A Self-scoring Five-question Risk Test for Coronary Heart Disease

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SUMMARY A simple, five-question risk test for coronary heart disease (CHD) is presented. The test allows a person to estimate his or her relative risk of CHD, based on answers to questions on smoking habits, history of diagnosis and treatment for high blood pressure, weight, pulse rate and family history of heart disease. The scoring system, developed from the 17-year CHD mortality study of 1899 white males age 40–55 years from the Chicago Western Electric Company study, is applied to the men of that study and predictively to 1158 white men age 40–59 years followed 15 years in the Chicago Peoples Gas Company study. In these two studies, the men with the highest quintile of risk scores had more than four times the observed numbers of CHD deaths as the men in the lowest quintile of risk scores. In addition, a test that uses actual blood pressure instead of treatment status, and includes serum cholesterol level, is also presented for use in cases where the values of these variables are available. Although the scoring systems for these tests are based on the mortality experience of middle-aged white males, the tests should have approximate validity for all age-sex-race groups because the scores are a measure of relative risk.

THE NATIONAL Broadcasting Company (NBC) requested us to develop a self-scoring risk test for coronary heart disease (CHD) to allow a person to estimate his or her relative risk of CHD. The self-scoring test we present is a modification of the test originally used and prepared with NBC. This test asks the person to score himself/herself on questions regarding smoking habits, history of diagnosis and treatment for high blood pressure, weight, pulse rate, and family history of heart disease. A second risk test that substitutes a question on actual blood pressure for the question on diagnosis and treatment for high blood pressure on the self-scoring test, and adds a sixth question on serum cholesterol, is also given.

In this report we present the questions that make up the tests and the associated scoring systems and discuss how the systems were developed statistically and the rationale that went into that development.

Materials and Methods

The self-scoring risk test was originally designed to be given to home viewers during the course of a television documentary on health care. It consisted of five multiple-choice questions, each with three to five answers, and each dealing with a characteristic or habit either known or suspected to be associated with premature death from CHD. For scoring, the home viewer was to determine the answer to each question that was most appropriate to his/her characteristics and lifestyle, and then select the score that had been assigned to that answer. At the conclusion of the test, each person was to be given an indication of his/her relative risk of CHD, based on total score for the five questions.

Any self-scoring device, especially one originally designed to be given to a national television audience, needs to be simple, requiring only pencil and paper to complete. For example, if the test includes a question on hypertension, the question cannot require a person to know his/her exact blood pressure. Hence, the blood pressure question included on the test, asks the person about diagnosis and treatment for high blood pressure. Similarly, although hypercholesterolemia is one of the three major risk factors for CHD, it is not possible to include a question for this trait on the self-scoring test that can be readily answered. In addition, the scoring system for a self-scoring device should meet certain criteria: 1) It should be uncomplicated, with scores preferably of a single digit or small two-digit number; 2) it should consist of a single score for each answer, not separate scores for specific age-sex-race groups; 3) it should be additive, i.e., the total score should be obtained by adding together scores on the individual questions; and 4) it should be readily interpretable, i.e., there must be an easy means to assess the risk in relation to others.

The scoring systems devised for the two risk tests are based on the 17-year CHD mortality experience of 1899 white males, originally age 40–55 years, from the Chicago Western Electric Company study. The Chicago Western Electric Company study, begun in the fall of 1957, is a long-term, prospective, epidemiological investigation of CHD among 2107 employees age 40–55 years from the Hawthorne works of the Western Electric Company in Chicago. This study has been described at length elsewhere. The cohort used to develop the scoring system consists of 1899 white
males free of definite CHD upon initial examination with complete baseline data.

The criteria stated above led to the choice of a multiple linear regression model for computation of the scoring systems. It is simple and possesses the required additivity property. The multiple logistic regression model, commonly used to examine relationships between risk factors and CHD, is a multiplicative model, and thus is not appropriate when scores must be added together to obtain a total score.

For each question on each test, the CHD mortality rate was computed for each answer category for the Western Electric men. The category on each question with the lowest mortality was then assigned a score of zero for that question. For each of the other categories on each question for each person, a variable was defined that was equal to 1 if the person were in that category, and 0 otherwise. Thus, if the question had four possible answers, three 0–1 variables were defined for that question, only one of which could be equal to 1 for each individual. (If the individual was in the category with the lowest mortality for a particular question, then all variables defined for that question were equal to zero.) Thus, the number of independent 0–1 variables used in the multiple regression was equal to the total number of categories on all of the questions that make up the test, minus the number of questions.

The dependent variable in the regressions was defined to be equal to $10 \div \bar{p}$ if the individual died of coronary heart disease during the study and 0, otherwise, where $\bar{p}$ is the 17-year CHD mortality rate for the entire cohort, in this case 0.0858. The value, $10 \div \bar{p}$, was selected as the value of the dependent variable for a decedent, because it gave a mean response of 10 for the entire cohort.

The regression coefficients from the fitted models provide the scores assigned to each answer. In the actual tests, the regression coefficients were rounded to the nearest whole number. The constant term from the regression represents the score for a Western Electric man in the zero category on all questions on the test, i.e., in the category with the lowest mortality. To obtain the estimated risk for an individual, one simply adds together the regression coefficients corresponding to his or her answers and adds in the constant. The constant terms actually used in the two tests are not those from the regressions of CHD mortality on the 0–1 variables in Western Electric. The constant terms in these regressions are equal to 10 minus the sum of the regression coefficients for each of the 0–1 variables times the proportion of persons in the Western Electric cohort with a 1 on that variable. Thus, the constant terms from the regressions reflect the distributions of the risk factors in the Western Electric men at the baseline examination in 1957 or 1958. Because there is evidence that the distributions of smoking habits, blood pressure, and serum cholesterol have changed in the United States since the late 1950s, the constant terms proposed for use in each test are based on more current data on the distributions of the risk factors. The constant terms are defined to provide a mean score close to 10 on each test for most age-sex-race groups. A mean of 10 was selected because it is a small number and because it provides a ready means for comparing scores and determining a person’s relative risk, i.e., a score of 15 means that one’s risk is about 50% higher than the average for his age-sex-race group with respect to the factors included on the test, while a score of 6 indicates a risk that is about 40% below average.

For a given sex-race group, the constant term on each test was computed by subtracting from 10 the average score on each question, with the averages determined from data from one of three sources. For the self-scoring test, the average scores for the questions on smoking, blood pressure, and pulse rate were obtained from 3953 white males, 3063 white females, 268 black males, and 258 black females age 40–49 years from the Chicago Heart Association Detection Project in Industry. The age group 40–49 years was selected to provide the average scores because it is an age group more or less in the middle of those ages for which the tests are designed.

From the fall of 1967 until early 1973, the Chicago Heart Association Detection Project in Industry screened 39,665 young adult and middle-aged men and women, both white and black, employed by about 85 firms in the greater Chicago area. For the question on diagnosis and treatment for high blood pressure, for those on medication, blood pressure was treated as uncontrolled if the diastolic pressure was $\geq$ 95 mm Hg. For the question on family history of heart disease, the percentage of yes responses in the Western Electric study was assumed for each sex-race group, i.e., 11.6%. Because the question on weight on the self-scoring test is the same as that used in the Community Hypertension Evaluation Clinic (CHEC) Program, the data from that study were used to obtain the average scores for the weight question. The CHEC Program screened more than 1 million Americans, both white and black, for hypertension. For the four sex-race groups, the percentages in the weight categories in the age groups 20–39 years and 40–64 years were averaged to obtain the average scores for each sex-race group for this question. For the test including serum cholesterol, the average scores for all questions except the family history question, which used the Western Electric data, were obtained from the black and white men and women age 40–49 years from the Chicago Heart Association Detection Project in Industry.

In addition to applying the tests to the men of the Western Electric Study, the tests are also applied predictively to the 15-year CHD mortality experience of 1158 white males age 40–59 years from the Chicago Peoples Gas Company study. This study, begun in 1958, is a longitudinal investigation of the epidemiology, etiology and natural history of the adult cardiovascular diseases in males originally age 40–59 years employed by the Chicago Peoples Gas Company. The 1158 men are white males free of definite CHD upon initial examination, with complete
TABLE 1. A Self-scoring Risk Test for Coronary Heart Disease

<table>
<thead>
<tr>
<th>Question</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Smoking habits</td>
<td></td>
</tr>
<tr>
<td>How many cigarettes do you smoke a day?</td>
<td></td>
</tr>
<tr>
<td>a) More than one pack</td>
<td>10</td>
</tr>
<tr>
<td>b) One pack</td>
<td>9</td>
</tr>
<tr>
<td>c) A half-pack</td>
<td>4</td>
</tr>
<tr>
<td>d) None</td>
<td>0</td>
</tr>
<tr>
<td>2. Blood pressure</td>
<td></td>
</tr>
<tr>
<td>Has your doctor ever told you that you have high blood pressure?</td>
<td></td>
</tr>
<tr>
<td>a) Yes, currently taking drugs, but doctor says that my blood pressure is not yet controlled</td>
<td>8</td>
</tr>
<tr>
<td>b) Yes, not currently taking drugs</td>
<td>3</td>
</tr>
<tr>
<td>c) Yes, currently taking drugs. Doctor says that my blood pressure is controlled</td>
<td>0</td>
</tr>
<tr>
<td>d) No</td>
<td>0</td>
</tr>
<tr>
<td>3. Weight</td>
<td></td>
</tr>
<tr>
<td>Do you consider yourself underweight, normal weight, or overweight?</td>
<td></td>
</tr>
<tr>
<td>a) Overweight</td>
<td>3</td>
</tr>
<tr>
<td>b) Normal weight</td>
<td>2</td>
</tr>
<tr>
<td>c) Underweight</td>
<td>0</td>
</tr>
<tr>
<td>4. Pulse rate</td>
<td></td>
</tr>
<tr>
<td>How many times does your heart beat in 15 seconds?</td>
<td></td>
</tr>
<tr>
<td>a) 23 or more times</td>
<td>5</td>
</tr>
<tr>
<td>b) 20-22 times</td>
<td>2</td>
</tr>
<tr>
<td>c) Fewer than 20 times</td>
<td>0</td>
</tr>
<tr>
<td>5. Family history</td>
<td></td>
</tr>
<tr>
<td>Did either of your parents die of heart disease, stroke, or high blood pressure before the age of 60?</td>
<td></td>
</tr>
<tr>
<td>a) Yes</td>
<td>6</td>
</tr>
<tr>
<td>b) No</td>
<td>0</td>
</tr>
</tbody>
</table>

To the sum of scores for the five questions add: 2

baseline data on all variables, including family history of heart disease. This study has been described in detail elsewhere. 5, 12

Results

The questions that constitute the self-scoring risk test and the scores assigned to each answer are given in table 1. The second risk test, with questions on exact blood pressure and serum cholesterol level, is given in table 2.

Because the Western Electric study did not collect data on blood pressure medication, it was necessary to use the exact blood pressure of the men to score the blood pressure question on the self-scoring test. Because treatment for high blood pressure is generally indicated for diastolic blood pressure levels ≥ 105 mm Hg, 13-15 based on the average of several readings, and a single casual pressure was used in Western Electric, a cutpoint of 110 mm Hg was selected for assigning the

Western Electric men to the category of treatment with blood pressure uncontrolled. For the category of positive diagnosis but no current treatment, the cutpoint for assigning the Western Electric men was selected to approximate the level of blood pressure at which an individual would generally be diagnosed as having high blood pressure, i.e., 95 mm Hg, based on the average of several readings. The Western Electric men were thus assigned to this category if the diastolic pressure was 100-109 mm Hg. The rest of the men were assigned to the other two categories, with no distinction made between the two.
For the weight question on the self-scoring test, the Western Electric men were assigned to the categories overweight, normal weight, and underweight, based on percentage of desirable weight; desirable weight is determined from tables published by the Metropolitan Life Insurance Company for given height. The cutpoints on this variable were chosen to reflect the average of the percentages of white males age 20-39 years and 40-64 years who assigned themselves to these categories in the CHEC program, i.e., 2.6% underweight, 71.6% normal weight, and 25.8% overweight. For the Western Electric men, the cutpoints < 90, 90-124, and ≥ 125, used to assign the men to the weight categories, yielded percentages of 2.8, 72.7 and 24.7, respectively.

For the question on family history of heart disease, because there were only nine men in Western Electric for whom both parents died before age 60 years of coronary heart disease, stroke, or high blood pressure, a positive response to this question was defined as either parent dying of these causes before age 60 years.

For both questions on pulse, a person was classified into category (a) if his pulse was ≥ 92 beats/min, and to category (b) if his pulse rate was 80-91 beats/min.

For the self-scoring test, the constant term for each sex-race group is the same, i.e., 2. For the test including serum cholesterol, the constant term ranges from 1-3.

Using the men and women from the Chicago Heart Association Detection Project in Industry, the means for the two risk tests were computed by 10-year age group for white and black men and women age 25-64. These means are given in table 3. Because data on family history of heart disease were not collected in this study, 0.70 was added in to each mean, i.e., the percentage of those with a positive family history was assumed to be equal to the proportion in the Western Electric study.

For the self-scoring risk test, the means are all within 1 point of 10 for all but white females age 55-64 years, where the mean is 8.63. For the second test with serum cholesterol, only black males 25-34 years and black females 25-34 years have means that differ from 10 by more than 1 point.

To assess how well each of the tests distributes risk, the scores on the test for the men from the Western Electric study were ordered from smallest to largest and divided into quintiles. Table 4 presents the number of expected and observed 17-year CHD deaths by quintile of risk, along with the range of scores for each quintile. The number of expected deaths was computed for each quintile by converting

<table>
<thead>
<tr>
<th>Table 3. Means of Risk Tests by Age, Sex and Race—Chicago Heart Association Detection Project in Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (years)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Self-scoring test</td>
</tr>
<tr>
<td>25-34</td>
</tr>
<tr>
<td>35-44</td>
</tr>
<tr>
<td>45-54</td>
</tr>
<tr>
<td>55-64</td>
</tr>
<tr>
<td>Test including serum cholesterol</td>
</tr>
<tr>
<td>25-34</td>
</tr>
<tr>
<td>35-44</td>
</tr>
<tr>
<td>45-54</td>
</tr>
<tr>
<td>55-64</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4. Expected and Observed Coronary Heart Disease Deaths by Quintile of Risk Score for 1989 White Males Age 45-55 years from the Chicago Western Electric Company Study, 1957-1975</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quintile</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td>II</td>
</tr>
<tr>
<td>III</td>
</tr>
<tr>
<td>IV</td>
</tr>
<tr>
<td>V</td>
</tr>
<tr>
<td>Ratio: V/I</td>
</tr>
<tr>
<td>Percent of events in V</td>
</tr>
</tbody>
</table>
the risk score to a probability of death and summing
the probabilities for all of the individuals in the quintile.
The quintiles were defined to be of equal size. Where
quintiles did not break exactly, the observed
CHD deaths were divided between adjacent quintiles
based on the proportion of individuals assigned to
each quintile to make them equal. In addition, the
ratio of the numbers of observed and expected deaths
in quintile V vs quintile I, along with the percentage of
all deaths in quintile V, both observed and expected,
are given. For the self-scoring test, the highest quintile
had 36.8% of all CHD deaths. For the test including
serum cholesterol, this percentage was 37.4. The ratios
of the numbers of observed deaths for the highest and
lowest quintiles of estimated risk is 4.62 for the self-
scoring test and 6.78 for the second test. On both tests,
the percentage of expected CHD deaths in the highest
quintile is lower than the percentage of observed
deaths in the highest quintile, primarily because the
constant terms used on the tests are not those from the
fitted models in Western Electric. If those constant
terms were used, the means for the tests in the
Western Electric men would be close to 10. Instead,
the means for the two tests are 11.32 and 11.62,
respectively.

The scoring systems were further validated by
applying the tests predictively to the 15-year CHD
mortality experience of 1158 white males age 40-59
years from the Chicago Peoples Gas Company study.
For categorizing the Gas Company men on the blood
pressure questions, because the Gas Company coded
the lowest of four diastolic blood pressures, cutpoints
of 102 mm Hg and 92 mm Hg were used to indicate
treatment with blood pressure uncontrolled and
diagnosis without treatment, respectively. (These cut-
points were selected because they cut off approx-
imately the same portions of the distribution of
diastolic blood pressure in the Gas Company men as
did the cuts of 110 and 100 in Western Electric.) For
the second test the blood pressure cutpoints for
categorizing the men were ≥ 102, 89-101, and 82-88.
In addition, because resting heart rate was obtained
on these men, the categories for heart rate were
defined to be ≥ 85, 73-84, and ≤ 72 beats/min. The
mean heart rate in the Gas Company is about 7
beats/min lower than the mean pulse rate in Western
Electric.

Table 5 presents the number of predicted and
observed CHD deaths by quintile of risk score for
each of the two tests for the Gas Company men, along
with the range of scores for each quintile, the ratios
of the numbers of predicted and observed deaths for
the highest and lowest quintiles, and the percentage of all
CHD deaths in the highest quintile. (The total number
of predicted deaths was normalized to be equal to
the actual number of deaths in the entire cohort.) Both
tests spread risk quite well for these men. The highest
quintile of predicted risk on the self-scoring test
experienced 34.9% of all CHD deaths, while 33.7% of all
CHD deaths occurred in the highest quintile of predicted risk on the second test. The ratios of the
numbers of observed deaths in the highest and lowest
quintiles on the two tests are 4.29 and 3.63, respectively,
and the means on the tests are 11.67 and 11.68,
respectively.

**Discussion**

Several traits and behavioral characteristics have
been shown to be risk factors for CHD, particularly
cigarette smoking, hypertension, hypercholes-
terolemia and obesity. Questions on three of these
traits are included on the simple self-scoring risk test
presented here; only a question on hypercholesterol-
emia or serum cholesterol is not. In addition to
questions on cigarette smoking, blood pressure and
obesity, this test includes a question on family history
of heart disease, and a question on pulse. Originally,
this test included a question on alcohol consumption,
but because of the disagreements over whether alcohol
use is in fact related to an increased risk of CHD, the
question on pulse was substituted. The role of pulse
or heart rate as a risk factor for CHD has also not been
clearly elucidated, although it has been related to an
increased risk of CHD in some studies. In addition,
heart rate tends to be negatively associated with
physical fitness, so that a high score on this question
might indicate a need for increased exercise.

A second test, intended for use by health
professionals rather than as an alternative self-scoring
device, is also presented. This test adds a question on

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Self-scoring test</th>
<th>Test including cholesterol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score range</td>
<td>Predicted deaths</td>
</tr>
<tr>
<td>I</td>
<td>4-6</td>
<td>7.02</td>
</tr>
<tr>
<td>II</td>
<td>6-10</td>
<td>12.33</td>
</tr>
<tr>
<td>III</td>
<td>10-13</td>
<td>17.94</td>
</tr>
<tr>
<td>IV</td>
<td>13-15</td>
<td>21.07</td>
</tr>
<tr>
<td>V</td>
<td>15-29</td>
<td>27.64</td>
</tr>
<tr>
<td>Ratio: V/I</td>
<td>3.94</td>
<td>4.29</td>
</tr>
<tr>
<td>Percent of events in V</td>
<td>32.14</td>
<td>34.88</td>
</tr>
</tbody>
</table>
serum cholesterol level to the self-scoring test, and in addition uses exact blood pressure for the question on blood pressure, and uses percent of desirable weight for the question on weight.

The Framingham study developed tables for estimating risk of CHD. However, these tables are somewhat complicated and require exact knowledge of blood pressure and serum cholesterol levels, as well as the results of an ECG. These tables are, therefore not intended for self-scoring use by the general public. On the other hand, the self-scoring risk test presented here is a simple device that almost everyone should be able to take.

When the self-scoring test is applied to the Western Electric men, the spread of risk obtained compares favorably to that obtained by more sophisticated methods of analysis, e.g., as recorded in the Final Report of the National Cooperative Pooling Project for the endpoint major coronary events (nonfatal or fatal myocardial infarction and sudden fatal CHD death) based on exact values for diastolic blood pressure, serum cholesterol, smoking pattern and relative weight. With data from five studies (average follow-up 8.6 years), multiple logistic regression models based on these four variables were fit to the age groups 40-44, 45-59, 50-54 and 55-59 years. When the numbers of observed events in the highest and lowest quintiles of estimated risk are pooled for the four age groups, 40.8% of all events occurred in the highest quintile of risk, and the ratio of observed events for the highest and lowest quintiles is 5.4. The figures in the Western Electric study based on the self-scoring risk test are 36.8 and 4.6 for these same measures. For the test that included serum cholesterol, the values are 37.4 and 6.8.

The capability of the self-scoring risk test to assess CHD risk predictively and to isolate persons at high risk also compares favorably with predictions reported elsewhere. When the coefficients of a logistic model fit to the 12-year incidence of first major coronary events in the Framingham study were applied predictively to the 10-year follow-up experience of 1211 white males from the Gas Company study, 39.1% of the observed events occurred in the highest quintile of predicted risk, and the ratio of the numbers of observed events in the highest and lowest quintiles was 4.9. The variables in this analysis were age, serum cholesterol, systolic blood pressure, relative weight, smoking pattern and ECG findings. When the self-scoring risk test was applied predictively to the 15-year CHD mortality experience in the Gas Company men, although age was not included as a variable, the values for the two measures of the spread of risk were 4.3 and 34.9. For the test including serum cholesterol, these values were 3.6 and 33.7.

Although the scoring systems for the two risk tests are based on CHD mortality of middle-aged white males, if we can assume that the risk factors are related to increased risk in other age-sex-race groups as well, the tests, because they are intended to measure relative risk and not absolute risk, should have approximate validity for most age-sex-race groups. For example, although women may have a much lower absolute risk of CHD than men, if the ratios of absolute risks for various categories on the questions are similar for men and women, the risk tests can provide a reasonable measure of relative risk for women as well. In this regard, data from the Framingham Study indicate that for women 45-54 years and 55-64 years blood pressure, serum cholesterol, and relative weight are positively related to CHD, including angina pectoris. In addition, pulse rate is positively related to CHD, excluding angina pectoris in women 55-64 years, while smoking is weakly associated with this endpoint for women 45-54 and 55-64 years.

To make the risk tests as appropriate as possible for all persons, regardless of age, sex or race, constant terms were computed for each sex-race group based on the levels of the risk variables in the Chicago Heart Association Detection Project in Industry, and the CHEC program for the question on weight on the self-scoring test. For the self-scoring test, the distributions of the risk variables were sufficiently similar in the four sex-race groups to yield the same constant term. For the test including serum cholesterol, the constant terms range from 1-3.

The goal in providing different constant terms for each sex-race group was to devise tests that will have means close to 10 for most age-sex-race groups. If this is the case, then the individual can obtain an approximate measure of how he or she stands with respect to others in his or her age-sex-race group by comparing the score obtained with 10. A score of 14 then indicates a risk that is about 40% above average, while a score of 5 indicates a risk that is about 50% below average. Regardless of the absolute risk, a high score indicates that a person can improve his or her risk status by stopping smoking, changing eating habits, increasing exercise, or seeking treatment for high blood pressure.

When mean scores were computed for both tests by 10-year age groups for men and women, both white and black, from the Chicago Heart Association Detection Project in Industry, few of the computed means differed from 10 by more than 1 point. Because this study was conducted among volunteers in industry, it might be anticipated that the risk factors in this study are lower than in the general population. Since most of the means for the two tests listed in table 3 are less than 10, if the risk variables in this study are lower on the average than those in the general population, the tests should still yield means in most age-sex-race groups which are close to 10.

The self-scoring risk test presented here is intended primarily as an educational tool to reveal traits that lead to an increased risk of CHD, and to single out particular traits that can be altered to lower the risk. In using the test, we suggest that the questions and answers be given first, followed by the scoring system. This procedure should minimize the influence that knowledge of the scores assigned to the answers might have on the self-assessment. If the test is administered, the person administering the test should show or tell those taking the test how to measure pulse. In addi-
tation, it should be indicated that there are other risk factors not included on the test that affect the risk of CHD, such as diet and serum cholesterol.

The test presented here that includes serum cholesterol is for those who desire an instrument for assessing risk that includes this variable. It should be most useful in screening programs or prevention programs where an overall assessment of risk based on the measured levels of risk factors is desired. Like the self-scoring test, it can thus be used in such programs to acquaint individuals with risk factors, and to show them where they can lower their risk of CHD.

These tests, by reminding a person of key factors that increase his or her risk and by singling out those at high risk, encourage individuals to improve their lifestyles for better health and greater longevity.

Acknowledgments

It is a pleasure to express appreciation to the Officers and executive leaders of both the Western Electric Company and the Gas Company in Chicago; their continuous cooperation and support over the years since the late 1950s made these two studies possible.

We also thank the physicians who were active in the Western Electric Company Study for their invaluable assistance, and the research staff of the Peoples Gas Company Study. It is also a pleasure to express appreciation to Dan Garside and Tom Tokich, who assisted in the computer programming, and to the principal investigators, Jeremiah Stamler, M.D., James A. Schoenberger, M.D., and Richard B. Shekelle, Ph.D., of the Chicago Heart Association Detection Project in Industry, who graciously allowed us to use the data from that study. Thanks are also due to Sheldon Gawiser, Ph.D., and Dan O'Connor of NBC.

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