ON THE TREATMENT OF DIABETES MELLITUS BY FEEDING ON RAW PANCREAS AND BY THE SUBCUTANEOUS INJECTION OF LIQUOR PANCREATICUS.

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LAST November I determined on the first opportunity to try the effect of treating diabetes by feeding on pancreas and injecting pancreatic extracts, and the two cases I subjoin were under treatment at the time when Dr. Hector Mackenzie and Dr. Neville Wood gave an account of their cases in the BRITISH MEDICAL JOURNAL of January 14th, 1893. They are, I think, the first that have been published in which constant determinations of the urine have been made. Messrs. F. G. Hopkins, B.Sc., and W. J. Harris, my clinical assistants, who have made the analyses, and to whom I am much indebted, have taken great care with them, and the results may be absolutely relied upon. Each patient was for the whole period of observation kept upon a diet consisting each day of 20 soya bean biscuits, 2 eggs, 2 ounces of butter, 2 almond biscuits, 1 fluid ounce of milk, 12 ounces of cooked meat, greens, watercress, tea, and soda water. The state of the patient and of the urine on this diet having been ascertained, each was given, in addition, for his supper about 2 ounces of raw fresh sheep's pancreas chopped fine and flavoured with pepper and salt. When this was discontinued $\frac{1}{5}$ of liquor pancreaticus were injected subcutaneously night and morning, the restricted diet being as before.

RESULTS: A.—THE SUGAR.

CASE I.—

Total amount for two days before	Grains
" " first two days after pancreas given	7419
" " second " " " "	8698
" " third " " " "	6172
" " fourth " " " "	5478
" " fifth " " " "	5084
" " sixth " " " "	3671
" " seventh " " " "	3920

The day after this the patient had a rash, so the pancreas was discontinued, but after seven days it was resumed again. The results obtained then were:

Total amount for first two days	Grains.
" " second " " " "	3430
" " third " " " "	4971
" " fourth " " " "	4680

It was then omitted for two days, on which 6426 grains were passed. Benger's liquor pancreaticus was then injected subcutaneously.

Total amount for first two days on Benger	Grains.
" " second " " " "	5244
" " third " " " "	6690
" " fourth " " " "	4478

CASE II.—

Total amount for two days before	Grains.
" " first two days after pancreas given	5355
" " second " " " "	5368
" " third " " " "	4801
" " fourth " " " "	5011
" " fifth " " " "	5355
" " sixth " " " "	7721
" " seventh " " " "	9042
" " first " " on Benger	7756
" " second " " " "	5144
" " third " " " "	5953
" " fourth " " " "	6336
" " fifth " " " "	5136

We therefore learn that, as regards sugar, in one case it was distinctly less when raw pancreas was taken than it was before, and that the same effect, but to a less degree, was associated with the injection of liquor pancreaticus subcutaneously. In the second case neither of these modes of treatment had any effect in reducing the sugar.

B.—QUANTITY OF URINE.

Case I. Daily average before the administration of pancreas, 158 fluid ounces. Daily average for thirteen days on which pancreas was given, 158 fluid ounces. Daily average for six days during which it was given a second time, 147 fluid ounces. Daily average for six days during which liquor pancreaticus was injected, 137 fluid ounces. Case II. Daily average before the administration of pancreas, 94 fluid ounces. Daily

average for seventeen days during which pancreas was given, 115 fluid ounces. Daily average for eight days on which liquor pancreaticus was injected, 108 fluid ounces. We may probably conclude that neither the feeding on pancreas nor the injection of liquor pancreaticus had any decided effect upon the quantity of urine.

C.—THE SPECIFIC GRAVITY.

This was not appreciably altered by either treatment.

D.—THE UREA.

Case I. Before the administration of the pancreas the daily average of urea excreted was 1447 grains. During the first administration it was 1495 grains, and during the second 1262 grains. Case II. Before the pancreas was given the daily average was 826 grains. When this was given it was 1079 grains, and when the liquor pancreaticus was injected it was 971 grains. It is, therefore, very doubtful whether either the pancreas or the liquor pancreaticus have any effect on the urea; certainly they had not in Case I, possibly they increased it in Case II.

E.—EFFECTS ON GENERAL CONDITION OF THE PATIENT.

Case I. Previous to taking the pancreas he had gained 12 lbs. in forty-two days. During the treatment he gained 7 lbs. in the first twelve days, his weight mounting from 134 to 141 lbs. Four weeks after this he was 140 lbs. In these four weeks he had had pancreas for six days, and liquor pancreaticus for six days, but these weeks also included the period of pyrexia. He enjoyed his pancreas, ate it with relish, but did not appear to feel much better for it. Case II. This patient, on treatment with restricted diet from November 28th to January 5th, sank in weight from 105 to 104 lbs. After feeding with pancreas for seventeen days his weight was 106 lbs., but, as it was this two days after the pancreatic treatment was begun, it is doubtful whether it had anything to do with the slight gain. He liked the raw pancreas, and said he felt better on it than on anything else. We may, I think, conclude that the patients do not lose weight when treated with the pancreas; perhaps they gain a little, and if there is any other alteration they feel a little better for the treatment.

F.—DISADVANTAGES.

It will be noticed that the first case suffered from a severe erythema accompanied by fever. These symptoms could only be set down to the pancreas he was taking, which was, however, perfectly fresh. Probably the illness is of the same nature as that due to shell fish, or that sometimes brought about in myxœdematous patients treated with thyroid gland. The presence of a sore throat is not against this view, for it may occur in copaiba poisoning. During the febrile attack the sugar fell very low. The second patient had no rash, but perhaps the rise of temperature and slight sore throat he had on one day were of the same nature as the illness of the first patient.

The general conclusions at which we may arrive, if we may judge from two cases only, are that it is very doubtful whether feeding on fresh pancreas or the subcutaneous injection of liquor pancreaticus is of any benefit in diabetes mellitus. Neither appear to have any influence on the quantity of the urine, its specific gravity, or the urea; perhaps they decrease the amount of sugar passed and very slightly increase the weight and feeling of strength. Patients like raw pancreas, but one great disadvantage is that it may cause severe erythema with fever and a slight sore throat.

I hope the publication of these two cases will lead others to try the treatment, so that we may soon have sufficient cases to form a just estimate of it.

CASE I (clinical clerk, Mr. W. J. Harris).—D. D., aged 22, admitted into Guy's Hospital for diabetes. Has lost one brother from it; has had measles and scarlet fever. Gives two months' history of thirst, polyuria, and loss of weight. He has recently had eczema. His tongue is very raw and beefy-looking, his knee-jerks are absent, the edges of the optic discs are ill-defined. His urine was analysed for many days before the pancreas was given; only two previous days are shown in the table, but they are characteristic of the others. He had been in the hospital some time before the pancreas was given, and he was slowly improving and increasing in weight, having gained from 123 lbs. to 134 lbs., or 12 lbs. from November 21st to January 3rd, namely, forty-two days, by simply restricting his food to the diabetic dietary mentioned in the table.

January 6th. The treatment with pancreas was begun to day. The organ was taken from the sheep. About 2 ounces was given once a day; it was chopped fine, flavoured with salt and pepper, and eaten raw. The patient enjoyed it thoroughly,

January 8th. The pancreas appears to have had no influence on the urine.

January 12th. The quantity of sugar has shown a slight decrease for the last day or two.

January 18th. The quantity of sugar appears to be slowly decreasing. The patient's weight is 141 lbs.; on January 3rd it was 134 lbs. He says nothing satisfies his craving so much as the pancreas, which he much enjoys. He does not want quite so much ordinary meat as formerly.

January 19th. Last evening a red papular rash appeared. It was first noticed at the bends of the elbows, but in the course of an hour or two it spread to the trunk, thighs, and legs, the only parts of the body which it avoided being the head and neck, and the palms of the hands and the soles of the feet. Below the knees it was indistinct. At first it consisted of sparsely distributed discrete papules, varying in size from the diameter of a pin's head to that of a pea. There were, perhaps, forty or fifty of them on the forearm. On the trunk they were much thicker on the abdomen and loins than over the ribs, but even on the abdomen they were not as numerous as on the forearm. The skin around was only slightly reddened, but a general blush quickly appeared; and in places, especially on the chest and back, this assumed a punctate character very like a scarlatinal rash. Owing to the irritation, the tops of some of the large papules were scratched off. The temperature was 101°. The tonsils were enlarged and somewhat congested. Both to-day and on subsequent days the patient was carefully examined by several physicians, and all were agreed that he was not suffering from scarlet fever.

Date.	Number of ozs. in 24 hours.	Specific Gravity.	Sugar.			Urea.			Treatment.
			Parts per 1,000.	Grs. per oz.	Total Grs. in 24 hrs.	Per cent.	Grs. per oz.	Total Grs. in 24 hrs.	
Jan. 5	172	1040	54.1	23.8	4,093	2.0	8.8	1,513	Diabetic diet: 20 soya bean biscuits, 2 eggs, 2 ozs. butter, 2 almond biscuits, 1 fl. oz. milk, 12 ozs. cooked meat, greens, watercress, tea, and soda water <i>ad libitum</i> . No drugs.
" 6	144	1038	52.6	23.1	3,326	2.2	9.6	1,382	
" 7	160	1040	55.8	25.8	4,128	2.1	9.2	1,472	Raw pancreas in addition.
" 8	156	1036	66.6	29.3	4,570	2.1	9.2	1,435	
" 9	208	1036	41.6	18.3	3,803	1.9	8.4	1,747	
" 10	140	1038	40.0	17.6	2,364	2.0	8.8	1,232	
" 11	184	1036	36.4	16.0	2,940	2.3	11.2	1,377	
" 12	180	1042	32.2	14.1	2,538	1.9	8.3	1,505	
" 13	160	1036	43.4	19.1	3,056	2.0	8.8	1,408	
" 14	148	1035	31.2	13.7	2,028	2.2	9.7	1,426	
" 15	152	1038	33.8	14.8	2,147	2.5	11.0	1,672	
" 16	148	1038	23.5	10.3	1,524	2.3	10.2	1,510	
" 17	120	1040	44.6	19.6	2,352	1.8	7.7	924	
" 18	148	1038	24.3	10.6	1,568	2.8	12.3	1,820	
" 19	160	1035	26.6	11.7	1,872	2.0	8.8	1,408	
" 20	48	1038	23.5	10.3	494	2.5	11.0	528	Pancreas omitted.
" 21	80	1038	27.8	12.2	976	2.7	11.9	952	
" 22	80	1034	32.5	14.3	1,144	2.7	11.9	952	
" 23	62	1033	21.2	9.3	566	2.7	11.9	737	
" 24	52	1034	16.0	7.0	354	5.6	15.8	821	
" 25	124	1034	20.0	8.8	1,101	2.3	10.2	1,265	
" 26	122	1025	21.0	9.2	1,122	1.7	7.4	1,002	
" 27	140	1032	25.2	11.0	1,540	1.7	7.4	1,036	Pancreas given again.
" 28	140	1038	30.8	13.5	1,890	1.8	7.9	1,108	
" 29	140	1038	30.8	13.5	1,890	2.2	9.7	1,358	
" 30	144	1042	48.7	21.4	3,081	1.7	7.4	1,480	
" 31	200	1038	30.5	13.4	2,680	—	—	—	
Feb. 1	160	1040	28.5	12.5	2,000	1.9	8.3	1,328	
" 2	272	1038	36.3	15.9	4,324	1.4	6.1	1,659	Pancreas omitted; 3-gr. doses of opium thrice a day given.
" 3	144	1040	33.3	14.6	2,102	1.9	8.3	1,196	
" 4	124	1040	37.0	16.2	2,008	2.8	12.3	2,952	Benger's liquor pancreaticus <i>mv</i> injected subcutaneously night and morning; opium continued.
" 5	132	1040	44.4	19.5	3,276	—	—	—	
" 6	168	1040	50.0	22.0	3,696	—	—	—	
" 7	140	1038	48.8	21.4	2,994	—	—	—	
" 8	132	1040	40.7	17.9	2,362	—	—	—	
" 10	128	1038	38.4	16.8	2,116	—	—	—	

January 20th. The erythema is more marked and more punctate this morning. The large papules are less prominent. There is a slight blush on the face, but it is doubtfully punctate; morning temperature 100°, evening temperature 103.6°.

January 21st. The rash has begun to fade, and on the face it is decidedly uniform and not punctate; in fact, it is only a blush. There is obvious peeling about the face and also on the clavicles. Since the eruption came out there has been a marked change in his urine; it is much less in quantity, and as the percentage of sugar has not increased, the total quantity of sugar is very much less. Reference to the table will show that during the whole period of the rash the excretion of sugar was much diminished, the daily average being only 822 grains (on the day before the rash appeared it was 1872 grains). There was never any albuminuria. Morning temperature 100°, evening temperature 102.6°.

January 22nd. There is more peeling to-day. Morning temperature 99.6°, evening temperature 101.8°.

January 23rd. The papules have disappeared, and there is a good deal of fluff desquamation. The erythema is fading everywhere except on the face, neck, and back. Morning temperature 101°, evening temperature 101°.

January 24th. He is now peeling all over; on the backs of the hands there are large flakes of epidermis; the erythema is fast disappearing. Temperature 99°.

January 28th. The palms of the hands have finished peeling; the soles of the feet are beginning.

February 7th. The face is still a little branny, and the feet have not quite finished peeling.

February 18th. Weight 140 lbs. He says he is not sure that he felt any better when taking the pancreas or when having the injections.

Case II (clinical clerk, Mr. F. G. Hopkins).—W. E., aged 18. Patient originally came into the hospital on November 22nd, 1892, under Dr. F. Taylor, who kindly transferred him to my care. He then gave seven weeks' history of diabetes. From November 28th, when his weight was 105 lbs., to January 8th he was treated upon diabetic diet and opium. He did not improve at all, but got slightly worse. On December 5th his weight was 103 lbs., on December 12th 104 lbs., and on January 6th it was 104 lbs., or 1 lb. less than when the treatment began, which has not reduced the quantity of sugar. January 18th. The treatment with raw pancreas commenced. January 20th. The patient likes the pancreas. He takes about 2 ounces every evening at supper. It is chopped fine and eaten with pepper and salt. His weight is 106 lbs. January 24th. The patient had a sore throat yesterday, and his temperature rose to 101°. There was no rash. He now feels well and likes the pancreas. February 4th. Injections of liquor pancreaticus begun to-day. Weight 106 lbs. He says he feels better than he has done for a long time. February 11th. The subcutaneous injection of the liquor pancreaticus occasionally leaves a slightly tender swelling, but this disappears in a few hours. To avoid this the injections may be made deep into the gluteal region.

Date.	Number of ozs. in 24 hours.	Specific Gravity.	Sugar.			Urea.			Diet.
			Parts per 1,000.	Grs. per oz.	Total gr. in 24 hours.	Per cent.	Grs. per oz.	Total gr. in 24 hours.	
Jan. 15	84	1040	55.5	24.4	2,049	2.1	9.2	773	Diabetic diet. No drugs.
" 16	100	1036	62.5	27.3	2,730	1.9	8.3	830	
" 17	100	1035	60.0	26.25	2,625	2.0	8.75	875	
" 18	104	1035	65.0	28.4	2,953	2.1	9.2	956	Pancreas in addition.
" 19	92	1038	60.0	26.25	2,415	1.8	7.8	697	
" 20	80	1040	60.5	26.8	2,144	2.2	9.6	768	
" 21	92	1038	66.0	28.9	2,657	—	—	—	
" 22	100	1035	—	—	—	—	—	—	
" 23	110	1035	64.0	28.0	3,080	—	—	—	
" 24	68	1040	65.0	28.4	1,931	2.6	11.3	768	
" 25	100	1030	60.0	26.25	2,625	—	—	—	
" 26	100	1030	62.5	27.3	2,730	—	—	—	
" 27	120	—	—	—	—	—	—	—	
" 28	140	1035	66.0	28.9	4,046	1.9	8.3	1,160	
" 29	140	1035	60.0	26.25	3,675	2.4	10.5	1,470	
" 30	180	1040	62.0	27.0	4,860	2.2	9.6	1,728	
" 31	92	—	—	—	—	—	—	—	
Feb. 1	161	—	58.5	25.5	4,182	—	—	—	Pancreas omitted. Benger's liq. pancreaticus, <i>mv</i> , subcutaneously night and morning.
" 2	140	1035	65.0	28.4	3,976	1.8	7.8	1,092	
" 3	144	—	60.0	26.25	3,750	—	—	—	
" 4	86	1036	68.0	29.75	2,558	1.9	8.3	713	
" 5	106	1036	55.5	24.4	2,586	2.2	9.6	1,017	
" 6	112	1036	62.5	27.3	3,037	2.0	8.7	974	
" 7	103	1035	62.0	27.0	2,916	2.2	9.6	1,036	
" 8	132	1036	55.0	24.0	3,168	2.2	9.6	1,267	
" 9	132	1038	55.0	24.0	3,168	2.1	9.2	1,214	
" 10	100	1038	60.0	26.25	2,625	1.9	8.3	830	
" 11	92	1040	62.5	27.3	2,511	1.8	7.8	717	

DR. HAWKSLEY'S BEQUESTS.—By his will the late Dr. Thomas Hawksley of Bermans, Chertsey, the founder of the National School of Handicrafts for Destitute Boys at Chertsey (upon which he had expended, it is believed, upwards of £20,000), and one of the founders of the Charity Organisation Society, who died in December last, aged 72 years, bequeathed to King's College Hospital £500, to the Medical Benevolent Fund £200, to the Medical Benevolent College at Epsom £100, to the Royal Normal College for the Blind £100, to the Charity Organisation Society £100, to Miss Gilbert's Institution for the Welfare of the Blind £50, to the Chertsey School of Handicrafts, during his wife's occupation of Bermans, £150 a year; and to the trustees of the School of Handicrafts such a sum as will produce £1,000 a year for its endowment. The value of Dr. Hawksley's estate was £53,630.