

Comparison of Different Methods for the Evaluation of the Oral Glucose Tolerance Test

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SUMMARY

Among 746 first degree relatives of diabetics we have performed oral glucose tolerance tests (GTT) very similar to the recommendations of the Committee on Statistics of the American Diabetes Association. The number of pathologic cases according to our method was 223 (or 29.9 per cent), according to the Wilkerson Point System 95 (or 12.7 per cent), according to the criteria of Fajans and Conn 213 (or 28.6 per cent) and after the University Group Diabetes Program 196 (or 26.3 per cent). For subgroups of different sex, age and body weight the relations were similar. The main difference between the four methods consists in a different sensitivity in finding pathologic test results. In addition the different methods of evaluation do not indicate the same subjects as being diabetic. 20 to 25 per cent of the diabetics with one method are nondiabetic with another despite the same over-all number of diabetics found. A fifth method is proposed which seems to be superior to all the other methods because the sum of those cases which are positive or negative only with this method is the lowest. According to this method a person is diabetic if the sum of the one-hour and the two-hour values of the GTT is 300 mg./100 ml. or more. Two hundred and forty-six (or 33.0 per cent) of our probands were diagnosed diabetic with this method. Only by follow-up studies will a decision be possible as to which method of evaluation of the GTT gives the best results, i.e., the lowest number of false positive and false negative cases. *DIABETES 19:870-77, November, 1970.*

Recently, the Committee on Statistics of the American Diabetes Association has recommended a set of conditions for the conduction of the oral glucose tolerance test (GTT).¹ Standardization of conditions should make possible a comparison of frequency estimations

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of diabetes in different populations or by different authors. For methods of evaluation the following are recommended: (1) The Wilkerson Point System,⁸ (2) The criteria of Fajans and Conn,²³ (3) The University Group Diabetes Program,⁵ and (4) other methods at the author's discretion. An investigation of the comparability of diagnoses made with the different criteria was recommended by the Committee.

We have performed GTTs among first degree relatives of diabetics*⁶ and have reviewed the findings in regards to the methods of evaluation mentioned above. The frequency of abnormal tests according to the three methods given is compared with one another and with the method used in our study. Since the four methods gave variable results, we attempted to find an approach which would indicate the lowest number of falsely negative and falsely positive cases in comparison to other methods. The relationships to age and body weight of the subjects were also analysed.

METHODS

An oral GTT was performed on 746 first degree relatives of diabetics from the out-patient department of our hospital. The subjects were at least thirty years old and were thought not to be diabetic. They were asked to take meals rich in carbohydrates three days before the test. The tests were started between 7 and 9 a.m. after an overnight fast. Venous blood samples were obtained before and one, two and three hours after ingestion of 75 gm. glucose. Whole blood sugar was measured by the AutoAnalyzer (Hoffmann's ferricyanide method⁴). During the tests the subjects were seated, with some slow walking permitted. Height and body

*First degree relatives are defined as parents, siblings, and offspring of the probands.

weight were measured in all subjects. The ideal body weight and the relative overweight were calculated according to the values of the Society of Actuaries.⁷ The data were placed on punch cards and calculations made with an Algol program by the IBM Computer 7040.

Evaluation of the glucose tolerance test

A diagnosis of a diabetic glucose tolerance curve was made if the one-hour value exceeded 200 mg./100 ml. or the two-hour value exceeded 150 mg./100 ml. These criteria will be called *Method I*. For comparison we now used the following four methods:

Method II—The Wilkerson Point System.

A fasting value above 110 mg./100 ml. equals one point;

A one-hour value above 170 mg./100 ml. equals one-half point;

A two-hour value above 120 mg./100 ml. equals one-half point;

A three-hour value above 110 mg./100 ml. equals one point;

Two points or more indicate diabetes.

Method III—The criteria of Fajans and Conn. The diagnosis of diabetes is made if the one-hour value exceeds 160 mg./100 ml. and the two-hour value exceeds 120 mg./100 ml.

Method IV—The criteria of the University Group Diabetes Program. The fasting, one, two and three-hour glucose levels are added together. If the sum is 500 or more the diagnosis of diabetes is made.

Method V—From several other approaches tested in a computer program a method was selected which had the least differences in relation to all other methods. By this method the diagnosis of diabetes is made if the sum of the one-hour and the two-hour levels is 300 mg./100 ml. or more.

RESULTS

According to our criteria (Method I), of the 746 subjects a diabetic glucose tolerance test was found in 223, or 29.9 per cent.

The corresponding figures for the other methods were: Method II (Wilkerson Point System): 95, or 12.7 per cent.

Method III (Fajans and Conn): 213, or 28.6 per cent.

Method IV (University Group Diabetes Program): 196, or 26.3 per cent.

Method V (computer method): 246, or 33.0 per cent.

In the 346 male subjects the values were:

I 127, or 36.7 per cent.

II 46, or 13.3 per cent.

III 109, or 31.5 per cent.

IV 104, or 30.1 per cent.

V 134, or 38.7 per cent.

In the 400 female subjects the values were:

I 96, or 24.0 per cent.

II 49, or 12.3 per cent.

III 104, or 26.0 per cent.

IV 92, or 23.0 per cent.

V 112, or 28.0 per cent.

With Methods I, IV and V there was a significantly greater frequency in the men (I: $p < 0.01$, IV and V: $p < 0.05$) than in the women, but the difference between the sexes was not significant with Methods II and III.

Two hundred and seventy-six subjects (or 37.0 per cent) were diabetic according to at least one method but only 89 (or 11.9 per cent) had diabetes according to all four methods. Although the over-all frequency with Methods I, III and IV was nearly the same, there were great discrepancies regarding the positive results in the single case, that is, different subjects were diagnosed as diabetic by the three methods.

In table 1 are demonstrated these discrepancies. In the table for each method the number of positive cases are given which are negative according to the other four methods.

To check the validity of the methods of evaluation the number of cases were determined which were dia-

TABLE 1
Discrepancies among five methods of evaluation of the GTT

| | Diabetics | | of the diabetics nondiabetic according to | | | |
|------------|-----------|-------------------------|---|---------------------------|--------------------------|-------------------------|
| | n | Method I n(per cent) | Method II n(per cent) | Method III n(per cent) | Method IV n(per cent) | Method V n(per cent) |
| Method I | 223 | — | 134 60.1 | 55 24.6 | 42 18.8 | 16 7.2 |
| Method II | 95 | 6 6.3 | — | 1 1.1 | 1 1.1 | 0 |
| Method III | 213 | 45 21.1 | 119 55.9 | — | 41 19.2 | 12 5.6 |
| Method IV | 196 | 15 7.7 | 102 52.0 | 24 12.2 | — | 3 1.5 |
| Method V | 246 | 39 15.5 | 154 62.7 | 45 18.3 | 53 21.5 | — |

COMPARISON OF DIFFERENT METHODS FOR THE EVALUATION OF THE ORAL GLUCOSE TOLERANCE TEST

TABLE 2
Number of cases which are

| | diabetic only according to this method | not diabetic according to this method but according to one of the others |
|------------|--|--|
| Method I | 15 | 181 |
| Method II | 0 | 53 |
| Method III | 12 | 63 |
| Method IV | 2 | 80 |
| Method V | 5 | 30 |

betic only according to one method. This number was compared with the number of cases which were not diabetic by this method but diabetic by at least one of the other methods (table 2).

An increasing frequency of diabetes with increasing age and increasing overweight of the subjects was seen with all methods (figures 1 and 2). Also, the different age curves for males and females described by us⁶ can be seen with all methods.

Details about the 276 cases, who showed a pathologic glucose tolerance according to at least one method of evaluation are given in the appendix.

DISCUSSION

The Committee on Statistics of the American Dia-

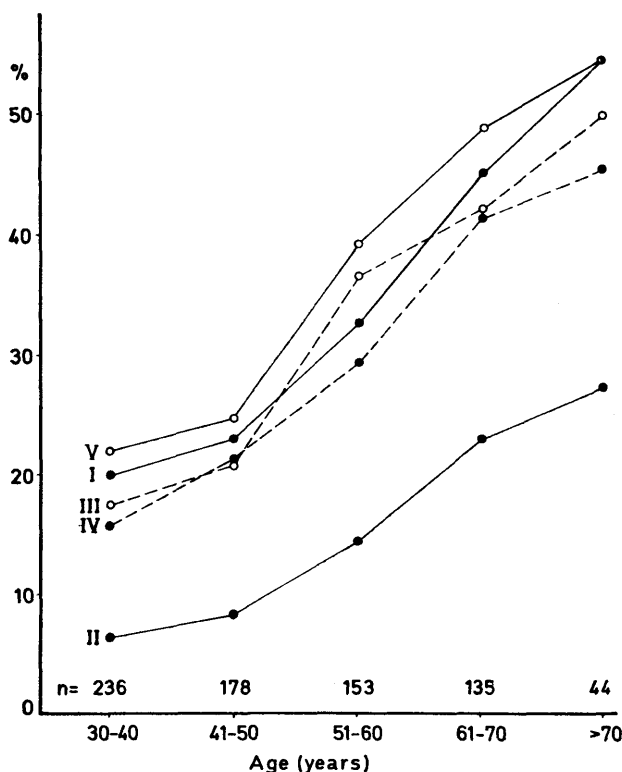


FIG. 1. Frequency of diabetic GTTs among first degree relatives of diabetics in correlation to age according to five different methods.

betes Association stated that research was needed for evaluation of the glucose tolerance test.¹ They recommended a study in which the diagnoses would be made for comparison by different methods of evaluation. It is in this line that we have conducted our study.

The oral GTTs were performed by us in all ways as recommended by the Committee on Statistics of the American Diabetes Association: carbohydrate rich meals three days before the test; overnight fasting; starting the test between 7 and 9 a.m.; four venous blood specimens at hourly intervals; avoidance of physical exertion or emotional stress during the test; glucose determination on whole blood by the AutoAnalyzer (Hoffmann's ferricyanide method). Our only difference was to give a constant glucose load of 75 gm. compared to the recommended 40 gm. per square meter of body surface. For investigation of a greater number of people a variable glucose load is not practicable. When a constant glucose load is to be used, a dose between 50 and 100 gm. is recommended.

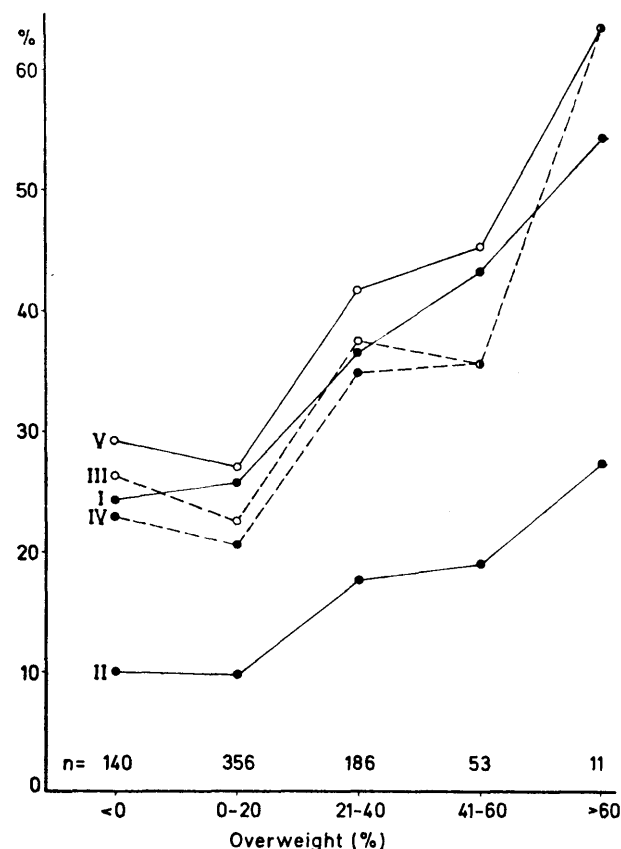


FIG. 2. Frequency of diabetic GTTs among first degree relatives of diabetics in correlation to the relative weight according to five different methods.

All the present subjects were first degree relatives of diabetics. As a result, the percentage of pathologic test results was higher than would be expected among an unbiased population sample. There is no reason to assume that the frequency shift would be different for the different methods of evaluation.

Comparing the frequency of diabetic tests according to the five methods we find about the same percentage of diabetes with our own methods (I and V), with the method of Fajans and Conn and the University Group Diabetes Program. The different prevalence found with the Wilkerson Point System is highly significant, however. The relative distribution in different subgroups, males and females, different age groups and different groups of body weight, was similar with all methods used. Therefore the five methods of evaluation differ mainly in their sensitivity in indicating pathologic cases.

In our opinion the more predominant evaluation of the fasting level and the three-hour level by Method II is of no advantage. Of the subjects found to be diabetic by this method many apparently already have manifest diabetes. On the other hand not all cases of subclinical diabetes will be detected. A further disadvantage of this method (as well as of Method IV) is the necessity of having all four blood glucose values in order to make the diagnosis. For a diagnosis according to Methods I, III and V only two blood glucose values (after one and two hours) are necessary.

We diagnosed diabetes if the blood glucose level was either above 200 mg./100 ml. at one hour or above 150 mg./100 ml. at two hours (Method I). After Fajans and Conn (Method III) two conditions must be fulfilled simultaneously but the limits are 40 and 30 mg./100 ml. lower. The limit is intermediate with Method V but both levels are of equal diagnostic value since the sum is decisive.

Of great interest were the discrepancies between the different methods regarding the positive result in the single case. 24.6 per cent of the cases diagnosed as diabetics according to Method I were nondiabetic according to Method III, while 21.1 per cent of the cases indicated as diabetics according to Method III were nondiabetic according to Method I. This resulted in a similar percentage of diabetics in the whole group, but the same subjects were not always called diabetic. The same holds true for the comparison with Method IV

(see table 1). These results demonstrate the weakness of all methods of evaluation used to date.

Method V also has discrepancies in comparison to the other methods, but the discrepancies are not as great as those among the other methods. This can be seen especially well from table 2. For Methods I, II, III and IV it can be stated that there is an inverse relationship between the left and right numbers of the table. But although the number of negative cases is the lowest by Method V, only five cases are diabetic by this method alone. Thus the sum of those cases which are positive or negative only with one method is lowest for Method V. In our opinion this simple method for evaluation can be recommended for further investigation.

Only by repetition of the tests after some years will one see whether a higher sensitivity is an advantage or if it only increases the number of "false positive" cases. One then may decide which of the methods gives the most reliable forecast as to the development of manifest diabetes. Up to now all criteria are arbitrary.

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COMPARISON OF DIFFERENT METHODS FOR THE EVALUATION OF THE ORAL GLUCOSE TOLERANCE TEST

APPENDIX—Comparison of different methods for the evaluation of the oral glucose tolerance test

| Number | Sex* | Age (yrs.) | Per cent overweight | Blood sugar mg./100 ml. | | | | Diagnosis† Method | | | | |
|--------|------|------------|---------------------|-------------------------|-------|-------|-------|-------------------|----|-----|----|---|
| | | | | Fasting | 1-hr. | 2-hr. | 3-hr. | I | II | III | IV | V |
| 1 | 2 | 44 | 18 | 104 | 248 | 116 | 108 | 1 | 0 | 0 | 1 | 1 |
| 9 | 2 | 50 | 10 | 104 | 200 | 88 | 86 | 1 | 0 | 0 | 0 | 0 |
| 14 | 2 | 33 | 20 | 116 | 210 | 206 | 154 | 1 | 1 | 1 | 1 | 1 |
| 15 | 1 | 68 | 14 | 120 | 208 | 124 | 68 | 1 | 1 | 1 | 1 | 1 |
| 16 | 1 | 45 | 14 | 92 | 246 | 206 | 54 | 1 | 0 | 1 | 1 | 1 |
| 21 | 1 | 51 | 9 | 80 | 210 | 82 | 56 | 1 | 0 | 0 | 0 | 0 |
| 24 | 1 | 77 | -11 | 104 | 172 | 172 | 108 | 1 | 0 | 1 | 1 | 1 |
| 26 | 1 | 47 | 39 | 88 | 210 | 184 | 102 | 1 | 0 | 1 | 1 | 1 |
| 27 | 1 | 30 | 7 | 104 | 176 | 138 | 76 | 0 | 0 | 1 | 0 | 1 |
| 31 | 2 | 71 | 31 | 292 | 456 | 480 | 396 | 1 | 1 | 1 | 1 | 1 |
| 32 | 1 | 60 | 21 | 102 | 264 | 86 | 56 | 1 | 0 | 0 | 1 | 1 |
| 33 | 2 | 55 | 71 | 88 | 222 | 123 | 70 | 1 | 0 | 1 | 1 | 1 |
| 38 | 1 | 72 | -9 | 142 | 240 | 204 | 170 | 1 | 1 | 1 | 1 | 1 |
| 40 | 1 | 67 | 3 | 104 | 242 | 140 | 56 | 1 | 0 | 1 | 1 | 1 |
| 41 | 2 | 62 | -2 | 120 | 248 | 172 | 68 | 1 | 1 | 1 | 1 | 1 |
| 44 | 2 | 65 | 24 | 128 | 168 | 128 | 68 | 0 | 0 | 1 | 0 | 0 |
| 55 | 1 | 76 | -4 | 112 | 180 | 196 | 172 | 1 | 1 | 1 | 1 | 1 |
| 56 | 1 | 46 | 14 | 116 | 216 | 180 | 104 | 1 | 1 | 1 | 1 | 1 |
| 57 | 1 | 42 | -1 | 114 | 178 | 180 | 84 | 1 | 1 | 1 | 1 | 1 |
| 59 | 2 | 74 | 13 | 82 | 176 | 140 | 70 | 0 | 0 | 1 | 0 | 1 |
| 60 | 2 | 50 | 34 | 84 | 162 | 128 | 82 | 0 | 0 | 1 | 0 | 0 |
| 61 | 1 | 43 | 29 | 108 | 234 | 118 | 68 | 1 | 0 | 0 | 1 | 1 |
| 62 | 1 | 67 | 8 | 102 | 206 | 80 | 70 | 1 | 0 | 0 | 0 | 0 |
| 63 | 1 | 61 | 20 | 136 | 330 | 270 | 152 | 1 | 1 | 1 | 1 | 1 |
| 72 | 2 | 64 | 10 | 118 | 262 | 240 | 120 | 1 | 1 | 1 | 1 | 1 |
| 73 | 2 | 61 | 39 | 102 | 160 | 144 | 78 | 0 | 0 | 1 | 0 | 1 |
| 74 | 2 | 58 | 14 | 100 | 180 | 152 | 112 | 1 | 1 | 1 | 1 | 1 |
| 79 | 1 | 65 | 20 | 100 | 200 | 84 | 60 | 1 | 0 | 0 | 0 | 0 |
| 82 | 1 | 41 | 29 | 112 | 160 | 144 | 116 | 0 | 1 | 1 | 1 | 1 |
| 88 | 1 | 60 | 9 | 176 | 354 | 304 | 216 | 1 | 1 | 1 | 1 | 1 |
| 91 | 2 | 60 | -7 | 224 | 396 | 398 | 314 | 1 | 1 | 1 | 1 | 1 |
| 93 | 1 | 67 | 21 | 106 | 202 | 156 | 100 | 1 | 0 | 1 | 1 | 1 |
| 95 | 1 | 33 | 29 | 102 | 214 | 102 | 72 | 1 | 0 | 0 | 0 | 1 |
| 96 | 1 | 47 | 7 | 184 | 340 | 224 | 104 | 1 | 1 | 1 | 1 | 1 |
| 97 | 2 | 45 | 10 | 106 | 210 | 82 | 68 | 1 | 0 | 0 | 0 | 0 |
| 98 | 2 | 55 | 20 | 120 | 204 | 156 | 100 | 1 | 1 | 1 | 1 | 1 |
| 99 | 1 | 52 | 4 | 110 | 200 | 102 | 82 | 1 | 0 | 0 | 0 | 1 |
| 102 | 1 | 59 | 16 | 128 | 188 | 112 | 88 | 0 | 0 | 0 | 1 | 1 |
| 104 | 1 | 38 | 17 | 100 | 210 | 112 | 88 | 1 | 0 | 0 | 1 | 1 |
| 108 | 2 | 59 | 11 | 98 | 208 | 84 | 72 | 1 | 0 | 0 | 0 | 0 |
| 114 | 2 | 73 | 15 | 146 | 352 | 352 | 228 | 1 | 1 | 1 | 1 | 1 |
| 117 | 2 | 62 | 47 | 108 | 212 | 216 | 160 | 1 | 1 | 1 | 1 | 1 |
| 118 | 1 | 58 | 1 | 228 | 412 | 392 | 348 | 1 | 1 | 1 | 1 | 1 |
| 120 | 1 | 43 | 41 | 106 | 204 | 124 | 82 | 1 | 0 | 1 | 1 | 1 |
| 121 | 1 | 34 | 34 | 142 | 276 | 228 | 160 | 1 | 1 | 1 | 1 | 1 |
| 122 | 2 | 50 | 28 | 114 | 246 | 194 | 116 | 1 | 1 | 1 | 1 | 1 |
| 128 | 1 | 42 | 19 | 104 | 202 | 100 | 78 | 1 | 0 | 0 | 0 | 1 |
| 129 | 1 | 33 | 30 | 114 | 184 | 164 | 96 | 1 | 1 | 1 | 1 | 1 |
| 134 | 1 | 29 | 56 | 100 | 164 | 164 | 118 | 1 | 0 | 1 | 1 | 1 |
| 135 | 1 | 33 | 30 | 108 | 264 | 210 | 144 | 1 | 1 | 1 | 1 | 1 |
| 136 | 2 | 36 | 38 | 92 | 186 | 138 | 74 | 0 | 0 | 1 | 0 | 1 |
| 137 | 2 | 65 | 41 | 110 | 250 | 188 | 102 | 1 | 1 | 1 | 1 | 1 |
| 138 | 2 | 53 | 39 | 96 | 224 | 162 | 98 | 1 | 0 | 1 | 1 | 1 |
| 139 | 2 | 58 | 53 | 112 | 284 | 154 | 110 | 1 | 1 | 1 | 1 | 1 |
| 140 | 2 | 58 | 91 | 88 | 210 | 158 | 100 | 1 | 0 | 1 | 1 | 1 |
| 141 | 1 | 59 | 31 | 104 | 250 | 174 | 110 | 1 | 1 | 1 | 1 | 1 |
| 142 | 2 | 65 | 30 | 122 | 248 | 212 | 112 | 1 | 1 | 1 | 1 | 1 |
| 143 | 1 | 68 | 41 | 92 | 192 | 156 | 66 | 1 | 0 | 1 | 1 | 1 |
| 144 | 1 | 68 | 33 | 104 | 222 | 206 | 108 | 1 | 0 | 1 | 1 | 1 |
| 145 | 1 | 29 | 9 | 90 | 214 | 140 | 90 | 1 | 0 | 1 | 1 | 1 |
| 146 | 1 | 54 | -2 | 110 | 232 | 256 | 52 | 1 | 1 | 1 | 1 | 1 |
| 147 | 2 | 64 | 3 | 90 | 260 | 196 | 158 | 1 | 1 | 1 | 1 | 1 |
| 148 | 2 | 33 | 9 | 102 | 182 | 166 | 122 | 1 | 1 | 1 | 1 | 1 |
| 149 | 1 | 60 | 7 | 112 | 228 | 132 | 76 | 1 | 1 | 1 | 1 | 1 |
| 150 | 2 | 36 | -7 | 98 | 174 | 148 | 84 | 0 | 0 | 1 | 1 | 1 |
| 151 | 2 | 64 | 9 | 94 | 248 | 212 | 112 | 1 | 1 | 1 | 1 | 1 |
| 152 | 2 | 52 | 6 | 70 | 204 | 154 | 70 | 1 | 0 | 1 | 0 | 1 |
| 153 | 1 | 75 | 9 | 96 | 226 | 178 | 86 | 1 | 0 | 1 | 1 | 1 |
| 154 | 1 | 33 | 7 | 132 | 188 | 152 | 112 | 1 | 1 | 1 | 1 | 1 |

*Male = 1, female = 2.

† Nondiabetic = 0, diabetic = 1.

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APPENDIX—Comparison of different methods for the evaluation of the oral glucose tolerance test—(continued)

| Number | Sex* | Age (yrs.) | Per cent overweight | Blood sugar mg./100 ml. | | | | Diagnosis† Method | | | | |
|--------|------|------------|---------------------|-------------------------|-------|-------|-------|-------------------|----|-----|----|---|
| | | | | Fasting | 1-hr. | 2-hr. | 3-hr. | I | II | III | IV | V |
| 155 | 2 | 60 | —3 | 104 | 164 | 232 | 124 | 1 | 0 | 1 | 1 | 1 |
| 177 | 1 | 82 | 21 | 96 | 164 | 134 | 68 | 0 | 0 | 1 | 0 | 0 |
| 181 | 2 | 72 | 11 | 108 | 238 | 176 | 72 | 1 | 0 | 1 | 1 | 1 |
| 182 | 1 | 75 | 17 | 98 | 216 | 124 | 50 | 1 | 0 | 1 | 0 | 1 |
| 187 | 2 | 55 | 27 | 122 | 258 | 112 | 86 | 1 | 0 | 0 | 1 | 1 |
| 188 | 1 | 33 | —19 | 108 | 204 | 148 | 72 | 1 | 0 | 1 | 1 | 1 |
| 190 | 1 | 57 | —3 | 108 | 202 | 140 | 88 | 1 | 0 | 1 | 1 | 1 |
| 193 | 1 | 45 | 20 | 82 | 168 | 128 | 76 | 0 | 0 | 1 | 0 | 0 |
| 194 | 1 | 34 | 13 | 96 | 236 | 104 | 76 | 1 | 0 | 0 | 1 | 1 |
| 199 | 2 | 44 | 34 | 104 | 218 | 120 | 66 | 1 | 0 | 1 | 1 | 1 |
| 200 | 1 | 46 | 34 | 106 | 210 | 100 | 80 | 1 | 0 | 0 | 0 | 1 |
| 203 | 2 | 49 | 27 | 100 | 218 | 182 | 120 | 1 | 1 | 1 | 1 | 1 |
| 206 | 1 | 39 | 9 | 100 | 192 | 114 | 80 | 0 | 0 | 0 | 0 | 1 |
| 207 | 2 | 72 | 23 | 114 | 206 | 110 | 78 | 1 | 0 | 0 | 1 | 1 |
| 208 | 2 | 67 | 47 | 106 | 156 | 158 | 106 | 1 | 0 | 0 | 1 | 1 |
| 210 | 2 | 67 | —20 | 128 | 276 | 136 | 80 | 1 | 1 | 1 | 1 | 1 |
| 211 | 1 | 64 | 8 | 100 | 188 | 120 | 76 | 0 | 0 | 1 | 0 | 1 |
| 213 | 1 | 56 | —1 | 80 | 176 | 130 | 60 | 0 | 0 | 1 | 0 | 1 |
| 214 | 1 | 54 | 1 | 96 | 192 | 116 | 60 | 0 | 0 | 0 | 0 | 1 |
| 217 | 2 | 45 | 22 | 102 | 192 | 156 | 84 | 1 | 0 | 1 | 1 | 1 |
| 218 | 1 | 43 | 2 | 110 | 222 | 86 | 70 | 1 | 0 | 0 | 0 | 1 |
| 220 | 1 | 33 | 43 | 122 | 236 | 130 | 96 | 1 | 1 | 1 | 1 | 1 |
| 222 | 1 | 41 | 50 | 94 | 228 | 118 | 80 | 1 | 0 | 0 | 1 | 1 |
| 223 | 1 | 35 | 48 | 106 | 214 | 96 | 90 | 1 | 0 | 0 | 1 | 1 |
| 224 | 1 | 63 | 11 | 120 | 204 | 136 | 110 | 1 | 1 | 1 | 1 | 1 |
| 226 | 1 | 45 | —4 | 102 | 242 | 70 | 70 | 1 | 0 | 0 | 0 | 1 |
| 228 | 1 | 43 | 29 | 108 | 234 | 118 | 68 | 1 | 0 | 0 | 1 | 1 |
| 229 | 2 | 50 | 34 | 84 | 162 | 128 | 82 | 0 | 0 | 1 | 0 | 0 |
| 230 | 1 | 71 | 13 | 82 | 208 | 100 | 60 | 1 | 0 | 0 | 0 | 1 |
| 234 | 2 | 42 | 27 | 116 | 226 | 140 | 112 | 1 | 1 | 1 | 1 | 1 |
| 235 | 1 | 37 | 20 | 86 | 216 | 52 | 64 | 1 | 0 | 0 | 0 | 0 |
| 237 | 1 | 38 | 8 | 90 | 232 | 70 | 68 | 1 | 0 | 0 | 0 | 1 |
| 238 | 2 | 80 | —3 | 130 | 248 | 236 | 122 | 1 | 1 | 1 | 1 | 1 |
| 241 | 2 | 67 | 25 | 102 | 152 | 154 | 98 | 1 | 0 | 0 | 1 | 1 |
| 242 | 2 | 58 | 14 | 108 | 186 | 134 | 90 | 0 | 0 | 1 | 1 | 1 |
| 243 | 1 | 34 | 21 | 92 | 210 | 128 | 76 | 1 | 0 | 1 | 1 | 1 |
| 244 | 1 | 44 | 11 | 100 | 210 | 120 | 78 | 1 | 0 | 1 | 1 | 1 |
| 247 | 2 | 70 | 7 | 80 | 144 | 172 | 188 | 1 | 0 | 0 | 1 | 1 |
| 248 | 2 | 56 | 35 | 104 | 180 | 132 | 68 | 0 | 0 | 1 | 0 | 1 |
| 249 | 2 | 47 | 28 | 90 | 228 | 146 | 64 | 1 | 0 | 1 | 1 | 1 |
| 250 | 2 | 54 | 9 | 100 | 242 | 224 | 92 | 1 | 0 | 1 | 1 | 1 |
| 251 | 1 | 62 | 8 | 96 | 212 | 128 | 78 | 1 | 0 | 1 | 1 | 1 |
| 252 | 1 | 41 | 12 | 136 | 268 | 280 | 212 | 1 | 1 | 1 | 1 | 1 |
| 254 | 2 | 63 | 18 | 120 | 256 | 208 | 110 | 1 | 1 | 1 | 1 | 1 |
| 255 | 1 | 59 | 22 | 118 | 280 | 220 | 140 | 1 | 1 | 1 | 1 | 1 |
| 256 | 2 | 61 | —5 | 94 | 226 | 170 | 104 | 1 | 0 | 1 | 1 | 1 |
| 261 | 2 | 51 | 31 | 96 | 208 | 142 | 82 | 1 | 0 | 1 | 1 | 1 |
| 262 | 2 | 44 | 36 | 96 | 164 | 140 | 84 | 0 | 0 | 1 | 0 | 1 |
| 263 | 2 | 59 | 36 | 70 | 186 | 166 | 66 | 1 | 0 | 1 | 0 | 1 |
| 264 | 2 | 59 | 34 | 100 | 210 | 148 | 76 | 1 | 0 | 1 | 1 | 1 |
| 265 | 1 | 40 | 38 | 92 | 248 | 148 | 88 | 1 | 0 | 1 | 1 | 1 |
| 266 | 2 | 59 | 37 | 136 | 222 | 238 | 126 | 1 | 1 | 1 | 1 | 1 |
| 267 | 1 | 59 | 35 | 116 | 224 | 160 | 90 | 1 | 1 | 1 | 1 | 1 |
| 268 | 1 | 35 | 7 | 92 | 168 | 180 | 116 | 1 | 0 | 1 | 1 | 1 |
| 269 | 1 | 65 | 3 | 88 | 174 | 150 | 70 | 1 | 0 | 1 | 0 | 1 |
| 270 | 2 | 61 | —4 | 96 | 226 | 134 | 96 | 1 | 0 | 1 | 1 | 1 |
| 271 | 2 | 33 | —7 | 100 | 174 | 130 | 82 | 0 | 0 | 1 | 0 | 1 |
| 272 | 1 | 53 | —5 | 88 | 210 | 160 | 76 | 1 | 0 | 1 | 1 | 1 |
| 286 | 1 | 35 | 11 | 88 | 206 | 134 | 92 | 1 | 0 | 1 | 1 | 1 |
| 288 | 2 | 51 | 4 | 104 | 250 | 100 | 50 | 1 | 0 | 0 | 1 | 1 |
| 290 | 1 | 52 | 15 | 134 | 284 | 234 | 172 | 1 | 1 | 1 | 1 | 1 |
| 292 | 2 | 56 | 17 | 100 | 184 | 146 | 100 | 0 | 0 | 1 | 1 | 1 |
| 295 | 2 | 60 | 29 | 96 | 166 | 154 | 126 | 1 | 0 | 1 | 1 | 1 |
| 298 | 2 | 39 | 55 | 72 | 204 | 62 | 50 | 1 | 0 | 0 | 0 | 0 |
| 302 | 2 | 31 | 130 | 96 | 160 | 160 | 138 | 1 | 0 | 1 | 1 | 1 |
| 304 | 2 | 52 | 59 | 90 | 190 | 116 | 64 | 0 | 0 | 0 | 0 | 1 |
| 305 | 2 | 69 | 24 | 240 | 314 | 410 | 310 | 1 | 1 | 1 | 1 | 1 |
| 306 | 2 | 64 | 22 | 206 | 412 | 418 | 306 | 1 | 1 | 1 | 1 | 1 |
| 307 | 2 | 55 | 31 | 104 | 228 | 176 | 116 | 1 | 1 | 1 | 1 | 1 |

*Male = 1, female = 2.

† Nondiabetic = 0, diabetic = 1.

COMPARISON OF DIFFERENT METHODS FOR THE EVALUATION OF THE ORAL GLUCOSE TOLERANCE TEST

APPENDIX—Comparison of different methods for the evaluation of the oral glucose tolerance test—(continued)

| Number | Sex* | Age (yrs.) | Per cent overweight | Blood sugar mg./100 ml. | | | | Diagnosis† Method | | | | |
|--------|------|------------|---------------------|-------------------------|-------|-------|-------|-------------------|----|-----|----|---|
| | | | | Fasting | 1-hr. | 2-hr. | 3-hr. | I | II | III | IV | V |
| 309 | 2 | 68 | 9 | 110 | 212 | 202 | 120 | 1 | 1 | 1 | 1 | 1 |
| 310 | 1 | 56 | 16 | 96 | 194 | 120 | 82 | 0 | 0 | 1 | 0 | 1 |
| 316 | 1 | 71 | —30 | 122 | 232 | 318 | 148 | 1 | 1 | 1 | 1 | 1 |
| 317 | 2 | 63 | 29 | 80 | 216 | 202 | 104 | 1 | 0 | 1 | 1 | 1 |
| 319 | 2 | 68 | —22 | 96 | 188 | 206 | 96 | 1 | 0 | 1 | 1 | 1 |
| 320 | 1 | 65 | —16 | 116 | 222 | 226 | 132 | 1 | 1 | 1 | 1 | 1 |
| 322 | 2 | 54 | —2 | 98 | 180 | 144 | 68 | 0 | 0 | 1 | 0 | 1 |
| 324 | 1 | 66 | 73 | 110 | 182 | 190 | 108 | 1 | 1 | 1 | 1 | 1 |
| 325 | 1 | 46 | 20 | 120 | 252 | 204 | 144 | 1 | 1 | 1 | 1 | 1 |
| 327 | 2 | 74 | —10 | 70 | 182 | 188 | 92 | 1 | 0 | 1 | 1 | 1 |
| 328 | 1 | 63 | 12 | 96 | 196 | 200 | 110 | 1 | 1 | 1 | 1 | 1 |
| 331 | 2 | 39 | 37 | 104 | 210 | 130 | 72 | 1 | 0 | 1 | 1 | 1 |
| 336 | 2 | 62 | 8 | 92 | 170 | 134 | 88 | 0 | 0 | 1 | 0 | 1 |
| 344 | 1 | 37 | 42 | 104 | 206 | 156 | 86 | 1 | 0 | 1 | 1 | 1 |
| 345 | 1 | 30 | 60 | 114 | 224 | 134 | 100 | 1 | 1 | 1 | 1 | 1 |
| 346 | 1 | 31 | 4 | 88 | 260 | 200 | 106 | 1 | 0 | 1 | 1 | 1 |
| 347 | 1 | 70 | —4 | 96 | 296 | 122 | 64 | 1 | 0 | 1 | 1 | 1 |
| 348 | 1 | 67 | 14 | 88 | 244 | 96 | 86 | 1 | 0 | 0 | 1 | 1 |
| 349 | 2 | 67 | 21 | 100 | 222 | 122 | 76 | 1 | 0 | 1 | 1 | 1 |
| 355 | 1 | 59 | —21 | 92 | 184 | 128 | 44 | 0 | 0 | 1 | 0 | 1 |
| 357 | 1 | 69 | —2 | 100 | 232 | 166 | 76 | 1 | 0 | 1 | 1 | 1 |
| 358 | 2 | 48 | 23 | 120 | 148 | 116 | 116 | 0 | 1 | 0 | 1 | 0 |
| 361 | 1 | 39 | —5 | 96 | 176 | 140 | 88 | 0 | 0 | 1 | 1 | 1 |
| 364 | 2 | 46 | 26 | 104 | 220 | 204 | 94 | 1 | 0 | 1 | 1 | 1 |
| 370 | 1 | 64 | —3 | 94 | 222 | 116 | 76 | 1 | 0 | 0 | 1 | 1 |
| 371 | 1 | 68 | 29 | 244 | 376 | 386 | 332 | 1 | 1 | 1 | 1 | 1 |
| 372 | 2 | 64 | 19 | 104 | 196 | 142 | 72 | 0 | 0 | 1 | 1 | 1 |
| 373 | 1 | 37 | 49 | 108 | 200 | 102 | 82 | 1 | 0 | 0 | 0 | 1 |
| 374 | 1 | 27 | 39 | 92 | 200 | 128 | 80 | 1 | 0 | 1 | 1 | 1 |
| 378 | 1 | 30 | 19 | 108 | 160 | 138 | 72 | 0 | 0 | 1 | 0 | 0 |
| 384 | 1 | 33 | 29 | 102 | 214 | 102 | 72 | 1 | 0 | 0 | 0 | 1 |
| 385 | 1 | 59 | 6 | 92 | 200 | 60 | 64 | 1 | 0 | 0 | 0 | 0 |
| 387 | 2 | 55 | —4 | 108 | 252 | 164 | 120 | 1 | 1 | 1 | 1 | 1 |
| 389 | 2 | 63 | 26 | 96 | 158 | 148 | 92 | 0 | 0 | 0 | 0 | 1 |
| 390 | 1 | 57 | 38 | 110 | 220 | 96 | 76 | 1 | 0 | 0 | 1 | 1 |
| 391 | 2 | 48 | 27 | 100 | 216 | 156 | 100 | 1 | 0 | 1 | 1 | 1 |
| 395 | 1 | 41 | 15 | 100 | 182 | 170 | 86 | 1 | 0 | 1 | 1 | 1 |
| 396 | 1 | 31 | 7 | 80 | 160 | 126 | 70 | 0 | 0 | 1 | 0 | 0 |
| 397 | 1 | 31 | 40 | 112 | 266 | 152 | 96 | 1 | 1 | 1 | 1 | 1 |
| 400 | 2 | 57 | —5 | 94 | 220 | 124 | 50 | 1 | 0 | 1 | 0 | 1 |
| 401 | 2 | 55 | 10 | 108 | 254 | 180 | 120 | 1 | 1 | 1 | 1 | 1 |
| 402 | 2 | 49 | 31 | 120 | 212 | 120 | 76 | 1 | 1 | 1 | 1 | 1 |
| 403 | 2 | 41 | 7 | 148 | 286 | 268 | 176 | 1 | 1 | 1 | 1 | 1 |
| 405 | 1 | 55 | 6 | 86 | 204 | 132 | 86 | 1 | 0 | 1 | 1 | 1 |
| 413 | 1 | 39 | 14 | 88 | 248 | 88 | 64 | 1 | 0 | 0 | 0 | 1 |
| 414 | 1 | 36 | 19 | 100 | 206 | 60 | 78 | 1 | 0 | 0 | 0 | 0 |
| 420 | 1 | 55 | 46 | 156 | 248 | 312 | 236 | 1 | 1 | 1 | 1 | 1 |
| 421 | 2 | 46 | 50 | 120 | 200 | 100 | 64 | 1 | 0 | 0 | 0 | 1 |
| 427 | 2 | 60 | 40 | 94 | 172 | 156 | 84 | 1 | 0 | 1 | 1 | 1 |
| 428 | 1 | 56 | 11 | 78 | 226 | 188 | 94 | 1 | 0 | 1 | 1 | 1 |
| 430 | 2 | 48 | 61 | 100 | 166 | 158 | 94 | 1 | 0 | 1 | 1 | 1 |
| 434 | 2 | 37 | 121 | 120 | 196 | 136 | 104 | 0 | 1 | 1 | 1 | 1 |
| 439 | 1 | 77 | —3 | 100 | 200 | 122 | 66 | 1 | 0 | 1 | 0 | 1 |
| 440 | 2 | 71 | —9 | 140 | 262 | 270 | 160 | 1 | 1 | 1 | 1 | 1 |
| 445 | 2 | 73 | 18 | 100 | 232 | 206 | 120 | 1 | 1 | 1 | 1 | 1 |
| 447 | 1 | 61 | 13 | 102 | 306 | 244 | 132 | 1 | 1 | 1 | 1 | 1 |
| 448 | 2 | 70 | 24 | 100 | 220 | 196 | 134 | 1 | 1 | 1 | 1 | 1 |
| 453 | 2 | 40 | 12 | 98 | 218 | 64 | 66 | 1 | 0 | 0 | 0 | 0 |
| 457 | 2 | 46 | 28 | 114 | 214 | 120 | 92 | 1 | 1 | 1 | 1 | 1 |
| 461 | 1 | 70 | 10 | 100 | 200 | 82 | 58 | 1 | 0 | 0 | 0 | 0 |
| 462 | 2 | 66 | —3 | 76 | 226 | 102 | 92 | 1 | 0 | 0 | 0 | 1 |
| 465 | 2 | 55 | 58 | 104 | 264 | 168 | 86 | 1 | 0 | 1 | 1 | 1 |
| 466 | 1 | 38 | 23 | 82 | 190 | 148 | 64 | 0 | 0 | 1 | 0 | 1 |
| 467 | 1 | 33 | 42 | 100 | 288 | 220 | 112 | 1 | 1 | 1 | 1 | 1 |
| 471 | 1 | 64 | —15 | 176 | 240 | 370 | 424 | 1 | 1 | 1 | 1 | 1 |
| 475 | 1 | 36 | 8 | 114 | 220 | 80 | 74 | 1 | 0 | 0 | 0 | 1 |
| 485 | 2 | 52 | —2 | 98 | 166 | 138 | 76 | 0 | 0 | 1 | 0 | 1 |
| 488 | 1 | 53 | 8 | 84 | 210 | 86 | 56 | 1 | 0 | 0 | 0 | 0 |
| 503 | 1 | 39 | 33 | 104 | 272 | 154 | 88 | 1 | 0 | 1 | 1 | 1 |

*Male = 1, female = 2.

† Nondiabetic = 0, diabetic = 1.

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APPENDIX—Comparison of different methods for the evaluation of the oral glucose tolerance test

| Number | Sex* | Age (yrs.) | Per cent overweight | Blood sugar mg./100 ml. | | | | Diagnosis† Method | | | | |
|--------|------|------------|---------------------|-------------------------|-------|-------|-------|-------------------|----|-----|----|---|
| | | | | Fasting | 1-hr. | 2-hr. | 3-hr. | I | II | III | IV | V |
| 504 | 2 | 61 | 4 | 116 | 274 | 200 | 106 | 1 | 1 | 1 | 1 | 1 |
| 512 | 2 | 69 | 29 | 120 | 262 | 312 | 220 | 1 | 1 | 1 | 1 | 1 |
| 515 | 2 | 43 | 13 | 100 | 158 | 138 | 130 | 0 | 0 | 0 | 1 | 0 |
| 524 | 1 | 70 | 4 | 294 | 404 | 500 | 492 | 1 | 1 | 1 | 1 | 1 |
| 526 | 2 | 33 | 20 | 108 | 212 | 130 | 90 | 1 | 0 | 1 | 1 | 1 |
| 527 | 2 | 71 | 33 | 200 | 266 | 372 | 344 | 1 | 1 | 1 | 1 | 1 |
| 530 | 1 | 66 | —8 | 102 | 216 | 130 | 94 | 1 | 0 | 1 | 1 | 1 |
| 532 | 2 | 50 | 8 | 106 | 160 | 148 | 100 | 0 | 0 | 1 | 1 | 1 |
| 533 | 2 | 72 | 2 | 106 | 200 | 148 | 72 | 1 | 0 | 1 | 1 | 1 |
| 534 | 2 | 35 | —5 | 92 | 140 | 152 | 152 | 1 | 0 | 0 | 1 | 0 |
| 536 | 1 | 65 | 41 | 104 | 168 | 130 | 94 | 0 | 0 | 1 | 0 | 0 |
| 537 | 2 | 61 | 35 | 112 | 188 | 116 | 68 | 0 | 0 | 0 | 0 | 1 |
| 541 | 2 | 60 | —7 | 224 | 396 | 398 | 314 | 1 | 1 | 1 | 1 | 1 |
| 542 | 1 | 70 | 17 | 166 | 360 | 334 | 266 | 1 | 1 | 1 | 1 | 1 |
| 549 | 1 | 60 | 27 | 104 | 176 | 156 | 84 | 1 | 0 | 1 | 1 | 1 |
| 551 | 1 | 65 | 12 | 98 | 206 | 120 | 96 | 1 | 0 | 1 | 1 | 1 |
| 555 | 1 | 53 | 26 | 82 | 172 | 148 | 100 | 0 | 0 | 1 | 1 | 1 |
| 559 | 2 | 68 | 14 | 118 | 246 | 226 | 104 | 1 | 1 | 1 | 1 | 1 |
| 562 | 2 | 46 | 58 | 82 | 182 | 138 | 76 | 0 | 0 | 1 | 0 | 1 |
| 564 | 1 | 34 | 25 | 100 | 190 | 120 | 76 | 0 | 0 | 1 | 0 | 1 |
| 567 | 1 | 64 | 5 | 94 | 172 | 128 | 74 | 0 | 0 | 1 | 0 | 1 |
| 571 | 2 | 41 | 28 | 106 | 186 | 162 | 82 | 1 | 0 | 1 | 1 | 1 |
| 577 | 2 | 44 | 29 | 156 | 324 | 288 | 108 | 1 | 1 | 1 | 1 | 1 |
| 584 | 1 | 41 | 17 | 116 | 244 | 168 | 88 | 1 | 1 | 1 | 1 | 1 |
| 585 | 1 | 38 | 5 | 122 | 254 | 166 | 102 | 1 | 1 | 1 | 1 | 1 |
| 586 | 1 | 54 | 36 | 150 | 310 | 272 | 212 | 1 | 1 | 1 | 1 | 1 |
| 588 | 1 | 53 | 3 | 144 | 192 | 136 | 84 | 0 | 1 | 1 | 1 | 1 |
| 590 | 2 | 50 | 19 | 92 | 206 | 120 | 74 | 1 | 0 | 1 | 0 | 1 |
| 592 | 2 | 45 | —8 | 104 | 168 | 134 | 112 | 0 | 0 | 1 | 1 | 1 |
| 593 | 1 | 42 | 13 | 94 | 182 | 166 | 76 | 1 | 0 | 1 | 1 | 1 |
| 603 | 2 | 61 | 51 | 100 | 212 | 88 | 64 | 1 | 0 | 0 | 0 | 1 |
| 607 | 1 | 55 | 46 | 156 | 248 | 312 | 236 | 1 | 1 | 1 | 1 | 1 |
| 614 | 1 | 33 | 10 | 112 | 220 | 92 | 76 | 1 | 0 | 0 | 1 | 1 |
| 618 | 1 | 59 | 5 | 98 | 202 | 152 | 70 | 1 | 0 | 1 | 1 | 1 |
| 631 | 1 | 58 | —3 | 98 | 218 | 144 | 70 | 1 | 0 | 1 | 1 | 1 |
| 632 | 1 | 50 | 6 | 108 | 222 | 192 | 102 | 1 | 0 | 1 | 1 | 1 |
| 638 | 1 | 55 | 33 | 112 | 240 | 84 | 80 | 1 | 0 | 0 | 1 | 1 |
| 639 | 1 | 60 | 14 | 104 | 210 | 116 | 72 | 1 | 0 | 0 | 1 | 1 |
| 640 | 1 | 59 | 20 | 88 | 132 | 162 | 98 | 1 | 0 | 0 | 0 | 0 |
| 646 | 2 | 60 | 14 | 120 | 224 | 158 | 100 | 1 | 1 | 1 | 1 | 1 |
| 648 | 1 | 56 | 3 | 92 | 170 | 130 | 68 | 0 | 0 | 1 | 0 | 1 |
| 649 | 2 | 52 | 7 | 96 | 166 | 128 | 80 | 0 | 0 | 1 | 0 | 0 |
| 650 | 1 | 38 | 9 | 104 | 148 | 154 | 82 | 1 | 0 | 0 | 0 | 1 |
| 654 | 1 | 62 | 20 | 134 | 298 | 304 | 214 | 1 | 1 | 1 | 1 | 1 |
| 655 | 1 | 46 | 22 | 94 | 186 | 120 | 86 | 0 | 0 | 1 | 0 | 1 |
| 656 | 1 | 44 | 16 | 88 | 196 | 186 | 106 | 1 | 0 | 1 | 1 | 1 |
| 657 | 1 | 50 | 6 | 108 | 222 | 192 | 102 | 1 | 0 | 1 | 1 | 1 |
| 661 | 2 | 36 | 38 | 92 | 186 | 138 | 174 | 0 | 1 | 1 | 1 | 1 |
| 667 | 2 | 36 | 14 | 96 | 200 | 110 | 68 | 1 | 0 | 0 | 0 | 1 |
| 668 | 2 | 35 | 10 | 90 | 200 | 128 | 72 | 1 | 0 | 1 | 0 | 1 |
| 669 | 1 | 42 | 18 | 106 | 206 | 196 | 92 | 1 | 0 | 1 | 1 | 1 |
| 670 | 2 | 58 | 23 | 108 | 212 | 172 | 110 | 1 | 1 | 1 | 1 | 1 |
| 671 | 2 | 54 | 17 | 90 | 170 | 122 | 92 | 0 | 0 | 1 | 0 | 0 |
| 672 | 1 | 52 | 5 | 100 | 182 | 176 | 112 | 1 | 1 | 1 | 1 | 1 |
| 673 | 1 | 35 | 25 | 100 | 224 | 178 | 104 | 1 | 0 | 1 | 1 | 1 |
| 675 | 2 | 55 | 33 | 112 | 172 | 130 | 82 | 0 | 1 | 1 | 0 | 1 |
| 681 | 2 | 59 | 42 | 168 | 326 | 370 | 306 | 1 | 1 | 1 | 1 | 1 |
| 690 | 1 | 29 | 14 | 98 | 166 | 126 | 76 | 0 | 0 | 1 | 0 | 0 |
| 691 | 1 | 34 | 29 | 98 | 216 | 128 | 100 | 1 | 0 | 1 | 1 | 1 |
| 697 | 1 | 31 | 40 | 112 | 266 | 152 | 96 | 1 | 1 | 1 | 1 | 1 |
| 699 | 1 | 38 | 6 | 96 | 216 | 66 | 76 | 1 | 0 | 0 | 0 | 0 |
| 700 | 1 | 49 | 8 | 100 | 216 | 146 | 96 | 1 | 0 | 1 | 1 | 1 |
| 702 | 1 | 30 | —5 | 100 | 218 | 82 | 60 | 1 | 0 | 0 | 0 | 1 |
| 705 | 2 | 64 | 17 | 104 | 196 | 162 | 110 | 1 | 1 | 1 | 1 | 1 |
| 706 | 1 | 62 | 8 | 92 | 256 | 80 | 52 | 1 | 0 | 0 | 0 | 1 |
| 708 | 2 | 45 | 19 | 112 | 220 | 176 | 80 | 1 | 1 | 1 | 1 | 1 |
| 718 | 2 | 60 | 13 | 106 | 248 | 128 | 82 | 1 | 0 | 1 | 1 | 1 |
| 725 | 1 | 34 | 14 | 132 | 304 | 232 | 176 | 1 | 1 | 1 | 1 | 1 |
| 736 | 2 | 47 | 58 | 100 | 160 | 132 | 72 | 0 | 0 | 1 | 0 | 0 |

*Male = 1, female = 2.

† Nondiabetic = 0, diabetic = 1.