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AUTO-TOXEMIA AS A FACTOR IN THE NEUROSES.

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The doctrine of auto-intoxication is a very old one; the central idea of the primitive conception survives in the term rheumatism, applied to a condition due to the auto-intoxication resultant on suboxidization. Many of the morbid states now regarded as auto-toxic were of old charged to rheums, as the products of rheumatism. Obesity and allied states were placed in the sixteenth century in the nosologic position they occupy to-day. In Sydenham's time the effects of these conditions were even better recognized than during the middle decades of the nineteenth century. Sydenham pointed out that suppressed gout (that is, gout without joint expression) exercised marked influence on the constitution. The body, he remarks, "is not the only sufferer and the dependent condition of the patient is not his worst misfortune. The mind suffers with the body, and which suffers most is hard to say. So much do mind and reason lose energy as energy is lost by the body, so susceptible and vacillating is the temper, such a trouble is the patient to others as well as himself, that a fit of gout is a fit of bad temper. To fear, anxiety and other passions, the gouty patient is a continual victim; whilst as the disease departs, the mind regains tranquillity." He also pointed out that gout affected the throat, heart and lungs as in asthma.

Upon the auto-intoxication doctrine was based the therapeutic principle underlying blood-letting. This aimed to remove the *materias morbi* and so replace blood by water as to carry on the circulation. The principle laid down by Sangrado (Le Sage's caricature of the phlebotomizer) was to drink water in great abundance as a universal menstruum which dissolves all kinds of salts. Plentiful bleedings and frequent draughts of water were to Sangrado the secret of health.

Auto-intoxication states existed to an enormous degree before the days of fresh winter vegetables, and formed the basis of most of what were called scorbutic disorders. For these reasons "spring cleaning," as it is called, still survives in popular medicine. In rural Italy the practice still obtains of bleeding in the spring and using water infusions of purgatives.

The practical adoption of the germ theory (which has hovered over the profession for two centuries) in the early eighties of the nineteenth century, turned atten-

tion, through discovery of the toxin, to the allied products formed in the system without bacterial action. Nearly simultaneous with this came the demarcation of neurasthenia by Beard, with the consequent study of fatigue and its results. Fatigue was found to produce auto-toxemia in two ways: First, by the direct products of nerve waste, and second, by the fatigue of the organs of sanguification and elimination from overwork after the loss of inhibitions, from central nerve tire. What were considered pathologic results, dependent on a specific lesion in a special location, were shown to be due to weakness of inhibito-motor centers, with resultant overwork of excito-motor neurons and the ultimate fatigue.

In this way occurred the fatigue fever pointed out by Vaughan and others. Fever, as Ott affirms, is primarily set up by an increase of heat production beyond that of heat dissipation, an agent from within or without deranging the harmony of the thermotaxic, thermogenetic and thermolytic apparatus by which in the initial stage the metabolism of the tissues is usually temporarily increased, this increment being greater than that generated upon a restricted amount of nutriment.

Once established, the fever continues, not from excessive production, but from an altered relation between heat production and heat dissipation. Fever is not a fire kept up by an excessive oxidation of the constituents of the economy. Heat production may be subnormal, yet the bodily temperature be at high fever heat. The thermotaxic centers of the brain so maintain balance between heat production and heat dissipation as to keep the temperature at 98.4 F. In fevers these thermotaxic centers are disordered so that the relation between heat production and heat dissipation being disturbed a higher temperature results. The peripheral endings of the sensory nerves influencing a thermolytic center are, therefore, important factors in heat regulation.

From disturbance of the thermic balance consequent to nerve shock or allied conditions, results the auto-intoxication state underlying saburral fever. This begins with loss of appetite, which may be gradual. The tongue is large, white and dirty; the mouth is clammy; the breath is fetid; constipation is habitual. The patient is languid, feeble, indisposed for work. The discomfort augments after each attempt to take food. Febrile paroxysms preceded by chills and followed by sweating often supervene. Sometimes jaundice and hepatic enlargement are present. Under the influence of overwork, emotion, exposure to cold, etc., arrest of digestion, nausea, vomiting, headache, chills and fever occur. In children and neurotics vertigo and convulsions often usher in and accompany the disease as an expression of the general toxic condition. There may be a week's fever nearly resembling a mild typhoid. Sometimes after one or more attacks a chill occurs, followed by

fever; profuse evacuations set in and convulsions rapidly ensue. There is generally constipation from the first. Even when there is diarrhea the natural evacuation may be insufficient for elimination.

The foregoing condition, which occurs generally without the fever, marks the onset of auto-toxemia and is an expression of the constitutional disturbance resultant on non-elimination. The hepatic involvement has a double expression. The liver has a poison-destroying, eliminatory function, and acts as a sanguifacient. Disturbance of either of these tends to produce auto-toxemia.

The various products produced through normal work are eliminated by various channels. Some are transformed in the alimentary canal into innocuous substances. Gases are eliminated by the lungs. Other compounds are intercepted and decomposed in the liver. Certain effete products are eliminated by the kidneys and skin. When any one of these emunctories is interfered with in discharge of its functions the phenomena of auto-intoxication make their appearance. This is observed in certain affections of the alimentary system attended by headache, pallor, nosophobia, etc. These manifestations, the result of a chronic auto-intoxication, were not improperly attributed by the older writers to disturbance of hepatic functions.

The symptoms of auto-intoxication are often those of profound systemic depression, but they likewise, as already stated, present convulsive and exciting types. Nearly four decades ago Meynert suggested that epileptic attacks were due to an unstable nervous system acted on by the accumulation of a proteid toxic substance. This view was subsequently corroborated by the researches of Brieger, Bouchard, Féré and others on the toxic state of the urine antecedent to the epileptic state.

What is usually a congenital condition in the epileptic may be an acquired state from prolonged auto-toxemia, in which a sudden increase of auto-intoxication may excite centers whose inhibitions have already been weakened. This acquired predisposition is a temporary diathesis established in the manner described by Bouchard. Nerve reactions by corrupting for the moment nutrition not only produce the morbid opportunity, but may also modify nutrition in a lasting manner and develop diathesis. The acquired diathesis once established may become hereditarily transmissible in its etiology: be it in the individual or his ancestors, it has had for its origin the abnormal play of nerve reaction. Let a bad alimentary hygiene, cold and moisture, privation of air and light cause an infant to become lymphatic, and let the permanence of the same cause keep up the nutritive disorder which is designated as the scrofulous diathesis; or let a young man, by hygienic errors, by the abuse of the table, by protracted studies at night, by venereal excesses, by nervous shock, which may be the consequence of complete derangement of the mind as also of a jaded brain, develop this other nutritive disorder designated arthritism—in both cases each cell will have a tainted nutrition and will produce cells that maintain the same nutritive type. Among these cells are the generative elements; in their turn they give birth to the cells of a new being with nutritive activity similar to the individual which has begotten it. The acquired diathesis has become hereditary. It does not have for its cause in the descendants the vice of their own nerve reaction; in them, the diathetic state really arises from nerve perturbation experienced by their ancestors. There are, therefore, two factors to be reckoned with in auto-tox-

emia: the acquired diathesis and the effects on this of increased toxemia.

Relief from the ordinary effects of imperfect elimination is often very great so far as its expression in consciousness is concerned. In early life, as Havelock Ellis remarks, the emotions due to forced repression of excretions are frequently acute in the highest degree, and the joy of relief is correspondingly great. In adult life, on most occasions, these are pushed into the background of consciousness, partly by training, partly by the fact that involuntary muscular activity is less imperative in adult life, so that the psychic element in connection with ordinary excretions is almost negligible. In many cases, however, the balance of adult consciousness is so disturbed by irritations from auto-toxemia that relief from these produces a buoyancy out of proportion to the amount of elimination secured. In the adult the majority of functions cease to find expression other than in subconscious states.

Making up what is called consciousness are a number of clear conscious states, accompanied by others less clear and by physiologic states which, though not entering into consciousness, are even more potent than the conscious states. These last would be the first affected by auto-intoxication. The morbid irritations resulting therefrom obtrude on consciousness, producing anxiety and uncertainty. These morbid irritations of physiologic states produce the two great conditions ordinarily found as a result of auto-toxemia. The first is what the older clinicians called nervous adynamia and ascribed not only to the essential fevers, etc., but also to auto-toxemia.

From these two states, the conscious and the psychologic, the first an irritable weakness, the other a deep-seated constitutional neurosis, result the various conditions of temporary or protracted disorder charged to auto-toxemia. The two conditions are predisposing factors of almost distinct value. One type disturbs the balance of health so that it is easily upset and easily recovers. In the deeper type a secondary condition to auto-toxemia has been engendered, which, like all conditions influenced in their action by causes secondary to a great primary origin will not yield to treatment of this primary cause alone. This latter condition, like chronic nutritional disturbances, set up by syphilis, by the exanthemata, and by other diseases in which the nervous state or the nutritional disturbance remains long after the primary cause has disappeared, acts as a predisposing neurosis.

All these morbid states and prolonged auto-intoxication produce a protracted neuropathy with suspicious and anxious tendencies. This condition mimics all the chronic neuroses and is often taken for them, whence the frequent cures of conditions like tabes by quack systems and medical pretenders. To a certain extent the period of attack gives a complexion to the clinical picture. A very common type between 25 and 45 is a disorder mimicking locomotor ataxia and often accompanied by convulsive attacks. In such cases even physicians not unnaturally give an erroneous prognosis. Lightning-like pains of locomotor ataxia are simulated by temporary darting pains, partly of psychic origin. As the existing auto-toxic state aggravates any effect of eye strain and even produces these, in certain cases examination of the eyes often reveals conditions mistaken even by ophthalmologists for the preliminary stages of optic atrophy. As the reflexes are often as exaggerated in this condition as they are in the earlier stages of loco-

motor ataxia, an error in diagnosis is always possible.

The variations in the mental state of this class of cases requires but little to pass over into the confusional types of insanity, which, indeed, were the earliest directly charged to auto-intoxication. The most frequent type presented is that of acute confusional insanity. This was the case with those which Schroeder van der Kolk, decades ago, demonstrated to be due to fecal accumulation in the colon. In some cases melancholia is produced. The urine of these has been found to produce stupor and depression in animals. The urine from confusional cases produces stupid excitement and violence. Exceptionally emotional exaltation may occur, producing extravagant actions, thereby creating a suspicion of parietic dementia. A very frequent type produced by railroad travel aggravating auto-intoxication is a stupid hallucinatory violence, which disappears in a very few days after rest, the use of stimulant enemata and hypnotics. This type often occurs in persons of either sex traveling on their honeymoon.

In many cases charged to mental shock auto-intoxication is the dominant cause, which is often due to the inhibitory effect that mental shock has produced on the liver and kidneys, causing the latter to secrete only the clear, pale urine of nervous agitation. The cases of transitory frenzy, with their wild, brief, unremembered violence, charged to mental shocks, are really due to auto-toxemia. The gynecologic conditions ascribed by Goodell to nerve-tire are produced through intervention of auto-toxemia in the manner already described.

The most common symptoms of this form of nerve-tire are the very ones which lay tradition and dogmatic empiricism attribute to womb ailment. They are in the usual order of their frequency: Great weariness and more or less nervousness and of wakefulness; inability to walk any distance, and a bearing-down feeling; then headache, napeache and backache. Next comes scant, painful, delayed or suppressed menstruation, cold feet, and an irritable bladder, general spinal and pelvic soreness, and pain in one or both ovaries. The woman, always tired, spends the day tired, goes to bed tired and wakes up tired, often, indeed, more so than when she fell asleep. She sighs a great deal, has low spirits, and often fancies that she will lose her mind. Her arms and legs become numb so frequently that she fears paralysis. The skin becomes dry, harsh and scurfy. Pigmentary deposits appear under the eyes, around the nipples, and on the chin and forehead. Blondes get mottled in complexion. Brunettes are disfigured by brown patches or by general bronzing. Sometimes the whole complexion changes to a darker hue, while a disfiguring growth of hair appears on the face. A physician, especially if the patient has backache, bearing-down feeling, an irritable bladder, and pain in the ovaries, is apt to hunt diligently for a uterine lesion. If one be found, no matter how trifling, he will attach to it undue importance and treat it heroically as the erring organ. If no visible or tangible disease of the sexual organs be discoverable, he will lay the blame on the invisible endometrium or on the unseeable ovary and continue the local treatment. In this connection it should be remembered that menstruation to a certain extent is eliminative, and that interference with it causes retention of toxic elements.

Even where the bowels seemingly move freely in constipated individuals elimination is very imperfect. The acid urine of these patients causes, as Spallaci long ago discovered, stupor, asthenia, tremor, tetanoid symptoms and hypothermia, followed by hyperthermia when inocu-

lated in animals. Improvement in elimination removes from the urine the factors producing these conditions. The urine of amenorrheic or dysmenorrheic women, not obviously suffering from constipation and having seemingly free movements of the bowels, present similar qualities. Mental states in women or nervous men are peculiarly apt to disturb primarily the genito-urinary apparatus and secondarily the hepatic and renal. Thus jealousy often evinces itself first in bladder disturbance, later in slight jaundice and symptoms resembling gall-stone colic.

These symptoms, according to Lepine, are very frequent in women and in nervous men after emotional disturbances. They are extreme expressions of auto-toxemia due to emotional disturbance. The fact is generally ignored but none the less clinically evident that nerve-tire and auto-intoxication work in a vicious circle. Here the influence of secondary casual factors, as often ignored in etiologic pathology, is evident. This is peculiarly obvious in nervous conditions due to errors of refraction and curable by proper glasses in an early stage. Here the influence of auto-intoxication in producing the headaches is shown in disappearance of the symptoms under treatment directed against the auto-intoxication alone. In a class of cases the supra-orbital headache of eye strain is combined with vertical and suboccipital headache. Here, although considerable astigmatism be present, all the headaches disappear under treatment for auto-toxemia. The underlying condition has not been removed, and, unless the astigmatism be treated, will soon cause auto-intoxication at the proper etiologic moment, attended with recurrence of the headaches.

The same is true of aural, rhinologic, laryngologic and pharyngeal states. Adenoids in children, for example, bring about constitutional disturbances, producing auto-toxemia through continued strain on the nervous organism. The nose, through its erectile tissue, having nerve relations to the erectile sexual systems, and, through the large extent of the olfactory nerve, may be irritated by the attempts at elimination through mucous membranes. This irritation, by exciting the nerves concerned, unduly increases the nerve-tire of the central nervous system and thereby the auto-intoxication. Pathologic sneezing is often an expression of this, and similar influences play a part in the auto-toxic laryngeal and pharyngeal vertiginous states so frequent in auto-toxemics. The irritations of these regions often occasion the undue cardiac stress which expresses itself in pseudo-anginas. Pelvic irritations of the female produce in a similar manner severe constitutional states. This is why women with severe pelvic disorder who have become insane recover without other treatment than removal from home surroundings and treatment of the auto-toxemia.

The predisposing cause, however, in these aural, laryngologic, rhinologic, pharyngeal and gynecologic conditions remain to set up recurrences of auto-toxemia and its consequences if untreated. Preparation for special procedures often imply treatment of auto-toxemia, which treatment predisposes remarkably to the benefits seemingly effected by operation. Very much of what is charged to reflex causes is really due to strain producing auto-toxemia little by little.

The pure type of auto-toxemia which underlies many of the so-called reflex states was recognized by the older clinicians as fecal anemia and treated on eliminative and roborant principles. The milder states resultant on auto-toxemia are generally of local expression like irri-

table bladder, various neuroses, unilateral headache, and neuralgic irritations about the gums and teeth, together with dermatoses like angioneurotic edema and hives, disordered rhino-laryngologic conditions, local fleeting pains, etc. The severe types may vary from fecal anemia to conditions simulating chlorosis, neurasthenia of the ordinary type and of types mimicking tabes, transitory frenzy, melancholia, acute confusional insanity, stupor, amnesia, emotionally exalted states, and sometimes epileptiform attacks resembling grave hysteria, but accompanied with partial or complete loss of consciousness.

One unpleasant and frequent mental state in otherwise logical auto-toxemias is nosophobia, or worry over the possibility of disease. This differs from hypochondria in the fact that the subject does not think he has a particular disease, but fears he may have. The irregular action of his organs resulting from auto-toxemia intrudes on his consciousness and causes a fear or uncertainty as to his actual state. That parietic dementia and tabes are often due to the toxin of syphilis is now generally admitted. The clinical history of some cases would indicate that auto-toxemia has here played its part more especially, as it has been demonstrated beyond cavil that temporary auto-toxic neuroses mimic these two great constitutional disorders. The fact is but too often forgotten that the law of periodicity of the nervous system fixes a tendency of certain symptoms to recur from a slighter exciting cause. Hence, frequently recurring auto-intoxication causes that breakdown of the vasomotor balance which constitutes the underlying basis of tabes and parietic dementia.

Diagnosis in conditions of auto-intoxication is, therefore, not so simple as it first seems. Owing to the tendency of the neuroses with an underlying vasomotor factor to remit or assume temporary appearances of health, the distinction between the deep forms of auto-intoxication and these neuroses becomes at times difficult. This difficulty is intensified by the fact that auto-intoxication, in a hereditarily defective or acquired neuropathic constitution, may cause marked and decided symptoms of less augury than when found in a healthy constitution. Auto-intoxication occurring in puberty often temporarily initiates seemingly serious puberty neuroses and psychoses. The same is true of the climacteric end of the senile period. In all these cases the condition produced by auto-intoxication has the clinical tinge of the period in which it appears. This is why treatment directed to a change of environment and the habits of the individual so often produces favorable effects on seeming senile and climacteric breakdown.

The grave auto-intoxication resembling tabes and allied conditions are differentiated as a rule by the state of the reflexes as to absence of stupor, melancholia and acute confusional insanity, as well as amnesia, and differ little from the ordinary types except in their comparative quickness of response to treatment. This, however, is only a relative test, since in no case of these affections is auto-intoxication absent as an etiologic factor. The convulsive types of auto-intoxication differ from epilepsy in their infrequency and absence of recurrence. Practically the status of the auto-intoxicated is as brief as that of the epileptic is prolonged.

The therapeutics of auto-intoxication will depend on the type. In irritable weakness, while removal from surroundings is desirable for permanent recovery, much may be attained by regulation of diet, use of the mineral waters, regular, moderate exercise and massage, as well as hydrotherapy. Here, as in all cases of auto-intoxica-

tion, the great need of the system is water, and it should be amply supplied, whether in the form of mineral waters or ordinary water, or large quantities of milk. Purgatives require very careful adjustment; both aloetic and the cascara purgatives tend to produce congestion of the hemorrhoidal veins with resultant irritation. In old people salines must be used cautiously. In no small number of cases of irritable weakness a small dose of a mercurial followed by a morning saline acts rapidly and very beneficially in securing elimination, which is what is needed, not simple purgation. In the deeper type removal from home surroundings and conditions is imperatively indicated. In addition to dietetics, hydrotherapy, elimination and exercise, faradism and franklinization along the spine are often found necessary and valuable. The indication in this type for the use of water is no less imperative than in the first type. The patient, however, has an intense repugnance to water, as a rule, and to secure its use the physician will need much ingenuity.

One phase of auto-intoxication which has received less attention that it deserves is the pseudo-angina which so frequently occurs. Sometimes, albeit very rarely, death has occurred from this. This condition is due to the primarily increased inhibition of the heart, succeeded by increased power of the excitomotor ganglia of the heart with resultant irregular action. From this often results the emotional exaltation, depression and suspicious states found in auto-intoxication of brain and heart. It is readily comprehensible how these irregularities tend to increase each other. Independently of the condition just described, cardiac irregularities occur in auto-intoxication from arterial tension due to the character of the blood. Inevitable renal and hepatic disturbances occur, whence the temporary albuminuria and glycosuria.

The phenomena of arthritis deformans bear a marked resemblance to the trophic changes of tabes, and it is by no means improbable that they are sometimes due to the two states produced by auto-intoxication. The chronic type has so deranged the trophic mechanism that irritation changes result from the products of auto-intoxication. The influence of these factors can be shown experimentally by section of the sciatic nerve in rabbits and the injection of irritating material above the center of the body. As a result the side of the sciatic nerve section is attacked by arthritic changes like those of arthritis deformans.

THE USES OF TUBERCULIN.*

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When Koch had announced the discovery of tuberculin and the world was agog with expectations for the new cure of tuberculosis, this sign was said to have been posted upon the shop of an ambitious barber in Switzerland: "Corns treated and tuberculin given here." What was the conception of that barber as to the intricate nature of the remedy and the delicate shades of disease which were suited or unsuited to its use, it would be difficult to state. The case of some physicians who, under the assumed authority of professional proficiency, deal in borrowed criticisms of everything that pertains to the subject of this paper, is a little less inexplicable. A criticism to be of weight should be based upon a reasonably complete personal knowledge.

* Read before the Congress on Tuberculosis, Medical Section, held in London, July, 1901.