Foshay (P. M.)

LITHEMIA,

—BY—

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Read before the Cuyahoga County, Ohio, Medical Society, February 16, 1893.

Reprinted from "The Cleveland Medical Gazette,"
May, 1893.

PRESS OF
BUEL & HUBBELL, 110 Sheriff Street,
Cleveland, Ohio.

LITHEMIA.*

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DEFINITION—The term lithemia (without regard to its etymological meaning), will be used in this paper to describe a certain general diseased state, due to errors in diet and characterized by certain definite symptoms. The essential factor in the disease is the accumulation of products of disordered metabolism in the fluids and tissues of the body.

PATHOLOGY—An accurate knowledge of the pathology of a disease is so essential to a thorough comprehension of its clinical manifestations and so necessary to intelligent treatment, that it is much to be regretted that no complete scientific pathology of lithemia is as yet forthcoming. A rapid survey of some of the recent literature of the subject will, while emphasizing this unfortunate uncertainty, be of some value, however.

Bartholow treats of it as a disease of the liver, whose distinguishing mark is an increased production of uric acid, dependent upon deficient oxidation of nitrogenous food. Either albuminoid food is taken in excess; or the supply of oxygen is deficient; or digestion is imperfectly performed.

Osler treats only of lithuria. Flint and Fagge find little difference between lithemia and gout.

Haig,[1] predicating a varying degree of alkalinity of the blood, says that when the alkalinity is low uric acid is stored in the tissues to be dissolved out and appear in great excess when change in diet renders the blood more alkaline. Then we have symptoms of acute uric acid poisoning.

Herter* concludes that urea and uric acid are both end-products of different chains of nitrogenous metabolism, and that there is nothing to prove that uric acid is a necessary and less oxidized step in the urea-forming series. As the absolute daily amounts of urea and uric acid excreted vary chiefly with the char-

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(1) Uric Acid as a factor in the causation of disease, 1892.

*Observations on the excretion of uric acid in health and in disease, by C. A. Herter, M. D., and E. E. Smith, Ph. D.—*N. Y. Med. Jour., June 4, '92.

acter of the food, and the ratio which the latter bears to the former is a fairly constant factor in health, this ratio furnishes a much better index of the state of the metabolic processes than would the daily quantities. That uric acid is formed in the liver may be regarded as fairly well established by the experiment of Minkowski in removing the liver from geese and finding that uric acid excretion practically ceased, and it is interesting to note that lactic acid seemed to replace it in the urine. It must be borne in mind that proteid matter after digestion must become a part of the body-tissues before *starting* upon its downward course to urea and other final products; in other words, anabolism must be completed before katabolism begins.

While the amount of uric acid excreted *may* vary as the alkalinity of the blood there is at present no proof that such is the fact. That uric acid is stored in otherwise normal tissues is an hypothesis absolutely unsupported by facts. The appeal to gouty tophi is invalid because the deposition of urate of soda is here determined solely by local necrotic changes. Haig's elaborate theory of the causative relation of uric acid to epilepsy and migraine is based upon observations of but three or four cases, and his estimations of uric acid were made by a faulty process. It is generally said that urates occur in excess in the urine of fever patients, but there are no well-established facts upon which to base such a statement. The deposition of urates as a sediment in a urine by no means proves excessive quantity, but may be merely evidence of hyperacidity or high concentration. In diseases of the respiratory organs, where the supply of oxygen to the organism is presumably curtailed, no increased excretion of uric acid has been ascertained, the evidence at hand being inconclusive; and Herter calls attention to the fact that birds, whose respiratory apparatus is most active, excrete nearly all their nitrogen as uric acid.

The most recent work upon the relation of uric acid to gout by Von Jaksch and Pfeiffer demonstrates an increased amount in the blood of gouty patients with the urine showing a decrease previous to a paroxysm and a large increase during the attack. Leukemia

and chorea are diseases in which a continuous and excessive excretion of uric acid is known to occur. In the *petit-mal* form of epilepsy also an increase of uric acid is a quite constant accompaniment, while in *grand-mal* the only relation is an increase after the paroxysm. From this latter fact it would seem evident that the increased amount of uric acid is merely an effect of the conditions associated with epilepsy and stands in no causative relation to that disease.

W. W. Johnston* denies to uric acid first place in the etiology of lithemia and gives equal rank to other products of disordered nitrogenous metabolism. He divides lithemic cases into two classes, in one of which disease of the gastro-intestinal tract and liver is the primary factor, while in the other a defective store of nerve power is the basal condition.

In normal digestion, when peptones reach the intestines, they undergo changes which result in part in the formation of ptomains and leucomains, and in health these are eliminated before harm results, but when digestion is slow absorption and poisoning occur.

Absorption of the toxines having occurred, the liver disposes of them so long as it can, but soon the hepatic cells become overworked and the vessels engorged, and then the poisons reach the general circulation with the added injurious products of disordered hepatic function. These toxines produce the typical lithemic symptoms of hypochondria, mental inertia, irritability, drowsiness, unrest, etc. Albertoni and Silvia have enumerated the following poisons formed in the intestines: peptoxine, the various ptomains and leucomains, indol, phenol, lactic acid, ammonia, hydrogen sulphide, acetone, and we may add skatol. Direct proof that these substances produce the nervous symptoms is wanting, but the finding in the urine of such cases excessive amounts of sulphates, phenol, indican, acetone, ammonia, diamine, alkaloids and peptones furnishes positive evidence of their absorption and succeeding elimination by the kidneys, and renders it in the highest degree probable that they produce the nervous symptoms.

* "On the nature and treatment of forms of disease characterized by indigestion, the presence of bile, urates and uric acid in the urine and nervous symptoms."—*Med. News, March 12, '92. Vol. LX, p. 281.*

On the other theory a true neurasthenia is the fundamental condition, and from the lack of nerve force we have disturbed circulation, poor digestive secretions, indigestion, and so on. Both theories probably hold true in different cases.

Dr. James Wood,[1] of Brooklyn, N. Y., makes lithemia a disease of improper alimentation, especially the use in excessive quantity of carbo-hydrate food. The ill influence of such diet, besides disordering digestion, is due to the consumption of a large proportion of the available oxygen of the body in the oxidation of the carbohydrates, leaving an insufficient amount to transform the food into kinetic or final products. Hence we have suboxidation of proteids and the production of certain poisonous substances. This first product of suboxidation having appeared, it may pass through successive katabolic stages, becoming increasingly obnoxious.

A too large amount of food will also determine suboxidation. "Thus we see if a larger quantity of food is eaten than can be perfectly oxidized in the body, and especially if the starches, sugars and fats be in preponderance, imperfect results of general bodily oxidation must ensue. If this super-feeding should continue for a length of time, with its resultant incomplete products, a devitaliszation of the protoplasmic elements of the hepatic cells occurs, with serious deterioration of the most important functions of the liver and kidneys. In consequence of these abnormal changes in such important organs and the decrease in the oxygenating capacity of the body, a host of incomplete katabolins is developed and retained to a large extent within the body." In illustration of the phenomena of suboxidation of proteids, Wood gives the following: A proteid molecule attacked by 139O gives results of normal oxidation, viz.: urea, uric acid, kreatinin, CO_2, H_2O and SO_3. If, however, only 136W are forthcoming, more uric acid is formed. If 129O, we have oxalic acid; if 94O, lactic acid is formed, while with only 76O we have glucose produced. This is largely theoretical, of course, but explains many clinical facts, e. g., why lithemia is complicated by oxaluria, rheumatism and diabetes.

(1) The Relation of Alimentation to some Diseases, by James Wood.—*Science, Vol. XXI, p. 62.*

Pepper, in his lectures upon the practice of medicine, insists strongly that a condition of mal-nutrition, lithemia, underlies all the nervous diseases characterized by convulsions.

RESUME OF PATHOLOGY.

Lithemia is a state of general mal-assimilation and faulty metabolism due to disturbance of the functions of the nervous system, stomach, intestines and liver; in any one of which may have occurred the primary fault, the others being implicated secondarily; and the symptoms in a given case may be more or less limited to those of disturbance of function of one of these organs.

While the theory of suboxidation of proteid food-stuffs due to excessive consumption of the carbo-hydrate foods, with its attendant misapplication of nerve force and too great combustion of the oxygen of the body in handling this surplus, and consequently leaving an insufficient amount of oxygen and nerve force to convert proteids into kinetic products; while this theory lacks definitive proof it is nevertheless supported by all the facts yet at our disposal, and is the only theory that adequately accounts for the multiplicity of symptoms which this disease presents and which furnishes a rational basis for scientific and successful treatment. If this view is correct, as I believe it is, the frequent (apparent) occurrence of excessive excretion of uric acid in lithemia is but an indication of the condition of suboxidation which obtains in the economy. Rather the essential factor in the disease is the production by faulty metabolism of a large number of toxines whose action upon the different body tissues gives rise to the typical lithemic symptoms.

While I do not believe with Haig that excess of uric acid excretion or storage is the cause of epilepsy, migraine, neurasthenia, melancholia, gout, rheumatism, Bright's disease, etc., I do believe that underlying all these diseases there is a condition of mal-assimilation, marked by poor digestion of carbo-hydrates and errors in the chain of nitrogenous metabolism. This condition I call, for want of a better name, lithemia.

CAUSE.—Little remains to be said of the causes of lithemia.

They may be classified as follows:

*(1.) Improper food—either excessive amount or inordinate use of one class of food to exclusion of others.

(2.) Use of beer, wine and spirits.

(3.) Lack of proper air and exercise.

(4.) Various nervous influences.

(5.) Inherited dyscrasiæ.

An exacerbation will be determined by some unusual indiscretion in diet or by exposure to cold and damp.

CLINICAL HISTORY.—The symptoms may be classified as follows:

I. Symptoms due to gastro-intestinal and hepatic disturbance.

II. Nervous symptoms.

III. Circulatory symptoms.

IV. Local and anomalous symptoms.

V. Changes in urine.

I Symptoms due to gastro-intestinal and hepatic disturbance. Those of dyspepsia, capricious appetite; distension; flatus; heartburn; coated tongue; coppery taste; bowels irregular—alternating constipation and diarrhœa, stools liquid and black and light yellow, with offensive odor.

Hepatic symptoms—liver enlarged and tender, perhaps, hemorrhoids from portal congestion; conjunctivæ often a little yellow. Intestinal hemorrhage was seen a number of times by Murchison.

II. Nervous symptoms—mostly of auto-intoxication by products of fermentation in the intestines. Drowsiness after meals; weariness; lassitude; mental inertia; irritability; periods of despondency; headache—especially frontal, more rarely occipital, usually constant with exacerbations, in some cases ceasing at sunset; vertigo; dim vision; tinnitus. Sleep unrefreshing and dreamy; often insomnia; memory weakened; aphasia has been seen; and even attacks of unconsciousness with convulsive movements have occurred.

Neuralgic attacks are frequent, especially intercostal and sciatic, in many cases shifting location frequently; lumbago; aching pains

*Lithemia, by A. Stewart Lobingier; *Medical News, Vol. LX, p. 33.*

in limbs; cramps in muscles, especially at night; nocturnal emissions in the male may be a symptom; gastralgia is not infrequent. The migrainic paroxysm is regarded by many as simply a lithemic crisis.

III. Circulatory symptoms. Pulse in many cases (the robust) is hard and tense, may be irregular and intermittent; second heart-sound somewhat accentuated; palpitation frequent; atheroma is found in old cases.

IV. Local and anomalous symptoms. Skin muddy and dry, rarely hyperidrosis, pruritus—particularly p. ani; eczema, particularly of genitals; a feeling of heat and scalding about anus and scrotum—noticed particularly after eating sugar; seborrhœa; alopecia; acne; attacks of urticara—often with systemic symptoms; burning sensation in palms and soles. Suffusion of eyes; ecchymoses of conjunctivæ; iritis.

Duckworth notes spontaneous loosening and falling out of the teeth; and too rapid erosion of the cutting surfaces of the teeth may occur. Murchison speaks of constant grinding the teeth together to relieve a disagreeable, uneasy sensation in them and I have seen one mild instance. A case of Wiest's[1] was very pale each morning, but in the afternoon the face became congested.

V. Changes in urine. These are not well known. As a rule it is scanty and high colored. The specific gravity is high, unless the case is of long standing with organic disease of kidney. Usually deposits urates freely. Frequent micturition with scalding is commonly met with. Bile pigment occurs in the urine in many cases.

Lithemics are usually over-sensitive to changes in atmospheric temperature, density and humidity. Wood says a great deal of the ill health of young women is due to unhygienic modes of life and diet bringing on lithemia. Many of the ill-defined abnormalities of health in children are due to similar conditions of malnutrition.

1. Uric Acid by N. Wiest, *Medical News, Vol. LXI, p. 459.*

The grouping of symptoms in actual cases is best illustrated by quoting briefly from my notes of three cases:

CASE I. An Englishman æt. 30, of robust habit and single; a manufacturer. Being of good family, he had a distinctly gouty ancestry, his father having died of gout after life-long suffering, and a brother of the patient's having suicided while in an attack of lithemic hypochondria. He was an enormous eater, especially of rich foods; sedentary habits; perfectly temperate in use of alcohol. He complained of constant headache, aggravated by every attempt to attend to his business affairs; disordered vision; memory failing; total inability to concentrate mind upon any subject; despondency reaching to true melancholia and prompting frequent thoughts of suicide. Trifling mistakes in conduct filled him with keenest remorse, so that he thought his demise would be a boon to the world. He was in constant and keen dread of organic brain disease. Urine was scanty, highly concentrated, high color and sp. g. and scalded during micturition. As he was a refractory case with which to deal I recommended him to Weir Mitchell for consultation. Being authoritatively assured that he had no brain disease and persevering in careful anti-lithemic diet, with the addition of an ocean voyage, he made a complete recovery and is well at the present time.

CASE II. Lawyer æt. 28. Inclines to occasional over-weight. Sedentary. Father for years been subject to attacks of nephritic colic. Each spring has had 'bilious spells.' Uses no alcohol. Last year, after a winter of severe mental work, other symptoms appeared. Constant weariness and loss of bodily energy. The most distressing symptom was inability to concentrate his mind upon his work. Had nocturnal emissions every one or two weeks, about which he worried excessively. Urine had usual characters. Cure has been prompt and complete upon appropriate treatment.

In the third case the most prominent symptom was gastralgia, occurring in a man of neurasthenic family.

DIAGNOSIS.—The diagnosis is not difficult. The history of erroneous diet makes it certain.

COURSE, DURATION AND PROGNOSIS.—If untreated all the symtoms go on from bad to worse, and structural changes occur in the liver. The arteries become atheromatous and even degeneration of the cerebral substance may ensue.

Intercurrent and complicating maladies influence prognosis powerfully.

Cure is always possible before organic change has occurred.

COMPLICATIONS AND SEQUELÆ.—In England commonly, more rarely in America, lithemia runs on to gout.

Draper and Duckworth have noted a close relation between lithemia and diabetes; and temporary glycosuria is a not infrequent complication.

Da Costa has reported a number of cases of albuminuria complicating lithemia, with tube casts and excess of oxalates and urates. The specific gravity of urine was high. The albuminuria yielded readily to appropriate anti-lithemic treatment.

Muscular and articular rheumatism are frequent complications. Johnston[1] and Dulles[2] have seen Bright's disease occur. Nephritic colic is not rare. Angina-pectoris is met with occasionally. Migrain is very common. Melancholia quite frequently ensues in neurasthenic cases. Recurrent tonsilitis, nasal catarrh, chronic pharyngitis and bronchitis frequently harass the lithemic.

TREATMENT.—Before taking up the treatment in detail it must be noted that no hard and fast rule will suit every case; in no disease is this so true as in lithemia. There are two broad classes of cases which must be carefully differentiated; in one we find robust, plethoric individuals, usually gross feeders and high livers, leading indolent and sedentary lives, who have rugged constitutions, and only become lithemic by continued and inordinate abuse of their bodies. On the other hand are people of spare habit with no original surplus of energy, who suffer promptly from every dietary indiscretion; they eat seemingly scarcely enough and yet are unable to thoroughly digest that. They are anemic and neurasthenic and get their lithemia, in spite of every care, largely be-

1 Loc. cit. 2 Obscure Forms of Gout, by Chas. W. Dulles, *Medical News, Vol. LX., p. 253.*

cause they suffer from a congenital lack of nervous energy. Of these two classes, predicating thorough control by the physician, the former is much more amenable to treatment.

In the matter of diet we must be governed by the following principles enunciated by Wood:

(1). We should understand which kind of diet is best suited to furnish to the body the elements which it requires daily.

(2). The constituents of the diet should be such as will give nourishment to the body and use but a minimum of vital force in its preparation.

(3). The quantity ingested daily should be such as will maintain an equilibrium between production and destruction. This is to be determined by a study of the renal excretion.

(4). Auto-intoxication by products of decomposition and fermentation in the intestines is prevented by the application of the above facts.

(5). Entrance of deleterious agents into the entero-hepatic circulation is prevented by preventing hepatic derangement.

Starches, sugars and fats are especially to be avoided so long as intestinal digestion is abnormal. Highly acid fruits and other acid foods do harm. Strawberries seem particularly obnoxious to some cases, bringing on violent urticaria. Foods fried or prepared in fat are not admissible. Coffee and tea in reduced quantity or not at all, according to severity of case. No pork, nor fat or preserved meat.

The foods allowed will be rare, lean meat broiled; fowl and game particularly; eggs occasionally; fish and oysters. All fresh succulent vegetables and most fruits. A little bread and light starches. Milk, cocoa and plenty of pure water. Not much fluid at meals. No alcohol in any form, as it impairs digestion, irritates the liver and retards metabolism.

The English plan of simply cutting off all nitrogenous food is not rational, does not meet the indications and gives very unsatisfactory results, except in robust cases where gastric digestion is most at fault.

The hygienic treatment is of supreme importance. The plethoric cases must have plenty of out-door exercise to promote oxidation. The anemic cases need complete rest, with light graduated exercise or massage. Oxygen inhalations have been of service in the latter class of cases.

The patient's surroundings must be made more congenial, if possible, and overwork and anxiety must be avoided. Travel is highly beneficial.

Frequent baths are an essential element in the treatment. A cool sponge-bath in the morning is useful to all, even the most anemic.

Daily evacuation of the bowels, without the use of purgatives, must be secured.

The medicinal treatment varies greatly with the individual case. An active purge may do well in robust cases to commence with, but only gentle laxation can be used in anemic cases. Phosphate of sodium, with the bicarbonate, as the best cholagogue is indicated in nearly all cases. The mineral acids, nitric and nitro-hydrochloric, agree better with the anemic cases than the alkalis. Diaphoresis must be induced when toxic symptoms are marked.

Lavage does good where there is gastric dyspepsia, with cardiac palpitation and insomnia.

The alkalis and acids promote oxidation, but this use should not be persisted in too long.

The mineral waters, alkaline and saline, are very beneficial if used perseveringly; waters like Friedrichshalle and Carlsbad for robust, with Vichy, Lithia or Saratoga Vichy for anemic cases.

Arsenic is useful for the vertigo and hypochondria.

Intestinal antiseptics, though none are really efficient, often do good. The best are thymol, salol, naphthol and salicylate of bismuth.

So-called tonics are not indicated and iron must not be used, nor cod-liver oil.

Some cases are very refractory, particularly those due to long continued worry and anxiety; and middle-aged women, who have

lithemia with constipation and hepatic engorgement, and in addition neurasthenia, from leading a sedentary life, with lack of oxidation and prolonged mal-nutrition, are nearly incurable.

GENERAL CONCLUSIONS.

In conclusion let me say that I am fully aware of the imperfections of this essay, only part of which can be attributed to the somewhat indefinite state of teaching upon the subject treated. Certain phases of the disease deserve far more thorough investigation than could be accorded them.

Certain facts, however, I regard as thoroughly well-established.

There are more diseased conditions due solely (primarily) to error in diet than (probably) to any other one cause. This is today the broadest field in medicine open for investigation, and is sure to yield bountiful results to the careful scientific investigator.

A fact to which Ferguson[1] has called attention, must be borne in mind, and it has an important bearing upon the great fundamental biologic problem now being controverted by the neo-Lamarckians and neo-Darwinians, namely, the question of the inheritance of acquired characters. Ferguson shows that there is a tendency for continued dietetic errors to produce organic change in the body, and such errors impressing successive generations insure an organic enfeeblement which becomes hereditary.

The question then of proper alimentation is of the highest importance to render certain the propagation of a vigorous race. We, to-day, are far from knowing all we should concerning this matter of diet; and the people at large in their cooking and choice of dietary are far from treating their bodies in a manner calculated to secure the most service with the least illness.

I must not close without a warm commendation of the invaluable work accomplished by Edward Atkinson in striving to both improve and cheapen the dietary of the masses.

(1) The Dietetic Treatment of Certain Neuroses, by John Ferguson.—*Medical News. Vol. LX, p. 5.*