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*A  
Clinical Study of Diabetes  
and its  
Treatment*

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The presence of Sugar in the urine has been known for upwards of two Hundred years, but an inordinate flow of urine from the body has been ~~taken~~ notice of by writers as early as the latter part of the first Century of the present era.

Aretaeus seems to have been the first to give a correct and concise description of the disease which he called the wonderful disease Diabetes, which is a falling away of the flesh and members into urine, They evacuate the urine without intermission and short will be the life of that man in whom this disease has been established swift is the wasting, sudden death sometimes takes place, or life becomes loathsome and vexed with pain. Thirst is intolerable, the increased quantity of drink not corresponding with the still greater quantity of urine which is discharged and so Diabetes or a straining through because the moisture remains not in the body but wherever it had need to be collected it slides away, Some acute disease may be the cause of this debility which having made its attack upon this part, has deposited by

crisis the peculiar malignity of its lurking  
poison

Galen, Theophilus, Actuarius  
and others all give an account of the  
disease, and it is not till about the end  
of the 17<sup>th</sup> Century that its saccharine  
quality was discovered by Hercules Saxonia  
who distinguished a true and spurious  
diabetes by the smell, colour, and taste  
of the urine, which discovery was afterwards  
verified by Willis, Sydenham and Cullen &c.

Diabetes is not a disease commonly met with  
in every day practice as in a practice extending  
over upwards of seven years I did not meet  
with one case, and in the practice of this  
Hospital I have only come in contact with  
four cases, two of Mellitus and two  
of Insipidus, among upwards of 10000  
patients and my observations extending over  
two and a half years,

The ideas of the ancient physicians as to the  
cause of the disease were very varied, H. Saxonia  
attributed the sweet taste of the urine of his patient  
to the sweetened ptisan which he drank, the  
habit of drinking punch in Willis' time  
was ascribed by him as the cause of the

disease, Sydenham sometimes saw though rarely old men who had had a fever become diabetic, after having been bled and purged improperly even after the fever had wholly departed, because their blood was so far weakened as to be incompetent to the assimilation of the juices of the digesta so that these seek an outlet in a crude and uncollected form by the urinary ducts, the excessive loss of urine weakens the frame and the whole substance of the body passes off by this channel, Cullen also in an old man after a long fever, found the urine sweet. Its Heredity was also recognised as Kondelinius had seen it in a father and daughter, and Morton had seen it in a father and son, in one of my cases a female, her brother died of the disease, Dr. Pavy also mentions the case of a man who was the subject of diabetes whose two sisters and a brother were affected with the complaint, another patient of his aged sixty years, suffered from the disease for the period of four years, who had a son who died after a short illness of the disease, Dr. Dickenson gives the case of

two sisters who simultaneously suffered from the disease, and Senator mentions two instances which had come under his knowledge, one where two brothers were affected with it, and the other in which four children of a Polish Jew were attacked with the disease and died.

Drinking cold water when perspiring has been ascribed by some as a cause of the disease and when we consider it is more common in India, Egypt, France, Italy &c there can be no doubt it forms an important factor in its causation, working in cold damp places also has been mentioned by Prout and Griesinger as a cause of the disease and in one of my cases it could be distinctly traced to this.

Galen thought the disease sometimes arose from the kidneys, Van Helmont thought diabetes caused by an acid not being corrected by the bile and then conveyed with the fluids to the kidneys, Marlianus supposes the cause of the disease to be a conversion of the air in the arteries to water, Quercetius thinks an imperfect sanguification from a weakened action of the stomach is the cause, Willis thinks it arose rather

from the blood than <sup>an</sup> affection of the Kidneys  
Laster seems to think medicines which first  
injure the stomach and intestines and next  
the Kidneys and bladder excite the disease  
Blackmore thinks the disease consists in  
a depraved condition of the glands in  
the Kidneys, that filter the serum and  
such a shattered and dissolute state  
of the blood, that make it apt to run  
off in a great profusion of uncrackish  
waters, the remote causes being irregular  
diet, an immoderate use of cyder, ale, and  
particularly rhenish and all other sharp  
white wines, which cause the coagulation  
of the blood, Dr Cullen inclines to the  
opinion that the proximate cause  
is some fault in the assimilatory  
powers. Dr Home, were I to give a theory  
to explain the nature of this wonderful  
disease, I should say it arises from a  
defect of the assimilatory process by  
which the aliment is converted into the  
nature of our body, and Dr Rollo in 1798  
published his work on Diabetes in which he  
thinks that a morbid condition of the stomach  
and a general diffusion of saccharine matter

with probably some change from that of health in the fluids of the system are the immediate causes the keenness of the appetite with the very quick returns of it after eating mark an increased action of the stomach, by means of the stomach and general regimen the system may be hyper-oxygenated, may be deoxygenated and may be confined to its necessary oxygenated state.

Having thus briefly given a sketch of what the ancient and other writers ascribed as the cause of the disease, it will be necessary now to notice what has been done in more recent times for this part of our subject. The most of the ideas given are such as if they were groping in the darkness in search of light, and it is a well acknowledged axiom in medicine that it cannot remain stationary, so when enquiring minds were thus baffled as when sugar was discovered they set about to examine the kidneys, but could not detect anything neither in their structure nor function to give them a clue as to its cause, Rollo's theory was then taken up and reasoned out that naturally in the process of digestion sugar is not formed out of starch



substances, stopping short of its formation by the stomach transforming it, and the blood also having a similar power, in diabetes however these powers were lost, and starchy matters were carried past the transformation stage and changed into sugar, this idea was further strengthened by the experiments of Dr Robert MacGregor of Glasgow, who discovered sugar in the serum of the blood of a diabetic patient, he then gave him an emetic when he knew his food would be half digested and he again found sugar in the vomited matter, he then fed his patient and a healthy man on roast beef, and gave each an emetic under the same condition and he detected no sugar <sup>in</sup> the healthy man's vomited matters but a considerable quantity in the diabetic's, and he could not come to any other conclusion but that the stomach was at fault and that what ought to have gone to nourish the body was

washed away in the form of sugar  
in the urine.

It was left to the Illustrious Professor of  
the College of France to open up a new era in the  
history of Diabetes by his brilliant experiments  
he began by studying the changes in the body  
up to the formation of sugar, and its  
elimination by the Kidneys, he found no  
sugar ~~in~~ in the blood going to the liver but  
a considerable quantity in the blood flowing  
from it and concluded it was formed in  
the liver by the action of some ferment  
in the blood. He then made the discovery of  
the now well known substance Glycogen.  
This substance was isolated by C. Bernard,  
by cutting up into small pieces a bit of liver  
taken from an animal recently killed, and  
placing them in water for some time, then  
bruising the pieces in a mortar to a pulp  
and subsequently boiling in distilled  
water for a short time and then  
adding alcohol which precipitated  
it and formed a white powder, he  
concluded this substance was formed  
in the liver and by the action of  
some unknown substance is converted

into sugar in the blood, and carried by the blood to the lungs to be there oxidised in health but in diabetes it is not oxidised and so gets into the circulation and is eliminated by the kidneys

Dr Pavy of London on the other hand in 1858 by a series of ingenious experiments showed conclusively that during life there was a mere trace of sugar in the blood of the hepatic vein, but that blood examined some time after death contained sugar in considerable quantity and still more recently in his Croonian Lectures of 1878 he by more delicate tests has verified what he published 20 years before.

The four principal ideas as to the pathology of the disease are C Bernard's who concluded from his puncture at a certain point of the floor of the fourth ventricle that it was a diseased state of that part, acting on the liver causing it to form sugar.

Dr Pavy that it is a faulty state

of the liver, which he says is an essentially sugar assimilating organ, and when its assimilative action is properly exerted as in health very little sugar gets into the circulation, but if it is not properly exerted then sugar is allowed to pass into the circulation and in proportion as a greater or less quantity passes the urine becomes more or less saccharine in character

D. Donkin that the seat of the disease is in the liver and it is a morbid nutrition and morbid secretion of that organ

D. Dickenson discovered in the brain excavations and pores. These excavations were along the course of the arteries and were produced by exudations from the vessels of blood corpuscles & causing destruction of the brain substance around in cases of older standing there is a cribriform appearance with here and there larger excavations these appearances were found principally in the Corpora Striata, Optic Thalami, The pons. Medulla oblongata

and Cerebellum. These changes have different degrees and stages none are exactly repeated in every case, though there is evidence in each of changes of the same nature. They may want constancy, but do not want significance.

Still more recently there was a discussion as to the Pathology of Diabetes at the Pathological Society of London and nothing definite was forthcoming and it was left an open question then Dr Latham in his Croonian lectures of 1886 does not bring any new light to bear on this mysterious disease.

The four cases I am going to submit to you are such as I think from a therapeutical point throws some light on the Pathology of the disease and without any further remarks I shall relate them.

Case 1  
Case of  
Diabetes  
Insipidus

J. E. aged 28 years was admitted to this Hospital on 7<sup>th</sup> January 1885, complaining of passing a very large quantity of urine and great thirst. I could get no definite family history, he was a labourer but could not be called a drunkard,, he was fat and well nourished, his skin was almost

natural, bowels slightly constipated and the thoracic organs were normal, he was stuttering and slow in speech, and almost complete loss of power of walking, he could drag his legs with great difficulty there was not at this point complete paralysis, the first thing he noticed was while he was sitting on a seat at the Broomfield, he felt a violent pain at the back of the head at the nape of the neck, which continued all day the following day he began to pass large quantities of urine with excessive thirst and also a difficulty in walking urine was faintly acid, easily decomposing, no albumen, specific gravity 1005, quantity 1000 oz, for months there was considerable increase of the salivary secretion, and gradual loss of power of walking, ultimately complete paralysis and passing his urine unconsciously in bed.

Having the idea there was a connection between this disease and *D. Mellitus*, I used all the usual remedies such as Opium, Gallic Acid, Ergot, Iodine, Glycerine of Carbolic Acid, &c &c, but it defied them all and

about four months before his death, the increased flow of Saliva stopped, symptoms of Phthisis set in, extreme emaciation, insomnia, intermittent diarrhoea, diminution of the quantity of urine and death. I am sorry to say no P. M. was allowed,

This is a case in which all the known remedies were tried, according to the prevailing ideas as to its pathology and found wanting, but with the following cases a medicine which has been mentioned but so far as I am aware from a careful study of the literature has not been tried at all and which I used with most surprising results,

Case 2  
Case of  
Diabetes  
Mellitus

M. M., aged 52 years, widow, was admitted into this Hospital on the 28<sup>th</sup> April 1886, complaining of great thirst and passing great quantities of urine,

She was twice married first when she was about 18 years of age, she had 10 children of the marriage, who were all born alive but while she was carrying her fourth child she got a fright and the child was taken away from her under chloroform, 4 died while they were infants and 5 are still living

and all healthy, but a daughter who is  
Consumptive, her husband died of Consump-  
tion after being married to him 15 years.

She was married the second time to a  
boarder who was a heavy drinker and  
who died of apoplexy 8 years ago, her  
father died of Pleurisy aged 72 and  
cant say what her mother died of at the  
age of 69 years, and she knows of no  
one of her family who had her complaint.

She was always healthy, no difficulty  
in changing, was about 13 years of age when  
the flow began, no disease up to marriage.

She had very hard work to rear her  
family, and suffered a good deal of  
privation and anxiety.

She had no difficulty at the change  
of life, but took a sore leg an ulcer, and  
was troubled with it for four or five years,  
and then it got better.

Her present complaint began  
about 2 years ago just as if she was  
taking the bile, was sick and vomiting  
the bile, a horrible bitter taste and greenish  
in colour, was bad in this way from  
Saturday morning till Monday, and



When she began to drink water she would drink three quarts of water before she would let the vessel out of her hand, then she began to notice she got up 3 or 4 times during the night to make her water, otherwise she was quite stout and healthy she had an awful itching and heat and an excruciating pain about the perineals for about 3 months and then she noticed on her petticoats a whitish brown glistening crust, she could not keep her urine any length of time and so she made it on her clothes she then felt an awful craving for water in her stomach and the more she drank, the more she inclined to drink, and along with this she had an awful craving for food, and she could eat anything that was put before her, but notwithstanding this she began to lose flesh and got that weak on her legs that a blast of wind would blow her down, and she would let fall a penny piece not having the strength to keep a hold of it.

She was treated at the Royal

Infirmary Dispensary and at the  
George Street Dispensary, without any  
improvement there was no diminution  
of the quantity of urine nor of the  
great craving for food or water,  
before she took this complaint she was  
between 10 and 11 stones but she just  
now <sup>is</sup> about 8 st.

Her present condition is that of a woman  
very much reduced in body, her temperature  
is normal and her pulse of fair volume  
and strength, face of a ruddy complexion  
and tongue dry, just like cracked leather  
her skin is markedly dry and scaly,  
and never perspires, the several  
thoracic and other organs are normal  
height is 5 feet 6 inches, weight 8 stone  
and quantity of urine passed in the  
24 hours is 400 oz and the amount  
of sugar as calculated quantitatively by  
Pavy's test, was 4 lbs 3 oz or 73.6 grains  
in the ounce, Sp, Gr 1040, no albumen  
acid in reaction, and of a pale yellow  
colour, thick or syrupy and no sediment  
I put her on a restricted diet  
alone, until I got all the information

I could about the medicine I was going to use, which information however unfortunately was at a discount, the restricted diet having had no effect. As the report on the 1<sup>st</sup> May when I was ready with the medicine was just the same as above, I therefore put her on the following diet, and medicinal treatment, I measured the urine daily and the quantity drunk but as there is a sameness about that part of it I shall give you the results when she was weighed and the sugar estimated,

1886	Urine Passed		Drink		Patient's weight		Notes
	Pb	oz	Pb	oz	St.	Lb.	
May 1 <sup>st</sup>	20		15		8		Diet, <u>Breakfast</u> Bread 3oz, Tea 10oz, Egg, Butter 1/2oz, <u>Dinner</u> Panado-White Bread 4oz, sweet milk 20oz, sugar 1/2oz, and for <u>Supper</u> White bread 3oz, Tea 10oz, Steak 4oz, and butter 1/2oz, and 1 Gallon of Low milk, for her thirst medicine, R Lig Arsenicals Brom. m <sup>ii</sup> three daily, in water.
2	19		12	10			<u>Urine</u> , sp. Gr. 1040 sugar 4 lb 3 oz
3	15		11	10			
4	14		14	"			
5	13	10	12	10			
6	14		10	"			
7	12		11	"			
8	13	10	11	"	8	4 1/2	R Lig Arsen Brom m <sup>iii</sup> three daily, in water, sp. Gr. 1034, sugar 3 lb 1 1/2 oz. she is not so thirsty, and feels stronger,

1886	urine passed		Drink		patient weight		
	Pts	Oz	Pts	Oz	Lbs	Oz	
May 15	9		11		8	6	Urine, Sp. Gr. 1030, Sugar 1 lb 4 1/2 oz, was with difficulty she took all her milk, so I reduced it to 1/2 Gallon and allowed her to get water as needed, she was very thankful for the great change for the better, not nearly so thirsty and has a good nights rest now, she also goes down to the airing yard & walks about with some pleasure.
" 27	8		10		8	13 1/2	
" 28	8		10				
" 29	8		8				
" 30	8	10	11				
" 31	7	10	8				
June 9	8	10	7		8	11 1/2	Urine, Sp. Gr. 1028 Sugar 13 oz 3 1/2 oz nothing to note, is taking her food well and feels quite comfortable.
" 19	6		4				
" 21	6		4				
" 23	6		4		9	4	Urine Sp. Gr. 1027 Sugar 9 oz 20 grs. took off the 1/2 Gallon of sour milk at her own request, as she said she was in a different world now, her mouth was suppy, had not the same thirst, her skin was moist and in fact she was now and then perspiring
" 24	5	10	4				
" 25	do	do	4				
" 26	do	do	3	10			
" 27	do	do	3	10			
" 28	5		3	16			
" 29	4	10	3	16			
" 30	5		3	10			
July 1 <sup>st</sup>	5		3	16			
" 2	5		3	10			
" 3	5		3	10			
" 4	5		3	10			
" 7					9	7	Medicine on account of an attack of Diarrhoea, was stopped, urine could not be calculated. Lime water was the only treatment, and stopped at this date



1886	Urine Passed		Drinks		Net weight
	Pts	oz	Pts	oz	at lb.
Nov 29					
Dec 1	3	10	2	10	
" 6	4	10	3		
" 14	4	"	3	"	
" 24	3		2	10	
" 31	3	10	2	10	
1887					
Jan 1	3	10	2	10	
" 8	2	10	2		
" 20	3	"	2	10	8 9
" 31	3	10	3		
Feb 10	4		3		8 9
" 17	3	10	3		8 10
" 25	3		2	10	
" 27	3		2	10	
" 28	3		2	10	
Mar 1	4		3		
" 2	3	10	2	10	
" 3	4		3		

Diarrhoea

Nothing to note, she took her food well but kept the house, she was as hearty and strong as ever she was,

Urine sp. Gr. 1028 sugar, 4oz 2 drs

During this month she was frequently in the airing yard, she was most grateful for the great change in her condition for the better she had a pleasure in living now compared with her state 12 months ago, on the 1<sup>st</sup> of March, she caught cold when down in the airing yard

Conjestion of the lungs set in and she died on the 4<sup>th</sup>, In this case also no P.M. was allowed,

Case of  
Diabetes  
Mellitus

H. R. or K, aged 29 married, admitted  
15<sup>th</sup> January 1887, complaining of thirst and passing  
large quantities of urine, her family history is good  
but a brother of hers died aged 11 years of  
the same complaint as she has, she herself  
was always healthy never was very fat, got  
married about 8 years ago, she nursed  
all her children, her complaint began five  
months ago, with a terrible itch round her  
privates which continued up to a fortnight  
ago, and both thirst and itch began  
at the same time, and she wondered what  
was wrong with her, she noticed her  
Chemise glistening when dry, and she  
was up making her urine terrible often  
at night, and a gnawing not satisfied  
sensation at her stomach her appetite  
was terrible never done eating and after she  
took an awful lot she had to drink as  
much as she ate, she was otherwise quite  
healthy, she nursed a baby up to a month  
ago, and had no difficulty in weaning  
her, she was very weak on her legs

She was put on a purely restricted  
or Diabetic diet, and on the 19<sup>th</sup>  
began with the Liq Arsen Brom with the

following result.

1887	Urine Passed		Drink		Patient's weight		Notes
	Pts	oz	Pts	oz	pts	lbs.	
Jan 19	19	10	19	10	6	4	Urine sp. Gr. 1040, Sugar 4lbs 7oz 3 drs.
" 20	17		18	10			Ry Lig Arsen Brom m 25 Ag 3vi ttt
" 21	10	10	9				1/2 oz three daily
" 22	9	15	9				
" 23	7	10	7				Doubled quantity of Gluten Bread
" 24	7	6	8				at her own request.
" 25	6	"	8				Ry 50 m in the mix
" 26	10		11		6	5	Urine sp Gr 1036, sugar 1 lb 3oz 7/8 drs
Feb 1	11	15	10	10	6	7	Urine sp. Gr. 1036 sugar 1 lb 9oz 5 drs.
" 4	10	5	9	10			Urine sp. Gr. 1038 @ sugar 1 lb 12oz 6 drs.
" 9	11	5	9	15	6	9 1/2	R 6 m of Lig Arsen Brom as a dose
" 14	9	15	9				three daily.
" 15	7	5	6		6	6 1/2	Urine, 1035 sp Gr, sugar. 1 dr less
" 20	8	10	6	10			than 1 lb.
" 21	9	15	7				
" 23	6	10	6				
" 24	6	7 1/2	6				
" 28	6	15	5	10			
Mar 4	6		4	10	6	7	Urine sp. Gr. 1032 sugar 13 drs 7/8 drs
" 7	6		5				
" 10	6	7 1/2	5	10			
" 11	6	15	4	10			
" 13	6	10	5	10			



In this case we have the same marked improvement in the patient's condition and after she saw so great a change for the better, she began to fret about her children and her husband and she dismissed herself on the 13<sup>th</sup> March.

Case 4  
Diabetes  
Insipidus

L. A., aged 60, now was married, was admitted on the 6<sup>th</sup> of May 1887 complaining of cough and a stuffing in the chest, and also of an excessive thirst and passing large quantities of urine, under appropriate treatment the Bronchitis was subdued and I put him on the same diet as No 2<sup>nd</sup> Case, examined his urine and found no sugar, Sp. Gr 1007, almost no colour but in a large quantity a very pale yellow, and he passed 305 g

The complaint began about 12 months ago, when he was sent to work in a very damp place, his occupation being a miner, his attention was first drawn to something being wrong with him when he required to place a vessel with a large quantity of water at his bedside to drink through the night, he had also to get up very frequently to make his urine has lost in weight more than 2 stones and

wherever he was, he was always looking for water, & it passed through him almost as quick as he drank it, Family History is indifferent and unsatisfactory, no history of syphilis

I put him on  $\text{m} \frac{5}{8}$  in water three daily, of the Licj Arsen Brom, on the 16<sup>th</sup> May, and the measured quantity of urine on the 19<sup>th</sup> and 20<sup>th</sup> was 305 oz, on the 21<sup>st</sup> 300 oz, 22<sup>d</sup> 260 oz, 23<sup>d</sup> 210 oz, 24<sup>th</sup> 190 oz. He drank of water during the same time 215 oz, 21<sup>st</sup> 225 oz, 22<sup>d</sup> 205 oz, 23<sup>d</sup> 120 oz, 24<sup>th</sup> 85 oz, on this day he dismissed himself.

In these three cases we have a most marked improvement in the patients condition under the use of the Licj Arsen Brom whether on a restricted diet or not, and my opinion from a study of these cases is that there is no need of putting a patient rigidly on Diabetic diet as Houssean and others recommend as the medicine seems to have a specific effect on both diseases

My Pathology of the disease is that D. Insipidus is a disease

of the Medulla Oblongata about the vaso-dilator Centre while that of *D. Mellitus* is a disease of the same part but in addition there is disease of the Hepatic Cells. This idea is purely deduced from the known action of the medicine used.

I trust that at some future time I may be enabled to pursue this subject still further,

The following works were consulted,  
The Lancet from 1870 to 1887, different articles on the subject by different Authorities,  
Case of Diabetes &c by Thomas Girdlestone M.D. 1799  
On Diabetes, by D. Pavy, 2 edition 1869  
On the Relation between Diabetes and Food, by D. Donkin 1875  
On Diabetes, by D. Dickinson 1875  
On Diabetes Mellitus and Insipidus by Senator in the 16 vol of Jemesens Cyclopaedia 1877  
Physiology, by D. M. Foster, 3 edition 1879,  
Manual of Pathology by D. Coats 1883,

George Buchan M.B. Ch.M.