

W. F. Hamilton, of several instances of lead encephalopathy in one family following the burning for fuel broken boxes in which white lead had been contained; and again, the very interesting group of cases which occurred one summer and were reported by Dr. H. B. Cushing, in which lead poisoning developed among owners of small soda water fountains. He found that they had drunk their own beverage after the carbonated water had been undisturbed for some hours in the lead container. Then there are the instances of poisoning from pickles kept in vessels lined with lead glaze; not to mention instances in which hair dye, face powder and such other resources of civilization contained the poison.

These points thus emerge as lessons from this case:

1.—The sudden appearance of paralytic manifestations as a result of stress (pulling up a runaway horse) in a man probably long a subject of lead poisoning.

2.—The unusual type of the paralysis—shoulder girdle and arm.

3.—Contamination from a water supply in use for years.

4.—Confirming of the diagnosis by "Confrontation."

5.—The light thus thrown upon the patient's previous abdominal complaints.

THE INFLUENCE OF INFECTION UPON THE REACTION OF THE DIABETIC TO INSULIN TREATMENT*

I. M. RABINOWITCH, M.D.

Montreal

THE object of this communication is to record the types of "blood sugar time curves" obtained from patients suffering from diabetes mellitus, complicated by gangrene and infection, which demonstrate the influence of the latter upon the reaction of such individuals to insulin treatment.

It is generally recognized that infection is an important factor influencing the mortality statistics of diabetes mellitus. The statistical data of this hospital, recorded briefly below, may be used to demonstrate this point.

Total number of diabetics treated from April, 1920 to April, 1924—412.

Total number of deaths, 25 or 6.06%.

Causes of death:

Coma	10 or 2.42%
Infection	9 or 2.12%
Cerebral Haemorrhage	2
Pulmonary "	2
Inanition "	2

It will be noted that infection accounted for approximately the same number of deaths as did coma. If the data are divided as obtained

from two periods—before and after the advent of insulin treatment—the influence of infection upon the mortality rate is still more strikingly demonstrated. Since insulin was first employed 196 patients have been treated for diabetes (including those with and without insulin). Amongst these the total number of deaths was 4. Thus insulin has reduced the mortality rate in this hospital to approximately two per cent. All of these four patients died of a septicaemia. In only one could there be demonstrated, from the laboratory view point, an acidosis of a sufficient degree to cause death from diabetic coma. No uncomplicated case of diabetic coma has as yet failed to respond to insulin treatment.

The "blood sugar time curves" obtained following the administration of insulin in the cases of diabetes mellitus complicated by infection presented one phenomenon in common; namely, the absence of the characteristic rapid onset and steep nature of the fall of the blood sugar. Various types of curves have been noted. In isolated instances with septicaemia and severe acidosis only the slightest changes were noted in spite of the enormous doses of insulin (100 units) administered. Thus:

*From the Department of Metabolism, Montreal General Hospital.

Hosp. No. 3938; Female aged 50. Infected gangrene of right leg—Septicaemia.

Time	Blood Sugar %	
Before administration	0.357	Insulin 100 units
1 hr. after	0.344	
2 " "	0.333	
3 " "	0.285	
4 " "	0.302	

Fever seemed to be an influencing factor in the great majority of cases. In two cases with infected gangrene the "blood sugar time curves" were obtained before and two weeks after amputation of the gangrenous extremity. The following are the data. In Case No. 4260-23 the fever persisted in spite of the amputation. In Case No. 146-24 the temperature had returned to normal. Thus:

Hosp. No. 4260-23 M., age 65. Infected gangrene of leg.

Before operation, Temp. 101°

Time	Blood Sugar %	
Before administration	0.285	Insulin 20 units
1 hr. after	0.250	
2 " "	0.251	
5 " "	0.252	

Two weeks after operation, Temp. 102.1°

Time	Blood Sugar %	
Before administration	0.285	Insulin 20 units
1 hour after	0.210	
2 " "	0.212	
3 " "	0.212	

Hosp. No. 146-24 M. Age 57. Infected Gangrene of foot.

Before operation, Temp. 102.4°

Time	Blood Sugar %	
Before administration	0.385	Insulin 20 units
1 hour after	0.332	
2 " "	0.278	
3 " "	0.277	

Two weeks after operation, Temp. 98.2°

Time	Blood Sugar %	
Before administration	0.196	Insulin 20 units
1 hour after	missed	
2 " "	0.097	
3 " "	0.036	Hypoglycaemic reaction.

It will be noted that in patient No. 146-24 following operation and in absence of fever a characteristic curve was obtained.

Though in the greatest number of cases the slow response to insulin was associated with fever, such a reaction was noted in the absence of fever, but in the presence of suppuration.

Hosp. No. 5951-23 M. Age 59. Abscess thigh. Profuse suppuration. Temp. 98.4°.

Time	Blood Sugar %	
Before administration	0.526	Insulin 60 units
1 hour after	0.500	
2 " "	0.476	
3 " "	0.500	
4 " "	0.501	

In two cases of diabetes complicated by uraemia, the curves obtained differed. In one, Hosp. No. 3531-23, death was due to uraemia (blood urea nitrogen 136 mgm. per 100 cc., creatinine 3.26 mgm.) The reaction to insulin was characteristic. At the time of death there were no laboratory data suggestive of an acidosis.

Time	Blood Sugar %	
Before administration	0.526	Insulin 50 units
1 hour after	0.357	
2 " "	0.250	
3 " "	0.220	
4 " "	0.147	

The uraemia in this patient was due, primarily, to arterio-sclerosis. In the other case Hosp. No. 6448-22 the uraemia (blood urea nitrogen 112 mgm. per 100 cc., creatinine 10.2 mgm.) was due to a bilateral pyelonephritis with marked suppuration.

Time	Blood Sugar %	
Before administration	1.001	Insulin 50 units
1 hour after	0.958	

The patient died before more data could be obtained. The reaction noted one hour after the insulin, however, differed from that of the other case of uraemia in which there was no suppuration present.

These curves obtained from diabetics, complicated by infection, at the time of admission of the patient to the hospital, were no index to prognosis. In 26 such cases including gangrene, carbuncle, abscess, etc. there were only 4 deaths. Sixteen patients were eventually able to do without insulin, dietary restriction alone sufficing. These patients apparently, prior to the complication, were mild diabetics, the pancreatic function being suddenly deranged by infection.

The object of recording these data is to demonstrate that in the presence of infection no routine course can be followed in establishing the dose of insulin. Enormous doses may be required. The amount and frequency of administration during the emergency period is best determined by the frequent (hourly if necessary) estimation of the blood sugar.

Grateful acknowledgement is tendered the Chiefs of the Medical and Surgical Services for co-operation.