diagnosis.—Fibrinopurulent leptomeningitis, acute interstitial and chronic diffuse nephritis with slight so-called secondary contraction; hyperemia of the renal pelvis; hyperplasia of the spleen; anasarca; cloudy swelling of the myocardium; slight hydropericardium; marked edema of the lungs; slight bronchopneumonia of the posterior portions of the lower lobes of both lungs.

In this instance it may be that uremia in a measure contributed to death. That the coma was due to the meningitis is also equally admissible.

CASE 12.—G. N., an old man, was admitted to the hospital with the diagnosis of uremia and a history that he had been ill for five weeks. He was obese and there was general anasarca. The pupils were contracted and inactive to light, and there was a slight general icterus; death occurred in twenty-two hours. The diagnosis was organic heart disease and uremia.

Anatomic Diagnosis.—Marked atrophic cirrhosis of the liver; chronic parenchymatous nephritis; marked anasarca; marked edema of the brain; moderate generalized icterus; hyperplasia of the spleen; marked syphilitic aortitis; atrophic catarrhal gastritis.

In some degree the changes in the kidneys commonly referred to as parenchymatous nephritis are present with cirrhosis of the liver; and such alterations, tense parenchyma, slightly icteric and a little mottled wide cortex were the only gross changes in

this instance and in the two following; nor were there noteworthy gross changes in the brain in any of these individuals with cirrhosis of the liver.

CASE 13.—Unknown old man entered the hospital as having uremia and jaundice. His legs were very edematous, the liver was enlarged and hard and there was a marked icterus. Death occurred in fifty-five minutes. The diagnosis was "atrophic cirrhosis? uremia?"

Anatomic Diagnosis.—Cirrhosis of the liver; icterus; hydroperitoneum and hydropericardium; submucous hemorrhages of the gastro-intestinal tract; chronic catarrhal gastritis.

CASE 14.—D. H., a clerk, aged 36, entered the hospital in a semicomatose condition with a diagnosis of cirrhosis of the liver. On entering the ward, supra-orbital pressure aroused him so he told his name. The liver was enlarged and there was some edema about the ankles. He died within two hours. Death was thought to be due to uremia complicated by cirrhosis of the liver.

Anatomic Diagnosis.—Atrophic cirrhosis of the liver with fatty infiltration; passive hyperemia of the mucous membrane of the stomach and bowel; chronic hyperplasia of the spleen; anasarca.

CASE 15.—K. P., a housewife, aged 26, was brought to the hospital in a dying condition. She suffered a persistent hiccup and was markedly jaundiced. The abdomen bulged, especially in the upper right quadrant. The liver was enlarged and palpable, and the splenic dulness extended to the border of the left costal arch. There were numerous purplish spots on the extremities. There was no edema. The patient died in seven hours. The diagnosis was uremia.

Anatomic Diagnosis.—Puerperal uterus and mammae; gangrenous endometritis; recently dilated cervix uteri; icterus; corpus luteum of pregnancy in the left ovary; large fatty liver.

CASE 16.—R. C., aged 80, and greatly emaciated, was brought to the hospital in coma. He was admitted on a diagnosis of uremic coma. The pupils were unequal and inactive to light. There was no edema. A suprapubic mass was palpated, and the prostate gland was noticed to be greatly enlarged and nodular. The temperature was 100 F. rectally on admission. Death came in fifty-five minutes and was ascribed to uremia.

Anatomic Diagnosis.—Carcinoma of the prostate; blood in the urinary bladder; anemia; extensive secondary metastases in the periaortic lymph nodes; emaciation; anasarca of the ankles.

With carcinoma of the prostate, as with enlargements of the prostate from other causes, an ascending infection of the urinary tract is not infrequent. Many authorities attribute death under such conditions to uremia.³ With this prostate carcinoma there was no ascending infection.

It has long been recognized by persons with extensive experience in the making of post-mortem examinations that the diagnosis of uremia is frequently made by clinicians and rarely verified by the necropsy. Cabot, in the article already referred to, has commented especially on this defect in clinical diagnosis. In the report regarding conditions in the New York hospitals,² the following occurs:

3. Miller, Friedrich: Ueber Morbus Brightii, Verhandl. d. Deutsch. path. Gesellsch., 1906, ix, 64.

Chart 4.—Correct and incorrect diagnoses in forty-six deaths from uremia. Heavy black line, deaths; light black line, correct diagnoses. In this chart, one death in coma is not plotted. It occurred on the seventeenth day.

The large percentage of incorrect clinical or ante-mortem diagnoses in Bellevue is partly due to the lack of medical knowledge among our better class of practitioners, and partly to hasty and insufficient examinations. Too much reliance on inexperienced house physicians and interns also accounts for a portion of these errors.

As stated in the beginning, this is an effort to throw some light on the relative frequency of the various forms of coma. It is imperfect, as previously noted, in not including some of the comas which offered no problem to the clinicians, the explanation being well-verified accounts of the taking of morphin, of exposure to illuminating gas, etc. It is also imperfect in that during the period during which these 200 deaths occurred, still others died in coma whose bodies were not examined, the period of clinical observation being so long and the understanding of the disease so adequate that their deaths were not a subject of medicolegal inquiry, or being made the subject of such inquiry, post-mortem examinations were not indicated without request of relatives; in still another class of deaths, not medicolegal, the cause of coma long observed and well explained clinically was not verified because of failure to secure consent for a necropsy. These considerations should be kept in mind in any attempt to utilize the information in this review.

Regarding the diagnosis of uremia, it will be noted from the protocols that it was correct in a number of instances when death occurred in fifty minutes, seventy minutes, one hour or other similarly brief periods after entering the hospital, times altogether too short to make comprehensive examinations. These must be reckoned with as in the nature of "chance shots." It may be argued that diagnoses made under such conditions deserve no serious consideration; but, on the other hand, it has seemed to us that the tendency to deal with the diagnosis of uremia in this haphazard manner denotes a serious defect in the teaching of medicine, an ignorance of the comparative infrequency of uremic coma; finally, it should be stated that accurate figures for the relative frequency of coma of various sorts would constitute an equipment for the differential diagnosis of coma comparable in its value with the mortality statistics so useful to surgeons in making statements regarding the prognosis for operations they undertake or advise.

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THE THERAPEUTIC USE OF COLD

WITH ESPECIAL REFERENCE TO THE CLIMATIC
TREATMENT OF TUBERCULOSIS

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The production of anesthesia by freezing, the relief of pain by heat or cold, the reduction of pyrexia by cold baths, evaporation of water or alcohol, etc., are all familiar practices; so also are the cold morning sponge, spray, shower or tub given for the general tonic effect. Since little attention, however, has in the past been paid to hydrotherapy in our medical schools, such measures are not always accurately prescribed nor given the serious attention which they deserve.

THE PHYSIOLOGIC EFFECTS OF COLD WATER

As the effect of cold has been most carefully studied by the hydrotherapeutist, and as water offers the most convenient medium for laboratory experimentation,

let us first consider the effect of cold water. Without entering into physiologic detail we may understand by the word "cold," those temperatures which lower the temperature of the human body. (All those temperatures below a neutral zone which has no effect on body heat.) In his work on hydrotherapy Bottey¹ gives the lower limit of this neutral zone as 91 degrees F., subject, of course, to some variations with individuals and mode of application.

Extremely cold water (32 to 52 F.) when applied to the skin is at first more or less painful, then with the anemia which results with continued application there occurs a degree of anesthesia. The same is true with slightly higher temperatures—the sensation of a douche at 60 F. resembling the anesthetic effect of menthol.

Cold water applications to the body as a whole for therapeutic purposes are given in practice between 45 and 90 F. and the physiologic effect depends on the following principles: 1. Primary refrigeration of the skin and superficial tissues, a physiologic phenomenon. 2. Refrigeration due to nervous reflex action. 3. Elevation of the central temperature resulting from the flow of blood from the skin to the central organs. 4. Elevation of central peripheral temperatures of nervous origin.

These are, in brief, the main physiologic features resulting from an application of cold. The best results are obtained when the cold is applied suddenly; that is, the transition from warm water which may precede the cold, as in the Scotch douche, should be immediate and not gradual. So it is after exercise or after the hot air bath used as a preparation for a cold application; the body should not be first allowed to cool, but the cold should be applied at once.

The aim of all hydrotherapeutic use of cold is what is known as the "reaction," and includes circulatory, thermic and reflex organic phenomena—a true tonic effect on the nervous system, the heart and the lungs. Quoting Bottey,¹

A series of reflex effects upon the circulation both local and general, contraction of striated and unstriated muscle fiber, stimulation of organic and interstitial combustion, metabolism, secretion and excretion . . . a great physiological synthesis which results finally in increase of the general vitality, greater activity of the functions of digestion and assimilation, increase of muscular force and aptitude for work, a sensation of wellbeing, of physical, mental and moral balance, a remarkable ensemble, the result of hydrotherapy.

THERAPEUTIC EFFECTS OF COLD WATER

While the nervous system regulates all the organic processes of the organism and is in itself dependent on the other cells of the body for existence, they are not able to function without it. In treating a diseased body we cannot afford to have in mind any group of cells or any organ to the exclusion of the intricate system of cells which control their activity, their food supply, their disposal of refuse, etc. Thus the treatment of disease includes the treatment of the nervous system of the patient, and what medicine, therapeutic method or device can compare with cold when it is necessary to whip up a flagging nervous system?

"Better than any other therapeutic method" says Scheuer,² "better than any agent of *materia medica* does the stimu-

1. Bottey, F.: *D'Hydrothérapie Médicale*, Paris, E. Plon, Nourrit & Co., p. 68.

2. Scheuer: (de Spa), *Essai sur l'action physiologique et thérapeutique de l'hydrothérapie*, etc., Paris, A. Delahaye & E. Lecrosnier, 1885.