The electrocardiogram showed sinus arrhythmia; sino-atrial block, with a pause of 1.36 seconds from which there was an escape by an impulse originating in the upper junctional tissues, and occasional ectopic beats which arose in the right ventricle. The block occurred at irregular intervals and neither it nor the sinus arrhythmia appeared to be related respiration (Fig. 5).

This patient has been seen several times during the year. Each subsequent visit was after a rest and she was clinically improved. The sino-atrial block was observed only at the first examination.

AN EVALUATION OF THE ALLEN METHOD OF TREATMENT OF DIABETES MELLITUS.[1]

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Before the year 1915 a quite different method of treating diabetes mellitus prevailed than has since been employed. This change in method, which must be looked upon as an improvement, owes its inception to the experimental work done on dogs by Frederick M. Allen, and since confirmed by studies on humans by Allen and a number of independent workers. Among other things, Allen showed that diabetic patients could be rendered urine sugar- and ketone-free by the withdrawal of food, by fast days, and periods of underfeeding. Previous to this, other workers including Geulpa, had combined fasting with various dietary procedures, but all such work lacks the basis of scientific study. Their observations were largely clinical and uncontrolled.

Prior to 1915 the treatment of diabetes consisted chiefly in restricting the intake of carbohydrate foods, substituting for the loss occasioned thereby, additional fat and proteins. Methods were largely conjectural. Particular curative virtues were ascribed to certain foods which later investigations do not warrant. Oatmeal, skimmed milk, potato, sour milk, maple sugar and other special food cures are still in our memories. A host of drugs, ferments, animal extracts and mineral waters have similarly been exploited and have been found wanting.

Furthermore, clinical observations and statistics on diabetes made prior to 1915 are unquestionably grossly inaccurate. It has been commonly assumed by physicians that an individual whose

[1] Presented before the Pittsburgh Academy of Medicine, Pittsburgh, Pa., April 27, 1920.

urine would reduce a copper solution under certain conditions had diabetes. It is now well known that reducing substances other than sugar are found in the urine and that the presence of sugar in the urine is not conclusive proof of diabetes. At least 10 per cent. of the cases referred to my clinic as having diabetes are found not to have this malady. When reducing substances other than glucose are found in the urine in considerable amount, they lead to confusion in diagnosis. During the past year I have carefully examined 480 new cases presenting various medical problems with the following result:

Of 480 cases examined, 250 patients, or 55 per cent., had no urine sugar. 106 patients, or 23.2 per cent., were diabetics. 100 patients, or 21.8 per cent., had sugar or other reducing substance in the urine.

Of these 100 patients who had a reducing substance in the urine, 8 had blood sugars of 0.15 per cent. or higher; 8 had blood sugars between 0.12 per cent. and 0.15 per cent.; 84 had blood sugars between 0.07 per cent. and 0.12 per cent.

Of the 100 cases which had reducing substances in the urine, several were excreting glycuronic acid, others were eliminating animal sugars, a number of cases have renal diabetes and a fourth group are patients affected with low-grade chronic infections in which traces of sugar are often found in the urine. This entire question is reserved for a separate study and will not here be further discussed. Reference to it is made because unquestionably many of the alleged cures from diabetes attributed to medicines, ferments, pseudo-scientific mechanotherapy and religiopsychologic methods, are effected on patients who belong in this group and who have not true diabetes. Furthermore the statistics of the older scientific workers are undoubtedly diluted and vitiated by the inclusion of such cases.

Since 1915 the older clinical methods of studying the metabolism of the diabetic have been supplemented by blood chemistry and studies of the respired air. Moreover the necessity for accurate control of food intake has been realized. Accordingly the clinical observations of workers in this field during the past five years are much more accurate and trustworthy.

What is now known as the Allen treatment really represents the composite ideas of a number of workers. As first employed, patients were fasted until the urine was free from sugar. Food was then cautiously added until glycosuria reappeared. This was followed by a fast and the process repeated more cautiously until a point was found where, if possible, the patient would remain urine sugar- and ketone-free. The next step in the evolution of the treatment was the discovery that the incautious use of fat was responsible for many of the failures. The most recent and important improvement, in

my judgment, was the discovery that to really improve the food tolerance of a patient, one must restrict the diet to the point where the blood becomes and remains approximately normal as to its sugar content.

To summarize the principles involved in the present method, it is assumed that every diabetic—

1. Has a limited total food tolerance.
2. He has a limited carbohydrate tolerance.
3. He may in addition have a special intolerance for fat and protein.

The method of study employed in my clinic has been along the following lines: On admission, in addition to a physical examination, a careful routine chemical study of the blood is made, supplemented by a Wassermann test and cell examination. In this study the blood sugar, urea, creatinin, cholesterol and blood bicarbonate are determined. Whenever any of these elements are found in abnormal amount the blood test is repeated at intervals of two or three days. In actual practice this means that, as a rule, the blood sugar only is determined every second or third day during the patient's average three weeks' stay in the hospital. The urine is examined daily, but patients rarely show sugar after the third or fourth day. The food intake is regulated with great care on the basis of the blood-sugar level. The diet is kept low until the blood-sugar level becomes normal. Food is added cautiously while the blood-sugar level remains within normal limits and is reduced in amount when the level becomes high. Fast days are rarely used. Rest days in which the diet is reduced one-half or one-third are employed instead. Supplementing these scientific observations the patients are taught by various means and devices the elements of food chemistry, so that they may know without reference to books or charts the foods that are safe for them to use. They are also taught the approximate weights or quantities which are permissible.

Instruction is also given in the preparation of food and in matters of personal hygiene. In the diet kitchen we are experimenting with special dishes and foods. For example, we have developed a method of making a good soy-bean flour and also a flour from casein at a great saving to the patient. Ordinary pork and beans are proscribed in the diet of the diabetic, but we have developed a method of preparing pork and beans, with tomato sauce, which is perfectly safe and which compares favorably in flavor with the well-known commercial preparations of navy beans.

Our unit for the study and treatment of diabetes consists of scientific laboratories, a special diet kitchen, a room for the instruction and entertainment of patients and a group of eleven bedrooms. The unit has been in operation since 1915. From the very first

we have made an effort, by follow-up letters and by having them return for examination, to keep in touch with patients after they have left the hospital.

All kinds of patients have been treated, the courageous and the cowardly, the enterprising and the slothful, the attentive and interested, and the indifferent. These types are mentioned because the character of the individual has much to do with the outcome. To successfully contend with diabetes a patient must not only be wisely advised, but he must also possess courage and a willingness to learn and assist, to create new dietary habits and eliminate old ones.

All of the foregoing is what we now call the Allen treatment. The question which first presents itself to the new diabetic is, "Is it worth the sacrifice and effort?" This must be the question uppermost in the minds of physicians in general practice who see only an occasional case. There is not the slightest doubt about the immediate value of the treatment. No procedure in medicine of which I have knowledge gives more spectacular relief than does the institution of this method in the acute stages of untreated diabetes. I have witnessed many patients, practically moribund, temporarily saved from impending coma and death by its use. The ultimate value of the treatment has yet to be determined. Since I have had the good fortune to treat patients along the most approved lines since it was first proposed and have had a large number of cases constantly under observation, I shall try to answer the following questions:

1. Does the method ever restore the diabetic to health with power to use unlimited quantities of food?

2. Can severe cases always be kept from failing by rigorously following the method?

3. Does the method of undernourishment improve the physical condition of the diabetics enough to make the sacrifice and expense worth while, or does it merely increase or prolong the misery occasioned by the disease?

4. Does the use of the Allen treatment add materially to the expectancy of life of the diabetic?

To the first question as to the possibility of a complete cure and the use of an unlimited diet the answer is that it is highly improbable. I have seen several mild cases apparently become able to eat temperately of all kinds of food, even cane sugar. One case in particular was that of a physician who on admission had a blood-sugar level of 0.25 per cent. on a slightly restricted diet. At the present time, and after a lapse of three years, his blood sugar is normal and he is eating a general diet, including cane sugar, although it should be admitted that his eating habits are temperate. Many mild cases, particularly adults, have gained so much in tolerance that they are able to eat with discretion all kinds of ordinary foods

except cane sugar. I have never seen severe cases make such notable gains.

In answer to the second question as to whether or not severe cases can be kept from failing, it may be said that many can be kept alive, although it may be necessary to constantly readjust and maintain the diet at levels exceedingly low. For example, I have had such a case in a young man whom I am treating jointly with Dr. Allen. His diet is rarely permitted to go above 650 calories. I have had bad cases live for more than two years on diets averaging below 700 calories. A certain number of cases will succumb in spite of all fasting and underfeeding, as will be seen in tables exhibited later.

The third question as to whether or not the condition of severe patients is improved sufficiently to make the undernutrition ordeal worth while, I think can truthfully be answered in the affirmative. If patients properly regulate their daily activities so as not to exhaust themselves they can live with a fair degree of comfort and with greater freedom from symptoms for a much longer time than if treated by any other method of which I have knowledge.

The fourth question as to the gain in expectancy of life is a very difficult one to answer in terms of precision, and for several reasons. In the first place one must compare a given set of cases treated by the method with a similar group treated by older or former practices. To do this with any assurance of accuracy is quite impossible. (*a*) Included in all former studies on diabetes as before mentioned, because of inefficient methods of investigation, there must be many cases, particularly those of mild or uncertain form, which were not true diabetes; (*b*) there is great variation in the severity of diabetes in different individuals and a corresponding variation in prognosis; therefore, only cases of similar degrees of severity can be fairly compared; (*c*) a large proportion of diabetics have complications or associated diseases which are frequently the cause of death; obviously only groups of cases of uncomplicated diabetes can be compared.

Secondly, a large proportion of those who succumb to diabetes under the Allen treatment are not faithful to the method, as shown by the appended tables. Most of them are unwilling to continue under limitations and privations which it imposes and rarely follow it for more than a few weeks.

In spite of all these disconcerting factors, from careful observation one gains a distinct clinical impression that life is materially lengthened by the treatment. Curves plotted so as to show the average duration of life of fatal cases arranged according to age of onset and duration of disease between 408 fatal cases treated by Joslin[2] prior to December 1, 1915, and 103 fatal cases treated by me since 1915,

[2] Joslin, E. P.: Treatment of Diabetes Mellitus, Lea and Febiger, 1917, p. 36.

show that life has been prolonged from one to two years in most of the age groups.

Children when seen at the onset of diabetes, even when severely ill, may be greatly relieved for several months, oftentimes for upwards of two years. There may be noted, however, a gradual decline in the ability to use food. If the diet be constantly reduced to keep the blood sugar within normal limits, the child will get along fairly comfortably for several months more, provided it does not succumb to some other disease or until trophic disturbances and evidences of malnutrition become distressing. Even under these conditions, children may live for four or five years. It is my judgment that the length of life of the average diabetic child is doubled by the Allen treatment.

Young adults do somewhat better than children. In many cases the tolerance for food slowly declines in spite of the most rigid restrictions; others do fairly well; but I have seen very few cases which justify the hope that anything approaching a normal tenure or life or physical well-being will ever be attained by this unaided treatment.

Older adults, as would be expected, do correspondingly better. A large proportion of my living cases are in good health and many of them undoubtedly will live out a normal expectancy.

My conclusions from this study are as follows:

1. Statistics as to the prevalence of diabetes, cures obtained and other data, based on former and inaccurate and incomplete methods of study, are untrustworthy. It is quite impossible therefore to compare with fairness results obtained by the use of the Allen method and results obtained by methods formerly in use.

2. In spite of these difficulties an extended clinical experience covering the use of all known forms of diabetic treatment justifies the conclusion that the Allen treatment is a distinct clinical advance. While permanent cures are not attained, nevertheless patients for a considerable time are much benefited.

3. It is difficult to say how much is added to the expectancy of life of the diabetic by this treatment. In young people in whom the disease is most serious it would appear that it is at least doubled. Middle-aged and elderly diabetics who are not too seriously afflicted with complications and when faithful to the treatment can probably survive the life-expectancy of the average normal individual.

4. The Allen method is of the greatest service when instituted early in the disease. Like tuberculosis and cancer, diabetes should be recognized and thoroughly treated in its incipiency. Most of the failures in its use are due either to serious complicating disease, or more frequently to unfaithfulness on the part of the patient. In the majority of cases its value is in inverse proportion to the seriousness of the failure of metabolism.

TABLE 1.—TOTAL NUMBER OF CASES OF DIABETES TREATED BY ALLEN METHOD—304.

	Cases.	Per cent.
Total:		
Adults	200	87.5
Children	38	12.5
Living	201	60.0
Adults	186	61.0
Children	15	5.0
Dead	103	34.0
Adults	80	20.0
Children	23	8.0

COMMENT. The foregoing represents only cases studied in the metabolic ward and does not include cases seen in consultation or in office practice.

TABLE 2.—SHOWING SEVERITY OF DISEASE AT BEGINNING OF TREATMENT IN 103 CASES OF DIABETES OF ALL AGES WHICH HAVE ENDED FATALLY.

Cases.	Per cent.	Severity.
11	10.5	Mild.
19	18.5	Moderately severe.
73	71.0	Severe.

COMMENT. The greatest hope and safety for the victim of diabetes depends upon the early recognition of the disease and its intelligent and faithful treatment. In this respect it resembles tuberculosis.

TABLE 3.—SHOWING SEVERITY OF DISEASE AT BEGINNING OF TREATMENT IN 80 CASES OF DIABETES IN ADULTS WHICH HAVE ENDED FATALLY

Cases.	Per cent.	Severity.
11	13.5	Mild.
19	24.0	Moderately severe.
50	62.5	Severe.

COMMENT. In this series of fatal cases in adults more than 80 per cent. were seriously ill before treatment was undertaken.

TABLE 4.—SHOWING SEVERITY OF DISEASE AT BEGINNING OF TREATMENT IN 23 CASES OF DIABETES IN CHILDREN WHICH HAVE ENDED FATALLY.

Cases.	Per cent.	Severity.
23	100	Severe.

COMMENT. Diabetes in a child rapidly becomes serious, often it is in an advanced stage before a physician is consulted.

TABLE 5.—IMMEDIATE AND CONTRIBUTING CAUSES OF DEATH IN 103 CASES OF DIABETES OF ALL AGES.

Cases.	Diseases.
71	Diabetes, no evident serious complication.
4	Pneumonia, lobar.
2	Influenza.
2	Tuberculosis, pulmonary.
1	Whooping-cough.
11	Cardiovascular renal.
5	Gangrene
3	Miscellaneous surgical diseases.
2	Cancer.
1	Syphilis.
1	General sepsis.

COMMENT. The foregoing table means that in 71 cases of fatal diabetes there were no serious complications while 32 cases were seriously afflicted with some other disease.

TABLE 6.—IMMEDIATE CAUSE OF DEATH IN 11 CASES OF DIABETES WHICH WERE MILD AT BEGINNING OF ALLEN TREATMENT.

Cases.	Disease.
3	Diabetes, treatment abandoned.
1	Gangrene.
1	General arteriosclerosis.
1	Apoplexy.
1	Pneumonia.
1	Heart.
1	Cholecystitis.
2	Surgical disease.

COMMENT. The Allen treatment of diabetes is of little avail when serious infections are present or when the patient is afflicted with the degenerative processes of old age.

TABLE 7.—IMMEDIATE CAUSES OF DEATH IN 19 CASES OF DIABETES WHICH WERE MODERATELY SEVERE AT BEGINNING OF ALLEN TREATMENT.

Cases.	Disease.
3	Diabetes, uncomplicated.
5	Diabetes, treatment abandoned.
2	Gangrene.
3	Apoplexy.
2	General arteriosclerosis.
1	Pneumonia.
1	Tuberculosis.
1	Nephritis.
1	Heart.

TABLE 8.—IMMEDIATE CAUSES OF DEATH IN 73 CASES OF DIABETES WHICH WERE SEVERE AT BEGINNING OF ALLEN TREATMENT.

Cases.	Diseases.
14	Diabetes.
46	Diabetes, treatment abandoned.
2	Gangrene.
2	Pneumonia.
2	Influenza.
1	Syphilis.
1	Heart.
1	Sepsis.
1	Tuberculosis.
2	Cancer.
1	Whooping-cough.

COMMENT. The foregoing table shows that many cases find the Allen treatment too exacting and rigorous. A very considerable proportion of those who die from pure diabetes are severe cases who wilfully violate their diets and then rapidly succumb to the malady.

TABLE 9.—SHOWING FAITHFULNESS TO ALLEN TREATMENT IN 103 CASES OF FATAL DIABETES, ALL AGES.

Cases.	Per cent.	Allen treatment.
22	21.5	Treatment had nothing to do with death.
17	16.5	Treatment abandoned after preliminary observations.
28	27.0	Treatment carried on for a very short period, then abandoned.
22	21.5	Treatment carried on for a longer period, then abandoned.
14	13.5	Treatment faithfully carried on until death.

COMMENT. It will be observed that in the above series comparatively few of the fatal cases, less than 14 per cent., were persistently faithful to the treatment. Many cases unquestionably die because of lack of courage. Cases with serious or hopeless complications frequently abdomen dietary treatment.

TABLE 10.—SHOWING FAITHFULNESS TO ALLEN TREATMENT IN 80 CASES OF FATAL DIABETES IN ADULTS.

Cases.	Per cent.	Allen treatment.
18	22.5	Treatment had nothing to do with death.
14	17.5	Treatment abandoned after preliminary observations.
19	23.8	Treatment carried on for a very short period, then abandoned.
19	23.8	Treatment carried on for a longer period, then abandoned.
10	12.5	Treatment faithfully carried on until death.

COMMENT. In many of the foregoing cases in adults death resulted because of the inability of the patients to provide suitable care. It will be noted that comparatively few were faithful to the treatment.

TABLE 11.—SHOWING FAITHFULNESS TO ALLEN TREATMENT IN 23 CASES OF FATAL DIABETES IN CHILDREN.

Cases.	Per cent.	Allen treatment.
4	17.5	Treatment had nothing to do with death.
3	13.0	Treatment abandoned after preliminary observations.
9	39.0	Treatment carried on for a very short period, then abandoned.
3	13.0	Treatment carried on for a longer period, then abandoned.
4	17.5	Treatment faithfully carried on until death.

COMMENT. Neglected diabetes is more rapidly and certainly fatal in a child than in an adult. Persistent and careful treatment imposes on the parents a task requiring much fortitude and intelligence.

TABLE 12.—SHOWING FAITHFULNESS TO ALLEN TREATMENT IN 201 LIVING CASES OF DIABETES.

Allen treatment.	Cases.	Per cent.
Abandoned after preliminary observations	9	4.5
Carried on for short period, then abandoned	9	4.5
Carried on for a longer period, then abandoned	44	21.5
Faithfully carried on up to present date	128	63.5
Unknown	11	5.0

COMMENT. There is little question but that many failures ascribed to the treatment are due to lack of faithfulness on the part of the patient.

TABLE 13.—SHOWING PRESENT CONDITION OF 89 CASES OF DIABETES TREATED BY THE ALLEN METHOD WHICH WERE MILD AT BEGINNING OF TREATMENT.

Cases.	Per cent.	Present condition.
49	55.0	Good.
6	7.0	Fair.
7	8.0	Poor.
3	3.0	Very poor.
11	12.0	Dead.
13	15.0	Unknown.

COMMENT. The majority of cases who live within their food tolerance gain in physical vigor; furthermore the distressing symptoms incident to the disease noticeably lessen.

TABLE 14.—SHOWING PRESENT CONDITION OF 67 CASES OF DIABETES TREATED BY THE ALLEN METHOD WHICH WERE MODERATELY SEVERE AT BEGINNING OF TREATMENT.

Cases.	Per cent.	Present condition.
33	49.0	Good.
7	10.5	Fair.
4	0.0	Poor.
3	4.5	Very poor.
19	28.5	Dead.
1	1.5	Unknown.

COMMENT. Moderately severe cases do surprisingly well, as evidenced by the foregoing table.

TABLE 15.—SHOWING PRESENT CONDITION OF 148 CASES OF DIABETES TREATED BY THE ALLEN METHOD WHICH WERE SEVERE AT BEGINNING OF TREATMENT.

Cases.	Per cent.	Present condition.
30	20.0	Good.
6	4.0	Fair.
18	12.0	Poor.
7	4.5	Very poor.
73	50.0	Dead.
14	9.5	Unknown.

COMMENT. Severe cases which have not been rigidly dieted are markedly benefited by the institution of the Allen treatment. Cases which have been dieted carefully for long periods do less well.

TABLE 16.—SHOWING TIME WHICH HAS ELAPSED SINCE ALLEN TREATMENT WAS BEGUN IN A SERIES OF 66 LIVING CASES WHICH WERE SEVERE AT BEGINNING OF TREATMENT.

Cases.	Per cent.	Time.
18	27.5	Less than 1 year.
11	10.5	1 to 2 years.
14	25.0	2 to 3 "
5	7.5	3 to 4 "
18	27.5	4 to 5 "

COMMENT. The time element is a most important factor in the evaluation of any treatment. The Allen method has been in use approximately five years, hence eighteen of the foregoing severe cases have been treated by the method since it was first made public. Under ordinary methods of treatment it is probable that few if any of these cases would be alive today.