DIABETES MELLITUS (hypoinsulinism) is only rarely accompanied by asthma (1), peptic ulcer (2) and rheumatic fever (3). This has suggested the hypothesis that these latter conditions are related to the physiological opposite of diabetes—hyperinsulinism (4, 5, 6, 7). The same line of reasoning has shown hyperinsulinism to be an endocrine or metabolic factor underlying the constitution of the "neurotic" (8).

The recent dramatic cures, or rather symptomatic relief, of rheumatoid arthritis by ACTH (9) and by cortisone (10) have awakened a great deal of interest in that disease. Unfortunately, the drugs are very scarce and costly and many painfully crippled victims of rheumatoid arthritis are clamoring for the relief that is beyond their grasp. These drugs are not entirely innocuous for their use has produced diabetes in some persons to whom they were administered (11). They have also induced symptoms akin to those found in Cushing's disease, such as "moon face" and "buffalo hump" (12). These untoward side reactions are due to the fact that it had not been established that the patients actually lacked the adrenal hormones and the administration of cortisone produced the same excess as is found in hyperadrenalism. ACTH has this effect by stimulating the patient's own adrenal glands to become overactive (13). Good practice dictates initial hospitalization of patients under treatment with either drug so that the proper dosage may be determined under conditions that permit close watch lest disastrous effects of overdosage occur. Furthermore, they must be given indefinitely for their withdrawal is often followed by a return of symptoms, usually much more severe than before the treatment was begun (14). They should not be used to treat persons with hypertension for they sometimes induce dangerously high blood pressures (15). They occasionally cause psychotic episodes (16). They might also mask latent infections, such as tuberculosis, because they tend to diminish febrile reactions (17). On the credit side of the ledger we may cite their successful use in treating acute rheumatic fever (18) and severe asthma (19).

Although statistics as to the concomitant occurrence of rheumatoid arthritis and diabetes are not available, there is the general impression that it is quite rare. In an experience of two decades in two busy diabetes clinics, the author fails to recall a single case of rheumatoid arthritis. On the other hand, hypertrophic arthritis, which is, in a sense, opposite to rheumatoid (atrophic) arthritis, is fairly common among diabetics, especially the elderly ones. Per contra, rheumatoid arthritis usually attacks young adults whom it continues to afflict throughout their lives. Dr. Reginald Burbank, who has treated many thousands of arthritics, has found diabetes in only six of them (20).

There is a constitutional habitus generally associated with rheumatoid arthritis. The patients are usually of the asthenic type (21). This same constitution is found among persons afflicted with allergies, rheumatic fever and peptic ulcer. As was mentioned above, these ailments have been found to be associated with hyperinsulinism. On the other hand diabetes and biliary disease are usually found in the opposite, sthenic, type. It has been noticed that rheumatoid arthritis often become symptom free if they happen to become jaundiced (22).

During pregnancy, there is a tendency toward elevation of the blood sugar level (lowered tolerance) (23). Many female arthritics have had considerable amelioration of their symptoms during gestation (24).

A low carbohydrate diet for rheumatoid arthritis has been in vogue for many years (25). This was based on the finding of rather elevated hyperglycemic responses in applying the standard two hour glucose tolerance test (26). It was assumed that the test indicated impaired glucose tolerance (but not enough to warrant the diagnosis of diabetes). However, it has since been demonstrated that lowered carbohydrate tolerance (diabetes) is best treated by restriction of fats (27, 28) and that curtailment of carbohydrate intake is indicated in hyperinsulinism (28). The dietary treatment that has been recommended has been of some help—but not for the reasons advanced. Furthermore, blanket restriction of carbohydrates, as we shall see presently, does not cover the situation completely.

All of these considerations lead to the possibility that rheumatoid arthritis might be accompanied by hyperinsulinism. If there be any merit to this hypothesis, it must be supported, not by a statistical trend, but by a complete correspondence. EVERY case must indicate, by the six hour glucose tolerance test of Harris (29), that the arthritic has hyperinsulinism as well. The rare cases of simultaneous rheumatoid arthritis and diabetes must have dysinsulinism (30). In this condition, the glucose tolerance test shows the usual diabetic response during the first two or three hours after the ingestion of the glucose and this initial period of hyperglycemia is followed by a profound drop into the hypoglycemic range. Harris believes that this rare metabolic disorder is due to a time lag in the production of insulin followed by an inordinately large secretion of the hormone. A single failure to obtain hypoglycemia in subjecting rheumatoid arthritics to the glucose tolerance test would completely demolish the theory.

This hypothesis was tested in five patients. Fortunately, the first case had diabetes as well as rheumatoid arthritis, the latter diagnosis having been made at one of New York City's leading hospitals. The six hour glucose tolerance test fulfills all the criteria for dysinsulinism (Curve A). The small figures over the segments of the graph indicate the grams of glucose excreted during the corresponding intervals. If the curve had been plotted for but two or three hours, it would have been unquestionably called a diabetic curve. However, the subsequent drop into the hypoglycemic range makes it indicative of dysinsulinism. The patient left New York City, making further observation impossible.

The second case was that of a woman of 56 who had been called a diabetic curve. She had had repeated episodes of pain.

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and limitation of motion in all her extremities. In November, 1950, she had an attack of severe pain in the middle of her neck. Her hands and feet also became much more uncomfortable than usual. Her temperature fluctuated between 99 and 100.8°. Her sedimentation rate was 48 mm in an hour. The trapezii muscles were spastic and tender. Otherwise, the only positive physical sign was tenderness in the left upper abdominal quadrant. With deeper pressure, there was some protective spasm of the left rectus abdominis. These findings have been shown by Harris to be found with hyperinsulinism (29). The tenderness and spasm are probably due to sensitivity of the tail of the pancreas where the islands of Langerhans are concentrated.

She was prescribed tablets of Empirin Compound with 2/5 grain of Codeine every four hours. She was massaged and her neck was supported by a “Foam Cloud Pillow” which is a small pillow about the size and shape of a loaf of bread. One side has a concavity into which the neck fits as the patient lies on it.

As soon as the temperature remained below 99.6° and her pain became bearable without medication, she was subjected to the six hour glucose tolerance test. The results are indicated by Graph B. Her serum calcium was 8.8 mgs per 100 cc. This tends to be somewhat low in hyperinsulinism (31).

These findings demonstrate that this patient, who had just partially recovered from an acute exacerbation of rheumatoid arthritis, also had hyperinsulinism. If one wishes to restore the beam of an unequally loaded balance to the horizontal position, one can either increase the lighter weight or diminish the heavier. By the same token, we should be able to accomplish at least some amelioration of symptoms by diminishing the output of insulin as well as we can by increasing the flow of the antagonistic adrenal hormone, either by stimulating the adrenal cortex with ACTH or by supplying exogenous cortisone. The patient was therefore prescribed Harris’s diet (modified slightly to conform with local dietary customs) to suppress the hyperinsulinism (28). She was advised to continue her habit of taking aspirin whenever her discomfort required it.

This diet is based on four principles. It is relatively high in fat which depresses the activity of the insulin apparatus (27, 28, 32, 33, 34). Carbohydrates are restricted to those slowly digested and absorbed in order to avoid stimulation of the islands of Langerhans by any marked rise in blood sugar (35). The food is taken in frequent small meals to prevent any large rise in blood sugar and to compensate for any postprandial fall in blood glucose. Caffeine is absolutely interdicted because it is a common exciting cause for hyperinsulinism (28). It induces glycogenolysis, causing the rapid rise in blood sugar we wish to avoid (36).

ON ARISING—Medium orange, half grapefruit or 4 ounces of juice.

BREAKFAST—Fruit or 4 ounces of juice; one egg with or without 2 slices of ham or bacon; only one slice of bread or toast with plenty of butter; beverage.

2 HOURS AFTER BREAKFAST—4 ounces of juice.

LUNCH—Meat, fish, cheese or eggs; salad (large serving of lettuce, tomato or Waldorf salad with mayonnaise or French dressing); only one slice of bread or toast with plenty of butter; dessert; beverage.

3 HOURS AFTER LUNCH—Glass of milk.

1 HOUR BEFORE DINNER—4 ounces of juice.

DINNER—Soup, if desired (not thickened with flour); vegetables; liberal portion of meat, fish or poultry; only one slice of bread or toast, if desired; dessert; beverage.

2-3 HOURS AFTER DINNER—Glass of milk.

EVERY 2 HOURS UNTIL BEDTIME—4 ounces of juice, fruit or a few nuts.

ALLOWABLE VEGETABLES—Asparagus, avocado, beets, broccoli, Brussel sprouts, cabbage, cauliflower, carrots, celery, corn, cucumber, egg plant, lima beans, onions, peas, radishes, sauerkraut, squash, stringbeans, tomatoes, turnips.

ALLOWABLE FRUITS—Apples, apricots, berries, grapefruit, melons, oranges, peaches, pears, pineapple, tangerines. These may be cooked or raw, with or without cream but without sugar. Canned fruits should be those packed in water (not syrup).