

THE EFFECT OF PHYSICAL FITNESS
AND OTHER RISK FACTORS ON THE INCIDENCE OF HYPERTENSION
IN APPARENTLY HEALTHY ADULT WOMEN:
A LONGITUDINAL STUDY

A DISSERTATION
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DEDICATION

To my family and friends,
whose enthusiastic support
has encourage me to complete
this dissertation.

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ABSTRACT

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A longitudinal study was conducted to determine whether significant differences existed between baseline physical fitness measures and other risk factors, identified during an initial visit to the Cooper Clinic, and subsequent development of hypertension in women over a period of 19 years. The study population was comprised of 4,327 adult women who completed a mailed questionnaire, of whom 2,677 participated in the study. The 2,677 participants ranged from 20 to 78 years of age (with a mean age of 43.4 years). Subjects were excluded from the study if they had a resting blood pressure above 140 mm Hg systolic or 90 mm Hg diastolic, or if other coronary heart disease risk factors were identified at the time of their first physical examination. Subjects were grouped into three fitness levels (low, moderate, and high) based on length of time on

a treadmill test which was adjusted for age. Participants were followed for durations ranging from a minimum of one year to a maximum of 19 years. The average duration of study of a participant was 7.1 years, totaling 18,988 person-years of followup. No intervention or supervision was provided throughout the study period. During the period from 1970 to 1989, 115 new cases of hypertension were reported, an increased incidence rate of 4.3%.

The study, tested at the 95% confidence level, identified age, body mass index, and physical fitness as risk factors that significantly affected the incidence of hypertension. In addition, the study found that diabetes mellitus, smoking, and alcohol consumption did not affect the incidence of hypertension significantly.

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CHAPTER I

INTRODUCTION TO THE STUDY

Hypertension, according to Hagberg (1990), is one of the most serious health problems faced by the industrialized countries of the world. It is one of the main risk factors for cardiovascular disease and a major cause of end-stage renal disease. The drug treatments for hypertension rank first in the sale of all prescription drugs, and hypertension is the most frequent reason for physician visits by women (Perloff, 1989). The Harvard alumni study showed that hypertension was a greater health risk factor than cigarette smoking for both men and women (Paffenbarger, Hyde, & Wing, 1990).

The prevalence and severity of hypertension increases with age. The prevalence of hypertension in people over 60 years of age could be as high as 60% (Perloff, 1989). Perloff also pointed out that, although younger white women generally have a lower prevalence of hypertension and hypertension complications than white men, they begin to catch up between the ages of 60 and 74.

The prevalence of hypertension in African Americans is

much greater than in Caucasian Americans (Perloff, 1989). Citing a national health survey of women in the United States, Eaker, Packard, and Thom (1989) reported that 20% of white women and 40% of black women over the age of 25 were hypertensive.

Cooper (1990) estimated that almost one third of the adult American population is at some risk of health problems or early death because of hypertension. Almost 75% of hypertensive persons either are unaware they have a problem, or for various other reasons have not sought treatment (Hagberg, 1990). Because the disease is usually painless and has few clinical symptoms, one third of the time the first warning is sudden death, most often due to a stroke or heart attack (Dahlberg, 1990). Hypertension is the main risk factor that predisposes to stroke in both men and women (Wong, Giuliani, & Haley (1990).

End-stage renal disease requiring dialysis, and believed to be caused by hypertension, is increasing among both men and women at a rate of more than 7% annually in America. About 80% of the cost for dialysis is paid by Medicare and is projected to increase approximately \$1 billion every 5 years (National High Blood Pressure, 1991).

Large prospective studies, such as the Framingham study, have identified an increased risk of stroke,

myocardial infarction, and other cardiovascular diseases associated with hypertension (Perloff, 1989). Based on 30 years of followup in the Framingham study, Kannel (1987) stated that high blood pressure was a powerful predisposing factor for coronary heart disease, and that the relationship was dose-related (the higher the blood pressure, the higher the risk). He also found that "the influence of blood pressure on the incidence of cardiovascular disease is independent of other predisposing cofactors but is greatly affected by them" (p. 918). He stated further that 35% to 45% of cardiovascular morbidity and mortality results from hypertension.

Hypertension often is asymptomatic and occurs without recognized clinical symptoms. The best preventive measures against hypertension are a good lipid profile, weight control, no smoking, exercise, and a healthy diet. Physicians should be encouraged to recommend preventive nonpharmacological therapy for mild hypertension before using antihypertensive drug treatment (Kannel, 1987). Hagberg (1990) pointed out that antihypertensive drug therapy posed a greater health risk than nonpharmacological therapy.

Controlling or preventing hypertension through diet and exercise is strongly encouraged. Diet objectives should include maintaining an ideal weight, increasing calcium and

potassium intake, and decreasing fat and sodium consumption (Cooper, 1990). Regular aerobic exercise, whether or not the subject is obese, has been shown to reduce blood pressure in mild hypertensives as well as in normotensives. When feasible, changes in lifestyle are clearly preferable alternatives to pharmacological treatment (Bjorntorp, 1982).

There is a myth in American medicine that cardiovascular disease is primarily a health problem in men when, in fact, cardiovascular disease is the number one cause of death for women in the United States (Castelli, 1988; Walsh et al., 1991). It is true, however, that women usually manifest cardiovascular affliction approximately 10 years later than men, and epidemiological evidence shows a continuing increase in cardiovascular disease in women after menopause (Becker, 1990). In addition, the changing role of women at the workplace has added increased exposure to stress and environmental hazards (Douglas, 1989). Becker (1990) strongly recommended that the medical community make a more serious commitment to cardiovascular disease research in women.

Statement of the Problem

There is a demonstrated need for more research of cardiovascular diseases in women. The following questions were addressed in this study: Does the incidence of

hypertension differ between women with varying baseline physical fitness levels? Does the incidence of hypertension differ between women who had other specific baseline hypertension risk factors and those who did not? The study included data for females who participated in one or more medical exams and preventive medical counseling sessions at the Cooper Clinic in Dallas, Texas, between 1970 and 1989.

Purpose of the Study

The purpose of this prospective study was to determine whether significant differences existed between baseline physical fitness measures during an initial visit to the Cooper Clinic and subsequent development of hypertension in women over a period of 19 years. A second purpose was to determine if the incidence of hypertension differed between women who had other baseline hypertension risk factors and those who did not. Those variables included body mass index, presence of diabetes mellitus, cigarette smoker, age, and alcohol use.

Hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

1. There is no significant difference in the incidence of hypertension across baseline levels of physical fitness

among female participants at the Cooper Clinic.

2. There is no significant difference in the incidence of hypertension between the group of subjects with negative self-reported diabetes and the group with positive self-reported diabetes.

3. There is no significant difference in the incidence of hypertension between the group of subjects who reported consuming an average of two or fewer alcohol drinks per day and the group that reported consuming more than two alcohol drinks per day.

4. There is no significant difference in the incidence of hypertension between the group of subjects found to be less than 20% overweight at baseline and the group that was 20% or more overweight at baseline.

5. There is no significant difference in the incidence of hypertension between the group of subjects identified as self-reported nonsmokers and the group identified as self-reported smokers.

6. There is no significant difference in the incidence of hypertension between a group of subjects equal to or less than 45 years of age and a group of subjects older than 45 years of age.

Definition of Terms

The following terms were defined for the purpose of

this study:

1. Age. A continuous variable that was collected from existing patient data records.

2. Alcohol Use. The average number of alcoholic drinks consumed per day by each subject as reported on the 1990 mailed questionnaire.

3. Body Mass Index. The variable of weight (kg)/height(m)^{1.5} as reported by each respondent on the 1990 mailed questionnaire.

4. Cigarette Smoker. Affirmative answer by the respondent on the 1990 mailed questionnaire that the respondent was a smoker of cigarettes at that time.

5. Cooper Clinic. Dr. Kenneth H. Cooper Preventive Health Clinic, Dallas, Texas.

6. Cooper Clinic Modified Balke Treadmill Protocol. A physical measure of 3.3 mph (90m/min), 0% grade for 1st min.; 2% grade for 2nd min.; 1% grade increase for each additional minute until 25 minutes; then .2 mph increase each min. until exhaustion (Blair et al., 1989).

7. Diabetes Mellitus. Affirmative physician diagnosis as reported by the respondent on the 1990 mailed questionnaire.

8. Healthy Female Adults. Female participants with no history of heart attack, stroke, diabetes, abnormal electrocardiogram; normotensive at the time of their first

preventive medical examination; and achieved 85% or more of their age-predicted maximal heart rate during the treadmill test.

9. Hypertension. Affirmative physician diagnosis as reported by each respondent on the 1990 mailed questionnaire.

10. Normotensive. Respondent self-report on the 1990 mailed questionnaire that a physician had not previously diagnosed hypertension.

11. Physical Fitness. Low, moderate, or high fitness as measured by the Cooper Clinic Modified Balke Treadmill Protocol (Blair et al., 1989).

Limitations of the Study

The epidemiological study was subject to the following limitations:

1. The levels of validity, reliability, and objectivity of the mailed survey questionnaire.

2. The reliability of data collected from the subjects' medical records by assistants, as well as the assistants' data collection methods.

3. Generalizability of the results of the study can be made only to other similar populations.

Delimitations of the Study

This study was subject to the following delimitations:

1. Only healthy female adults 20 to 78 years of age were included in the study.
2. A self-selected population of almost exclusively white females who were well-educated, from middle and upper socioeconomic levels, and were Cooper Clinic patients, were included in the study.
3. Only completed data sets were used.
4. Only 1990 mailed surveys were used.

Assumptions

The following conditions were assumed:

1. Varying geographical locations of the subjects' residences did not affect the results of this study.
2. The older as well as the younger subjects, either alone or with assistance, were able to fill out the questionnaire.
3. Hypertension was accurately and adequately measured.
4. The participants answered honestly and accurately.

Rationale For the Study

Cooper (1990) estimated that one of every three American adults is at some risk for a health problem or

early death that could be related to hypertension, a cardiovascular disease risk factor. The number one cause of death and the major cause of morbidity in American women is cardiovascular disease (Nachtigall & Nachtigall, 1990). Approximately one half of all deaths among women in the United States is the result of cardiovascular problems, which cause nearly 500,000 deaths each year (Castelli, 1988).

According to Weber (1987), there are three major risk factors for cardiovascular events: hypertension, hypercholesterolemia, and cigarette smoking. He further stated that these three risk factors can be independently associated with coronary heart disease and stroke. Nachtigall and Nachtigall, (1990) listed hypertension, smoking, hyperlipidemia, obesity, and diabetes as the most significant coronary risk factors for premenopausal women. She pointed out that high blood pressure was the primary cause of atherosclerosis and cerebrovascular events for both genders and all age groups. Hypertension affects over 40 million American people (Hall, 1990; Mascioli et al., 1990). Kannel (1987) stated that hypertension may be the direct cause of cardiovascular disease and premature death in both men and women. He expressed the opinion that measures taken to prevent or reduce elevated blood pressure would result in a significant decrease in morbidity and mortality.

Several authors have emphasized a gender difference in the diagnosis, prognosis, and treatment of cardiovascular diseases (Boucek, Romanelli, Willis, & Mitchell, 1982; Bush, 1990; Douglas, 1986; Lerner & Kannel, 1986). The focus of research for cardiovascular diseases during the last 20 years has been primarily on men (Becker, 1990). According to Douglas (1989), a very serious problem in research is that treatments for cardiovascular diseases in women often are based on research of populations consisting predominantly of men. Hagberg (1990) pointed out in a summary review of 25 studies examining blood-pressure-lowering effects from endurance-exercise (using sample sizes from four to 66 subjects) that more than half of the studies used men exclusively. Only three of the studies looked at separate data from women. Since research concerning women is lacking, available findings from male populations are generalized to women. In her discussion of the strong impact that cardiovascular disease has on postmenopausal women, Bush (1990) pointed out that few large population-based studies included women, and none studied women exclusively.

The effect of physical fitness on the incidence of hypertension in women exclusively in a large population-based study has yet to be determined and should be studied. As the American population ages, it is

increasingly important from a preventive-medicine perspective to use the most current knowledge available to delay or prevent hypertension, and to delay atherosclerosis in women.

CHAPTER II

REVIEW OF THE LITERATURE

The national movement toward implementing health promotion measures as a cost-containment strategy has led to extensive research related to prevention and control of chronic diseases, including coronary heart disease. Epidemiological studies have shown that a sedentary lifestyle in men or women may increase their risk for developing hypertension and cardiovascular disease. The following review of literature published between 1970 and 1992 will describe and discuss topics and variables relevant to hypertension in both men and women. Men are included because most of the data previously published on this subject was collected from men exclusively, or from a combination of men and women.

Physical Fitness and Blood Pressure

After reviewing several studies, Bjorntorp (1982) stated that the positive effect of physical exercise on blood pressure levels in early-type hypertensive and normotensive subjects has been well documented. Bjorntorp found that blood pressure apparently was reduced after

participation in an extended exercise program because of a decrease in heart rate and cardiac output. He believed that, when vascular disease would be more advanced, peripheral resistance would not be changed significantly and the effect on blood pressure would be less.

Surveys of blood pressure levels in the United States were conducted by the National Center for Health Statistics ([NCHS] cited in Dannenberg, Drizd, Horan, & Leaverton, 1987) during 1960 to 1962, 1971 to 1974, and 1976 to 1980. One of the objectives of these surveys was to measure the effects of health education. The study populations included adult men and women, both black and white, aged 18 to 74 years. The first survey involved over 7,000 adults; the second survey, over 19,000 adults; and the third survey involved over 18,000 adults. Between the first and last surveys, for the group of persons with systolic blood pressure of 140 mm Hg or higher, the mean systolic blood pressure declined 18 mm Hg. This change was attributed to both lifestyle changes and antihypertensive medication. The proportion of people found to have undiagnosed hypertension declined 59% and the portion taking antihypertensive medication increased 31% between the first and third surveys (NCHS, cited in Dannenberg et al., 1987).

Paffenbarger, Wing, Hyde, and Jung (1983) examined a sample of 14,998 male alumni of Harvard University to

determine the relationship of physical activity to incidence of hypertension. All participants initially were determined to be free of hypertension. Health and physical activity information were collected by mailed questionnaires. Data were collected in the 1960's, 16 to 50 years following subjects' college entrance. Ten years later, questionnaires were mailed again to the surviving respondents. The composite of physical activity obtained from the questionnaires was developed into a physical activity index measured in kilocalories per week. The energy activity index for the individual alumni ranged from 500 to 5,000 kilocalories per week. Vigorous exercise among the alumni was found to be associated with a reduced incidence of hypertension when compared with more sedentary activities.

A total of 6,039 men and women (Cooper Clinic patients) aged 20 to 65 years were followed for 1 to 12 years for the purpose of observing the incidence of hypertension (Blair, Goodyear, Gibbons, & Cooper, 1984). All of the subjects received at least one medical examination during a period between 1970 and 1981, and responded to a mailed questionnaire in 1982. Participants were excluded from the study unless they met all of the following requirements: (a) no history of cardiovascular disease, (b) normal electrocardiogram, (c) normotensive at baseline, and (d) achievement of at least 85% of their age-adjusted maximal

heart rate during a treadmill physical fitness test. The findings identified low levels of physical fitness as independent contributors to the increased incidence of hypertension in adult men and women. Researchers found the risk of developing hypertension was 1.52 times higher in the sedentary group than in the high-fitness group after adjusting for age, sex, body mass index, and baseline blood pressure (Blair, Goodyear et al., 1984).

Boyer and Kasch (1970) reported a study on the effect of a controlled exercise program on blood pressure for 45 sedentary men who were from 35 to 61 years of age. The men were divided into two groups, with 23 hypertensive men in one group and 22 normotensive men in the other group. A diastolic blood pressure greater than 95 mm Hg was used to qualify the hypertensive group, and resting blood pressures of 140/90 mm Hg or less were required for membership in the normotensive group. The study excluded persons with only systolic hypertension. All of the men were self-reported as sedentary at the beginning of the study. The supervised exercise program, which lasted 6 months, was conducted twice a week. At the beginning of each session, all subjects participated in 15 to 20 minutes of warm-up calisthenics followed by a walk-jog phase that lasted for 30 to 35 minutes. The pace was at a level of approximately 60% of each person's maximum age-adjusted heart rate during the

first 3 months, and approximately 70% of their age-adjusted heart rate during the second 3 months. Each man measured his own pulse rate to satisfy the pace level. After 6 months of training, the mean diastolic pressure of the hypertensive group dropped 11.8 mm Hg and the mean systolic pressure dropped 13.4 mm Hg, which was statistically significant at the .01 level of confidence. The normotensive group had an average diastolic pressure drop of 6 mm Hg. No other diet or pharmacological therapy was utilized. The study showed that hypertensive patients can receive effective physical fitness training when properly supervised.

Hagberg et al. (1983) examined a group of 25 adolescent boys and girls, comprised of 19 whites and 6 blacks, who had been diagnosed with hypertension. The mean age of the participants was 16 years. Maximal oxygen consumption was measured while each individual ran on a treadmill. Programmed increases of incline and speed of the treadmill were used for each individual until exhaustion was reached. All of the participants had systolic hypertension and nine had diastolic hypertension before training. The average maximum oxygen consumption of the total group was approximately 15% below average values of cohorts before training. The supervised physical exercise program for the group consisted of three sessions per week for approximately

6 months. Each session began with 5 minutes of calisthenics, stretching, and warm-up exercise; followed by 30 to 40 minutes of aerobic exercise with an intensity of about 60 to 65% of maximal oxygen consumption; and finished with a 5-minute cool-down period. Measurements taken at the end of physical training showed a significant decrease in both systolic and diastolic blood pressure. Participant's blood pressures were measured again approximately 9 months after termination of training, and the systolic blood pressure for each of the subjects was comparable to pretraining levels.

Darga, Lucas, Spafford, Schork, Illis, and Holden (1989) studied hypertension in two groups of physicians. One group consisted of 1,269 runners who averaged 10 or more miles per week and had been running for at least 5 years. The other group involved 683 nonrunners with similar life-styles, ages, professions, and socioeconomic levels. The study revealed significantly reduced cardiovascular risk factors, including reduced incidences of hypertension and fewer that required antihypertensive medication in the group of runners.

Self-selected physical fitness activity and its relationship to coronary heart disease was observed in more than 12,000 men (cited in Leon, Connett, Jacobs, & Rauramaa, 1987). Leisure-time physical activity for the preceding

year was quantified from a self-reported questionnaire into three levels of fitness (low, moderate, and high). The study, called The Multiple Risk Factor Intervention Trial (MRFIT), determined that coronary heart disease was 20% lower in the high-physical activity group when compared to the low-physical activity group (cited in Leon et al., 1987).

Kasch, Boyer, Van Camp, Verity, and Wallace (1990) conducted a longitudinal study of two groups of men over a period of 18 to 23 years to evaluate the effect of exercise on blood pressure. One group of 15 subjects exercised regularly for a period of approximately 23 years. The mean age of the exercisers at the time of the initial test was 45 years. The same group was retested at 68 years of age. A control group of 15 sedentary subjects was first tested at the mean age of 52 years, and retested at a mean age of 70 years. The exercising group had an average resting blood pressure of 120/79 initially, and 120/78 on the retest after 23 years. The sedentary group had an average resting blood pressure of 135/85 initially, and 150/90 on the retest after 18 years. The exercising group started lower and decreased over time while the sedentary group started higher and increased over time.

A study was conducted to determine if endurance exercise training could decrease blood pressure in older men

and women (Hagberg, Montain, Martin, & Ehsani, 1989). Participants ranging in age from 61 to 67 years, and identified as having essential hypertension, were randomly assigned to one of three groups. A maximal treadmill exercise test was used for the purpose of excluding subjects with cardiovascular disease. The low-intensity and the moderate-intensity groups received exercise training for 9 months, and the control group did not receive training. The low-intensity group trained at a level of 53% of maximal oxygen consumption while the moderate-intensity group trained at a level of 73% of maximal oxygen consumption. The researchers found that low-intensity training may lower blood pressure in older hypertensive persons as much or more than moderate-intensity training. This information may be useful for the elderly and cardiac rehabilitation patients who can manage a self-directed walking program without medical supervision (Hagberg et al., 1989).

Pescatello, Fargo, Leach and Scherzer (1991) studied the short-term effect of vigorous exercise on blood pressure among male volunteers ranging from 40 to 50 years of age. Half the men were mildly hypertensive and the other half were normotensive. Supervised exercise sessions were conducted on a bicycle ergometer every third day for a period of 2 weeks. Participants exercised for periods of 30 minutes at either 40% or 70% of maximal oxygen consumption.

Each participant wore a 24-hour blood pressure monitor following the exercise sessions. Findings indicated a significant decrease in the blood pressure of mildly hypertensive subjects for a period of more than 12 hours following exercise. Results of the low-intensity exercise (40% of maximal oxygen consumption) were comparable to moderate-intensity exercise (70% of maximal oxygen consumption).

A total of 411 men and women aged 18 to 65 years was evaluated for the purpose of determining the effects of age on the relationship between blood pressure and physical fitness (Siconolfi, Lasater, McKinlay, Boggia, & Carleton, 1985). Physical fitness of the randomly selected subjects was estimated using a bicycle ergometer test. Persons diagnosed with cardiovascular disease were excluded from the study. Siconolfi and associates found that the relationship between physical fitness and blood pressure was strongly influenced by the age of the participants.

More than 4,000 men between 30 and 69 years of age at baseline were followed for an average of 8.5 years to examine the association between physical fitness and subsequent cardiovascular disease mortality (Ekelund et al., 1988). There were 1,170 exclusions for various health reasons, leaving a total of 3,106 participants in the study. Submaximal treadmill exercise test procedures were used to

evaluate physical fitness. Ekelund and associates found that low levels of physical fitness were associated with an increased risk of mortality from cardiovascular disease.

Slattery and Jacobs (1988) conducted a study of U.S. railroad workers to measure the effect of physical fitness on cardiovascular disease mortality. More than 3,000 middle-aged white men were selected initially for the study. Pre-existing cardiovascular disease, determined from a standardized assessment, was the basis for excluding 465 men from the study. Men with lower levels of physical fitness were found to be at a significantly greater risk of cardiovascular mortality.

The Framingham survey, initiated in 1948, followed a cohort of 5,209 men and women while statistically analyzing the incidence of cardiovascular disease together with related morbidity, mortality, and lifestyle habits of the subjects. After many years of follow-up, findings showed that cardiovascular events were strongly, inversely related to the physical activity index of the subjects (Kannel, Belanger, D'Agostino, & Israel, 1986).

Duncan and associates (1985) conducted a 16-week exercise program to measure the effects of exercise on patients with an elevated diastolic blood pressure. The study involved 56 sedentary, white men, whose ages ranged from 21 to 37 years, and who had a diastolic blood pressure

ranging from 90 to 104 mm Hg. Most of the subjects had never received antihypertensive medication. A control group remained sedentary while two exercise groups followed an exercise regimen that required 60-minute sessions, three times per week, at a level of 70% to 80% of their predicted maximal heart rate. Findings at the end of the study showed mean diastolic blood pressure decreases of 6.3 mm Hg for the control group, 10.3 mm Hg for the normotensive group, and 15.5 mm Hg for the hypertensive group. The findings indicated a strong, inverse association between aerobic exercise training and resting blood pressures.

Twenty Japanese men and women with essential hypertension were randomly assigned to one of two groups in a study of exercise participation as a nonpharmacological therapy for hypertension (Urata, Tanabe, Kiyonaga, Ikeda, & Tanaka, 1987). The average age of the participants was 50 years. The exercise group worked out on a bicycle ergometer under supervision for one hour, three times per week, for 10 weeks. The matched hypertensive control group did not exercise. At the end of the 10-week period, blood pressures of the exercise group had decreased significantly while there was no change in the matched control group.

Weber, Barnard, and Roy (1983) conducted a study involving 70 participants (43 men, 27 women) ranging in age from 70 to 88 years. Forty-six of the participants were

hypertensive, 13 had diabetes mellitus, and 4 had osteoarthritis. All participants either were self-selected or were referred by a physician. During the 26-day study, the subjects were restricted to the Pritikin Diet (13% protein, 80% complex carbohydrate, and about 7% fat; cited in Weber et al.). Alcohol, tobacco, and caffeinated beverages were not permitted during the study. A walking exercise activity of approximately 30 minutes (two times per day) was assigned to all participants. At the end of the 26-day period, the average weight loss was 2.2 Kg; total cholesterol was reduced an average of 19%; 66% of the participants had reduced their blood pressure (though not statistically significant), and 9 of 18 participants for whom antihypertensive medication had been prescribed, discontinued its use.

Barnard (1991) studied 4,587 adult men and women for a period of 3 weeks. During that short period of time, participants were prescribed the Pritikin high-complex-carbohydrate, high-fiber, low-fat diet in combination with daily aerobic exercise which primarily involved walking. After only 3 weeks, the mean total serum cholesterol level dropped 23%. Grundy (1991) pointed out possible dangers in long-term use of a very-low-fat diet, including a drop in high-density lipoprotein (HDL) cholesterol level.

In a study conducted by Kiyonaga, Arakawa, Tanaka, and

Shindo (1985), a group of hypertensive patients were subjected to an aerobic exercise program following a 6-week pre-exercise period, during which time all antihypertensive medications were discontinued. A mild exercise program required the patients to spend 60 minutes on a bicycle ergometer, three times per week, for 10 weeks. A similar but increased work load was continued for the next 10 weeks. Fifty percent of the patients reduced their systolic blood pressures by 20 mm Hg and their diastolic blood pressures by 10 mm Hg after the first 10 weeks, and 78% had reduced blood pressures an equal amount by the end of the second 10-week period. Results of the study suggest that exercise therapy can be a very important instrument for treating essential hypertension (Kiyonaga et al., 1985).

A long-term study was conducted by Roman, Camuzzi, Villalon, and Klenner (1981) to examine the effect of physical training on hypertensive patients. A total of 30 chronic hypertensive (stage I and stage II) female patients were used in the research. Most of the patients had previously been receiving antihypertensive medication. For 3 weeks prior to the trial, all medications except minor sedatives were terminated in order to remove the effects of drug therapy. The prescribed exercise regimen consisted of varied aerobic exercises lasting 30 minutes, three times per week, at a training intensity of approximately 70% of

age-adjusted maximal heart rate. Three patients dropped out during the first year, and the remaining 27 patients completed from 12 to 30 months of followup. Resting blood pressures decreased significantly during and immediately following training, then increased again when training was discontinued for 3 months (Roman et al., 1981).

Cade and associates (1984) examined 105 hypertensive men and women to determine the effect of exercise training on blood pressure levels. The exercise program consisted of walking and subsequently jogging up to two miles per day. There was no diet intervention. A total of 78 patients were actively followed for an average of more than 5 years. A mean blood pressure decrease of 15 mm Hg was reported in the 58 patients who were not taking antihypertensive medication prior to enrolling in the exercise program. Of the 47 patients who previously had been receiving antihypertensive therapy, 24 were able to discontinue medication and others were able to reduce medication. After 3 months of exercise, 15 patients were returned to a sedentary lifestyle which was continued for 3 additional months. At the end of the sedentary period, 5 patients had no change or a slight drop in blood pressure while 10 patients had a significant increase in blood pressure.

Owens, Matthews, Wing, and Kuller (1990) conducted a study of 541 premenopausal women to measure the effect of

physical activity on cardiovascular risk factors. The women selected for the study were 42 to 50 years of age, had menstruated within 3 months prior to the study, tested negative for diabetes, tested negative for hypertension, and were not taking medication known to be used for coronary heart disease therapy. The subject's personal data (including health behavior, medical history, and physical activity) were gathered by telephone and personal interviews. Additional data collected at a subsequent clinic visit included blood pressure, heart rate, and fasting blood sugar samples. Self-reported physical activity of the women was measured by the Paffenbarger Activity Questionnaire, and each was classified into four groups according to weekly energy expenditure expressed in kilocalories of less than 500 to over 2,000 per week. Women who reportedly expended 2,000 kilocalories per week had significantly lower total cholesterol, triglycerides, and low-density lipoprotein cholesterol. Women reporting activity of 1000 kilocalories or more per week had higher high-density lipoprotein cholesterol and lower diastolic blood pressure. The study supported the theory that women's cardiovascular risk profiles were improved with moderate physical activity. Further research was recommended by Owens and associates in order to clarify the relationship between physical fitness levels and hypertension in women.

Body Mass Index and Blood Pressure

Cambien, Chretien, Ducimetiere, Guize, and Richard (1985) pointed out that body mass index has a direct influence on blood pressure, but confounding variables cloud the issue. Hovell (1982) estimated that 30% of male adults and 40% of female adults in America, were 20% or more overweight.

Studies have indicated "the higher the weight, the higher the blood pressure" (Hovell, 1982, p. 360). Cross-sectional and longitudinal studies have shown a positive correlation between weight and hypertension (Pan, et al., 1986; Perloff, 1989). Bray (1980) noted that epidemiological studies have identified increased probabilities that obesity will predispose a person to hypertension.

Ford and Cooper (1991) stated that body mass index was clearly a predictor of the incidence of hypertension across race and sex groups. In the Harvard Alumni Study, Paffenbarger et al. (1983) found that men who were at least 20% overweight relative to height had a 78% increased risk of hypertension.

It is not muscle tissue but adiposity tissue and the manner in which the fat is distributed on the person's body that are the major factors which effect blood pressure (Donahue, Skyler, Schneiderman, & Prineas, 1990). Body mass

index expresses a weight-for-height ratio. It does not make a distinction between adipose tissue and muscle tissue.

From 1960 to the present, there has been very little change in the percentage of overweight women in the United States (Eaker, Packard, & Thom, 1989). Surveys have indicated that the percentage of overweight black women has been almost twice that of white women, and the incidence of hypertension in black women has been almost twice that of white women (Eaker et al., 1989).

Hovell (1982) reviewed the statistical evidence from 21 intervention studies concerning the effects of weight loss on hypertension and concluded that properly supervised weight loss apparently was not only a safe but also effective method for treating essential hypertension. It might be concluded, therefore, that body mass index should be considered when studying the relationship between blood pressure and physical fitness.

The Community Hypertension Evaluation Clinic ([CHECK] cited in Stamler, Stamler, Riedlinger, Algera, & Roberts, 1978) was a hypertension screening program conducted from 1973 to 1975, which involved over one million adults located in 42 states. Self-estimates were made by the participants relative to personal weight classification in their selection of weight categories of underweight, normal weight, or overweight. The prevalence of hypertension in

overweight persons between the ages of 20 and 39 years was found to be twice that of the normal weight group, and three times the underweight group. In persons 40 to 64 years of age, the researchers found prevalence of hypertension in the overweight group to be 50% greater than the normal weight group and twice that of the underweight group. Stamler et al. (1978) cited other prospective studies that showed obesity in young people and weight gain by middle-aged persons were predictive of hypertension.

A four-year trial study was conducted to determine if nutritional therapy could reduce and maintain the blood pressure of participants previously receiving effective antihypertensive drugs. A total of 189 men and women, 35 years of age and older, were randomly assigned to one of three groups. Group 1 reduced body mass index, sodium, and alcohol intake, together with antihypertensive drug withdrawal after two months. Group 2 received no other intervention except antihypertensive drug withdrawal after two months. Group 3 had no intervention and continued antihypertensive therapy. Members of Groups 1 and 2 resumed antihypertensive therapy if blood pressures could not be controlled. After 4 years, 39% of Group 1 remained normotensive without medication. Only 5% of Group 2 remained normotensive without drug therapy (Stamler et al., 1987).

Another study examined 24 postmenopausal, obese, hypertensive, non-diabetic white women. Ages of the subjects ranged from 49 to 67 years. All participants were hospitalized and placed on an 800 calorie per day controlled diet with fixed proportions of 55% carbohydrate, 22% fat, and 23% protein. The diet also included a fixed daily intake of sodium, potassium, and calcium. Subjects' blood pressure drop was directly related to weight loss. When dietary intake was controlled, changes in sodium and potassium balance did not effect changes in blood pressure. Weight reduction appeared to have an independent effect on lowering blood pressure (Weinsier et al., 1991).

Risk Factors for Hypertension Applicable to Women Exclusively

Cardiovascular and coronary heart disease risk factors associated exclusively with women are menopause and postmenopausal hormones, oral contraceptive use, and pregnancy, any of which can effect blood pressure (Corrao, Becker, Ockene, & Hamilton, 1990). Petitti, Wingerd, Pellegrin, and Ramcharan (1979) found that long-term use of oral contraceptives was associated with a significantly increased risk of cardiovascular disease. They stated further that women who use oral contraceptives should be strongly encouraged not to smoke. Becker (1990) reported

that systolic blood pressure increased in most women who have a long-term history of using oral contraceptives.

High levels of serum cholesterol and high blood pressure have been associated with coronary artery disease, but total cholesterol levels and blood pressure are not strongly correlated with each other (Hulley, 1988). There is epidemiologic evidence, however, that high-density lipoprotein (HDL) levels are inversely predictive of hypertension and coronary artery disease (Nachtigall & Nachtigall, 1990). Nachtigall and Nachtigall stated further that, prior to menopause, younger women generally have higher levels of HDL and lower levels of low-density lipoproteins (LDL).

The HDL levels in healthy men are approximately 45 to 55 mg/dl, and may decrease with age. The HDL levels in women normally average 10 to 15 mg/dl higher than men. This higher level is believed to be directly related to the female hormone estrogen, which is common in premenopausal women (Rifkind, 1990). Rifkind also found that high-density lipoprotein (HDL) levels were usually lower in persons who smoked and persons who were obese. For each change in HDL level of 10 mg/dl, risk of hypertension is increased or decreased as much as 50% (Kannel, 1987).

Cooper (1990) stressed that HDL/total cholesterol ratio is a more important predictor of hypertension than the level

of either HDL or total cholesterol. In order to provide better protection against hypertension and atherosclerosis, he recommended that women achieve HDL/ total cholesterol ratio of 5.0 or less.

Duncan, Gordon, and Scott (1991) completed a recent study that analyzed the correlation between cardiorespiratory fitness and cardiovascular risk profile. The randomized clinical study involved premenopausal women ranging from 20 to 40 years of age. Fifty-nine women (more than 80% were white) completed the physical training described as a supervised walking program with a frequency and duration of 5 days per week for 24 weeks. Participants were randomly assigned to one of four groups: aerobic walkers ($n=16$), brisk walkers ($n=12$), strollers ($n=18$), and controls ($n=13$). The walking distance was 3 miles per day, 5 days per week for all of the walkers. Intensity separated the three groups of walkers. The aerobic walkers walked 3 miles in 36 minutes; the brisk walkers, 3 miles in 45 minutes; and the strollers, 3 miles in 60 minutes. The controls continued the same sedentary lifestyle as before. At the end of the 24-week training period, cardiorespiratory fitness improved significantly and was dose-related (based on increase in maximal oxygen demand). The cardiovascular risk profile was not dose-related (HDL cholesterol levels rose significantly for all walkers but was unrelated to

walking intensity). The increase in HDL for the strollers with the lowest intensity was equal to that of the aerobic walkers who had the highest training intensity and the highest cardiorespiratory fitness level.

Barrett-Connor (1989) stated that HDL/total cholesterol ratio may be the most important factor involved in providing protection from cardiovascular disease. Smoking reduces HDL cholesterol levels and menopause generally occurs at an earlier age in women who smoke while physical activity is effective in raising a person's HDL level (Kannel, 1987). Without estrogen replacement in postmenopausal women, the HDL cholesterol level believed to provide a gender advantage protective effect against coronary artery disease will decrease (Corrao et al., 1990).

The early belief that estrogen replacement therapy provided a protective effect from cardiovascular diseases for women, following natural or surgical menopause, was probably based on the fact that women had a lower rate of coronary artery disease prior to menopause, when compared to men of about the same age. Most studies have found that estrogen replacement therapy does result in a significant reduction in both systolic and diastolic blood pressure in postmenopausal women (Henderson, Ross, Paganini-Hill, & Mack, 1986; Stampfer et al., 1985). Studies also have confirmed that natural estrogen therapy decreased LDL

cholesterol and increased HDL cholesterol levels (Barrett-Connor, 1989). In addition, Barrett-Conner pointed out that natural estrogens are used almost exclusively for estrogen replacement therapy in postmenopausal women, whereas synthetic (man-made) estrogens are used in oral contraceptives.

Stampfer et al. (1985) conducted a survey of female nurses to study the effect of postmenopausal estrogen use on coronary heart disease. For the study, mailed questionnaires were sent to 121,964 married female nurses who were 30 to 55 years of age. Information was sought on a variety of personal health questions, including natural or artificial menopause, hypertension, diabetes, and family medical history. Results of the data supported the theory that estrogen replacement therapy will reduce the risk of coronary heart diseases.

A prospective study was conducted to measure the effect of hormone-replacement therapy in postmenopausal women, the majority of which were white, married, and college educated (Matthews et al., 1989). The study began initially with 541 healthy premenopausal women between the ages of 42 and 50 years. As soon as the women stopped menstruating, they were randomly assigned to either the control group or the intervention group. Each participant in the intervention group was evaluated after receiving hormone-replacement

therapy for 12 months. Results showed that HDL cholesterol declined significantly and LDL cholesterol increased significantly from baseline to examination in the postmenopausal women who did not receive hormone-replacement therapy. HDL and LDL cholesterol levels did not change in the group of postmenopausal women who received hormone-replacement therapy (Matthews et al., 1989).

Several researchers have examined the effect of estrogen replacement therapy for postmenopausal women and have reported results that suggested estrogen use does provide a protective effect for coronary heart disease (Ross, Paganini-Hill, Mack, Arthur, & Henderson, 1981; Szklo, Tonascia, Gordis, & Bloom, 1984; Henderson et al., 1986). Although more recent studies have supported the positive benefit to cardiovascular health from estrogen therapy, the Framingham study reported no increased benefit by estrogen users (Gordon, Kannel, Hjortland, & McNamara, 1978). A subsequent re-analysis of the Framingham data in women 50 to 60 years of age found the overall risk of coronary heart disease in estrogen users to be about half that of nonusers (Barrett-Connor, 1989).

Diabetes Mellitus and Blood Pressure

Paffenbarger and Hyde (1980) stated that exercise has been shown to increase insulin sensitivity and reduce the

risk for adult-onset diabetes. Helmrach, Ragland, Leung, and Paffenbarger (1991) studied the effectiveness of physical activity in preventing noninsulin-dependent diabetes mellitus. The study involved 5,990 male alumni of the University of Pennsylvania over a 14-year period. Respondents completed a questionnaire on lifestyle habits and health in 1962 and responded to a similar questionnaire in 1976. Self-reported physical activity was measured by the Paffenbarger Activity Questionnaire based on participants weekly energy expenditure expressed in kilocalories. Physical activity of the respondents ranged from less than 500 to over 3,500 kilocalories per week. The incidence of noninsulin-dependent diabetes mellitus was reduced by 6% for each 500 kilocalories of total energy expended per week by the participants. Subjects with hypertension had almost twice the incidence of diabetes during the followup period, and normotensive subjects and men with a family history of diabetes had almost three times the incidence when compared to men with no family history of diabetes. Helmrach and associates (1991) noted that physicians should recommend physical activity to their noninsulin-dependent diabetes mellitus patients because of its potential for increasing sensitivity to insulin. They also strongly encouraged lifestyle intervention (diet and exercise) as nonpharmacological treatment to help control

obesity, hyperlipidemia, and hypertension, which, in turn, is expected to have a substantial effect on reducing risk factors for noninsulin-dependent diabetes mellitus.

Barrett-Connor, Criqui, Klauber, and Holdbrook (1981) found an association between diabetes and hypertension in both men and women at all ages, even after adjusting for obesity. Donahue, Skyler, Schneiderman, and Prineas (1990) cited a large epidemiological survey by Modan and others which showed glucose intolerance progressively increasing with increased hypertension. Glucose intolerance was defined in this study as the development of hyperglycemia or adult-onset diabetes (diabetes mellitus). Glucose intolerance was found in 27.8% of the normotensive group, 48.1% of the untreated hypertensive group, and 61.7% of the treated hypertensive group.

Healthy but previously sedentary men, approximately 25 years of age, were examined in a study to test the effect of physical training on insulin sensitivity. The exercise program consisted of riding a cycle-ergometer for 1 hour, four times per week, at approximately 65% of each person's maximum predicted age-adjusted heart rate. The duration of the training was 6 weeks. Results at the end of the training period showed an increase in insulin binding that resulted from a 50% increase in the number of insulin receptors. It was pointed out that physical training

increased muscle tissue sensitivity for insulin uptake in direct proportion to fitness improvement (Soman, Koivisto, Deibert, Felig, & DeFronzo, 1979). Helmrich and associates (1991) stated that adult-onset diabetes was characterized by decreased insulin sensitivity. Krotkiewski and associates (1979) suggested a possible association between elevated blood pressure and metabolic variables, including plasma insulin and blood glucose.

Age and Blood Pressure

The variables associated with elevated blood pressure in older adults are not dissimilar to those of younger adults and nonpharmacological interventions are recommended for older as well as younger adults. In most industrialized countries, hypertension generally increases with age. Older persons, over 55 years, have twice the prevalence of hypertension when compared with younger adults, and the prevalence of hypertension increases progressively with age (Harlan et al., 1984). Hypertension is not a health problem in all societies. In some primitive or unacculturated societies, blood pressure does not increase with age as it does in most industrialized societies (Fries, 1976; Schoenberger, 1986).

Exercise alone is not always effective in reducing blood pressure, especially in older adults. Seals and

Reiling (1991) conducted a study involving 34 subjects (24 men and 10 women) who were 50 years of age and older. All of the subjects were hypertensive (diastolic pressure from 90 to 105 mm Hg). Twelve of the subjects were randomly assigned as nonexercising controls. All participants were free of coronary heart disease based on a physical examination and medical history, and all were within 20 percent of ideal body weight based on their body mass index. All participants except the control group participated in a regular aerobic exercise program for 6 to 12 months. Instead of a blood pressure check at rest, arterial blood pressure was measured with a noninvasive ambulatory monitor which measured blood pressure continuously for a 24-hour period. The authors concluded that regular low-intensity aerobic exercise produced insignificant reductions in 24-hour levels of blood pressure in middle-aged and older adults.

Nearly 60% of the mortality associated with increased blood pressure can result from mild hypertension; although, in the last 10 to 15 years there has been a dramatic decline in cardiovascular mortality (Schoenberger, 1986). Schoenberger stated that, at present, explanations are only theoretical, however, hypertension continues to be a major public health problem.

Alcohol and Blood Pressure

Epidemiological studies have reported a relationship between alcohol consumption and elevated blood pressure (Arkwright, Beilin, Rouse, Armstrong, & Vandongen, 1982; Maheswaran, Beevers, & Beevers, 1992). There is considerable clinical and epidemiological evidence that an alcohol consumption of approximately three or more drinks per day in adult men and women is related to increased blood pressure, both systolic and diastolic (Gruchow, Sobocinski, & Barboriak, 1985; Klatsky, Friedman, & Armstrong, 1986; Witteman et al., 1990). Other studies have reported the relationship to be dose-related (Harburg, Ozgoren, Hawthorne, & Schork, 1980).

Almost 5,000 men and women, 20 years of age or older, were recruited from nine different North American populations to study the relationship between alcohol consumption and blood pressure. The highest blood pressures recorded in men were those consuming approximately three drinks of alcohol or more per day, and the lowest pressures were the nondrinkers or those consuming less than one drink per day. Results of the data for women showed a U-shaped relationship with nondrinkers and heavy drinkers (more than 2 drinks per day) recording the highest blood pressure levels. Blood pressure levels for nondrinking women decreased when the data were adjusted for age, obesity,

smoking, exercise, education, and use of hormones. Alcohol consumed during the preceding 24 hours significantly increased blood pressure in women (Criqui, Wallace, Mishkel, Barrett-Connor, & Heiss, 1981).

A study using a large cohort of female registered nurses was conducted to evaluate the relationship between alcohol consumption and the incidence of hypertension. The prospective study involved 58,218 healthy, normotensive, American women (98% white) ranging between 39 and 59 years of age. Data were collected from a mailed survey questionnaire with followup questionnaires sent to the participants every two years. All data relative to alcohol consumption and blood pressure were self-reported. Blood pressures were clinically measured on two sub samples of the participants to validate self-reported diagnosis of hypertension. Self-reported blood pressure data were determined to be valid. After four years of followup, 3,275 females reported an initial diagnosis of elevated blood pressure greater than 140/90 mm Hg. Results of the survey showed that 91% consumed between zero and two drinks per day, 5% consumed between two and three drinks per day, and 4% consumed more than three drinks per day. When adjusted for age and Quetelet's index (body mass index), the authors found a significant increase in the risk of hypertension for women consuming between two and three drinks per day and a

progressively increased risk for women consuming more than three drinks per day. Persons consuming two or fewer drinks per day were found to have a slightly reduced risk of hypertension when compared to nondrinkers (Witteman et al., 1990).

A study was carried out to measure the cardiovascular risk factor from alcohol consumption on employees of the Chicago Western Electric Company (Dyer et al., 1977). A total of 1,899 white male employees ranging from 40 to 55 years of age were evaluated. Data from the survey questionnaire showed 117 men who reported consuming five or more drinks per day. The group of 117 men, classified as problem drinkers, were found to have a significantly higher systolic and diastolic blood pressure than the average remaining employees.

Dyer and associates (1977) conducted a similar study of 1,233 white male employees of the Peoples Gas Company of Chicago. They found 38 problem drinkers with an elevated blood pressure, faster heart rates, a higher percentage of smokers (86.8%), and body mass indexes almost 10% less than the mean of the remaining employees.

Gruchow and others (1985) analyzed the data from the first Health and Nutrition Examination Survey (HAYNES I, n=9,553) male and female participants, to study the evidence of alcohol use as a predictor of hypertension. Heavy

alcohol use (more than two ounces per day) was significantly and directly correlated with elevated systolic blood pressure.

Harburg and associates (1980) studied an adult population of men and women from a community in Michigan. Data were gathered from a longitudinal health project on 1,481 persons ranging from 18 to 70 years of age. The highest levels of alcohol consumption for both men and women were associated with the highest levels of blood pressure, whether or not adjusted for age and weight. For men, there was a slight dip in systolic and diastolic blood pressure for those consuming one to two drinks per week. There was a more pronounced dip (more than 10 mm Hg systolic and more than five mm Hg diastolic) in blood pressure for women at a consumption level of approximately four drinks per week.

Gordon and Doyle (1986) conducted an 18-year prospective study of the relationship between alcohol consumption and other variables including blood pressure. The study involved over 1900 male state civil service employees in New York. Results of the study showed a positive and significant correlation between alcohol consumption and blood pressure, and the increase in blood pressure was dose-related (the higher the consumption, the higher the blood pressure).

Fortmann, Haskell, Vranizan, Brown, and Farquhar (1983)

conducted a study to evaluate the relationship between blood pressure and alcohol consumption in a representative community population. The population samples from four cities included 883 males and 959 females ranging from 20 to 74 years of age. The association between blood pressure and alcohol consumption was found to be different between men and women. Increased alcohol consumption of up to three drinks per day had insignificant effect on blood pressure of younger women (49 years or less) but, in older women (50 to 74 years), higher consumption was positively and significantly associated with elevated blood pressure. Men who consumed three or more drinks per day were found to have elevated blood pressures in the middle age group (35 to 49 years) and the older group (50 to 74 years), while younger men, below 35 years, did not show elevated blood pressure. The middle age group who consumed up to approximately one drink per day had the lowest blood pressure of any other group, including nondrinkers. Young women (20 to 34 years) who were taking birth control pills were found to have a significantly higher systolic blood pressure, but there was no significant relationship with alcohol consumption.

Klatsky, Friedman, Siegelau, and Gerard (1977) used health-check questionnaire data from 83,947 male and female patients of the Kaiser-Permanente Medical Care Program to measure the effect of alcohol consumption on blood pressure.

Three groups were developed according to daily alcohol consumption: two drinks or less per day, three to five drinks per day, and six or more drinks per day. More than 80% of the patients were Caucasian. Systolic blood pressure among the women who had two or fewer drinks per day averaged approximately 3 mm Hg lower than the group of women who were nondrinkers. Women who consumed three or more drinks per day had significantly higher systolic and diastolic blood pressures as well as a substantially higher prevalence of hypertension. The elevating effects of three or more alcohol drinks per day on blood pressure was independent of age, sex, race, education, and smoking.

A subsequent study reaffirmed the association between alcohol consumption and elevated blood pressure among more than 80,000 male and female patients from the Kaiser Permanente Medical Care Program (Klatsky et al., 1986). Blood pressures among white women increased only for those who consumed three or more drinks per day. There was a dose-related progressive increase in systolic and diastolic blood pressure among white men who consumed more than two alcohol drinks per day, and the pressure peaked at approximately six to eight drinks per day. White men and women showed a more consistent blood pressure and alcohol use relationship than did black men or black women. Results of this study also indicated that past alcohol consumption

of as much as three drinks per day showed no relationship to blood pressure if those persons were abstainers at the time of the study (Klatsky et al., 1986).

Summary

Hypertension is a very common chronic disease that becomes more prevalent in sedentary women, especially as they become older. Other risk factors for hypertension may include weight, cigarette smoking, alcohol consumption, and diabetes. Hypertension very often predisposes to progressive cardiovascular disease, coronary heart disease, stroke, and renal failure. It has been well documented that lifestyle modifications, including exercise, a nonpharmacological treatment, are associated frequently with reduced blood pressure. When nonpharmacological methods are inadequate, antihypertensive medication should be used.

CHAPTER III

METHODOLOGY

A prospective study of 2,677 apparently healthy adult women, ranging from 20 to 78 years of age, associated with the Cooper Clinic in Dallas, Texas was conducted. The study utilized a quasiexperimental design for the purpose of examining the differences between levels of physical fitness and the incidence of hypertension in a group of females followed up for 1 to 19 years. The study also examined differences between women with other risk factors and the incidence of hypertension.

Sample

The subjects in this study received one or more medical examinations plus preventive medical counseling sessions during a 19-year period from 1970 to 1989. Subjects included in the study were between the ages of 20 and 78 years, were mostly self-referred residents from across the United States, and completed and returned the 1990 mailed survey questionnaire.

The survey questionnaire requested information on exercise activity, health habits (including smoking

behavior, alcohol consumption, physical functioning capability, and social functioning), medical history, (including reproductive history), and basic dietary history. Medical history questions covered end points (physician diagnoses) such as cardiovascular disease and diabetes. During at least one visit to the Cooper Clinic for a medical examination, the cardiovascular fitness of each participant was measured by the Cooper Clinic Modified Balke Treadmill Protocol (Blair et al., 1989).

Only subjects who were classified as healthy at the time of their initial visit to the Cooper Clinic were included in the study. These clients had normal electrocardiograms at rest and during exercise; had no personal histories of heart attack, stroke, high blood pressure, or diabetes; and achieved 85% or more of their age-predicted maximal heart rate. All others were excluded from the study.

The exclusion criteria resulted in removing 1,650 women from the study to strengthen the validity of the results. If women with known cardiovascular risk problems had been included, the correlation between physical fitness and hypertension would have been increased substantially.

Most of the subjects had gone to the Cooper Clinic for a routine physical fitness evaluation or health examination. Prior to the examination, each patient signed an informed

consent form; completed a demographic questionnaire, and medical and family history; and prepared a one-week diet-recall record. Each patient reported for her examination following a 12-hour fast and was asked not to smoke until after the examination was completed. Each patient's resting blood pressure was taken while she was seated, by trained technicians according to recommended protocol, using periodically calibrated mercury sphygmomanometers.

A venous blood sample was taken from each subject and was analyzed by trained technicians for uric acid, glucose, and blood lipids. Lipid measurements were calibrated against standards developed by the Centers for Disease Control. Resting electrocardiograms were taken while patients were in a supine position, and subsequently were recorded again during a maximal treadmill test utilizing the Cooper Clinic Modified Balke Treadmill Protocol (Blair et al., 1989). During the treadmill test, patients were strongly encouraged to continue walking/running until exhaustion. Multiple leads were attached to each patient and monitored during the treadmill test. According to Pollock and associates (1982), the treadmill time used in this study to measure levels of physical fitness in women was highly correlated ($r = .94$) with maximal oxygen uptake (VO_{2max}). VO_{2max} is defined as maximal aerobic power, or the

maximal ability of the individual to utilize oxygen because fatigue prevents further increases (Pollock et al., 1982).

Nude body weight and height were measured on a standard physician's scale. Donahue et al. (1990) defined body mass index as a calculated index of obesity (weight [kg]/height [m]^{1.5}). The index expresses a weight-for-height ratio, but it does not make a distinction between adipose tissue and muscle tissue.

The placement of each patient in one of five physical fitness categories was based on age and total time on the treadmill test, with Level 1 being the least fit, and Level 5 being the most fit. Assignment to the different fitness categories was based on treadmill performance norms for women developed after several hundred tests (Blair, Lavey, Goodyear, Gibbons, & Cooper, 1984; Gibbons, Blair, Cooper, & Smith, 1983). For the purpose of this study, fitness levels were merged into three groups. Tertiles 4 and 5 were combined to form the high-fit group; tertiles 2 and 3 were combined to form the moderately-fit group, and tertile 1 is the low-fit group.

Instrumentation

Questions on the 1990 survey were adapted from the 1982 and 1986 surveys developed by the Cooper Institute for Aerobics Research. The 1982 survey was tested extensively

for validity and reliability (the 1986 questionnaire was essentially the same as the 1982 questionnaire). Validation of nonresponse bias (persons who did not return a completed questionnaire) for the 1982 survey was tested, and no significant selection bias was found (Blair, Goodyear et al., 1984). A test of the validity of self-reported hypertension among 207 randomly selected male and female respondents, indicated a sensitivity of 98% and a specificity of 99% (Blair, Goodyear et al., 1984). A validity analysis of the same question involving self-reported hypertension in another study indicated a sensitivity of 82% and a specificity of 98% (Paffenbarger et al., 1983).

The 1990 draft questionnaire first was formulated by the internal staff at the Cooper Institute for Aerobics Research, and then was submitted to a panel of external advisors. Distinguished scientists who served on the Scientific Advisory Board at that time were Lester Breslow, MD, MPH; William L. Haskell, PhD.; William B. Kannel, MD; and Ralph S. Paffenbarger, Jr., MD, DrPH. The overall objective of the questionnaire was to collect data for the purpose of examining the associations between physical activity and physical fitness levels in relation to health, morbidity, and mortality in a defined population.

The new questions added to the 1990 instrument were

related to functional capability and quality of life. Since they will have no direct or indirect bearing on the results, validation of those questions will not be necessary for this study on hypertension. Prior to the general mailing, the 1990 questionnaire was pilot tested for response rates (Perrin, 1990). After the completed questionnaires were returned, complete data sets from all respondents were entered independently into two data files which then were compared and differences were reconciled. Subsequently, the completed questionnaires of 100 respondents were selected at random and were compared manually with their respective data file records. No significant errors were found in the data file records.

Permission to use Cooper Clinic patient data and data from the 1990 mailed questionnaire was granted by Dr. Steven N. Blair, Director of Epidemiology, Cooper Institute for Aerobics Research, Dallas, Texas (see Appendix A).

Collection of Data

Data were collected from individual patient records and from the 1990 mailed survey questionnaire (see Appendix B). Clinical data, results from patient examinations, and questionnaire responses were processed and merged by trained data entry technicians at the Cooper Institute for Aerobics Research. Data were retrieved and were verified, and errors

or missing data were identified and reconciled before analyses were initiated.

Treatment of Data

Descriptive statistics such as means, percentages and confidence intervals were used to record subject's demographic characteristics. The Mantel-Haenszel technique was used to test the hypotheses. Logistic regression was used to determine the relative risks for the incidence of hypertension in women, across three fitness levels (low, moderate, and high) with a 95% confidence level.

CHAPTER IV

FINDINGS OF THE LONGITUDINAL STUDY

The purpose of the study was to determine whether significant differences existed between baseline physical fitness measures during the subjects' initial visit to the Cooper Clinic and subsequent development of hypertension in women. A second purpose was to determine if the incidence of hypertension differed between women found to have other baseline hypertension risk factors and those who did not. Those variables included body mass index, presence of diabetes mellitus, cigarette smoker, age, and alcohol use.

Description of Sample

The study population consisted of 4,327 women who completed the 1990 mailed questionnaire. Of those who completed the questionnaire, 2,677 females, ranging from 20 to 78 years of age (with a mean age of 43.4 years) were included in the study. Sixteen hundred and fifty females were excluded from the study. Subjects were excluded from the study if they had a history of a heart attack, stroke or diabetes; an abnormal electrocardiogram; a blood pressure above 140 mm Hg systolic or 90 mm Hg diastolic at the time

of their first physical examination; or if they did not achieve at least 85% of their age-predicted maximal heart rate during the treadmill test. Among the exclusions were 109 women who did not reach 85% of their age-predicted maximal heart rate. Excluding subjects with probable hypertension risk factors in addition to those found to be hypertensive was done to strengthen the analytical results.

Based on the type of clientele normally seen at the Cooper Clinic, it was estimated that most of the subjects were from middle and upper socioeconomic strata and were generally self-referred. Over 99% of the participants were Caucasian with above average levels of education.

Participants who were normotensive at the time of their initial Cooper Clinic visit, and who had no history of hypertension but reported hypertension on the 1990 survey questionnaire, were classified as incident cases of hypertension. Item number 21 in the 1990 survey questionnaire (see Appendix B) stated: "If a doctor ever told you that you had hypertension (high blood pressure) circle YES and write in (as accurately as you can remember) the year in which the diagnosis was first made." If participants did not report hypertension but acknowledged taking antihypertensive medication on item number 25 (see Appendix B), they also were classified as incident cases.

Self-reported incidence of hypertension is believed to

be valid. Blair, Goodyear et al. (1984) found a sensitivity of 98% and a specificity of 99% on the self-reported hypertension data obtained from identical survey questions.

Although counseling relative to the public health advantages of a healthy lifestyle, including exercise, was provided at the time of participants' initial physical examinations, no activity was supervised. The only personal followup occurred if a patient returned to the Cooper Clinic voluntarily for another physical examination one year or more later, or if she completed the 1990 survey questionnaire. Otherwise, there was no additional contact with participants.

Data Analyses

The software package, Statistical Analysis System (Ray, 1982) was utilized in the data analysis of this study. The null hypotheses were tested with the Mantel-Haenszel statistic, and significance was determined using 95% confidence intervals. The Mantel-Haenszel statistic, an extension of Chi-square, was a statistical adjustment designed for retrospective and prospective epidemiological studies (Somes, 1986).

Descriptive statistics were utilized for profiling study variables. These data, taken from both patient records and the 1990 survey questionnaire, are presented in Table 1. Four areas of special interest were identified

Table 1

Descriptive Statistics, Cooper Clinic Women

	HYPERTENSIVE WOMEN <u>n=115</u>		NORMOTENSIVE WOMEN <u>n=2,562</u>	
	<u>x</u>	<u>SD</u>	<u>x</u>	<u>SD</u>
Age (yrs)	47.9	9.4	43.2	10.1
Weight (kg)	62.7	10.2	59.6	8.7
Height (cm)	160.0	10.0	160.0	10.0
BMI	29.9	4.6	28.3	3.8
Followup (yrs)	10.9	5.4	6.9	4.8
Treadmill Time (sec)	637.8	265.6	815.8	280.2
Cholesterol (mg/dl)	216.1	41.7	202.2	36.1
HDL (mg/dl)	62.4	10.5	62.2	10.7
Resting Systolic BP (mmHg)	124.9	14.8	110.7	12.5
Resting Diastolic BP (mmHg)	82.7	9.8	74.0	8.1

without drawing conclusions. The average age of the group which later became hypertensive was approximately 4 years older than the average age of the normotensive group. Average treadmill time of the hypertensive group was 178 seconds less than the normotensive group. The average resting systolic blood pressure at baseline for the hypertensive group was 14.2 mm Hg higher than the normotensive group, and the average diastolic blood pressure was 8.7 mm Hg higher in the hypertensive group.

The first null hypothesis stated: There is no significant difference in the incidence of hypertension across baseline levels of physical fitness among female participants at the Cooper Clinic. The Mantel-Haenszel statistic was used to estimate the difference in incidence of hypertension in women across three fitness levels (low, moderate, and high). A difference at less than .001 level of significance was documented (see Table 2).

Each participant had previously been placed in one of five physical fitness categories based on the treadmill test (total length of time in seconds and adjusted for age). The five fitness categories were merged into three levels of fitness in order to meet the requirements of the first null hypothesis. Category 1 was the low-fit group, Categories 2 and 3 were the moderately-fit group, and Categories 4 and 5 were the high-fit group. As found in Table 2, the crude

incident rate (before adjusting for age, person-years of follow-up, or other confounding variables) was 10.63% for the low-fit group. This was almost double the incident rate for the moderately-fit group, which was 5.66%. The crude incident rate of the low-fit group was more than three times the crude unadjusted rate of the high-fit group, which was 3.01%.

Table 2

Fitness Levels and Blood Pressure

	Low-fit	Mod-fit	High-fit	Total
Normotensive	185 (89.37%)	667 (94.34%)	1710 (96.99%)	2562 (95.70%)
Hypertensive	22 (10.63%)	40 (5.66%)	53 (3.01%)	115 (4.30%)
				2677 (100.0%)

Note. Mantel-Haenszel (1) = 29.315; $p < 0.001$

The second null hypothesis stated: There is no significant difference in the incidence of hypertension between the group of subjects with negative self-reported diabetes and the group with positive self-reported diabetes. The Mantel-Haenszel statistic was used to test this hypothesis.

Diabetes mellitus, like hypertension, was a self-reported response (either "yes" or "no") collected from

item number 21 in the 1990 survey questionnaire. A response of "yes" was classified as an incidence case. Analysis, using the Mantel-Haenszel statistic to test this hypothesis, showed that diabetes does not significantly effect the incidence of hypertension. Data are presented in Table 3.

Table 3

Diabetes Mellitus and Blood Pressure

<u>Diabetes</u>	<u>Normotensive</u>	<u>Hypertensive</u>
Negative self-report of diabetes	2543 (95.78%)	112 (4.22%)
<u>Positive self-report of diabetes</u>	19 (86.36%)	3 (13.64%)

Note. Mantel-Haenszel (1) = 4.705; $p = 0.154$

The third null hypothesis stated: There is no significant difference in the incidence of hypertension between the group of subjects who reported consuming an average of two or fewer alcohol drinks per day and the group that reported consuming more than two alcohol drinks per day. The Mantel-Haenszel statistic was used to test this hypothesis. Alcohol consumption was based on participants' responses to questions relative to alcohol intake on the 1990 survey questionnaire (item number 6). The information identified the average amounts of beer, wine, and hard liquor consumed each week. The alcohol consumption index

was determined by combining the three alcohol categories and calculating the number of drinks per day for each participant. Participants were placed into two categories. The first group in Table 4 consumed an average of two or fewer drinks per day. The second group consumed an average of more than two drinks per day. Results of the analysis showed that alcohol use did not significantly effect the incidence of hypertension.

Table 4

Alcohol Use and Blood Pressure

Alcohol Use	Normotensive	Hypertensive
Two or fewer drinks/day	1743 (95.77%)	77 (4.23%)
> two drinks/day	819 (95.57%)	38 (4.43%)

Note. Mantel-Haenszel (1) = 0.059; $p = 0.809$

The fourth null hypothesis stated: There is no significant difference in the incidence of hypertension between the group of subjects found to be less than 20% overweight at baseline and the group that was 20% or more overweight at baseline. This hypothesis was tested by the Mantel-Haenszel statistic. Body mass index (BMI) was determined utilizing the formula: Weight(kg) divided by height (m)^{1.5}. BMI was measured at baseline (initial physical examination). The formula, although not an

accurate measurement of body fat, provides an estimate. BMI does not distinguish between extra fat (obese) and heavy (muscular). Increased body fat has a greater relationship to incidence of hypertension while lean body mass does not (Donahue et al., 1990). The participants' BMI were grouped into two categories. Group 1 in Table 5 represented individuals who were less than 20% overweight. Group 2 represented subjects who were 20% or more overweight. As Table 5 illustrates, a significant difference existed between BMI and the incidence of hypertension ($p < 0.001$).

Table 5

Body Mass Index and Blood Pressure

BMI	Normotensive	Hypertensive
< 20% overweight	1051 (97.50%)	27 (2.50%)
<u>20% or more</u> <u>overweight</u>	1511 (94.50%)	88 (4.50%)

Note. BMI = Body Mass Index. Mantel-Haenszel (1) = 14,079; $p < 0.001$

The fifth null hypothesis stated: There is no significant difference in the incidence of hypertension between the group of subjects identified as self-reported nonsmokers and the group identified as self-reported smokers. The Mantel-Haenszel statistic was used to test this hypothesis. The data on cigarette smoking was based on

an affirmative or negative answer to item number 4 from the 1990 survey questionnaire. Table 6 identifies cigarette smokers and nonsmokers. The independent effect of cigarette smoking on the incidence of hypertension was not statistically significant.

Table 6

Cigarette Smoking and Blood Pressure

Cigarette Smoking	Normotensive	Hypertensive
nonsmoker	2428 (95.78%)	107 (4.22%)
smoker	134 (94.37%)	8 (5.63%)

Note. Mantel-Haenszel (1) = 0.653; $p = 0.419$

The sixth null hypothesis stated: There is no significant difference in the incidence of hypertension between a group of subjects equal to or less than 45 years of age and a group of subjects older than 45 years of age. The Mantel-Haenszel statistic was used to test this hypothesis. The independent variable, age, collected from patient records (see Appendix C, Part I), was treated as a continuous variable when used to determine and adjust for it's effect on the relationship of physical fitness and hypertension. In Table 7, subjects were broken into two age groups: participants who were equal to or less than 45 years of age and participants older than 45 years of age.

As illustrated in Table 7, a significant difference between age groups on incidence of hypertension was documented.

Table 7

Age and Blood Pressure

Age (years)	Normotensive	Hypertensive
Equal or < 45	1568 (97.15%)	46 (2.85%)
More than 45	994 (93.51%)	69 (6.49%)

Note. Mantel-Haenszel (1) = 20.658; $p < 0.001$

Table 8 shows the relative risk of becoming hypertensive for varying levels of physical fitness, alcohol use, diabetes mellitus, cigarette smoking, and body mass index. Each of the variables was adjusted for age. Body mass index comparative analysis showed the relative risk (RR) of the heavier subjects to be 1.8, with confidence limits of (1.2, 2.7) when compared to the lighter group given a RR of 1.0. Comparative analysis showed smokers to have a RR of 1.3 with confidence limits of (0.9, 1.8) when compared with non-smokers given a RR of 1.0. The diabetics were also found to have a RR of 1.3 with confidence limits of (0.9, 1.8) when compared with nondiabetics. Subjects who reported alcohol consumption of more than two drinks per day were found to have a RR of 1.1 with confidence limits of (0.8, 1.5) when compared with those who reported consuming

Table 8

Age-adjusted rates per 10,000 person-years of followup (1970-1989) by
variable groups in women in the Aerobics Center Longitudinal Study

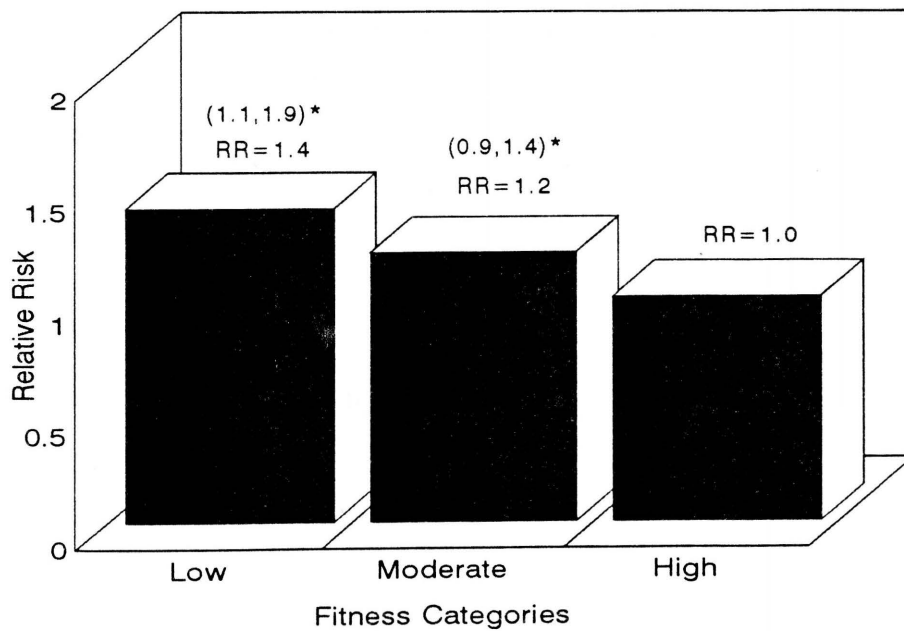
	Person- years of Followup	No. of Hypertensives	Age-Adjusted Rates per 10,000 Person-Years	Relative Risk	95% Confidence Limits
Body Mass Index					
≥ 20%	11,400.8	88 (0.77%)	72.5	1.8	1.2, 2.7
< 20%	7,587.3	27 (0.36%)	39.8	1.0	
Smoking Status					
Smoker	1,046.6	8 (0.76%)	78.5	1.3	0.9, 1.8
Non-smoker	17,941.5	107 (0.60%)	59.5	1.0	
Diabetes Mellitus					
Diabetic	172.3	3 (1.74%)	77.2	1.3	0.9, 1.8
Non-Diabetic	18,815.8	112 (0.60%)	59.7	1.0	
Alcohol Use					
> 2 drinks/day	6,159.2	38 (0.62%)	63.7	1.1	0.8, 1.5
≤ 2 drinks/day	12,829.0	77 (0.60%)	59.3	1.0	
Fitness					
Low	2,052.6	22 (1.07%)	113.6	2.4	1.7, 3.3
Moderate	6,094.9	40 (0.66%)	66.5	1.4	0.9, 2.0
High	10,840.3	53 (0.49%)	47.8	1.0	

two or fewer drinks per day. The probability of a woman in the low-fit group becoming hypertensive showed a RR of 2.4 with confidence limits of (1.7, 3.3) when compared to the high-fit group. Women who were 20% or more overweight or women classified as low-fitness were found to have a significantly increased risk of becoming hypertensive.

Hypertension-development rates per 10,000 person-years of follow-up were computed for each fitness category and were age-adjusted by the direct method, using the total experience in the Cooper Clinic female population as the standard. Age differences were adjusted by the following groups: 20-39, 40-49, 50-59, and 60 or more years. These rates were used to compute relative risks of hypertension for each fitness level (low, moderate, high) as well as for investigation of the role other variables held in confounding the relationship between hypertension and fitness. Multiple logistic regression was used to estimate relative risks of hypertension among fitness-categories after controlling for associated confounding risk factors. Interval estimation was used to calculate confidence intervals around point estimates of risk.

Figure 1 shows the relative risk of a sedentary woman

Figure 1. Relative risk of hypertension in 2,677 women in the Aerobics Center Longitudinal Study by physical fitness levels (adjusted for diabetes mellitus, alcohol consumption, body mass index, smoking status, age, and length of followup).



*95% Confidence interval

becoming hypertensive to be 1.4 with confidence limits of (1.1, 1.9) when compared to the high-fit group. This would suggest that a sedentary woman has a 40% greater probability of becoming hypertensive than a woman in the high-fit group. The moderately-fit group showed a RR of 1.2 with confidence limits of (0.9, 1.4) when compared to the high-fit group. After adjusting for confounding risk factors, the increased probability of a low-fit participant becoming hypertensive was significant.

CHAPTER V

SUMMARY OF THE STUDY

This prospective study was designed to examine the differences between physical fitness levels and the incidence of hypertension in a group of healthy adult women followed up for 1 to 19 years. The literature was reviewed for information relative to hypertension and cardiovascular response to exercise in women. Most of the prior research in this area combined men and women or used men exclusively. A large, population-based study that utilized women exclusively was not found.

Epidemiological studies show an inverse relationship between resting blood pressure and regular exercise (Bjorntorp, 1982; Paffenbarger et al., 1983). Either systolic or diastolic hypertension increases the risk of cardiovascular disease. When both systolic and diastolic blood pressures are elevated, the risks are even greater (Cooper, 1990).

Hypertension is one of the most common and most serious health problems in the United States. It is one of the major risk factors for cardiovascular and coronary heart disease (Hagberg, 1990). Several authors have emphasized a

gender difference in the diagnosis, prognosis, and treatment of cardiovascular diseases (Boucek et al., 1982; Douglas, 1986; Bush, 1990).

The prevalence and severity of hypertension increases as a person gets older. The prevalence is generally higher in men than in women but women begin catching up around age 60 (Perloff, 1989).

As stated before, the independent effect of cigarette smoking on the incidence of hypertension was not statistically significant. For the record, it should be pointed out that only 5% of the participants in this study smoked cigarettes, which is far below the national average of 28% (McGinnis, 1987). Previous studies by Blair, Goodyear et al. (1984) and Paffenbarger et al. (1983) also found that cigarette smoking did not significantly effect the incidence of hypertension.

Paffenbarger et al. (1983) reported that vigorous exercise among men was found to be associated with a reduced incidence of hypertension when compared with sedentary men in their study. This study utilized an exclusively female sample in order to help rectify the lack of cardiovascular disease research on women.

Data were collected from individual patient records and from the 1990 mailed questionnaire. Permission to use the Cooper Clinic patient record data and data from the 1990

mailed questionnaire was given by Dr. Steven N. Blair, Director of Epidemiology, Cooper Institute for Aerobics Research, Dallas, Texas.

Sample Profile

A total of 4,327 Cooper Clinic female patients completed the 1990 mailed questionnaire. There were 1,650 females excluded from the study because they had been previously diagnosed with hypertension or exhibited indications of possible coronary heart disease at baseline. The sample included 2,677 participants. The participants' ages ranged from 20 to 78, with a mean age of 43.4 years. Each participant was followed from the time of her initial examination until she completed the 1990 survey questionnaire. The range of followup was 1 to 19 years (1970-1989). The mean number of followup years for the 2,677 participants was 7.1, totaling 18,988 person-years of followup. Treadmill time, determined during the initial examination of each participant, was used to establish the levels of fitness. Risk factors were also assessed for cigarette smoking, diabetes mellitus, body mass index, age, and alcohol use.

Conclusions

The study documented 115 new cases of hypertension and 2,562 subjects who remained normotensive during the followup from 1970 to 1989, resulting in a 4.3% incident rate. A positive effect of physical exercise on blood pressure levels was documented in the study. Other variables also were found to have an influence upon the incidence of hypertension in this sample.

Hypothesis 1. There is no significant difference in the incidence of hypertension across baseline levels of physical fitness among female participants at the Cooper Clinic. REJECTED.

Hypothesis 2. There is no significant difference in the incidence of hypertension between the group of subjects with negative self-reported diabetes and the group with positive self-reported diabetes. ACCEPTED.

Hypothesis 3. There is no significant difference in the incidence of hypertension between the group of subjects who reported consuming an average of two or fewer alcohol drinks per day and the group that reported consuming more than two alcohol drinks per day. ACCEPTED.

Hypothesis 4. There is no significant difference in the incidence of hypertension between the group of subjects found to be less than 20% overweight at baseline and the group that was 20% or more overweight at baseline.

REJECTED.

Hypothesis 5. There is no significant difference in the incidence of hypertension between the group of subjects identified as self-reported nonsmokers and the group identified as self-reported smokers. ACCEPTED.

Hypothesis 6. There is no significant difference in the incidence of hypertension between a group of subjects equal to or less than 45 years of age and a group of subjects older than 45 years of age. REJECTED.

Implications

Hypertension is a major risk factor for cardiovascular disease, cerebrovascular disease, aortic aneurysm, renal disease, and coronary heart disease (Hagberg, 1990). It significantly impairs life expectancy. Hypertension is one of the most prevalent chronic diseases for which treatment is both desirable and available (Hall, 1990). As previously pointed out, nonpharmacological treatment is preferable to medication (Bjorntorp, 1982). Dietary modification and regular exercise are basic lifestyle changes that should lead to a life of reduced cardiovascular and cerebrovascular problems (Cooper, 1990). Although it is not considered hazardous for women with mild hypertension to exercise, as a safety precaution, they should be monitored during exercise (Sallis, Patterson, Buono, & Nader, 1988).

Risk factors which solely impact upon women are menopause and postmenopausal hormones, oral contraceptives, and pregnancy (Corrao et al., 1990). Any of the above can effect blood pressure and represent some of the reasons why research on men should not be casually generalized to women.

Most of the published data relative to hypertension, fitness, and health, involved men only, or men and women. There were 12,000 participants (all men) involved in the Multiple Risk Factor Intervention Trial ([MRFIT] Leon et al., 1987). There were almost 15,000 participants (all men) involved in the Harvard Alumni Study (Paffenbarger et al., 1983). Studies that involved women exclusively were very limited.

Although cardiovascular diseases often are perceived as health problems for men, the incidence of hypertension and cardiovascular disease in women is comparable to that in men. Women usually develop manifestations of cardiovascular disease after menopause (Becker, 1990). In addition to age, hypertension may also increase significantly as women become obese or sedentary (Harlan et al., 1984; Cambien et al., 1985).

A sound public health practice (healthy lifestyle) of preventing cardiovascular disease should begin early in life and continue, with some modification, for the remainder of

one's life. Rapidly increasing health care cost will continue to be a motivating factor in forcing women, as well as men, to take more responsibility for personal health care maintenance. Sedentary habits and low-fitness levels represent a monetary burden for health care insurance carriers. Insurance carriers have already increased rates for smokers and may be pressured into considering rate increases for people with other unhealthy lifestyles.

Health promotion is the science and art of helping people change their lifestyle to upgrade quality of health and increase longevity. Lifestyle change can be facilitated through a combination of efforts to enhance awareness, change behavior, and create environments that are supportive of good health practices. Supportive environments will probably have the most impact for producing lasting changes.

The participants were mostly self-referred, well educated women from middle and upper socioeconomic strata, and more than 99% white. This population may be limited in generalizability to other populations. However, Blair et al. (1989) found that participants in the Cooper Clinic population have similar clinical variables such, as total cholesterol levels, triglyceride levels, and blood pressure levels, as indicated in the Lipid Research Clinics Prevalence Study as well as in surveys conducted by the National Center for Health Statistics. Blair, Lavey et al.

(1984) also reported that levels of fitness for Cooper Clinic women were within the distribution of fitness levels found in the published literature.

A major strength of this study would include the large sample size (2,677 participants). Another major strength would include the treadmill test, a recognized scientific method of testing both men and women for physical fitness. The treadmill test is highly correlated with VO_{2max} (Pollock et al. 1982).

Several epidemiological studies suggest that physical exercise helps provide protection against hypertension and cardiovascular disease (Bjorntorp, 1982; Blair, Goodyear et al., 1984; Hagberg, 1990). It is believed that this study supported that contention.

Recommendations for Further Research

Much more research is needed to answer questions regarding the difference in morbidity and mortality between genders. Are some of the differences related to biological or behavioral factors? Many epidemiological studies indicate that biological factors do influence cardiovascular risk factors in women. An excellent example of this is the estrogen hormone, common in premenopausal women, that generally corresponds with significantly increased high-density lipoprotein (HDL) and decreased low-density

lipoprotein ([LDL] Nachtigall & Nachtigall, 1990). Smoking has been well documented as a behavioral factor in researching hypertension. Several studies have implicated heredity as a cardiovascular disease risk factor. More research is needed to determine what portion of the risk is due to biological factors which cannot be changed and what portion is due to environmental-behavioral factors (bad habits) which can be changed. Findings of this study need to be replicated by other researchers using other populations.

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APPENDICES

APPENDIX A
Letter of Permission
to Use the Aerobics Center
Longitudinal Study Data

Institute for Aerobics Research

12330 PRESTON ROAD / DALLAS, TEXAS 75230 / 214-701-8001 / FAX 214-991-4626 / TELEX No. 791578

KENNETH H. COOPER, M.D., M.P.H.
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MARILLU D. MCKEDITH, Ed.D.
Director
Computer Services

BRENDA S. MITCHELL, Ph.D.
Director, Behavioral Science
and Health Promotion

JOEL W. WOODBURN, D.D.S.
Director
Development

September 13, 1991

Joe L. Perrin
Texas Woman's University
Denton, TX

Dear Joe:

This will reply to your letter of August 1, 1991 requesting the use of the Aerobics Center Longitudinal Study data for your dissertation research. You have my permission to use all the data from the ACLS, including the 1990 mail survey data. I will be pleased to cooperate with you on your study.

Sincerely,



Steven N. Blair
Director, Epidemiology

SNB:leb

APPENDIX B

The Aerobics Center Longitudinal Study
(1990 Mail Survey Questionnaire)

THE AEROBICS CENTER LONGITUDINAL STUDY

This survey, funded by the U.S. Public Health Service and conducted by the Institute for Aerobics Research (a non-profit organization) is part of the ongoing study of all Cooper Clinic patients on lifestyle factors related to health. By completing this survey, you have a unique opportunity to contribute to a better understanding of how to prevent disease and maintain quality of life throughout the adult years.

- Most individuals find that the questionnaire can be completed in approximately 20-30 minutes.
- Replies are important from all Cooper Clinic patients; healthy or unhealthy; exercisers or non-exercisers.
- Be as accurate as possible, but provide your best estimate if you do not remember precisely.
- All responses will be kept strictly confidential like your other Cooper Clinic records.
- Please take the time to complete the questionnaire and return it to us today.

If you wish to comment on any of the questions or to qualify your answers, please write in the margins. Your comments are welcome and will be taken into account.

A summary of this research will be sent to all participants.

THANK YOU FOR YOUR HELP!



Institute for Aerobics Research
12330 Preston Road
Dallas, Texas 75230

In this section we would like to ask you about your current physical activity and exercise habits that you perform regularly, at least once a week. Please answer as accurately as possible. Circle your answer or supply a specific number when asked.

EXERCISE/PHYSICAL ACTIVITY

1. For the last **three months**, which of the following moderate or vigorous activities have you performed **regularly**? (Please circle **YES** for all that apply and **NO** if you do not perform the activity; provide an estimate of the amount of activity for all marked **YES**. Be as complete as possible.)

Walking

NO YES → How many sessions per week? _____
 How many miles (or fractions) per session? _____
 Average duration per session? _____ (minutes)

What is your usual pace of walking? (Please circle one)

CASUAL or STROLLING (< 2 mph)	AVERAGE or NORMAL (2 to 3 mph)	FAIRLY BRISK (3 to 4 mph)	BRISK or STRIDING (4 mph or faster)
--------------------------------------	--------------------------------------	---------------------------------	---

Stair Climbing

NO YES → How many flights of stairs do you climb **UP** each **day**? _____
 (1 flight = 10 steps)

Jogging or Running

NO YES → How many sessions per week? _____
 How many miles (or fractions) per session? _____
 Average duration per session? _____ (minutes)

Treadmill

NO YES → How many sessions per week? _____
 Average duration per session? _____ (minutes)
 Speed? _____ (mph) Grade? _____ (%)

Bicycling

NO YES → How many sessions per week? _____
 How many miles per session? _____
 Average duration per session? _____ (minutes)

Swimming Laps

NO YES → How many sessions per week? _____
 How many miles per session?
 (880 yds = 0.5 miles) _____
 Average duration per session? _____ (minutes)

Aerobic Dance/Calisthenics/Floor Exercise

NO YES ➡ How many sessions per week? _____
 Average duration per session? _____ (minutes)

Moderate Sports

(e.g. Leisure volleyball, golf (not riding),
 social dancing, doubles tennis)

NO YES ➡ How many sessions per week? _____
 Average duration per session? _____ (minutes)

Vigorous Racquet Sports

(e.g. Racquetball, singles tennis)

NO YES ➡ How many sessions per week? _____
 Average duration per session? _____ (minutes)

Other Vigorous Sports

or Exercise Involving

Running (e.g. Basketball, soccer)

NO YES ➡ Please specify: _____
 How many sessions per week? _____
 Average duration per session? _____ (minutes)

Other Activities

NO YES ➡ Please specify: _____
 How many sessions per week? _____
 Average duration per session? _____ (minutes)

Weight Training

(Machines, free weights)

NO YES ➡ How many sessions per week? _____
 Average duration per session? _____ (minutes)

**Household Activities (Sweeping, vacuuming,
 washing clothes, scrubbing floors)**

NO YES ➡ How many hours per week? _____

Lawn Work and Gardening

NO YES ➡ How many hours per week? _____

2. How many times a week do you engage in vigorous physical activity long enough to work up a sweat? _____ (times per week)

RECREATIONAL ACTIVITY

3. For each of the following activities, circle the response that reports how often you participate in that activity.

	Do not do	Once a month or less	Several times a month	Once a week	Several times a week	Every day
House repairs or do-it-yourself projects	0	1	2	3	4	5
Bake or can (not including regular meals)	0	1	2	3	4	5
Collect stamps, coins, read, do crossword puzzles, or other similar hobbies	0	1	2	3	4	5
Watch T.V., listen to the radio	0	1	2	3	4	5
Play cards, checkers, Bingo, or other games	0	1	2	3	4	5
Paint, do ceramics, or other art and craft hobbies	0	1	2	3	4	5
Attend sports events, movies, concerts, or theatre	0	1	2	3	4	5
Provide childcare, volunteer work, provide help to friends or family	0	1	2	3	4	5
Attend meetings of clubs, associations, or societies	0	1	2	3	4	5
Attend religious services	0	1	2	3	4	5

OTHER HEALTH BEHAVIORS

In this section we would like to find out about some of your health habits and behaviors. (Please circle your answers or supply a number when asked.)

4. Do you currently use tobacco?

NO YES → If you smoke cigarettes now, how many per day? _____
 What year did you start? 19_____
 If you smoke cigars/pipes now, how many per day? _____
 What year did you start? 19_____
 If you use smokeless tobacco now, how many times
 per day? _____
 What year did you start? 19_____

5. Have you used any of the following in the past, but do not use them now?

NO	YES →	Cigarettes	How many per day? _____ What year did you start? 19_____ What year did you stop? 19_____
NO	YES →	Cigars/Pipe	How many per day? _____ What year did you start? 19_____ What year did you stop? 19_____
NO	YES →	Smokeless Tobacco	How many times per day? _____ What year did you start? 19_____ What year did you stop? 19_____

6. Have you consumed any alcoholic beverages during the past 12 months?

NO YES → How many days per week? _____ (on the average)
 How many drinks per week?
 Beer (12 oz) _____
 Wine (5 oz glass) _____
 Hard Liquor (1.5 oz) _____
 What is the maximum number of drinks you had on any one day
 last year? _____

PHYSICAL FUNCTIONING AND ACTIVITIES OF DAILY LIVING

In this section we would like to find out what activities you are physically able to do.

7. Are you currently physically able to do the following activities? (Please circle **YES**, **YES with ASSISTANCE**, or **NO** for each activity. Remember that these questions refer to whether or not you **can** do the activity and not whether you **actually** do it regularly.)

RECREATIONAL ACTIVITIES

Moderate recreational activities such as leisure bicycling, fishing, ballroom dancing, or volleyball.

YES

YES with ASSISTANCE

NO

Strenuous recreational activities such as jogging, basketball, circuit training, skiing, or tennis.

YES

YES with ASSISTANCE

NO

HOUSEHOLD ACTIVITIES

Light household activities such as cooking, ironing, painting inside, dusting, or making beds.

YES

YES with ASSISTANCE

NO

Moderate household activities such as general carpentry, cleaning, food shopping, mopping floor, vacuuming, or raking.

YES

YES with ASSISTANCE

NO

Strenuous household activities such as digging in garden, mowing, scrubbing floors, shovelling snow, or washing cars.

YES

YES with ASSISTANCE

NO

DAILY ACTIVITIES

Light daily activities such as twisting/bending, reaching overhead/out, grasping with fingers, sitting, or standing.

YES

YES with ASSISTANCE

NO

Moderate daily activities such as lifting/carrying 10 lbs, stooping, crouching, kneeling, or prolonged sitting/standing.

YES

YES with ASSISTANCE

NO

Strenuous daily activities such as walking 1/4 mile, climbing 10 stairs with no rest, lifting/carrying 25 lbs, or moving large objects such as a heavy chair.

YES

YES with ASSISTANCE

NO

PERSONAL CARE

Moderate personal care activities such as bathing/showering, going to the toilet, dressing, or getting in/out bed/chair/bathtub.

YES

YES with ASSISTANCE

NO

Activities requiring dexterity such as writing, turning keys, buttoning, or opening jars.

YES

YES with ASSISTANCE

NO

8. **In general**, do you physically need household or nursing assistance to carry out your daily activities? (Please circle **YES** or **NO**. If you circle **YES**, list the reason(s) why, and supply the number of years.)

NO	YES —	HEALTH PROBLEMS	CHRONIC PAIN	LACK OF STRENGTH/ ENDURANCE	LACK OF FLEXIBILITY/ BALANCE
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How long have you needed assistance? _____ years

SOCIAL FUNCTIONING

In this section we would like to find out about your relationships with relatives and friends.

9. When you were born, did you have a living twin or triplet brother and/or sister?

NO YES

10. What is your current marital status? (Please circle one.)

SINGLE MARRIED WIDOWED DIVORCED SEPARATED

11. With how many people do you live? _____persons

12. Answer the following two questions, for relatives and friends with whom you do not live.

	Relatives	Friends
a. How often do you have social contacts with relatives and friends? (Circle one per group.)	DAILY WEEKLY MONTHLY YEARLY NEVER	DAILY WEEKLY MONTHLY YEARLY NEVER
b. With how many of these relatives and friends do you have contact at least once a week?	_____	_____

13. In general, how satisfied are you with your personal relationships with people in the following groups? (Please circle your level of satisfaction or Not Applicable (NA) for each group.)

	SATISFIED					
	Not at all	Slightly	Moderately	Very	Extremely	
Spouse or Partner	0	1	2	3	4	NA
Relatives	0	1	2	3	4	NA
Friends	0	1	2	3	4	NA
Overall relationships	0	1	2	3	4	NA

14. Do you receive social support from relatives and friends? Social support can be instrumental or emotional. **Instrumental Support** includes financial aid, information, help with family or work, advice, food, or transportation. **Emotional Support** includes affection, sympathy, trust, encouragement, or guidance.

Please indicate whether or not you receive social support from each of the groups listed by circling NO or YES. (If you circle YES, indicate if you are satisfied with the social support received by circling NO or YES.)

Do you receive support?			
Spouse or Partner	NO	YES —	Satisfied with support? NO YES
Relatives	NO	YES —	Satisfied with support? NO YES
Friends	NO	YES —	Satisfied with support? NO YES
Overall relationships	NO	YES —	Satisfied with support? NO YES

15. Do you have a primary or major responsibility to provide support to a bedridden or disabled individual?

NO	YES —	Does this limit your daily activities?	NO YES
		Does this limit your exercise habits?	NO YES
		Does this affect your mental health?	NO YES

GENERAL WELL BEING

16. Below is a list of the ways you might have felt or behaved. (Please circle how often you have felt this way **during the past week.**)

	Rarely or none of the time	Some or a little of the time	Occasionally or a moderate amount of time	Most or all of the time
During the past week:				
I was bothered by things that usually don't bother me.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I did not feel like eating; my appetite was poor.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I felt that I could not shake off the blues even with help from my family or friends.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I felt that I was just as good as other people.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I had trouble keeping my mind on what I was doing.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I felt depressed.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I felt that everything I did was an effort.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I felt hopeful about the future.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I thought my life had been a failure.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I felt fearful.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
My sleep was restless.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I was happy.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I talked less than usual.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I felt lonely.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
People were unfriendly.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS

Remember to circle how often you have felt this way **during the past week.**

I enjoyed life.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I had crying spells.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I felt sad.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I felt that people dislike me.	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS
I could not get "going".	< 1 DAY	1-2 DAYS	3-4 DAYS	5-7 DAYS

MEDICAL HISTORY

In this section we would like to ask you about your past and current health status.

17. Have you ever sought assistance from a health professional for any of the following conditions?
If **YES**, please give the year you first sought help.

			Year sought help
Low back pain	NO	YES	_____
Anxiety	NO	YES	_____
Depression	NO	YES	_____
Other mental illness	NO	YES	_____
Memory loss	NO	YES	_____
Nervous breakdown	NO	YES	_____
Alcoholism	NO	YES	_____

18. Are you troubled frequently by any of the following symptoms?

Incontinence (difficulty holding urine until you can get to a toilet)	NO	YES
Dizziness	NO	YES
Hearing loss (before age 50)	NO	YES
Hearing loss (after age 50)	NO	YES
Ringing/buzzing in ear	NO	YES

19. Do you have to ask people to speak more clearly or to repeat themselves more than you did one year ago?

NO YES

20. Within the past year, has a friend or relative told you that you don't seem to hear as well as you once did?

NO YES

21. Please examine the following list of illnesses or conditions. If a doctor ever told you that you had the problem, circle YES. Write in (as accurately as you can remember) the year in which the diagnosis was first made. If you have never had any of the problems in a section, circle NONE OF THE ABOVE.

Year of Diagnosis

Cardiovascular

Heart Attack (myocardial infarction)	YES	_____
Heart Failure	YES	_____
Angina (heart pain)	YES	_____
Arrhythmias (irregular heart beats)	YES	_____
Hypertension (high blood pressure)	YES	_____
Claudication	YES	_____
Stroke	YES	_____
High Serum Cholesterol	YES	_____
Mitral valve prolapse	YES	_____
Varicose veins	YES	_____
Other _____	YES	_____
NONE OF THE ABOVE		

Respiratory

Chronic Obstructive Pulmonary Disease:		
Chronic Bronchitis	YES	_____
Emphysema	YES	_____
Asthma	YES	_____
Other _____	YES	_____
NONE OF THE ABOVE		

Gastrointestinal

Peptic Ulcer:		
Stomach (gastric)	YES	_____
Duodenum	YES	_____
Diverticulosis/diverticulitis	YES	_____
Gall Bladder Disease	YES	_____
Ulcerative Colitis	YES	_____
Other _____	YES	_____
NONE OF THE ABOVE		

Remember, please respond to the following list of illnesses/conditions if a doctor ever told you that you had the problem.

		Year of Diagnosis
<u>Neurological</u>		
Multiple Sclerosis	YES	_____
Poliomyelitis	YES	_____
Recurrent weakness (post-polio)	YES	_____
Parkinson's Disease	YES	_____
Muscular Dystrophy	YES	_____
Cerebral Palsy	YES	_____
Paralysis due to spinal injury	YES	_____
Alzheimer's Disease	YES	_____
Other _____	YES	_____
NONE OF THE ABOVE		
<u>Orthopedic</u>		
Bursitis	YES	_____
Osteoporosis	YES	_____
Arthritis:		
Rheumatoid	YES	_____
Osteoarthritis (hip & knee)	YES	_____
Wrist, elbow, ankle, shoulder	YES	_____
Other _____	YES	_____
Fractures:		
Arm, hand, wrist	YES	_____
Back	YES	_____
Hip	YES	_____
Leg (other than hip)	YES	_____
Pelvis	YES	_____
Other _____	YES	_____
Joint replacement:		
Hip	YES	_____
Knee	YES	_____
Shoulder	YES	_____
Other _____	YES	_____
Other orthopedic problems:		
Specify _____	YES	_____
NONE OF THE ABOVE		

Remember, please respond to the following list of illnesses/conditions if a doctor ever told you that you had the problem.

		Year of Diagnosis
<u>Other</u>		
Diabetes:		
Insulin Dependent	YES	_____
Noninsulin Dependent	YES	_____
Gout	YES	_____
Thyroid Disorder	YES	_____
Cirrhosis	YES	_____
Prostate Disease (men only)	YES	_____
Glaucoma	YES	_____
Cataracts	YES	_____
Detached retina	YES	_____
Meniere's Disease	YES	_____
Otosclerosis	YES	_____
Renal (Kidney) failure	YES	_____
Renal (Kidney) stones	YES	_____
Infertility	YES	_____
Other _____	YES	_____
Cancer:		
Breast	YES	_____
Lung	YES	_____
Skin	YES	_____
Colon	YES	_____
Rectum	YES	_____
Cervical (women only)	YES	_____
Prostate (men only)	YES	_____
Pancreas	YES	_____
Other _____	YES	_____
Endometriosis (women only)	YES	_____
Fibrocystic Breast Disease (women only)	YES	_____

NONE OF
THE ABOVE

GENERAL HEALTH

In this section we would like to find out about your general health.

HEALTH CARE

22. How many times in the past 12 months have you seen a physician/doctor for:
 Routine check-ups _____ times
 Medical treatment (or follow-up of a medical condition)
 _____ times
23. Were you hospitalized for at least one night during the last year? (Please circle **YES** or **NO**.
 If you circle **YES**, supply the number of nights and the reason.)
- NO YES — How many nights did you spend in the hospital? _____ nights
 What was the reason for hospitalization? _____
24. During the past 12 months, how many **days** were you restricted to bed because of health
 problems or disability? (Please circle your answer.)
- 0 1-10 11-20 21-30 >30
- During the past 12 months, how many **days** were your daily activities, including work activities,
 restricted because of health problems, disability, or pain?
- 0 1-10 11-20 21-30 >30
25. Do you **currently** take any of the prescription medications listed below? (Please circle **YES** or
NO for each, if **YES**, indicate how many years you have taken the medication.)
- | | | | |
|-------------------------------------|----|-----|------------|
| Medicine for heart conditions | NO | YES | ____ years |
| High blood pressure medicine: | | | |
| Diuretics (water pills) | NO | YES | ____ years |
| Other blood pressure medicine | NO | YES | ____ years |
| Insulin | NO | YES | ____ years |
| Medicine for high cholesterol | NO | YES | ____ years |
| Sleeping pills | NO | YES | ____ years |
| Oral hypoglycemic (diabetic) agents | NO | YES | ____ years |
| Medicine for lung conditions | NO | YES | ____ years |
| Medicine for chronic pain | NO | YES | ____ years |
| Anti-depressants/tranquilizers | NO | YES | ____ years |
| Estrogen replacement | NO | YES | ____ years |
| Medicine for arthritis | NO | YES | ____ years |

26. Do you **regularly** take any of the non-prescription medications listed below? (Please circle **YES** or **NO** for each and indicate how many years you have taken the medication.)

Sleeping pills	NO	YES	____years	# tablets per week____
Aspirin (Bayer,				
Ascriptin, Anacin				
Bufferin)	NO	YES	____years	# tablets per week____
Ibuprofen (Motrin,				
Rufen)	NO	YES	____years	# tablets per week____
Acetaminophen (Tylenol)	NO	YES	____years	# tablets per week____

HEALTH PERCEPTION (Please circle your response for each question.)

27. Do you feel your health is as good now as it has ever been?

NO YES

28. How do you rate your current overall health?

POOR FAIR GOOD VERY GOOD EXCELLENT

29. Compared to 12 months ago, would you say your overall health is:

SAME BETTER WORSE DON'T KNOW

WEIGHT

30. Please provide your current:

Weight	_____pounds	Waist girth	_____inches
Height	_____feet/inches	Hip girth	_____inches

31. Are you a yo-yo dieter (do you intentionally lose weight, and then regain the weight often)?

NO YES

32. How much did your weight fluctuate in a typical 6 month period during the last 10 years?
_____pounds

INJURIES

33. During the past 12 months, have you fallen to the floor or ground?

NO YES →

In your most recent fall, what were you doing when this occurred?
(Please circle one response.)

WALKING
STANDING ON STOOL/LADDER
GETTING UP FROM LYING POSITION
GETTING IN/OUT TUB/SHOWER
SPORTS/EXERCISING
OTHER _____

Were you feeling dizzy just before you fell?

NO YES

Did you fracture a bone?

NO YES



List part(s) of body fractured: _____

How many times did you fall during the past 12 months?

ONCE MORE THAN ONCE

34. During the past 12 months, have you suffered an injury related to physical activity in which you injured yourself seriously enough to see a physician? (If **YES**, please circle what was injured.)

NO YES → BONES MUSCLES JOINTS LIGAMENTS TENDONS

OCCUPATIONAL HEALTH

35. What is your current occupational status? (Please circle your status. If you are a homemaker or are employed, please circle the physical exertion level for a routine day.)

Physical Exertion Level

EMPLOYED → HEAVY LABOR MILD EXERCISE SEDENTARY

HOMEMAKER → HEAVY LABOR MILD EXERCISE SEDENTARY

UNEMPLOYED



What is the reason you are not working?

BY CHOICE HEALTH REASONS RETIRED LAID OFF

REPRODUCTIVE HISTORY (WOMEN ONLY, MEN GO TO NEXT PAGE)

For the following questions, please circle YES or NO, and provide an answer where specified.

36. At what age did you begin having menstrual periods? _____ years old

Are you still having menstrual periods?

YES NO ➡

At what age did you have your last period? _____ years old

Did your periods stop:

Naturally NO YES

Due to surgery NO YES

Due to radiation NO YES

Other reasons NO YES

37. Have you ever been pregnant?

NO YES ➡

How many live births? _____

Age at your first childbirth? _____ years old

Did you breastfeed the first child?

NO YES _____ months

How many still births? _____

How many miscarriages? _____

38. Have you ever taken oral contraceptives?

NO YES ➡

How long? _____ years

Age at first use? _____ years old

Are you taking them now? NO YES

Longest continuous use? _____ years

39. Have you ever had estrogen replacement therapy?

NO YES ➡

How long? _____ years

Age at first use? _____ years old

Are you under therapy now? NO YES

40. How many servings of the following foods do you eat? (Please circle the letter in the appropriate column for **each** food.)

	AVERAGE USE LAST YEAR						
	ALMOST NEVER	1-3 PER MONTH	1-2 PER WEEK	3-6 PER WEEK	1-2 PER DAY	3-5 PER DAY	6+ PER DAY
Eggs	A	B	C	D	E	F	G
Whole milk	A	B	C	D	E	F	G
Low fat milk	A	B	C	D	E	F	G
Cream	A	B	C	D	E	F	G
Yogurt	A	B	C	D	E	F	G
Cheese	A	B	C	D	E	F	G
Ice cream	A	B	C	D	E	F	G
Butter	A	B	C	D	E	F	G
Poultry	A	B	C	D	E	F	G
Fish	A	B	C	D	E	F	G
Beef, Pork, Lamb	A	B	C	D	E	F	G
Vegetables	A	B	C	D	E	F	G
Green salads	A	B	C	D	E	F	G
Breads and cereals	A	B	C	D	E	F	G
Fruits and fruit juices	A	B	C	D	E	F	G
Sweet desserts	A	B	C	D	E	F	G
Candy	A	B	C	D	E	F	G
Salty snacks	A	B	C	D	E	F	G
Tea	A	B	C	D	E	F	G
Coffee	A	B	C	D	E	F	G
Wine, sherry, port	A	B	C	D	E	F	G
Beer, ale, stout, etc.	A	B	C	D	E	F	G
Liquor-whiskey, gin, etc.	A	B	C	D	E	F	G
Soft drinks	A	B	C	D	E	F	G

Please continue to back page.

THANK YOU very much for completing this survey. Your responses will be combined with the responses of others to provide useful and important information on lifestyle factors and functional health in men and women throughout the adult years.

Please check your name and address on the label below and make any necessary changes.

Please remember that it will take several months to tabulate the survey results and prepare a report.

APPENDIX C

Cooper Clinic Medical History Questionnaire

MEDICAL HISTORY QUESTIONNAIRE



Name: _____

Date of Examination: _____

This is your medical history form for your visit to The Cooper Clinic. All information will be kept confidential. The doctor you see at the clinic will use this information in his evaluation of your health. Obviously, you will want to make it as accurate and complete as possible.

Please print your responses.

I. GENERAL INFORMATION

NAME:

_____ Dr. (USE FULL LEGAL NAME PLEASE)
 _____ Rev.
 _____ Mr. _____ Age _____
 _____ Mrs. (Last) (First) (Middle)
 _____ Ms.
 _____ Miss
 _____ Other (Nickname or named used) (Maiden Name, if applicable)

ADDRESS: _____ (Number and Street) (City and State)
 _____ (Country) (Zip Code) ()
 _____ (Home Phone Number)
 _____ (Soc. Sec. Account Number) (Birthday month-day-year) (Mother's Maiden Name)

PERSONAL PHYSICIAN: _____ (Last Name) (First)
 _____ ()
 _____ (Number and Street) (Physician's Phone Number)
 _____ (City) (State) (Zip Code)

Do you want a copy of your report and all other documents relating to this medical examination sent to your personal physician? ☐ Yes ☐ No

If yes, give permission by signing your name. _____

Do you wish to authorize the loan of x-ray films to your personal physician, or other consultant whom you may designate? ☐ Yes ☐ No

If yes, give permission by signing your name. _____

CURRENT OCCUPATION: Are you currently employed? ☐ Yes ☐ No

Name of Business or Employer: _____

Type of Business: _____

Your position, title, or type of work: _____

How long have you been with your present job? _____

Complete Office Address: _____

()
 (Business Phone Number)

BILLING AND INSURANCE INFORMATION

PATIENT'S NAME _____ DATE _____

IF YOU ARE A MEDICARE BENEFICIARY, IT IS ESSENTIAL THAT YOU CONTACT THE BUSINESS OFFICE BEFORE YOUR APPOINTMENT. 1-800-444-5764

INSTRUCTIONS

If you are responsible for your charges, go to section marked SELF.

If your company is responsible for your charges, go to section marked COMPANY.

NOTE: Charges for any procedures which we perform at your request, which your company does not cover, will be your responsibility.

SELF

MAILING ADDRESS FOR STATEMENT: ☐ HOME ☐ OFFICE

Patients are responsible for prompt payment of charges. If you plan to file for insurance for reimbursement to yourself, please indicate:

☐ Insurance form required (number of copies needed _____).

☐ Participation in Type B Medicare.

Please provide your Health Insurance Claim Number as it appears on your Health Insurance Card if you are a participant in Medicare.

A standard insurance form will be mailed to you. You will need to fill in the name of the insurance company, your policy number, and sign a release form. You should then forward the completed form to your insurance company. If you need any assistance, please contact our bookkeeping department.

COMPANY

You will receive the original medical report. If a copy of this report and other documents relating to this medical examination are to be forwarded to your company, you **MUST** sign the authorization below. This copy will only be sent to an individual. Please indicate the name and address below.

I authorize the Cooper Clinic to send a copy of my medical report to the following individual:

NAME: _____ COMPANY NAME: _____

ADDRESS: _____

_____ PHONE (_____) _____

SIGNED: _____

MAILING ADDRESS FOR STATEMENT:

Same as above.

Other: _____

IF YOU NEED ANY HELP IN COMPLETING THIS PORTION, PLEASE ASK OUR RECEPTIONIST AT THE TIME OF YOUR VISIT.

I. GENERAL INFORMATION (CONT.)

REASON FOR VISIT:

Please check the appropriate box(es):

- ☐ Comprehensive Medical Evaluation
- ☐ Evaluation of Previously-Diagnosed Heart Disease
- ☐ Evaluation of Heart Disease Risk
- ☐ Determination of Present Level of Cardiovascular Fitness
- ☐ Recommendations for Exercise Program
- ☐ Recommendations for Nutritional Program
- ☐ Recommendations for Weight Loss Program
- ☐ Referred by Personal Physician
- ☐ Referred by Other Physician: Name _____ City/State: _____
- ☐ Participant in In-Residence Program Phone Number (_____) _____
- ☐ Company Benefit
- ☐ Company Requirement
- ☐ Other _____

OTHER HEALTH DATA:

1. How many days of work did you lose due to illness in the past year? _____
2. How many times did you see a physician for medical reasons last year? _____
3. When was your last visit to a physician? (Approximate date) _____
What was the reason for that visit? _____
4. When was your last visit to a dentist? _____
5. Please indicate someone outside your immediate family who will always know your address: (For our longitudinal research project)
Name: _____
Address: _____

6. Name, Address and Phone Number of Spouse: _____ Phone Number: _____
Name: _____ Home: (_____) _____
Address _____ Work: (_____) _____

7. Name, Address, and Phone number of person to be notified in case of emergency:
Name: _____ Relationship: _____
Address: _____

Phone Number: (_____) _____
8. How did you learn about the Cooper Clinic? _____

II. PERSONAL PROFILE

Sex: ☐ Male ☐ Female

Race: ☐ White ☐ Black ☐ Hispanic ☐ Asian ☐ Other (specify _____)

Place of Birth: _____

A. Marital History:

1. Are you now or have you ever been married? ☐ Yes ☐ No

If yes, how many times have you been married? _____

2. Current marital status:

☐ Single

☐ Married

If yes, how long? _____

☐ Divorced

☐ Widowed

3. Number of children? _____

B. Education: (Circle highest level attained).

Grade: 7 8 9 10 11 12

Degree

Field

College/Univ.

College: 1 2 3 4

BACHELOR

MASTERS

Post Graduate: 1 2 3 4

DOCTORATE

C. Military: Are you now or have you in the past served in the Armed Forces?

☐ Yes ☐ No

If yes, give branch and dates: _____

D. Present Household (Check all that apply).

☐ Apartment

☐ House

☐ Other _____

☐ City

☐ Suburbs

☐ Country

Does anyone live with you?

☐ Live alone

☐ Parents

☐ Spouse

☐ In-Laws

☐ Children

☐ Other

E. Present Occupation: What is your present work situation (Check all that apply.)

☐ Employed Full-time

☐ Self-Employed

☐ Other _____

☐ Employed Part-time

☐ Unemployed

☐ Semi-Retired

☐ Housewife

☐ Fully-Retired

☐ Student

If you are employed, please indicate the following:

Name of business or employer: _____

IV. REVIEW OF SYSTEMS

Please indicate whether you have ever had a *significant* problem with any of the symptoms or conditions listed below.

	Yes	No	Don't know	If yes, when or onset?	Is this still a problem?
GENERAL					
1. Unexplained weight loss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
2. Chronic fatigue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
3. Change in appetite	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
4. Night sweats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
5. Fever or chills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
6. Any type of cancer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
7. Sleep disorder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
HEART/VASCULAR					
8. Chest pain or pressure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
9. Chest pain with exertion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
10. Heart attack	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
11. Rapid or irregular heartbeats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
12. Fainting or lightheadedness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
13. High blood pressure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
14. Rheumatic fever	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
15. Calf pain with exercise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
16. Varicose veins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
17. Phlebitis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
18. Stroke	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
19. High blood cholesterol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
20. High blood triglycerides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
EYES					
21. Decrease in vision Date of last eye exam _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
22. Double vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
23. Glaucoma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
24. Color blindness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
25. Cataracts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
26. Serious injury to eye	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
EAR-NOSE-THROAT					
27. Hearing loss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
28. Prolonged exposure to loud noise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
29. Ringing in ears	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
30. Chronic ear infection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
31. Ruptured eardrum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
32. Sinus infection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
33. Vertigo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
34. Vocal cord polyp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
ENDOCRINE					
35. Thyroid disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
36. High blood sugar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
37. Diabetes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

IV. REVIEW OF SYSTEMS (CONT.)

	Yes	No	Don't know	If yes, when or onset?	Is this still a problem?
PULMONARY					
38. Chronic cough or phlegm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
39. Wheezing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
40. Asthma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
41. Tuberculosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
42. Bronchitis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
43. Pneumonia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
44. Emphysema	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
45. Coughed up blood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
46. Unexplained shortness of breath	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
— while sleeping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
— while sitting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
— with physical activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
GASTROINTESTINAL					
47. Fatty food intolerance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
48. Ulcer disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
49. Frequent heartburn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
50. Vomited blood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
51. Gallbladder trouble	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
52. Abdominal pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
53. Jaundice, hepatitis or cirrhosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
54. Frequent diarrhea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
55. Diarrhea caused by milk (lactose intolerance)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
56. Blood in stools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
57. Tarry black stools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
58. Hemorrhoids	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
59. Colon polyps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
60. Chronic constipation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
GENITOURINARY					
61. Venereal Disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
— syphilis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
— gonorrhea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
— herpes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
62. Sexual problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
63. Decreased sex drive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
64. Impotency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
65. AIDS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
66. Blood in urine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
67. Burning or pain during urination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
68. Kidney/bladder infection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
69. Difficulty urinating (starting or stopping)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
70. Prostate trouble	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
71. Awakening at night to urinate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
72. Kidney stones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

IV. REVIEW OF SYSTEMS (CONT.)

	Yes	No	Don't know	If yes, when or onset?	Is this still a problem?
BONE AND JOINT					
73. Chronic joint or muscle pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
74. Low back pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
75. Swollen/stiff joints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
76. Arthritis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
77. Gout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
NEUROPSYCHIATRIC					
78. Loss of consciousness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
79. Vertigo	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
80. Seizures or epilepsy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
81. Frequent headaches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
82. Treatment for nervous disorder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
83. Numbness or tingling of arms, legs or face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
84. Difficulty sleeping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
85. Depression	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
86. Anxiety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
87. Thoughts of suicide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
88. Nervous breakdown	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
89. Psychiatric or psychological counseling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
HEMATOLOGY					
90. Anemia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
91. Blood clotting deficiency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
92. Enlarged or swollen lymph nodes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
93. Previous blood transfusion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
DERMATOLOGY					
94. Skin rash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
95. Skin cancer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
96. Shingles (herpes zoster)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
97. Skin sores that won't heal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
98. Unusual moles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
99. Mouth sores that won't heal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____
100. Other skin problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____

ALLERGIES AND IMMUNIZATIONS

	Yes	No	Don't know
101. Do you have any allergy problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
102. Do you have hay fever symptoms?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
103. Do you have food allergies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
104. When was your last tetanus shot? _____			
105. Do you have an annual flu vaccine?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
106. Have you had a pneumonia vaccine (Pneumovax)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
107. Have you had a polio immunization series?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
108. Have you had recent immunizations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
109. Have you had a tuberculosis skin test (PPD or Tine)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If yes, was it negative?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Date of test? _____			

IV. REVIEW OF SYSTEMS (CONT.)

CURRENT MEDICATIONS: (Include oral contraceptives, over-the-counter medications, vitamins, diet supplements, etc.)

MEDICATION	DOSAGE	DOSES PER DAY	FOR WHAT?	WHEN STARTED?
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

DRUG ALLERGIES: Are you allergic to any medication? ☐ No ☐ Yes

If so, list medication and reaction to it.

MEDICATION	TYPE OF ALLERGIC REACTION	YEAR
_____	_____	_____
_____	_____	_____
_____	_____	_____

GYNECOLOGICAL HISTORY WOMEN ONLY:

1. When was your last menstrual period? _____
2. When was your last pelvic examination? _____
 Was the pelvic examination abnormal? ☐ Yes ☐ No
 Was the Pap Smear abnormal? ☐ Yes ☐ No
3. Are (or were) your menstrual periods abnormal? ☐ Yes ☐ No
4. Do you have urine loss when you cough, sneeze or laugh? ☐ Yes ☐ No
5. Have you had a hysterectomy? ☐ Yes ☐ No
6. Are you currently using a form of birth control? ☐ Yes ☐ No
 If yes, what kind? _____
7. Number of pregnancies? _____
8. Number of live births? _____
9. Year of last pregnancy? _____
10. When was your last breast examination by a physician? _____
11. Do you examine your breasts for lumps each month? ☐ Yes ☐ No
12. Are you aware of any breast lumps? ☐ Yes ☐ No
13. Do you have any nipple discharge or bleeding? ☐ Yes ☐ No
14. Have you ever had breast x-rays (mammography) performed? ☐ No ☐ Yes
 If yes, date _____
 Was it abnormal? ☐ Yes ☐ No
15. Have you ever had a breast biopsy? ☐ Yes ☐ No
16. Have you had any other breast surgery? ☐ Yes ☐ No
 Type? _____

V. PAST MEDICAL HISTORY

A. SIGNIFICANT PAST ILLNESSES: Please list any other significant illnesses you had as a child or adult.

ILLNESS	YEAR(S)	
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

B. PAST SURGERY: Please list in chronological order any surgeries you have had. Include hospital and out-patient surgery.

TYPE OF SURGERY	YEAR	
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

C. INJURIES: Please list any significant injuries you have had.

TYPE OF INJURY	YEAR	
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

D. RADIATION TREATMENT: Please list any radiation treatment that you have received to your head, neck, skin or elsewhere. (Do not include diagnostic studies.)

AREA TREATED	YEAR	REASON FOR TREATMENT
_____	_____	_____
_____	_____	_____

E. DIAGNOSTIC STUDIES: Check which of the following diagnostic studies you have had in the past.

TEST	YEAR
<input type="checkbox"/> ECG (Electrocardiogram)	_____
<input type="checkbox"/> Treadmill Stress Test	_____
<input type="checkbox"/> Ultrasound examination of the heart (Echocardiogram)	_____
<input type="checkbox"/> Heart catheterization (Dye test of heart vessels)	_____
<input type="checkbox"/> X-ray exam of stomach ("Upper GI Series")	_____
<input type="checkbox"/> X-ray exam of large intestine ("Barium Enema")	_____
<input type="checkbox"/> Proctoscopy or sigmoidoscopy (Examination of the lowest portion of the colon and rectum with a rigid tube)	_____
<input type="checkbox"/> Colonoscopy (Examination of the colon with a long flexible tube)	_____

VI. FAMILY MEDICAL HISTORY

PARENTS	AGE IF ALIVE	OR	AGE AT DEATH	SIGNIFICANT HEALTH PROBLEMS	IF DECEASED, CAUSE OF DEATH
FATHER	_____		_____	_____	_____
MOTHER	_____		_____	_____	_____

BROTHERS/SISTERS	SEX	AGE IF ALIVE	OR	AGE AT DEATH	SIGNIFICANT HEALTH PROBLEMS	IF DECEASED, CAUSE OF DEATH
	_____	_____		_____	_____	_____
	_____	_____		_____	_____	_____
	_____	_____		_____	_____	_____
	_____	_____		_____	_____	_____
	_____	_____		_____	_____	_____

SPOUSE: NAME _____ AGE _____ HEALTH _____

CHILDREN	SEX	AGE IF ALIVE	OR	AGE AT DEATH	SIGNIFICANT HEALTH PROBLEMS	IF DECEASED, CAUSE OF DEATH
	_____	_____		_____	_____	_____
	_____	_____		_____	_____	_____
	_____	_____		_____	_____	_____
	_____	_____		_____	_____	_____
	_____	_____		_____	_____	_____

FAMILY ILLNESSES: Have your parents, grandparents, sisters or brothers, aunts or uncles, or your children developed any of the following? Exclude cousins, relatives by marriage or adoption, and half relatives. (Please check appropriate boxes.)

	FAMILY RELATION
<input type="checkbox"/> Heart attacks, coronary bypass, angioplasty or angina under age 50 (circle problem)	_____
<input type="checkbox"/> Heart attacks, coronary bypass, angioplasty or angina age 50-65 (circle problem)	_____
<input type="checkbox"/> Strokes under age 50	_____
<input type="checkbox"/> Strokes age 50-65	_____
<input type="checkbox"/> Other heart disease	_____
<input type="checkbox"/> High blood pressure	_____
<input type="checkbox"/> Sudden unexplained death	_____
<input type="checkbox"/> High cholesterol or triglycerides	_____
<input type="checkbox"/> Diabetes	_____
<input type="checkbox"/> Thyroid disease	_____
<input type="checkbox"/> Osteoporosis	_____
<input type="checkbox"/> Obesity	_____
<input type="checkbox"/> Colon polyp	_____
<input type="checkbox"/> Lung Cancer	_____
<input type="checkbox"/> Colon Cancer	_____
<input type="checkbox"/> Breast Cancer	_____
<input type="checkbox"/> Other Cancer	_____

Please indicate any death or serious illness, of immediate family members in the past year: _____

VII. PERSONAL HABITS

A. TOBACCO:

1. Do you **currently** use tobacco? ☐ Yes ☐ No
(If not, go to question 2.)
 - a. If you smoke cigarettes now, how many per day? _____
What year did you start? 19_____
 - b. If you smoke cigars now, how many per day? _____
What year did you start? 19_____
 - c. If you smoke a pipe now, how many pipefuls per day? _____
What year did you start? 19_____
 - d. if you use "smokeless" tobacco now, how often? _____
What year did you start? 19_____
2. Have you used any of the following in the **past**, but do not use them now?
☐ Yes ☐ No
(If not, go to the next section.)
 - a. Cigarettes How many per day? _____
 What year did you start? 19_____
 - What year did you Stop? 19_____
 - b. Cigars How many per day? _____
 What year did you start? 19_____
 - What year did you stop? 19_____
 - c. Pipe How many per day? _____
 What year did you start? 19_____
 - What year did you stop? 19_____
 - d. "Smokeless" How many times per day? _____
Tobacco What year did you start? 19_____
 - What year did you stop? 19_____
3. Do you live with people who smoke? ☐ Yes ☐ No
4. Did your parents smoke when you were growing up? Father ☐ Yes ☐ No
 Mother ☐ Yes ☐ No

B. ALCOHOL:

1. Do you drink alcoholic beverages? ☐ Yes ☐ No
If yes, how many drinks per week?
Beer (12 oz.) _____
Wine (5 oz. glass) _____
Hard Liquor (1.5 oz.) _____
2. Do you now have or have you ever had problems with excessive alcohol use? ☐ Yes ☐ No
3. If you drink alcoholic beverages
 - a. Have you ever felt you ought to cut down on your drinking? ☐ Yes ☐ No
 - b. Have people annoyed you by criticizing your drinking? ☐ Yes ☐ No
 - c. Have you ever felt bad or guilty about your drinking? ☐ Yes ☐ No
 - d. Have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover? ☐ Yes ☐ No
 - e. Has your drinking ever affected your job or ability to work? ☐ Yes ☐ No
 - f. Have you ever been arrested for driving while intoxicated or under the influence of alcohol? ☐ Yes ☐ No

VII. PERSONAL HABITS (CONT.)

C. WEIGHT:

1. What is your current weight? _____ pounds
2. What do you consider a good weight for yourself? _____ pounds
3. What was your highest weight after age 18 (excluding pregnancy)? _____ pounds
At what age? _____
4. What was your lowest weight after age 18? _____ pounds
At what age? _____
5. What was your weight at age 21? _____ pounds
6. Weight loss history: How many times in your life would you estimate you have lost the number of pounds shown below?

	5 lbs.	10 lbs.	20 lbs.	30 lbs.	50 lbs.	80 lbs.	100 lbs.
Number of Times							

D. DIET:

1. Some people have to watch what they eat all the time to control their weight, others eat all they want and their weight is fine, and others have to eat more than they want to keep their weight up. What is your case?

☐ 1
Eat Much
Less Than
I Want

☐ 2
Eat Somewhat
Less Than
I Want

☐ 3
Eat Just
What I
Want

☐ 4
Eat Somewhat
More Than
I Want

☐ 5
Eat Much
More Than
I Want

2. How often are you dieting (eating less than you would like)?

☐ 1
Never

☐ 2
Rarely

☐ 3
Sometimes

☐ 4
Often

☐ 5
Always

3. Are you currently on any diet or dietary restriction?

☐ Yes ☐ No

If yes, check the appropriate description.

- ☐ Low Fat
☐ Low Cholesterol
☐ Low Sodium (salt)

- ☐ Low Calorie (wt. reduction)
☐ High Fiber
☐ Other (Specify): _____

Who (if anyone) supervises or sponsors the program? _____
 How long have you been following the diet? _____

VII. PERSONAL HABITS (CONT.)

E. MEALS:

1. In an average week, how many meals (out of 21) do you eat? _____

2. Give the number of those meals which include the following:

- | | |
|---|---|
| _____ Fried poultry or fish | _____ Baked/broiled poultry or fish |
| _____ Beef (include burgers, tacos) | _____ Fruit |
| _____ Pork (include bacon & ham) | _____ Vegetables |
| _____ Luncheon meat (include hot dogs) | _____ Low-fat yogurt |
| _____ Cheese (include pizza) | _____ Ice milk, sherbet, or frozen yogurt |
| _____ Fried foods (include chips, donuts) | _____ Grains (bread, rice, pasta, corn) |
| _____ Pie, cake, ice cream, or cookies | _____ Legumes (beans, lentils, etc.) |
| _____ Eggs | _____ Breakfast cereal |
| (Number of eggs per week = _____) | (Specify Types: _____) |
| _____ Butter | _____ |
| _____ Margarine | |
| _____ Mayonnaise, salad dressing | |

3. In an average week, how many "snacks" do you eat? _____

Circle those that you eat most frequently:

chips	peanuts	pretzels	candy bars	candy	ice cream
cookies	popcorn	fruit	Other _____	_____	_____

F. BEVERAGES: Give the number of servings that you consume in an average week of the following:

Water (glasses)	_____
Coffee: (cups)	_____
	Regular _____
	Decaffeinated _____
Tea: (cups)	_____
	Regular _____
	Decaffeinated or Herbal _____
Soft Drinks: (12 oz.)	_____
	Regular (With Sugar) _____
	Sugar Free _____
	How many of the above contain caffeine? _____
Milk (8 oz. glasses)	_____
Whole Milk	_____
Low-Fat (2%) Milk	_____
Skim (½-1%) Milk	_____

VIII. EXERCISE

A. AEROBIC ACTIVITIES:

1. Are you currently involved in a routine of regular exercise (*moderate continuous exertion for at least 15-20 minutes duration at least 3 days a week?*) ☐ Yes ☐ No
2. How long have you been exercising regularly? _____ Yrs. _____ Mos. _____ Wks.
3. For the last three months, which of the following activities have you performed regularly? (Please check YES for all that apply and NO if you do not perform the activity; provide an estimate of the amount of activity for all marked YES. Please be as complete as possible.)

Walking

- ☐ Yes
☐ No

How many workouts per week? _____

How many miles (or fractions) per workout? _____

Average duration of workout? _____ (minutes)

Average time per mile? _____

Jogging or Running
(outdoors or on track)

- ☐ Yes
☐ No

How many workouts per week? _____

How many miles per workout? _____

Average duration of workout? _____ (minutes)

Average time per mile? _____

Treadmill
(walking or running)

- ☐ Yes
☐ No

How many workouts per week? _____

Average duration of workout? _____ (minutes)

Speed? _____ Grade? _____ % Heart Rate? _____

Bicycling
(outdoors)

- ☐ Yes
☐ No

How many workouts per week? _____

How many miles per workout? _____

Average duration of workout? _____ (minutes)

Average time per mile? _____

Stationary Cycling

- ☐ Yes
☐ No

Type of stationary cycle? _____

How many workouts per week? _____

Average duration of workout? _____ (minutes)

Heart rate during exercise? _____

Swimming Laps

- ☐ Yes
☐ No

How many workouts per week? _____

How many miles per workout? _____

(880 yds. = 0.5 miles)

Average duration of workout? _____ (minutes)

How many months per year? _____

Aerobic Dance
or

Floor Exercises

- ☐ Yes
☐ No

How many workouts per week? _____

Average duration of workout? _____ (minutes)

Heart rate during exercise? _____

Vigorous Racquet Sports
(e.g. Racquetball,
Singles Tennis)

- ☐ Yes
☐ No

How many workouts per week? _____

Average duration of workout? _____ (minutes)

Other Vigorous Sports
Or Exercise
(e.g. Basketball or
Soccer) Please specify: _____

How many workouts per week? _____

Average duration of workout? _____ (minutes)

- ☐ Yes
☐ No

4. Do you follow the Aerobics points exercise program? ☐ Yes ☐ No
If yes, about, how many Aerobics points do you earn per week? _____
How many Aerobics points did you earn last week? _____
5. What time of day do you usually exercise? _____

VIII. EXERCISE HISTORY (CONT.)

6. How do you rate the physical activity that you are now getting compared to others in your same age and sex? Think about both your leisure and work activities. (Please check your response.)

- | | |
|--|--|
| <input type="checkbox"/> A. EXTREMELY INACTIVE | <input type="checkbox"/> E. SOMEWHAT ACTIVE |
| <input type="checkbox"/> B. INACTIVE | <input type="checkbox"/> F. ACTIVE |
| <input type="checkbox"/> C. SOMEWHAT INACTIVE | <input type="checkbox"/> G. EXTREMELY ACTIVE |
| <input type="checkbox"/> D. ABOUT AVERAGE | |

7. Compared to a year ago, how much regular exercise do you currently get?

- | | |
|--|---|
| <input type="checkbox"/> A. MUCH LESS | <input type="checkbox"/> D. SOMEWHAT MORE |
| <input type="checkbox"/> B. SOMEWHAT LESS | <input type="checkbox"/> E. MUCH MORE |
| <input type="checkbox"/> C. ABOUT THE SAME | |

8. Have you continuously followed your program?

- ☐ No Approximately how many times have you stopped for at least six months? _____
 What is the longest period that you were continuously active? _____
 What is the longest period that you were not on any program? _____
 Since you started an exercise program, how many total years have you been regularly active? _____
- ☐ Yes

9. What exercise equipment, if any, do you own? (Check those that apply)

- | | | |
|---|--|--|
| <input type="checkbox"/> Running Shoes | <input type="checkbox"/> Rowing Machine | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> Stationary Cycle | <input type="checkbox"/> Treadmill | |
| <input type="checkbox"/> Bicycle | <input type="checkbox"/> Cross Country Ski Simulator | |

10. To what exercise facilities do you have easy access? (Check those that apply)

- | | |
|---------------------------------------|--|
| <input type="checkbox"/> Fitness Club | <input type="checkbox"/> Aerobic Exercise Class |
| <input type="checkbox"/> Jogging Path | <input type="checkbox"/> Swimming Lap Pool |
| <input type="checkbox"/> Bicycle Path | <input type="checkbox"/> Suitable Area For Walking |

11. If you are not exercising regularly, what exercise activities might be of most interest to you? (List in order of decreasing preference.)

- a. _____
- b. _____
- c. _____

B. MUSCLE STRENGTHENING ACTIVITIES

1. Are you currently involved in a muscle strengthening program?

☐ Yes ☐ No

If yes, what type? (Check those that apply)

- ☐ Calisthenics
- ☐ Free Weights
- ☐ Weight Training Machines
- ☐ Other: (Specify) _____

How many days per week do you do these exercises? _____

Average duration of workout? _____

How long have you been involved in this routine? _____

EXERCISE HISTORY (CONT.)

C. FLEXIBILITY ACTIVITIES

1. Are you currently involved in exercises to maintain or improve your joint flexibility?

☐ Yes ☐ No

If yes, what type?

- ☐ Stretching
- ☐ Calisthenics
- ☐ Exercise Class

How many days per week? _____

Average duration of exercise? _____

How long have you been involved in this routine? _____

2. Can you touch your toes without bending your knees?

☐ Yes ☐ No

D. EXERCISE SAFETY

1. Do you warm up prior to exercise?
2. Do you cool down slowly after exercise?
3. Do you know how to take your pulse?
4. Do you monitor your heart rate when exercising?
5. If you bicycle, do you wear a protective helmet?
6. If you exercise outdoors at night, do you use reflective gear or a light?

<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> Yes	<input type="checkbox"/> No

IX. STRESS AND EMOTIONAL FACTORS

1. How stressful do you consider your home life to be?

☐ Low
☐ Moderate
☐ High
2. How stressful do you consider your occupation to be?

☐ Low
☐ Moderate
☐ High
3. How would you classify yourself on the following tension and anxiety scale?

☐ 1
No Tension
Very Relaxed

☐ 2
Slight
Tension

☐ 3
Moderate
Tension

☐ 4
High
Tension

☐ 5
Very Tense
"High-Strung"
4. What is your greatest source of worry or concern at present?

☐ Marriage
☐ Family
☐ Job
☐ Finances
☐ Health
☐ Other
5. How well do you feel you manage your stress?

☐ Not well most of the time
☐ Fairly well most of the time
☐ Very well most of the time
6. Do stress and tension in your life seem to cause you to have any of the following symptoms? *(Check all that apply)*

☐ General irritability or impatience
☐ Headache
☐ Abdominal discomfort
☐ Sleeplessness
☐ Other *(Specify)*
7. How often do you use medications, alcohol, or other substances to help you relieve stress and relax?

☐ Frequently (several times a week)
☐ Occasionally (once or twice a week)
☐ Seldom (once or twice a month)
☐ Almost never
8. Please rate your general emotional outlook on life on the following scale:

☐ 1
Often very
Depressed

☐ 2
Generally
Sad

☐ 3
Happy & Sad
Equal Amount

☐ 4
Generally
Happy

☐ 5
Usually Very
Happy And
Optimistic
9. How do you rate overall health?

☐ 1
Poor

☐ 2
Fair

☐ 3
Good

☐ 4
Excellent
10. How do you spend your leisure time?

X. LIFESTYLE RISK EVALUATION

HOME

- | | Yes | No |
|---|--------------------------|--------------------------|
| 1. Do you live in a dwelling without a smoke alarm? | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Do you live in a dwelling without a fire extinguisher? | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Do any household members use alcohol to excess or use illicit drugs? | <input type="checkbox"/> | <input type="checkbox"/> |

AUTO

- | | | |
|---|--------------------------|--------------------------|
| 4. Do you drive a sports car or a subcompact car? | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Do you ever drive or ride in a car without using seat belts? | <input type="checkbox"/> | <input type="checkbox"/> |
| If yes, what percent of the time without seat belts? _____ | | |
| 6. Does your commute to work involve freeway traffic? | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Does anger occasionally affect your driving? | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Do you ever pick up hitchhikers? | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Have you received any speeding tickets or warnings in the past year? | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Do you ever drive after drinking alcohol? | <input type="checkbox"/> | <input type="checkbox"/> |

LIFESTYLE

- | | | |
|---|--------------------------|--------------------------|
| 11. Do you have any hobbies that involve high risk such as race cars, motorcycles, ATV's, small planes, parachuting, or scuba diving? | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Do you attend happy hour more than once per week? | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Do you use any "recreational" drugs? | <input type="checkbox"/> | <input type="checkbox"/> |

XI. CURRENT LEVELS OF SATISFACTION

Please indicate your level of satisfaction in each of the following areas by checking the appropriate box. Then indicate whether you intend to make any changes in those areas during the next 12 months.

- | | Generally
satisfied | Generally
dissatisfied | Intend to make
changes |
|--|--------------------------|---------------------------|---------------------------|
| 1. My diet | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. My weight | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. My physical condition and stamina | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. My use of cigarettes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. My use of alcohol or recreational drugs | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. My blood pressure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. My handling of tension and stress | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. My job | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. My family life | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. My general health and lifestyle | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

CONSENT

(NOTE TO TECHNICIAN: IF YES IS CHECKED, YOU MUST COMPLETE THE AAC MEMBERSHIP MEDICAL FORM AND SEND TO AAC BUSINESS OFFICE.)