A Thesis on Diabetis Mellitus

by

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Preliminary page, as suggested.
A good deal of interest has been excited during the present session, by a case of diabetes, just discussed from the clinical wards of the Infirmary, in which the succharine treatment was tried with very satisfactory results. This mode of treatment was first proposed by Piorry on the principle of supplying water, and in 1857 he published some remarks on a case treated by him on this plan, in which the urine was reduced to one fourth of its original amount, and the sugar to less than one fifth. In the end of the same year and the commencement of the following, Dr. Budd published a similar case, in which, though the decrease in the
quantity of sugar was less decided, there was a marked improvement in the general health and weight of the patient. A favourable case was also recorded by Dr. Cooke, about the same time.

In opposition to these Dr. Henry Jones published a paper and described two cases, one having occurred in 1854 and the other in 1858, in which he had tried this treatment with unfavourable results.

Dr. Budd in reply commented, very justly in my opinion, on the coarse manner in which Dr. Jones's experiments were conducted, and gave the history of another case, which he says in the following words:

"In the interval between
the thirtieth of March and the fourth of May, the patient gained nine pounds (a gain representing one seventh of her whole weight), with a proportionate decrease of health and strength.

3rd During the same time, she was taking from five to eight ounces of sugar daily.

3rd Notwithstanding this large daily consumption, instead of an increase, there was an abatement of the proper diabetic symptoms. I quote this summary because it corresponds in some measure to the results of the case already alluded to, and with which this thesis is more immediately connected.

Shortly after this, Dr. Jorge published three other cases, in which he had used ce
Modification of this treatment, giving saccharine vegetables and fruits, and excluding bread and fermented liquors: the results appear to have been very favourable. Last session a case was treated in the clinical wards on Piercy's plan, but adequate results could not be obtained, as the patient was found to have practised deception as to the quantity of urine passed; he was, however, so much improved in general health as to warrant a repetition of the experiment. Accordingly, when, in the commencement of the present session, a man came in presenting symptoms of diabetes, it was determined to put him under this treatment, and
as every precaution was taken to prevent falling, the results, so far as they go, are perfectly reliable. The case is as follows; I quote from the hospital reports:

James Campbell, aged 33, a shepherd, admitted 29th Nov. 1850 and presented on examination the following symptoms: Pulse 52, weak, cardiac sounds normal. No headache, but great giddiness which is increased on change of posture; no mucocoe Valutantes; sight somewhat impaired, is a little deaf; no singing in the ears; has not slept well since he has been in hospital, but he generally had good nights previous to admission; he does not dream. Patient thinks that his memory is worse than
It was: he is very slow in answering questions, perhaps due to his deafness as he is otherwise intelligent. tongue coated with a moist white fur; has a ravenous appetite but suffers no inconvenience after food; bowels regular, no purging. Passes a very large quantity of clear, light-colored urine having a faint sweetish odor. Sp. Gr. 1048; contains sugar in considerable quantity.

Complains of pains in his limbs, having the character of cramps, confined apparently to the muscles of the ham and calf, which are very flabby; he is very weak and emaciated. The skin is very dry and cracked in places; patient states that
He never sweats since the commencement of his illness. Face very pale, no sun also his lips; folds of skin about the face are much marked. There is an incipient Arenus said. Weight 9 4 10 pounds.

History. He has generally lived well, his diet being usually oatmeal porridge morning and evening, and meat at noon. He does eat, however, appear to have lived very temperately, whiskey having been his favourite drink. From his occupation he has been much exposed to the vicissitudes of the weather, but at the same time he has always been provided with good clothing. His father and brother both died about
Sixty years of age, and there does not appear to have been any special disease in the family. He had never known what illness was, until about twelve months ago, when he first noticed a great thirst which crept upon him without any assignable cause, and which he attempted to satisfy by means of copious draughts of water, or beer if he could get it; but soon after this noticed that he was passing a very large quantity of urine than was natural to him; gradually he lost strength, and became very subject to dizziness in the head, more marked on change of posture. He also became troubled with cramps in his legs. He continued at work (having become a labourer...
last June) till six or seven weeks ago when he gave up from sheer weakness; since that time he has lost flesh very fast (two years ago he weighed twelve stones) he then had medical advice but received no benefit." This is the history of the case up to his admission to hospital when he was put on a regulated diet, and the amount of solids and fluids taken, as well as the quantity and specific gravity of the urine passed was recorded in a tabular form. These reports as regards the urine for the last three days before he commenced to take the sugars are:

<table>
<thead>
<tr>
<th>Date</th>
<th>Quantity</th>
<th>Specific Gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 20</td>
<td>900 ounces</td>
<td>1049</td>
</tr>
<tr>
<td>21</td>
<td>198</td>
<td>1046</td>
</tr>
<tr>
<td>22</td>
<td>188</td>
<td>1040</td>
</tr>
</tbody>
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Up to this time no treatment had been adopted except that on 16th Dec. the patient, having complained of headache and loss of appetite, was ordered a mixture containing Strychnia and Lig. Rutaceae. It is worthy of notice here that these symptoms came on a week before he was first under treatment.

He now (on the 28th Dec.) commenced to take half a pound of sugar every day the regulated diet being continued as before. On the fifth of January the report states—The Sr. Jr. of the urine, as well as the quantity passed, remains much the same, varying slightly from day to day and again returning to its original standard—up to this time the patient had lost 2 1/2 in weight since the commencement of the treatment. After this he
gradually improved in health though subject to occasional recurrences of headache and other symptoms; on the twenty-eighth of January he was weighed again and found to have gained 3 lbs. Since the last weighing, on the thirty-first he was again weighed and found to have gained 1 lb. Feb. 8— we have this report: “He continues to pass about 200 ounces of urine and to drink about 100 ounces of liquids; the urine is generally of Sp. Gr. 1040 to 1045.” He was weighed again on the first of March, and found to have gained 6 lbs. Since former weighing quantity of urine 190 to 200 ounces Sp. Gr. 1040; liquids taken, 80 to 100 ounces, solids still the same March 4— Specific gravity of urine 1035 to 1040.

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... the patient still feels
The influence on his character, as far as flesh and blood could tell, was...
Greatly improved, the headache and pain in epigastrium are entirely gone. The amount of urine passed has been, on an average, 190 ounces daily and of Sp. gr. 1040; the amount of liquid used about 90 ounces daily; the diet has always continued the same. His weight is now 10 stones 48 pounds being an increase of 4 lbs. since the first of March. He was today dismissed improved." During this treatment no medicine was given except three ounces of brandy ordered on the 9th of December, some aperients to relieve an attack of constipation which occurred in connexion with febrile symptoms on the first of January and a mixture containing a very small quantity of Liq. Cinchona and Inf. Antherae ordered on the eighteenth of February to relieve the headache,
which had assumed a periodic type. The improvement of the patient's condition at his dismissal consisted in

1st. A steadily progressive increase of weight, amounting to 14 lbs. since the fifteenth of January or 12 lbs. since the commencement of the treatment, on the twenty-third of December last.

2nd. Corresponding improvement in general health and strength.

3rd. The proper diabetic symptoms were certainly not increased, if anything, slightly diminished.

The pathology of diabetes has been discussed almost since the origin of medical science, and is still an unsettled question. Callen attributed it to a fault in the assimilating powers; Good, to a morbid excitement of the Kidneys; Wallaston, to
a change in the animal electricity of the kidneys; Dufourcq, to their perverted as well as increased action. Mead, from noticing its frequency in drunkards, was led to attribute it to the liver. Rolle ascribed it to "increased action and secretion with vitiation of the gastric juice, and probably a too active state of the lacteals," while the kidneys and other parts of the system were affected only secondarily. Dr. C. Darnall supposed that the injection of an unusually large quantity of stimulant fluids produced an increased action of the lacteals with inverted action of the renal absorbents accompanying with them, and thus allowed the chyle to be carried to the kidneys without entering the circulation; and that the frequent depititation
of this stimulation, made this retrograde action at last habitual, and so caused the disease in question. It has been attributed to determinations to the kidneys from decreased action in the skin, a view supported by Warré but opposed by Francois, on the ground that catarrhal sweats often accompany diabetes. He thought it depended on functional slump of the secreting processes of the kidney; he says, 'I confess I can see no difficulty in supposing that a substance so simple as sugar is, may be formed from the elements of the blood, or that the vessels of the kidney may, in a state of disease, take on a new action and secrete this substance with great rapidity.' Dr. Copeland considered it to be due
to deficient or exhausted influence of the sympathetic system interfering with sanographic and the nutritive processes generally, especially secretion, and thus producing blood imperfectly elaborated, and that part of this having to be carried off by the kidneys, constituted the disease. For McGregor of Glasgow, having found sugar in the blood in diabetes, as had been done before by Dr. Ponti, and having afterwards found it in the stomach of a diabetic man who had been fed for three days on roast beef and water exclusively, while there was none in that of a healthy man under the same circumstances, came at once to the conclusion that the immediate cause of the disease was imperfect elaboration of the chyle.
Claude Bernard, we have been made aware of the remarkable fact that the liver possesses the power of forming a substance, by contact with the blood, changed into sugar, which in its turn disappears in the lungs; and that this power acts altogether independently of the nature of the food, the origin of diabetic sugar is no longer doubtful. Still, however, the cause of its appearance in the urine remains to be determined, and on this subject there are numerous opinions. It has been suggested that the fault is not in the excessive production of sugar, but in its destruction in the lungs, either as account of structural disease of these organs themselves, or from disease of the brain, near the origin of the pneumogastric nerves, which might interfere...
with their functions, as Dr. Watson suggests. But I think that there are two very prominent phenomena of the disease, for which this hypothesis does not satisfactorily account. I mean voracious appetite and rapid emaciation consistent with it. Now if there is no more sugar formed than is ordinarily consumed in the lungs, and the kidneys merely take in the functions of these organs, we might expect that the effect would be, in a great measure confined to hypertrophy or disease of the kidneys from over-activity; and that in such excessive waste of the tissues, as seems really to ensure, would take place. The same remarks apply to Dr. Reese's very abstruse hypothesis, which places the fault in the liver's producing some sort of decomposed salivary action, a sugar differing from that of...
Health — a sugar which cannot be destroyed by the changes taking place naturally in the blood — changes rapidly affecting and destroying healthy hepatic sugar. The liver drugs produce a morbid quantity of sugar but unless it produces a morbid quantity also, the effect is not explained; may not this morbid quantity of the diabetic sugar — which Dr. Rees says distinguishes it from the sugar of artificial diabetes, as well as from the healthy hepatic sugar — be due to an alteration in the secreting power of the gland produced by its prolonged overaction? Dr. Watson offers a conjecture that disease or injury of the brain near the origin of the pneumogastric nerve, may directly affect the functions of the stomach and thus prevent its digestive powers producing diabetes, he does.
just say true. I think it is at least very probable, that such injury or disease may produce diabetes, as artificial injury produces a species of it. Beccarvich says that disease of the spinal cord produces symptoms of diabetes, and I suppose, the difference between the symptomatic and idiopathic depends chiefly on the intensity and permanence of the symptoms. But when injury to the brain, or encephalitis, produces diabetes, it is not through the medium of the pneumogastrotropic nerves, for the effect is produced equally well after the pneumogastrotropic nerves have been divided. Bernard's experiments prove that in the production of artificial diabetes, the influence travels along these nerves in the contrary direction, that is, towards the brain, and if we are to draw any inference from these experiments as to the source of the evil in the natural
disease, we must refer the seat of irritation to the parts to which they are distributed, namely, the lungs and digestive organs. The idea of the digestive organs being, in some cases, the dependents, is proved by a case recorded by Dr. A. H. Hassel, in the *British Medical Journal* for 16th April 1859, in which, from the antecedent history of the case, resting, insomnia, merely on the statements of the patient himself, the symptoms of dyspepsia seemed to have preceded those of diabetes. This case was completely cured, and, so far as the history extends, permanently cured, the essential part of the treatment consisting of bitters and bran diet, with intermission of his unhealthy employment which lessened that of a compositor, working for some time before his attack, 100 hours in the week and using stimulants. The same may be said of the cases recorded by Dr. Campell and others; in any, that I have seen in which permanent benefit is said...
to have occurred, the treatment appears to have been directed to remedy some existing evil in the digestive organs. Probably in most if not all cases of jaundice disorder there is urine or leuc sugar in the urine, but the amount is so small that it escapes notice.

That the cause of diabetes being traced to the lungs, perhaps as often as to any other organ we are, I think, entitled to infer from the long notated fact that tubercles are found in the lungs of the majority of those who die of it. Not that the organic lesion of the lungs, by deranging them for the performance of their functions allows the sugar to pass undecomposed; but that the irritative set up in them influences the liver distastefully through the pneumogastric nerves, and thus produces excessive secretion. It is true, these tubercles may be
said to be secondary, and perhaps in most cases they are secondary probably to some disorder of the digestive organs, impairing the nutriment of the system. But when we find, as has been shown by experiment, that irritation of the pulmonary terminations of the pulmonary stigmas will produce diabetes, and at the same time find a source of such irritation coexisting with diabetes, it is reasonable to conclude, that the source of the irritation is the cause and not the consequence of the diabetes. Or may be asked how come it happens that in the lungs produce diabetes, why not in the stomach, or in the bowels. In every case of Puthesis, but is not this explicable on the principle that excessive irritation produces Puthesis? or know that slight
irritation of the floor of the first ventricle produces diabetes, while some extensive injury suspends the sensory-function of the floor altogether, and will not the same one apply to the lungs? Why we not explain the cases alluded to by supposing that in them the tubercles are so situated as to compress and paralyze the ultimate branches of the nerve, so that no influence of any kind is conveyed from that part of the lung.

But whatever may be the primary cause of this affection, if it is a disorder of secretion, as I have supposed, its immediate seat is probably in the sympathetic system, now generally believed to govern secretion, and in some cases this may even be primarily affected as in the intermittent variety of the disease.
this idea is favoured by the occurrence of sugar in the urine in intermittent fevers whose seat is supposed to be in the system in question.

In the whole I think we may conclude that this disease may be traced to at least three origins, one lying in the digestive organs, one in the lungs and one in the nervous centres, either central or sym pathetic, and that the first of these causes produces the constant series of symptoms of the disease and that most amenable to treatment with the exception perhaps of that presenting the intermittent type.

Having stated what seems to be the most probable theory of the pathology of this disease, it remains to consider what indications for its treatment may be drawn from the case before
as and others of a similar kind which have been recorded.

The opinions on the treatment of diabetes have been fully as various as in its pathologies, all its different symptoms have been treated in turn: bleeding, purging, diuretics, and diaphoretics have all been recommended by different writers: hydrochloric and alkaline. The morbid appetite and first to decompensate the sugars supposed to be formed in the stomach. However, the prevailing plan of treatment has been to starve out the disease, as it were, by carefully forbidding all articles of diet containing any sort of starch or sugar; Dr. Watson says "I quite agree with Dr. Gurrad in believing that the regulation of the diet constitutes by far the most..."
important part of the treatment I have been to exclude all articles of food that contain saccharine matter or that are readily convertible into saccharine matter. The condition of the patient improves at once.

In one example recorded by Dr. Parrott, the daily amount of urine was reduced by regimen alone from 354 to 100 fluid ounces, and the daily quantity of sugar reduced with it, from 26 ounces to less than 4. It is quite true that in this as in most other diseases, regulation of the diet and regimen is of the very highest importance, but what diet is to be adopted? We have before us two directly opposite systems and both apparently producing equally favorable results; how then are we to explain this discrepancy?
The explanation appears to me to lie in what I think we may now assume to be proved, namely, that the nature of the food does not directly affect the function, any more than the healthy secretion of sugar, unless, from its indigestibility or some allied cause, it irritates the terminations of the nervous system alone; these terminations or the centres to which they go belong to the sensory portion of that system, so far as we may assume in a super-sensitiveness state. It follows then that in all cases of diabetes from uterine cause, the most important indication is to support the system by these kinds of diet which being least supplied with at the same time tend to aggravate the disease, by causing irritation of the stomach.
In this category we may place sugar, at least in the majority of cases, as it seems to disagree. If in any case it did seem to do so, I would feel inclined to try some form of hydrated starch under the idea that the evil effects ascribed to a macerating diet, especially bread and potatoes, are due rather to the difficulty of digestibility of the undissolved envelopes of the starch granules than to any chemical irritation produced by fermentation. The plan proposed by Dr. Corfe, of giving saccharin, fruits, and vegetables, would also be very eligible in cases where sugar is a substitute. Could not be borne, taking care, however, to choose such fruits as contain yeast or yeast matter, or in the words of President Secor, freeing them from it as empty.
as possible.

The medicinal treatment which has proved most beneficial appears to consist chiefly of the vegetable tonics, such as St. John’s Wort, Chamomile, and Calamus, which are, I think, almost universally applicable. In each case we should, of course, endeavor to discover and treat the primary cause, with this view we would examine carefully into the state of the stomach, lungs, and nervous centres, and if we found any remediable evil existing in any of them, by removing it we might find that we had cured the disease. If there were organic lesions in the encephalon, though beyond the reach of cure, we might perhaps palliate the symptoms by remedies such as Cinchona, which exercise a sedative influence.
Upon the cord; if it were of the intermittent variety, it would probably be perfectly under the control of quinine, and perhaps indeed, if its influence is exerted on the sympathetic system, as has been recently suggested, quinine might be useful in detail generally, at least as a palliative. But such a course of treatment combined with proper regime offers the best prospect of success in gaining relief, in some cases permanent, to persons affected with this disease. I think we are warranted to conclude from the cases I have mentioned, not only of the sugar, but also of the fever, treatment, and which appear to the incoincidence on any other principle than that I have mentioned, namely that the formation of sugar by the liver is not influenced by the nature,
of the food, further than as it may act as an irritant to the nerves distributed to the digestive organs, and thus directly influence the function of the liver, though the solar plexus