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**C - REACTIVE PROTEIN, CORONARY HEART
DISEASE AND ISCHEMIC STROKE IN THE ELDERLY
THE CARDIOVASCULAR HEALTH STUDY**

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DEDICATION

I would like to dedicate this work to old women and men who suffered from cardiovascular diseases. Reflecting on the powerful motivation for health promotion a common disease can foster. It is my hope that the research presented herein will contribute to a reduction in membership.

TABLE OF CONTENTS

Acknowledgements	1
Abstract	2
Introduction	3 - 7
Methods	8 - 11
Results	12 - 19
Discussions	20 - 27
Conclusions	28
References	29 - 33
Tables 1-19	34 - 50
Figures 1-2	51
Appendix A: SAS Syntax	52 - 137
Appendix B: SAS output	138 - 155

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C - Reactive Protein, Coronary Heart Disease and Ischemic Stroke in the Elderly: The Cardiovascular Health Study

Xia Li

Advisor: Dr. Tilahun Adera

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Background—C-reactive protein (CRP) has been associated with increased risk of coronary heart disease (CHD) and stroke, but much of the research had focused on middle-aged populations with limited prospective, population-based, longitudinal data. In this study, we examined data from an elderly population and described the distribution of CRP concentrations and the prevalence of elevated CRP levels (>3 mg/l), examined the association between CRP levels and incidence of CHD or ischemic stroke, and assessed the potential interaction of CRP with sex or race on the incidence of CHD or ischemic stroke.

Methods— Baseline CRP levels were measured in a cohort of 5713 participants ≥ 65 years of age from the Cardiovascular Health Study (CHS) using a high-sensitivity assay. The cohort included 3859 (68%) subjects free of cardiovascular disease and 1104 (19%) with existing CVD. Data were collected from 1989-1990 or 1992-1993 to June 30, 1997. SAS 9.10 software was used for analyses and statistical tests included *t* test, ANOVA, χ^2 , Kaplan-Meier method, Log-rank test, and Cox proportional hazards regression.

Results—CRP distribution was highly skewed toward higher values, thus necessitating the use of the median and log transformation of the mean. For all participants, the median of CRP concentrations was 1.92 mg/l; the geometric mean was 1.97 mg/l. Thirty percent of participants had CRP values >3 mg/l. Among subjects with prevalent CHD and those free of CHD at baseline the median CRP levels were 2.32 mg/l and 1.75 mg/l, respectively. The prevalence of elevated CRP levels was 36% in participants with baseline CHD and 26% in those free of CHD; it was higher in women than in men (32% vs. 27%, respectively), in blacks than in whites (42% vs. 28%, respectively), in subjects taking versus not taking cardiovascular medicines (35% vs. 22%, respectively). The mean CRP were similar among participants with and without initial statin uses ($P = 0.3155$). For CHD participants, 37% of statin users and 36% of nonusers had elevated CRP levels. During 8 years of follow-up, 270 incident CHD events and 245 incident ischemic strokes occurred. Incidence rate of CHD and ischemic stroke was 10.7 and 9.7 per 1000 person-years, respectively. The relative risk (RR) of CHD and ischemic stroke for CRP >3 mg/l compared with <1 mg/l was 1.48 (95%CI, 1.01- 2.18) and 1.58 (95%CI, 1.10-2.29), respectively, with adjustment for traditional CV risk factors. The population-attributable risk of CHD and ischemic stroke associated with elevated CRP levels was 11% and 13%, respectively. There was no effect modification by sex and race in the association of CRP with CHD (P for sex-CRP interaction, 0.7638; P for race-CRP interaction, 0.4428). Similarly, no effect modification was observed by sex and race in the association of CRP with ischemic stroke (P for sex-CRP interaction, 0.1721; P for race-CRP interaction, 0.5486).

Conclusions— CRP levels were higher among prevalent CHD subjects than among those without CHD. Women, blacks, and CV drug users had elevated CRP levels. Elevated CRP was associated with increased 8-year risk of CHD and ischemic stroke. Neither sex nor race modified the association between CRP and CHD or ischemic stroke. Future studies will be needed to explore new CRP thresholds for the elderly, and to examine if reduction of CRP levels using pharmacological agents reduces the risk of CHD or stroke.

INTRODUCTION

Approximately 1,200,000 coronary heart disease events and more than 700 000 strokes occur in the United States each year, with 58% of CHD and 71% of strokes occurring among people aged 65 and older, of which 88% of all strokes are ischemic.^{1 2} The estimated direct and indirect cost of CVD for 2006 is \$403.1 billion, including \$142.5 billion for CHD and \$57.9 billion for stroke.

¹ Although traditional risk factors account for much of the risk for CHD events, and at least 1 risk factor precedes 87% to 100% of CHD deaths, not all CHD risk is explained by the combined effect of traditional risk factors.³ For example, one half of all myocardial infarctions and stroke occur in adults with normal serum cholesterol levels.⁴ So it is paramount to identify new risk markers for CVD and improve identification of older population at high risk.

C-reactive protein (CRP), a biomarker of low-grade systemic inflammation, has been reported as a novel risk marker for myocardial infarction (MI),^{5 6 7} stroke,^{6 7 8} and sudden cardiac death⁹ in a series of prospective epidemiologic studies of apparently healthy adults. Recent clinical practice recommendations from the CDC/AHA support the use of CRP testing in primary prevention, suggesting that CRP values < 1 mg/l indicate normal levels, concentrations of 1 to 3 mg/l indicate intermediate risk, and levels > 3 mg/l indicate increased risk.¹⁰

An endogenous biochemical, CRP, originally named by Tiller and Francis in 1930,¹¹ is synthesized in the liver, but vascular sources, including cells in atheromas, also produce CRP.¹²
^{13 14 10} CRP belongs to the pentraxin family of proteins.¹⁵ This protein is very sensitive to inflammation, and its concentration can increase rapidly in response to a wide range of stimuli.

For example, interleukin-6 and other cytokines stimulate the release of CRP, increasing its level by 500-fold or more during an acute inflammatory response to tissue injury or infection.^{16 17} In the past decade, a role for inflammation has become well established in theories describing the atherosclerotic disease process.^{18 19} For a pathological viewpoint, infections and inflammation (which play a major role in determining atherosclerotic plaque vulnerability) may promote atherosclerosis and thrombosis by elevating serum levels of fibrinogen,²⁰ leukocytes,²¹ clotting factors,²² and cytokines²³ and by altering the metabolism and functions of endothelial cells and monocyte macrophages.²⁴ Low-grade infections, reflected in elevated levels of various acute-phase proteins,²⁵ may be partly responsible for the inflammatory processes observed in atherosclerotic lesions, which in turn may relate to the occurrence of CVD. (**Figure 1**) Specifically, CRP induces complement and upregulates the expression of cellular adhesion molecules.²⁶ High concentrations of CRP mediate LDL uptake by endothelial macrophages and induce the recruitment of monocytes into the walls of blood vessels.¹² These effects contribute to and may even accelerate the formation of fatty streaks in early atherosclerosis.

Although most of recent studies of CRP and CVD incidence have been prospective, they have often used nested case-control designs, which do not fully provide data on the CRP distribution in the entire study population. Furthermore, matching of cases and controls limits comparisons across sex and age. Most studies to date also have been carried out in groups of people of European ancestry, and there are few data on African Americans in particular. The use of different assays across studies also makes it difficult to define cutpoints. This study used high-sensitivity methods that are capable of reliably measuring CRP concentrations ≤ 0.15 mg/L (approximately the first and second percentiles of CRP distribution in healthy adults).^{27 28} As a

recent report suggested,¹⁰ critically needed is a firm understanding of the distribution of CRP in such an important population subgroup as the elderly, especially the distribution of high-risk levels of CRP in this age subgroups.

Current recommendations for CRP testing suggest uniform CRP thresholds to characterize the relative risk of CV events based on approximate tertile values in several populations.²⁹ The examined populations consisted predominantly of middle-aged adults, thus raising the question as to whether the recommended cut points and risk estimates may be expanded to the elderly. Only limited data are available regarding the CRP distributions in the elderly and the prognostic utility of CRP values in CHD participants. Compared with middle-aged adults in other reports²⁹^{30 31 32 33 34 35}, the US elderly (≥ 65 yrs) appeared to have higher CRP level,^{8 36 37} and CRP levels were higher among subjects with than without subclinical CVD,³⁷ but not to determine whether CRP distributions varied among groups defined by age, sex, race, and prevalence of CHD. The Women's Health Study (WHS) observed a slight change in CRP concentration with age: median CRP concentrations for individuals 45-54, 55-64, 65-74, and ≥ 75 years of age were 1.31, 1.89, 1.99, and 1.52 mg/l, respectively,³³ whereas no data on prevalence of high-risk levels of CRP in older Americans, and determining whether these prevalence varied by age, sex, race, and prevalence of CHD.

3-hydroxy-3-methylglutaryl coenzyme A (HMG CoA) reductase inhibitors, commonly referred to as statins, have anti-inflammatory (*plaque-stabilization*) properties and can lower the elevated CRP levels, in addition to their lipid-lowering roles.¹⁹ Experimental data indicated that statins reduce macrophage content within atherosclerotic plaques,^{38 39 40 41 42} suppress the expression of

metalloproteinases involved in the fibrous cap dissolution,^{43 44 45} and inhibit the expression of adhesion molecules critical for monocyte attachment and adhesion to the endothelial wall.⁴⁶

(Figure 2) Recent trials suggested interventions to lower CRP values and have linked decreased levels of CRP to a reduction in secondary cardiovascular events,^{6 47 48} in particular, effective in reducing stroke risk.⁴⁹ Although the elderly have the higher prevalence and a much higher risk of cardiovascular morbidity and mortality than middle-aged persons, few population-based data currently exist regarding the distribution of CRP among old Americans with initial statins use.

For example, recent studies of CRP and cardiovascular disease mainly consisted of the middle-aged adults.^{6 7 8 49 50 51 52 53 54 55 56 57 58 59 60 61} However, only limited prospective epidemiological studies of CHD or stroke and markers of inflammation in the elderly have been performed in one study to date.^{6 37 47 52 62 63} In the elderly, elevated CRP was associated with major coronary events in several studies,^{32 37 64} even after extensive adjustment for CVD risk factors and measures of subclinical atherosclerosis,³⁷ and strong associated with ischemic stroke in CHS.⁶³ But the strength of these relationships has been modest in some studies.^{65 66} The magnitude of relative risk in elevated CRP is attenuated after multivariable adjustment, including loss of statistical significance.⁶⁷

Several studies suggested that the association of CRP and stroke might be stronger in older men compared to older women without preexisting stroke or chronic atrial fibrillation from the CHS.⁶³ In the same study of elderly subjects, no gender and race difference in the risks of CHD with CRP existed in the elderly without prior vascular diseases,⁴⁷ but not providing the supported data. Similarly, although the risks of vascular disease with CRP were greater for older women vs. men with evidence of subclinical cardiovascular disease in CHS and in the Rural

Health Promotion Project, interactions with sex were not statistically significant.³⁷ In another study of healthy middle-aged women, the future risk of either MI or stroke for women in the Women's Health Study (WHS)⁵² with elevated CRP was higher than for men. In the Physicians Health Study (PHS),⁶ possible because these differences reflect chance or effect modification by sex, and based on comparisons of these risks across different studies with heterogeneous study populations. Xia, I am not sure what you mean in the info on WHS and PHS. Perhaps break into a couple of sentences. Adjustment for prior vascular diseases and stroke, and effect modification by sex or race, and direct comparisons of these risks between men and women within the same sample, might provide more complete adjustment for potential confounding, yielding new information on the sex- or race-specific effects of CRP with CHD or stroke.

To address the issue of the estimates of baseline CRP levels and risk of subsequent CHD or stroke events, we examined the distribution of CRP concentrations in members of the Cardiovascular Health Study original cohort at baseline, and related the baseline plasma concentrations of CRP to incident first coronary heart disease or ischemic stroke in these subjects free of vascular disease or stroke during a 8-year follow-up time.

The specific purposes were: (1) to describe the distribution of CRP in the elderly, and to determine whether the CRP distributions vary by age among the elderly, gender, race, prevalent CHD, commonly used cardiovascular drugs, and statin uses (2) to estimate the increase in risk for coronary heart disease or ischemic stroke among the US elderly due to elevated CRP levels (>3mg/l) (3) to determine whether there exists a sex- or race-specific effects of CRP on CHD or stroke.

METHODS

Study design and data

The CHS is a prospective, population-based, longitudinal, and observational study of risk factor for cardiovascular disease in 5888 adult ≥ 65 years of age. Of these, 2955 women and 2246 men were enrolled at 4 centers in either 1989 to 1990 or 1992 to 1993. The first cohort consisted of 5201 primarily white participants and the second consisted of 687 blacks. Invited participants were a random sample of Health Care Financing Administration eligibility lists and their household members in four counties⁶⁸ : Forsyth County, North Carolina; Washington County, Maryland; Sacramento County, California; and Allegheny County, Pennsylvania.

Exclusion criteria included institutionalization, active cancer treatment, or expectation of moving from the area with 2 years. All the participants provided informed consent, and the institutional review boards approved the CHS study.

Study Subjects

A total of **5713** adults had a value for CRP concentration. This cohort was examined for the distribution of CRP across various age, gender, co-morbid, and medication use groups. To examine the relation of CRP with incident CVD, 1854 participants were excluded because of the presence of confirmed prebaseline cardiovascular heart disease (n=1540, myocardial infarction, angina, congestive heart failure, stroke, transient ischemic attack, claudication, coronary artery bypass surgery, angioplasty, and carotid endarterectomy), and 314 women using oral postmenopausal hormones which have been reported to result in an elevation in CRP levels with

uncertain clinical consequence.^{51 69} Thus, 3859 participants were considered for analyzing the association of CRP and incident CHD or ischemic stroke.

CRP Measurements

In 1997, CRP was measured in all stored baseline plasma samples by use of an enzyme-linked immunosorbent assay developed at the CHS central blood laboratory.^{27 70} It is a colorimetric competitive immunoassay that uses purified protein and polyclonal anti-CRP antibodies, with an interassay coefficient of variation of 6.25%.

Baseline Definitions

Primary analysis of CHD or ischemic stroke events categorized CRP as low (<1 mg/L), intermediate (1 to 3 mg/L), or elevated (>3 mg/L) to address the utility of recent guidelines.⁸ Diabetes mellitus and impaired fasting glucose was defined using the American Diabetes Association criteria. Hypertension was defined as blood pressure \geq 140/90 mm Hg or self-reported hypertension with the use of antihypertensive drugs. Hyperlipidemia was defined as cholesterol \geq 6.22 mmol/L (240 mg/dl), LDL cholesterol \geq 4.14 mmol/L (160 mg/dl), or use of medications for hyperlipidemia. Cigarette use was categorized as never, former, or current and by number of packyears. Total alcohol per week among drinkers was defined as the number of alcoholic beverages (beer, wine, or liquor) consumed per week.

Definition of CHD and Ischemic Stroke Events

Subjects were examined annually, and followed up every 6 months by alternating field center visits and telephone calls between enrollment and June 30, 1997. Vascular outcomes were

ascertained by self-report and review of discharge codes for all hospitalizations. CHD was defined as myocardial infarction (MI) or coronary death. For suspected coronary events, medical records were abstracted and then reviewed and classified by a committee using standardized criteria.^{71 72} CHD death was defined as the absence of nonatherosclerotic cause of death and 1 or both of the following: chest pain within 72 hours of death or history of chronic ischemic heart disease in the absence of valvular heart disease or nonischemic cardiomyopathy.

Incident stroke was ascertained by self-report or from the Health Care Financing Administration hospitalized patient database of International Classification of Diseases, 9th Revision (ICD-9) codes.⁷³ For confirmation and classification of stroke type, hospital records, including cranial computed tomography and cerebral magnetic resonance images, were reviewed by a committee that included neurologists and a neuroradiologist. Only ischemic cerebral infarction was included as stroke in this analysis. Those participants who suffered primarily from hemorrhagic stroke were not included in this analysis.

Statistical Analysis

SAS version 9.10 software was used for analysis with the CHS database collected by June 30, 1997. Student's *t* test was used to estimate the range of CRP levels. Independent *t* test and the analysis of variance (ANOVA) test was used to evaluate the differences in CRP means by age, gender, race, or commonly used cardiovascular drugs. Because the distribution of CRP levels was skewed to the right, the distribution was log-normalized, and the transformed values were used for analyses. For ease of interpretation, median and standard errors of untransformed values were reported. The χ^2 statistic was used to test the proportions of the CHS cohorts for the 3

categories of CRP levels, and their differences in age, gender, race, or commonly used cardiovascular drugs. The Cochran-Armitage Trend Test was computed for the association between categorical CV variables and CRP risk categories. Multiple linear regression analyses were used to estimate the correlation between continuous CV risk factors and CRP, and to calculate the least-square-adjusted means of CRP levels for subjects with and without statin uses.

Log-rank test was used to test differences in probability of survival for CHD or ischemic stroke by strata of CRP risk level, overall, and by gender and race. Cox Proportional Hazards analyses (forward and stepwise selections) were performed to compute hazard ratios as estimates of relative risk of CHD with increasing category of CRP with adjustment for age, sex, and race in all participants and in subgroups defined by sex or race. Censoring occurred at death, last follow-up, or June 30, 1997, whichever occurred first. Differences in findings by sex and race were evaluated formally by adding interaction terms of each for these factors with CRP to the model. All P values were two-tailed, and values of less than 0.05 were considered to indicate statistical significance. All confidence intervals were calculated at the 95 percent level.

RESULTS

The baseline characteristics by three CRP categories among the 5713 elderly are shown in **Table 1**. Compared with levels considered to be normal, subjects with elevated CRP had a marked higher prevalence of diabetes, hypertension, smoking, statins uses, and more common with less education. People with elevated CRP had a higher mean BMI, triglyceride and fibrinogen level, lower mean HDL level, and consumed alcohol less often. Women and blacks were more likely to have higher CRP concentration. In this restricted population cohort of participants ≥ 65 years, there was no increase of CRP levels with increasing age.

The distribution of CRP concentrations by gender, age, race, and commonly used CV drugs in 5713 subjects (≥ 65 years of age) is presented **Tables 2**. CRP concentration ranged from 0.1 to 119.3 mg/l, a wide range due to skewness of the biomarker. The geometric mean (SE) concentration was 1.97 (0.01) mg/l and the median was 1.92 mg/l. Because the distribution of CRP is highly skewed to the right, the distribution was log-normalized, and the transformed values were used for analyses (**Table 3**). The unadjusted geometric mean of CRP concentrations was higher in women than in men (2.05 vs. 1.88 mg/l, $P = 0.0019$), in blacks than in whites (2.56 vs. 1.82 mg/l, $P < 0.0001$). The unadjusted geometric mean of CRP was 2.23 and 1.62 mg/l for participants with and without commonly used cardiovascular drugs. There was no significant difference in CRP means across age groups ($P = 0.1752$). As **Table 4** shows, subjects were unequally distributed across CRP risk categories, 26% ($n=1472$) with CRP < 1.0 mg/l, 44% ($n=2525$) with levels of 1 to 3 mg/l, and 30% ($n=1716$) with elevated values > 3 mg/l. The

prevalence of elevated CRP values was 32% in women and 27% in men, 42% in blacks and 28% in whites, 35% and 22% in subjects with and without CV drug uses, respectively.

We further examined the distribution of CRP concentrations separately among 1104 subjects with prevalent CHD and 3859 subjects free of CVD at the baseline examination. Overall, CHD participants had higher CRP levels (median, 2.32 mg/l) with the narrower range than those at risk of CVD (median, 1.75 mg/l) (**Tables 5 and 6**). In unadjusted analyses, the difference in CRP levels between black and white (69%) and between women and men (33%) were greater for CHD participants than for subjects free of CVD, but the similar pattern of these differences to observations for the whole cohorts (**Tables 7 and 8**). The CRP distribution by commonly used CV drugs was not different between these 2 groups. As summarized in **Tables 9 and 10**, CHD participants (36%) at baseline have the higher prevalence of elevated CRP values than those free of CVD (26%). Compared with those in normal levels of CRP, more prevalent CHD participants were in the higher-risk range (CRP >3mg/l), with 3 times for blacks, twice for women, nearly double for CV drug users. Among these CHD participants, the prevalence of elevated CRP values was 40% in women and 34% in men, 47% in blacks and 34% in whites, 38% and 25% in subjects with and without CV drug uses, respectively. In contrast, less men, whites, and subjects without CV drug uses were in the CRP levels more compared with less than 3 mg/l.

Specifically, statins, a key CV drug clinically indicated in current treatment guidelines, may independently lower the elevated CRP levels in order to reduce the risk of CHD and stroke. Here, we examined the CRP distribution by statin use, separately in the whole cohort and among subjects with prevalent CHD (**Tables 11 and 12**). In unadjusted analyses, the crude CRP

concentration was higher among statin users than nonstatin users (geometric mean, 0.82 vs. 0.68 mg/l). After adjusting for age, gender and race, the least-squares-adjusted geometric mean for statin users was 0.76 mg/l, and that for nonstatin users was 0.71 mg/l. There was no significant difference in CRP concentrations among subjects with and without initial statin uses ($P = 0.3155$). Among baseline CHD participants, 37% of statin users and 36% nonstatin users were at high-risk levels of CRP. Compared with statin users, nonstatin users with CHD were more common in elevated CRP levels than normal levels (36% vs. 21%)

To determine the correlation between traditional CV risk factors and CRP, we performed the test for trend and multiple linear regression analysis with log-transformed CRP concentration as the dependent variable. As summarized in **Tables 13 and 14**, increasing CRP levels were correlated with a number of CV risk factors in unadjusted analyses, including education status, diabetes, hypertension, smoking, BMI, and fibrinogen. Importantly, female gender and black race were both associated with higher CRP levels. The correlation between CRP and diabetes was stronger than the correlation between CRP and other CV risk factors.

Different CRP concentrations may have different impact on clinical outcomes. First, we examined the risk association of CRP to CHD or ischemic among subjects without preexisting vascular disease or stroke. Then, we determine the sex-specific and race-specific effects on these risk relationships.

Among the 3859 elderly without prior vascular disease or stroke (**Table 15**), gender, race, and diabetic status were associated all with incident CHD and ischemic stroke. Isolated systolic

hypertension, pack-years smoke, and alcohol drinking were also associated with incident CHD. Hypertension was associated with incident ischemic stroke. Because these characteristics were associated with both incident CVD and CRP, we controlled for them in the analysis of the relationship of incident CHD or ischemic stroke to CRP.

As summarized in **Tables 16 and 17**, during a follow-up time of 8 years, 270 first MI or CHD deaths occurred, with the incidence rate of 10.7 per 1000 person-years and the 8-year cumulative incidence of 7% for total subjects. The incidence increased with each higher CRP category (log-rank test for differences, $P = 0.0029$). For men and whites, the incidence rates of CHD increased with each higher CRP category (log-rank test, $P = 0.0006$ and $P = 0.0015$, respectively). The CHD incidence for men was significantly higher than women (log-rank test, $P < 0.0001$), with the crude incidence rates of 15.5 and 7.5 per 1000 person-years in men and in women, respectively. However, there appeared no racial difference in the incidence of CHD (log-rank test, $P = 0.1163$).

Table 16 shows the incidence rates and relative risks of CHD by baseline CRP categories among 3859 participants (≥ 65 yrs), CHS 1989-1997. The crude relative risks of CHD were slightly increased for intermediate CRP, and there was a 62% increased risk for participants with elevated CRP >3 mg/l compared to those with CRP <1 mg/l. Adjustment for age, sex, and race yielded little attenuation and rather demonstrated a more pronounced association with a nearly doubled risk of CHD for CRP >3 mg/l. Further adjustment for other traditional cardiovascular risk factors attenuated these relative risks, but there was still a 47% increased risk in CHD

comparing CRP >3 mg/l to < 1 mg/l, a finding that was statistically significant (95%CI, 1.05-2.06).

When CRP was considered as a continuous variables with adjustment for traditional cardiovascular risk factors, the relative risk associated with a 1-ln-unit-higher baseline CRP was 1.19 (95% CI, 1.04 to 1.37). The adjusted population-attributable risk percent (PAR %) for elevated CRP was 11.2%. Should a table be referenced?

To determine if the gender or race differences in the associations of CHD with CRP exist, we estimate these risk association of CHD with CRP separately in men and women, whites and blacks (**Table 17**).

In sex-stratified analyses, the crude relative risk of CHD in elevated compared with normal levels of CRP was 2.09 (95%CI, 1.37-3.20) in men and 1.30 (95%CI, 0.80-2.11) in women. Further adjustment for traditional cardiovascular risk factors reduced these relative risks to 1.78 in men (95%CI, 1.14-2.80) and to 1.11 in women (95%CI, 0.66-1.86). The approximate 50% increase in risk for each gender group is similar to what was demonstrated overall. However, it was not statistically significant most likely due to reduced statistical power. We further explored whether gender modified the association of CRP with CHD risk and did not find effect modification (P for interaction, 0.1398).

In race-stratified analyses, the crude relative risk of CHD in elevated compared with normal levels of CRP was 1.72 (95%CI, 1.23-2.40) in whites and 0.99 (95%CI, 0.34-2.98) in blacks.

Further adjustment for traditional cardiovascular risk factors reduced the relative risks to 1.43 in whites (95%CI, 1.01-2.04), which was not statistically significant, but actually increased the relative risk to 1.18 in blacks (95%CI, 0.35 – 3.94), which also was not statistically significant. We found no effect modification of race on the CRP-CHD risk association (P for interaction, 0.7086).

As summarized in **Tables 18 and 19**, during a follow-up time of 8 years, 245 first ischemic strokes occurred, with the incidence rate of 9.7 per 1000 person-years and the 8-year cumulative incidence of 6% for total subjects. The incidence increased with each higher CRP category (log-rank test, $P = 0.0008$). The incidence of ischemic stroke across CRP categories for men was statistically significant (log rank p-value 0.0016) and CRP was more strongly related to incident stroke among men than women (log-rank test for women, P 0.0806; interaction p-value < 0.0001). The number of ischemic stroke events in Blacks was extremely small (32 vs. 212 in Whites), resulting in low statistical power to detect relationships among Blacks and to detect a possible race interaction.

Table 18 showed the incidence rates and relative risks of ischemic stroke by baseline CRP categories among 3859 participants (≥ 65 yrs), CHS 1989-1997. The crude relative risks of ischemic stroke were slightly increased for intermediate CRP, and there was a 79% increased risk for elevated CRP >3 mg/l. Adjustment for age, sex, and race yielded little attenuation. Further adjustment for other traditional cardiovascular risk factors attenuated these relative risks, but the association of elevated levels of CRP with ischemic stroke persisted. There was a 58%

increased risk for participants with CRP >3 mg/l (95%CI, 1.10-2.29) compared to those participants with CRP < 1 mg/l.

When CRP was considered as a continuous variables, with adjustment for traditional cardiovascular risk factors, the relative risk associated with a 1-ln-unit-higher baseline CRP was 1.15 (95% CI, 1.01 to 1.31). The adjusted population-attributable risk percent (PAR %) for elevated CRP was 13.3%.

To determine if the gender or race differences in the associations of ischemic stroke with CRP exist, we estimate these risk association of ischemic stroke with CRP separately in men and women, whites and blacks (**Table 19**).

In sex-stratified analyses, the crude relative risk of ischemic stroke in elevated compared with normal levels of CRP was 2.36 (95%CI, 1.37- 4.06) in men and 1.48 (95%CI, 0.95-2.31) in women. Further adjustment for traditional cardiovascular risk factors reduced these relative risks to 2.11 in men (95%CI, 1.20 -3.72) and to 1.54 in women (95%CI, 0.99 - 2.42), associations that were statistically or nearly statistically significant. There was no effect modification of gender on the CRP-stroke association (*P* for interaction, 0.1721).

In race-stratified analyses, the crude relative risk of ischemic stroke in elevated compared with normal levels of CRP was 1.83 (95%CI, 1.27-2.65) in whites and 1.30 (95%CI, 0.50-3.39) in blacks. Further adjustment for traditional cardiovascular risk factors reduced these relative risks

to 1.65 in whites (95%CI, 1.11- 2.45) and to 1.33 in black (95%CI, 0.47- 3.77). As stated above, the number of ischemic strokes in Blacks was low.

DISCUSSION

This population-based study describes the CRP distribution, based on results obtained with a high-sensitivity CRP assay, in the US elderly. Older Americans have higher CRP concentrations than middle-aged ones, but no increase with increasing age in this restricted cohort (all participants > 65 years). CHD participants have higher CRP levels than healthy population. Women, blacks, and individuals with prevalent CHD, and CV drug users have higher prevalence of high-risk levels of CRP. Similarly, statin users have higher prevalence of elevated CRP values and in general mean CRP levels were higher in statin users vs. nonusers, though only 126 individuals were users. As in middle-aged adults,^{32 33 34} the distribution of the CRP level in the elderly is skewed toward the higher values, with most populations showing >95% of subjects with CRP values of <10 mg/l. These data provide the reference on CRP risk thresholds in the elderly, and have a substantial clinical implication because it clearly demonstrates that a single set of cutpoints for risk assessment of future coronary and stroke events can be used for the elderly.

In this prospective and longitudinal study, we demonstrate that elevated CRP levels were independently associated with incident CHD or ischemic stroke in the elderly without preexisting vascular diseases or stroke. The current study extends these findings in various sex and race groups, indicating that no sex or race difference in the risk relationship of CHD or ischemic stroke to CRP. Our findings will help define the most effective and efficient use of inflammatory marker CRP in the prediction of CHD and *stroke*. The addition of elevated CRP levels to the risk factor profile of the elderly may significantly increase the predictability of incident CHD or

ischemic stroke. Thus, the use of CRP values may aid in identifying a potentially large number of men and women who are at risk for CVD events, which, in turn, lead to the development for new preventive strategies for primary CHD and stroke prevention in those individuals identified as being at risk for developing CVD. Is this where you want to add the PAR% in terms of clinical relevance?

Distribution of CRP concentrations

Previous studies evaluating the distribution of CRP were mainly limited to middle-aged adults. The median of CRP concentrations was 1.52 mg/l for healthy US women and 1.50 mg/l for men in meta-analyses,³³ the median of 1.6 mg/l for US men in NHANES.³² For healthy US adults, there was only a slight change in CRP level with age: median CRP concentrations for individuals 45-54, 55-64, 65-74, and ≥ 75 years of age were 1.31, 1.89, 1.99, and 1.52 mg/l, respectively.³³ In our data, the median CRP concentration was higher among all participants, with 30% subjects of more than 3mg/l, close to reports from Cushman et al³⁷ using same dataset, indicating that the median CRP level in subjects without prior vascular was 1.76 mg/l, with 26% of more than 3mg/l. CHD participants have higher CRP concentrations than those free of CVD. Consistent with this finding, Tracy et al³⁶ showed that mean CRP level of female CVD case subjects or control subjects was 3.33 vs. 1.90 mg/l in the CHS cohorts with subclinical CVD; geometric mean of baseline CRP was 1.98 mg/l with subclinical CVD and 1.64 mg/l without subclinical CVD in the CHS cohorts.³⁷ In the same dataset, baseline median CRP level were 2.07 and 1.87 mg/l in the groups with and without incident ischemic stroke.⁶³ Our finding provides support for the pathophysiology that the inflammatory processes play an important role in the development of atherosclerosis.^{18 19} Moreover, old people are more likely to show signs of relatively poor

health (such CV risk factor as. diabetes, hypertension, and smoking) than middle-aged adults, and higher CRP levels may reflect this risk factor burden.

The CRP concentrations varied by sex, race, and by commonly used cardiovascular drugs, but no difference by age, among older Americans regardless of the presence of confirmed CHD.

Women have higher CRP levels than men, blacks have higher CRP than whites, consistent with observations in other studies including middle-aged adults.^{31 32 34 35} In Dallas Heart Study,⁷⁴ the median CRP level was almost twice as high in women compared with men, 30% higher in black subjects than in white subjects. Our data showed that CRP levels appeared to be higher among subjects with than without CV drug uses. However, our comparisons were performed in the unadjusted analyses. For example, the higher CRP levels in women than in men were attributed to estrogen use. Hormone replacement therapy, whether it is with estrogen alone or in combination with progestin, is known to significantly increase CRP concentration.^{69 75} It therefore is imperative that future studies examine the distribution of CRP concentrations after adjustment in the elderly. As we analyzed the association between CRP and CHD and ischemic stroke, we excluded women receiving hormone replacement therapy. On the other hand, some of these demographic differences in CRP concentrations may be attributable to differences in health status (such as presence of disease) and presence of known correlates of CRP concentration or genetic factors. These data therefore suggest that either unmeasured or genetic factors could account for these differences in CRP concentrations. Heritability studies further suggest that 35% to 40% of the variance in CRP levels is genetically determined.⁷⁴ Although self-designation of gender or race cannot be assumed to be a surrogate for genetic inheritance, self-designation has yielded important data regarding differences in cardiovascular morbidity and mortality in the

United States. Thus, our findings supported the hypothesis that differences in CRP levels among different sex or race groups may help explain part of the residual disparity in coronary heart disease morbidity and mortality associated with sex and race.

Although subjects with prebaseline confirmed CHD have higher CRP levels than those free of CVD at baseline, the adjusted geometric mean of CRP concentrations are similar among subjects with and without statin uses. Our data provide support for the hypothesis that statin therapy may results in a greater clinical benefit when CRP levels are elevated,^{48 76} and to lower CRP levels in a manner that is largely independent of LDL cholesterol levels.^{48 77 78 79} Unfortunately, we do not have adequate statin intake data in the present study to address this issue. Moreover, statin users most likely have clinically manifest disease, also associated with higher levels of CRP and therefore we cannot rule out confounding by indication. Future study is needed to examine the change of CRP concentrations before and after initially statin therapy, and to determine whether reductions in CRP levels from pharmacological interventions are associated with reductions in CVD risk. The utility of CRP as a target of therapy remains to be proved, and these ongoing efforts will likely provide us with guidance.

Along with other reports,^{23 76 80 81 82 83 84} we demonstrated that CRP was correlated to diabetes, hypertension, smoking, education status, BMI, LDL, triglyceride, fibrinogen, and alcohol uses. Importantly, female gender and black race were both associated with higher CRP levels. Elevated levels of CRP are not disease specific but are sensitive markers produced in response to tissue injury, infectious agents, immunologic stimuli, and inflammation. Our findings will help identify the factors affecting CRP levels.

CRP-CHD and CRP-Ischemic stroke associations

In this prospective CHS study, we confirmed prior observations^{8 37 63} that elevated CRP is associated with future CHD or ischemic stroke and extended prior findings to determine whether there were the sex and race differences in these risk associations.

Our 8-year prospective study in the elderly free of CVD demonstrated a strong relationship between elevated CRP levels and incidence of first CHD or ischemic stroke, and a graded increase in the incidence of first CHD or ischemic stroke with increased levels of CRP. Elevated CRP levels were associated with a 1.47-fold increased risk of CHD and 1.58-fold increased risk of ischemic stroke, with adjustment for other vascular risk factors, as reported by other studies.^{8 37 63} The similar study analyses using the same dataset showed that the elderly with elevated CRP levels had 1.48-fold increase in risk of CHD,³⁷ and 1.60-fold increase in risk of ischemic stroke.⁶³ Previous data on plasma CRP levels and CHD or ischemic stroke have suggested that this plasma marker is an independent predictor of the risk of future CHD or stroke among healthy middle-age adults.^{6 52} Participants with the highest baseline CRP values had twice the risk of ischemic stroke among men,⁶ a 5-fold increase in risk of any vascular event among women and a 7-fold increase in risk of the combined outcome of myocardial infarction or stroke.⁵² Our findings of an independent association of CRP in the risk of CHD or ischemic stroke suggest a hypothesis of an additional pathophysiological role for CRP to that of measurable atherosclerosis in relation to CHD or stroke. Overall, these data support the view that the inflammation marker CRP predicts an increased risk of atherothrombotic events in otherwise healthy individuals. In addition, inflammation not only appears to be a response to the underlying atherosclerotic disease process but also may be an integral part of it.¹⁸

The relative risk of CHD or ischemic stroke for elevated CRP observed here was smaller than in most studies of middle-aged subjects. However, event rates of CHD and ischemic stroke were high in this age group, so the attributable risk percents for elevated CRP was high at 11% and 13%, respectively, even given a modest relative risk.⁸⁵ Thus, a much higher percentage of subjects with elevated CRP subsequently had events in this study compared with studies of younger subjects.^{86 87} If elevated CRP represents a causal risk factor as suggested by several experimental studies,⁸⁸ our estimate of attributable risk indicates a hypothesis that correction of elevated CRP could eliminate up to 11% of incident CHD and 13% of incident ischemic stroke in this age group.

Recent reports^{37 63} indicated that there were no significant differences in the risk of CHD or ischemic stroke to CRP by sex or race, but gender, race, and CRP interactions were not tested. Here, our data indicated no significant sex-CRP and race-CRP interactions in gender- or race-stratified analyses for these relationship. We confirmed no effect modification by sex and race in the risk of CHD or ischemic stroke to CRP.

Strengths of this study include the prospectively collected data from a large sample of older, community-based individuals, and long-term event follow-up. Several new findings were observed on the basis of unique aspects of the study. First, we examined the distribution of CRP concentrations in the elderly, including prevalent CHD participants and subjects free of CVD. Second, we described the CRP distribution by initial statin uses. Third, we confirmed an association of elevated CRP with the incidence of first CHD or ischemic stroke in the same older age group. Fourth, further stratified analyses by gender and race were performed in the

association between CRP and CHD or ischemic stroke. Fifth, because CRP was measured in the whole cohort, incidence rates of CHD by baseline CRP were calculated, and sex- and race- strata analyses were performed. Additionally, to preserve the generalizability of our findings, we did not exclude participants with various conditions in examining the CRP distributions. Excluding the participants with cardiovascular disease, diabetes mellitus, and a myriad of other conditions would have led to additional sizeable exclusions, thus calling into question the generalizability of our findings.

The limitations include such points as: (1) The elderly who were willing to enroll in the study may not represent the general older population, so these findings can not be generalized to the US elderly; (2) the CHS cohorts consisted primarily of whites, the sample size of black subjects was too small, the sample size of statin users was even smaller, which reduced the ability to detect race-specific associations of CRP and CHD or stroke, and the CRP distribution among statin users and nonstatin subjects in important ways; (3) CRP was measured only once at baseline, which may not completely and accurately reflect the status of the study participants over a prolonged follow-up period. However, this source of variability could not account for the relationship observed in the present study, because a random misclassification of such nature would tend to underestimate study findings and bias the results toward the null hypothesis. So it has been suggested that repeated testing for confirmation be considered in those with high values.¹⁰ (4) the incidence of CHD or ischemic stroke in this healthy elderly cohort is relatively low. Although this lower incidence is likely due to selection and survival of a healthier cohort,⁸⁹ one would not expect these biases to affect prospective associations within the cohort in important ways. (5) The observational study design, even with extensive multivariate analysis,

cannot prove causal relationships. Competing risks may have diluted associations of CRP with CHD because CRP may be associated with other disease outcomes. (6) Other limitations include problem of uncontrolled confounding, the determination of CRP by a single measure which could result in imprecision or residual confounding due to measurement error. We believe this would bias our findings toward the null hypothesis, yielding underestimates of the actual risk associated with these measures.

The prospective cohort design allows us to exclude the possibility that acute ischemia affected the levels of plasma CRP in the study participants. The data were obtained in an elderly cohort of men and women, and this may limit the applicability of the results to younger men and women. And, these findings should be further explored in studies with higher prevalence of carotid disease and stroke risk factors, including other population-based cohorts.

CONCLUSIONS

In this prospective, population-based, longitudinal study, we observed that the CRP distributions varied by gender and race in the US elderly, with CHD participants having higher CRP levels than those free of CVD. CRP levels were similar among subjects with and without statin uses after adjusting for age, gender and race but the number of statin users was very small. We conclude that elevated CRP is independently related to the future occurrence of CHD and ischemic stroke in this elderly cohort. Therefore, CRP could be served as a risk factor for incident CHD or stroke. No gender or race difference in these risk associations exists. Because event rates are high overall in older age, further study is required to determine optimal clinical roles of CRP measurement, especially as related to interventions for elevated CRP, and to determine whether CRP risk threshold should be adjusted for older adults.

Because about half of the population variance in CRP is attributable to lifestyle (e.g., smoking, diet, and exercise) all of which are modifiable, Ridker et al⁹⁰ suggested that we should develop better lifestyle to prevent CVD. In addition, because the other half is primarily inherited (e.g., polymorphisms in the CRP gene), future studies are imperative to identify the pharmacogenetic issues that help us to figure out what participants to target for this inflammatory response.

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TABLES 1 - 19

Table 1. Baseline characteristics by baseline CRP concentration among 5713 U.S. adults ≥ 65 years of age, CHS 1989-1997.

Variable	Baseline CRP level (mg/l)		
	< 1 (n=1472)	1-3 (n=2525)	>3 (n=1716)
Continuous variables			
Pack-year (among ever smokers)	14.4	17.2	22.3
Body mass index, kg/m ²	24.9	26.6	27.9
Total serum cholesterol, mg/dl	208.18	213.4	210.22
HDL cholesterol, mg/dl	57.76	53.78	51.65
LDL cholesterol, mg/dl	126.53	131.99	129.3
Triglyceride, mg/dl	121.95	143.14	149.94
Fibrinogen, mg/dl	290.09	315.12	366.12
Fasting Glucose, mg/dl	104.39	110.13	119.29
Total alcohol per week among drinkers*	2.9	2.5	2.0
Median CRP, mg/l	0.60	1.82	5.95
Categories variables, %			
Men	27.3	45.4	27.3
Women	24.6	43.3	32.1
White	27.0	45.2	27.8
Black	18.8	39.5	41.8
Age (years)			
65-66	22.7	45.9	31.4
67-68	24.6	43.4	32.0
69-70	25.3	44.6	30.1
71-72	24.5	45.1	30.5
73-74	26.2	47.4	26.4
75-76	27.8	41.4	30.8
77-78	25.4	40.7	33.9
79-80	29.6	46.9	23.5
80+	28.3	42.5	29.2
High school education or less**	23.4	43.3	33.3
Diabetes	14.2	42.2	43.6
Hypertension	19.6	43.4	37.0
Isolated systolic hypertension	23.6	44.4	32.0
Current smoker	18.1	42.0	39.9
Statin use***	21.4	43.7	34.9

* Total alcohol per week among drinkers: Number of alcoholic beverages (beer, wine, or liquor) consumed per week.

** High school education or less refers to grade 8 or less, some high school, or high school graduation or GED.

*** Statin: 3-hydroxy-3-methylglutaryl coenzyme A (HMG COA) Reductase inhibitor.

**** Values for continuous variables are means.

Table 2: Distribution of Baseline High-sensitivity C-reactive Protein among 5,713 American Adults ≥ 65 Years of Age, CHS 1989–1997.

Variables	N	Median (mg/l)	RANGE (mg/l)			
			Min	25%	75%	Max
Total	5,713	1.92	0.07	0.97	3.41	119.30
Gender						
Female	3277	2.03	0.07	1.01	3.61	119.30
Male	2436	1.78	0.07	0.93	3.18	107.97
Age, years						
65-66	523	2.04	0.17	1.06	3.67	66.47
67-68	972	2.00	0.18	1.01	3.49	107.97
69-70	931	1.90	0.07	0.99	3.48	99.71
71-72	752	2.02	0.09	1.01	3.38	46.00
73-74	606	1.84	0.25	0.96	3.14	119.30
75-76	536	1.82	0.22	0.90	3.54	82.95
77-78	445	2.06	0.10	0.98	3.69	74.02
79-80	358	1.78	0.20	0.88	2.91	41.77
80+	590	1.78	0.16	0.91	3.30	75.97
Race						
White	4811	1.83	0.07	0.93	3.25	119.30
Black	864	2.56	0.17	1.22	5.62	65.54
Other	38	2.44	0.32	0.95	5.04	17.97
Cardiovascular drug uses*						
Yes	3579	2.18	0.07	1.11	3.89	119.30
No	2129	1.59	0.07	0.79	2.78	99.71

* Cardiovascular drug uses including any ACE inhibitor, any beta blocker, any aspirin use >2 days in 2 weeks, any diuretic, any calcium channel blocker, any hypertension medicine, any vaso dilator.

Table 3: Distribution of the log transformation of Baseline High-sensitivity C-reactive Protein among the 5713 US elderly ≥ 65Years of Age, CHS 1989--1997.

Variables	N	Log (Geometric CRP)		Geometric CRP(mg/l)	t-test p-value	RANGE (mg/l)			
		Mean	SE			Min	25%	75%	Max
Total	5,713	0.68	0.01	1.97		-2.66	-0.03	1.23	4.78
Gender					0.0019				
Female	3277	0.72	0.02	2.05		-2.66	0.01	1.28	4.78
Male	2436	0.63	0.02	1.88		-2.66	-0.07	1.16	4.68
Age, years					0.1752				
65-66	523	0.77	1.06	2.16		-1.77	0.06	1.30	4.20
67-68	972	0.70	1.02	2.01		-1.71	0.01	1.25	4.68
69-70	931	0.68	1.02	1.97		-2.66	-0.01	1.25	4.60
71-72	752	0.69	1.03	1.99		-2.41	0.01	1.22	3.83
73-74	606	0.64	0.97	1.9		-1.39	-0.04	1.14	4.78
75-76	536	0.66	1.06	1.93		-1.51	-1.11	1.26	4.42
77-78	445	0.75	1.06	2.12		-2.30	-0.02	1.31	4.30
79-80	358	0.58	1.04	1.79		-1.61	-0.13	1.07	3.73
80+	590	0.63	1.09	1.88		-1.83	-0.09	1.19	4.33
Race					< 0.0001				
White	4811	0.63	0.01	1.82		-2.66	-0.07	1.18	4.78
Black	864	0.95	0.04	2.56		-1.77	0.2	1.73	4.18
Other	38	0.87	0.18	2.44		-1.14	-0.05	1.62	2.89
Cardiovascular drug uses*					< 0.0001				
Yes	3579	0.80	0.02	2.23		-2.66	0.10	1.36	4.78
No	2129	0.48	0.02	1.62		-2.66	-0.24	1.02	4.60

* Cardiovascular drug uses including any ACE inhibitor, any beta blocker, any aspirin use >2 days in 2 weeks, any diuretic, any calcium channel blocker, any hypertension medicine, any vaso dilator.

Table 4: Unadjusted percentages of 5,713 Older Adults ≥ 65 Years of age in Three Categories of baseline hsCRP concentration, CHS 1989--1997.

Variables	N	Percentage with baseline hsCRP concentration						chi-square p-value
		<1mg/l		1--3mg/l		>3 mg/l		
		n	%	n	%	n	%	
Total	5713	1472	25.8	2525	44.2	1716	30.0	< 0.0001
Gender								
Female	3277	806	24.6	1420	43.3	1051	32.1	< 0.0001
Male	2436	666	27.3	1105	45.4	665	27.3	< 0.0001
Age, years								0.0091
65-66	523	119	22.7	240	45.9	164	31.4	
67-68	972	239	24.6	422	43.4	311	32.0	
69-70	931	236	25.3	415	44.6	280	30.1	
71-72	752	184	24.5	339	45.1	229	30.4	
73-74	606	159	26.2	287	47.4	160	26.4	
75-76	536	149	27.8	222	41.4	165	30.8	
77-78	445	113	25.4	181	40.7	151	33.9	
79-80	358	106	29.6	168	46.9	84	23.5	
80+	590	167	28.3	251	42.5	172	29.2	
Race								
White	4811	1300	27.0	2172	45.2	1339	27.8	< 0.0001
Black	864	162	18.8	341	39.5	361	41.8	< 0.0001
Other	38	10	26.3	12	31.6	16	42.1	0.4786
Cardiovascular drug uses*	5708							
Yes	3579	791	22.1	1550	43.3	1238	34.6	< 0.0001
No	2129	680	31.9	972	45.7	477	22.4	< 0.0001

* Cardiovascular drug uses including any ACE inhibitor, any beta blocker, any aspirin use >2 days in 2 weeks, any diuretic, any calcium channel blocker, any hypertension medicine, any vaso dilator.

Table 5: Distribution of Baseline High-sensitivity C-reactive Protein among 1,104 prevalent CHD Patients (at entry) \geq 65 Years of Age, CHS 1989--1997.**

Variables	N	Median	RANGE (mg/l)			
			Min	25%	75%	Max
Total	1,104	2.32	0.19	1.17	4.01	82.95
Gender						
Female	499	2.46	0.19	1.26	4.85	82.95
Male	605	2.16	0.20	1.08	3.61	59.42
Age, years						
65-66	78	2.65	0.27	1.41	5.96	30.02
67-68	142	2.35	0.22	1.09	3.87	56.04
69-70	165	2.61	0.20	1.45	5.09	46.02
71-72	148	2.64	0.20	1.48	3.94	36.97
73-74	106	1.83	0.25	1.02	3.11	22.85
75-76	129	1.98	0.25	0.92	3.18	82.95
77-78	107	2.35	0.29	1.22	5.66	74.02
79-80	84	1.79	0.20	0.92	3.13	16.03
80+	145	2.20	0.19	1.07	4.86	39.27
Race						
White	937	2.22	0.19	1.10	3.67	82.95
Black	161	2.70	0.20	1.54	6.20	29.61
Other	6	3.25	0.62	0.95	5.29	9.75
Cardiovascular drug uses*						
Yes	964	2.40	0.19	1.21	4.52	82.95
No	140	1.69	0.21	0.90	3.00	36.97

* Cardiovascular drug uses including any ACE inhibitor, any beta blocker, any aspirin use >2 days in 2 weeks, any diuretic, any calcium channel blocker, any hypertension medicine, any vaso dilator.

** CHD: coronary heart disease.

**Table 6: Distribution of Baseline High-sensitivity C-reactive Protein among 3,859 Subjects
≥ 65 Years of Age free of CVD**, CHS 1989--1997.**

Variables	N	Median	RANGE (mg/l)			
			Min	25%	75%	Max
Total	3,859	1.75	0.07	0.88	3.11	107.97
Gender						
Female	2247	1.85	0.07	0.96	3.24	86.36
Male	1612	1.64	0.07	0.86	2.95	107.97
Age, years						
65-66	376	1.82	0.20	0.99	3.15	66.47
67-68	695	1.86	0.18	0.93	3.25	107.97
69-70	638	1.68	0.07	0.87	3.03	99.71
71-72	509	1.73	0.09	0.82	3.10	46.00
73-74	433	1.76	0.28	0.89	2.93	50.06
75-76	339	1.75	0.22	0.82	3.32	33.23
77-78	282	1.95	0.1	0.89	3.28	54.80
79-80	226	1.66	0.2	0.78	2.64	41.77
80+	361	1.59	0.16	0.83	3.03	53.14
Race						
White	3261	1.68	0.07	0.85	2.93	107.97
Black	573	2.42	0.17	1.14	4.87	65.54
Other	25	2.27	0.42	1.24	4.80	17.97
Cardiovascular drug uses*						
Yes	2101	2.02	0.10	1.00	3.49	107.97
No	1754	1.51	0.07	0.76	2.66	99.71

* Cardiovascular drug uses including any ACE inhibitor, any beta blocker, any aspirin use >2 days in 2 weeks, any diuretic, any calcium channel blocker, any hypertension medicine, any vaso dilator.

** CVD: cardiovascular diseases includes MI, angina, congestive heart failure, stroke, transient ischemic attack, claudication, coronary artery bypass surgery, angioplasty, and carotid endarterectomy.

Table 7: Distribution of the Log Transformation of Baseline High-sensitivity C-reactive Protein among 1104 Prevalent CHD Patients (at entry) ≥ 65 Years of Age, CHS 1989--1997.**

Variables	N	Log (Geometric CRP)		Geometric Mean(mg/l)	t test p-value	RANGE (mg/l)			
		Mean	SE			Min	25%	75%	Max
Total	1,104	0.84	0.03	2.32		-1.66	0.16	1.39	4.42
Gender					0.0255				
Female	499	0.92	0.05	2.51		-1.66	0.23	1.58	4.08
Male	605	0.78	0.04	2.18		-1.61	0.08	1.28	4.42
Age, years					0.1753				
65-66	78	1.05	0.11	2.86		-1.31	0.34	1.79	3.40
67-68	142	0.79	0.09	2.20		-1.51	0.09	1.35	4.03
69-70	165	0.99	0.08	2.69		-1.61	0.37	1.63	3.83
71-72	148	0.90	0.08	2.46		-1.61	0.39	1.37	3.61
73-74	106	0.63	0.1	1.88		-1.39	0.02	1.13	3.13
75-76	129	0.71	0.1	2.03		-1.39	-0.08	1.16	4.42
77-78	107	0.92	0.1	2.51		-1.24	0.20	1.73	4.30
79-80	84	0.58	0.11	1.79		-1.61	-0.09	1.14	2.77
80+	145	0.85	0.09	2.34		-1.66	0.07	1.58	3.67
Race									
White	937	0.8	0.03	2.23	0.0110		0.10	1.30	4.42
Black	161	1.07	0.08	2.92		-1.61	0.43	1.82	3.39
Other	6	0.96	0.43	2.61		-0.48	-0.05	1.67	2.28
Cardiovascular drug uses*					0.0046				
Yes	964	0.87	0.03	2.39		-1.66	0.19	1.51	4.42
No	140	0.61	0.09	1.84		-1.56	-0.11	1.10	3.61

* Cardiovascular drug uses including any ACE inhibitor, any beta blocker, any aspirin use >2 days in 2 weeks, any diuretic, any calcium channel blocker, any hypertension medicine, any vaso dilator.

** CHD: coronary heart disease.

Table 8: Distribution of the Log Transformation of Baseline High-sensitivity C-reactive Protein among 3,859 Subjects \geq 65 Years of Age free of CVD, CHS 1989--1997.**

Variables	N	Log (Geometric CRP)		Geometric Mean(mg/l)	t test p-value	RANGE (mg/l)			
		Mean	SE			Min	25%	75%	Max
Total	3,859	0.56	0.02	1.75		-2.66	-0.13	1.33	4.68
Gender					0.0399				
Female	2247	0.61	0.02	1.84		-2.66	-0.11	1.18	4.46
Male	1612	0.54	0.03	1.72		-2.66	-0.16	1.08	4.68
Age, years					0.5742				
65-66	376	0.66	0.05	1.93		-1.61	-0.01	1.15	4.20
67-68	695	0.62	0.04	1.86		-1.71	-0.07	1.18	4.68
69-70	638	0.55	0.04	1.73		-2.66	-0.14	1.11	4.60
71-72	509	0.55	0.05	1.73		-2.41	-0.20	1.13	3.83
73-74	433	0.57	0.04	1.77		-1.27	-0.12	1.08	3.91
75-76	339	0.57	0.05	1.77		-1.51	-0.02	1.20	3.50
77-78	282	0.64	0.06	1.90		-2.30	-0.12	1.19	4.00
79-80	226	0.52	0.07	1.68		-1.61	-0.25	0.97	3.73
80+	361	0.54	0.06	1.72		-1.83	-0.19	1.11	3.97
Race									
White	3261	0.53	0.02	1.80	<0.0001	-2.66	-0.16	1.08	4.68
Black	573	0.88	0.05	1.79		-1.77	0.13	1.58	4.18
Other	25	0.86	0.22	1.60		-0.87	0.22	1.57	2.89
Cardiovascular drug uses*									
Yes	2101	0.71	0.02	2.01	< 0.0001	-2.30	0.00	1.25	4.68
No	1754	0.43	0.02	1.54		-2.66	-0.27	0.98	4.60

* Cardiovascular drug uses including any ACE inhibitor, any beta blocker, any aspirin use >2 days in 2 weeks, any diuretic, any calcium channel blocker, any hypertension medicine, any vaso dilator.

** CVD: cardiovascular diseases includes MI, angina, congestive heart failure, stroke, transient ischemic attack, claudication, coronary artery bypass surgery, angioplasty, and carotid endarterectomy.

Table 9: Unadjusted percentage of 1,104 prevalent CHD Patients (at entry) ≥ 65 Years of age in Three Categories of baseline hsCRP concentration, CHS 1989–1997.**

Variables	N	Percentage with baseline hsCRP concentration						chi-square p-value
		<1mg/l		1--3mg/l		>3 mg/l		
		n	%	n	%	n	%	
Total	1104	231	20.9	472	42.8	401	36.3	< 0.0001
Gender								
Male	605	140	23.1	262	43.3	203	33.6	< 0.0001
Female	499	91	18.2	210	42.1	198	39.7	< 0.0001
Age, years								0.0229
65-66	78	12	15.4	33	42.3	33	42.3	
67-68	142	31	21.8	57	40.1	54	38.0	
69-70	165	29	17.6	66	39.4	71	43.0	
71-72	148	21	14.2	69	46.6	58	39.2	
73-74	106	26	24.5	51	48.1	29	27.4	
75-76	129	35	27.1	58	45	36	27.9	
77-78	107	20	18.7	43	40.2	44	41.1	
79-80	84	24	28.6	38	45.2	22	26.2	
80+	145	33	22.8	58	40	54	37.2	
Race								
White	937	206	22.0	409	43.6	322	34.4	< 0.0001
Black	161	23	14.3	63	39.1	75	46.6	< 0.0001
Other	6	2	33.3	0	0.0	4	66.7	0.4142
Cardiovascular drug uses*								
Yes	964	190	19.7	408	42.3	366	38.0	< 0.0001
No	140	41	29.3	64	45.7	35	25.0	0.0066

* Cardiovascular drug uses including any ACE inhibitor, any beta blocker, any aspirin use >2 days in 2 weeks, any diuretic, any calcium channel blocker, any hypertension medicine, any vaso dilator.

** CHD: coronary heart disease.

Table 10: Unadjusted percentage of 3,859 Subjects \geq 65 Years of age free of CVD in Three Categories of baseline hsCRP concentration, CHS 1989–1997.**

Variables	N	Percentage with baseline hsCRP concentration						chi-square p-value
		<1mg/l		1--3mg/l		>3 mg/l		
		n	%	n	%	n	%	
Total	3859	1113	28.8	1729	44.8	1017	26.4	<0.0001
Gender								
Male	1612	484	30	739	45.8	389	24.1	<0.0001
Female	2247	629	28.0	990	44.1	628	27.9	<0.0001
Age, years								0.0579
65-66	376	96	25.5	181	48.1	99	26.3	
67-68	695	186	26.8	311	44.7	198	28.5	
69-70	638	180	28.2	296	46.4	162	25.4	
71-72	509	153	30.1	222	43.6	134	26.3	
73-74	433	127	29.3	202	46.7	104	24.0	
75-76	339	102	30.1	138	40.7	99	29.2	
77-78	282	86	30.5	112	39.7	84	29.8	
79-80	226	73	32.3	108	47.8	45	19.9	
80+	361	110	30.5	159	44.0	92	25.5	
Race								
White	3261	988	30.3	1491	45.7	782	24.0	<0.0001
Black	573	119	20.8	227	39.6	227	39.6	<0.0001
Other	25	6	24.0	11	44.0	8	32.0	0.4677
Cardiovascular drug uses*								
Yes	2101	522	24.9	927	44.1	652	31.0	<0.0001
No	1754	590	33.6	800	45.6	364	20.8	<0.0001

* Cardiovascular drug uses including any ACE inhibitor, any beta blocker, any aspirin use >2 days in 2 weeks, any diuretic, any calcium channel blocker, any hypertension medicine, any vaso dilator.

** CVD: cardiovascular diseases includes MI, angina, congestive heart failure, stroke, transient ischemic attack, claudication, coronary artery bypass surgery, angioplasty, and carotid endarterectomy.

Table 11. Baseline Range of High-sensitivity C-reactive Protein among the 5713 US elderly ≥ 65 Years of Age, CHS 1989--1997.

	N	hsCRP, mg/dl		Log (Geometric CRP)		Geometric mean	t-test p-value
		Median	SE	Mean	SE		
Unadjusted							0.1379
Statin* users	126	2.25	0.42	0.82	0.09	2.27	
Non-statin users	5581	1.91	0.08	0.68	0.01	1.97	
		Mean	SE	Mean	SE	Geometric mean	t-test p-value
Adjusted**							0.3155
Statin users	119	4.25	0.65	0.90	0.11	2.46	
Non-statin users	5260	4.12	0.35	0.80	0.06	2.23	

* Statin: 3-hydroxy-3-methylglutaryl coenzyme A (HMG COA) Reducatace inhibitor.

**Adjusted for age, gender, race.

Table 12: Unadjusted percentages of 5713 Adults ≥ 65 Years of age in Three Categories of baseline hsCRP concentration, CHS 1989--1997.

Variables	N	Percentage with baseline hsCRP concentration						chi-square test p-value
		<1mg/l		1--3mg/l		>3 mg/l		
		n	%	n	%	n	%	
Total	5713	1472	25.8	2525	44.2	1716	30.0	< 0.0001
Among all subjects								
Statin uses								
Yes	126	27	21.4	55	43.7	44	34.9	0.0088
No	5581	1444	25.9	2466	44.2	1671	29.9	< 0.0001
Among CHD patients								
Statin uses *								
Yes	51	13	25.5	19	37.3	19	37.3	0.4937
No	1053	218	20.7	453	43.0	382	36.3	< 0.0001

* Statin: 3-hydroxy-3-methylglutaryl coenzyme A (HMG COA) Reducatace inhibitor.

Table 13. Association between C-Reactive Protein Risk Categories and Demographic and Clinical Variables.

Variable	Total (N=5713)	Baseline CRP level (mg/l)			P-value for trend
		< 1 (n=1472)	1-3 (n=2525)	>3 (n=1716)	
Men (%)	3277	45.2	43.8	38.8	0.0002
Black (%)	864	11	13.5	21	< 0.0001
High school education or less (%)	3255	51.8	55.8	63.1	< 0.0001
Diabetes (%)	931	9	15.6	23.7	< 0.0001
Hypertension (%)	2537	33.9	43.6	54.7	< 0.0001
Isolated systolic hypertension (%)	1382	22.2	24.3	25.8	0.0192
Current Smoking	692	8.5	11.5	16.1	< 0.0001
Statin use** (%)	126	1.8	2.2	2.6	0.1608

* High school education or less refers to grade 8 or less, some high school, or high school graduation or GED.

** Statin: 3-hydroxy-3-methylglutaryl coenzyme A (HMG COA) Reducatace inhibitor.

Table 14: Multiple linear Regression results for Baseline log-transformed C-reactive Protein among 5713 US Adults ≥ 65 Years of Age, CHS 1989--1997.

Variables	Correlation		<i>partial T-test</i>
	Coefficie	SE	p-value
Pack-years smoked (among ever smokers)	0.003	0.0004	< 0.0001
Body mass index(BMI), kg/cm*2	0.051	0.003	< 0.0001
Total cholesterol, mg/dl	0.008	0.014	0.5846
HDL cholesterol, mg/dl	-0.006	0.014	0.6515
LDL cholesterol, mg/dl	-0.09	0.014	0.5077
Triglyceride, mg/dl	0.0001	0.003	0.9614
Fibrinogen, mg/dl	0.008	0.0002	< 0.0001
Fasting Glucose, mg/dl	0.002	0.0003	< 0.0001
Total alcohol per week among drinkers *	0.003	0.002	0.1336
Multiple R*2	0.34		

* Total alcohol per week among drinkers: Number of alcoholic beverages (beer, wine, or liquor) consumed per week.

Table 15. Association of traditional risk factors with Incident CHD or Ischemic Stroke Over 8 years among 3859 old adults, CHS 1989-1997.

Variables	Value	Incident CHD				Incident Ischemic Stroke		
		N	Events	Total P-Y	HR (95% CI)	Events	Total P-Y	HR (95% CI)
Age, years	65-66	376	17	2558.8	1.0(ref)	7	2590.9	1.0(ref)
	67-68	695	40	4686.6	0.50 (0.24-1.04)	20	4757.8	0.17 (0.06-0.47)
	69-70	638	34	4362.9	0.72 (0.40-1.31)	27	4374.0	0.33 (0.17-0.66)
	71-72	509	38	3376.3	0.58 (0.31-1.08)	36	3383.9	0.46 (0.24-0.87)
	73-74	433	38	2829.5	0.86 (0.47-1.56)	31	2809.1	0.71 (0.39-1.31)
	75-76	339	18	2233.3	0.86 (0.46-1.61)	27	2221.3	0.82 (0.44-1.55)
	77-78	282	28	1746.2	0.74 (0.37-1.45)	31	1744.9	0.80 (0.42-1.54)
	79-80	226	23	1403.3	1.12 (0.59-2.16)	27	1381.8	1.31 (0.69-2.49)
	80+	361	34	1978.7	1.29 (0.66-2.52)	39	1949.7	1.59 (0.84-3.03)
Gender	Female	2247	113	15073.9	1.0(ref)	144	14971.3	1.0(ref)
	Male	1612	157	10101.7	2.16 (1.52-3.06)	101	10242.0	1.07 (0.74-1.55)
Race	Black	573	20	2742.9	1.0(ref)	32	2731.6	1.0(ref)
	White	3261	248	22281.5	1.40 (0.79-2.47)	212	22330.6	1.33 (0.75-2.37)
	Other	25	2	151.2	3.45 (0.77-15.47)	1	151.2	2.06 (0.27-15.93)
Education Status	College Education or Higher	1677	86	11245.6	1.0(ref)	94	11251.1	1.0(ref)
	High School Education or less	2182	184	13930.1	1.38 (1.02-1.86)	151	13962.2	1.20 (0.87-1.65)
Diabete	No	2757	162	21859.1	1.0(ref)	179	21941.8	1.0(ref)
	Yes	555	68	3271.9	2.40 (1.42-4.06)	66	3227.0	1.98 (1.19-3.32)
Isolated Systolic Hypertension	No	2274	121	21245.1	1.0(ref)	201	21286.2	1.0(ref)
	Yes	424	43	2555.7	1.46 (0.89-2.40)	43	2551.1	1.27 (0.80-2.03)
Hypertension	No	1700	83	15340.8	1.0(ref)	102	15441.8	1.0(ref)
	Yes	1567	131	9803.5	1.17 (0.77-0.77)	143	9740.2	2.05 (1.34-3.13)
SMOKE	Normal	1832	115	12153.1	1.0(ref)	127	12084.4	1.0(ref)
	Former	1539	124	9976.2	0.83 (0.57-1.23)	89	10079.2	0.87 (0.56-1.33)
	Current	484	31	3026.3	0.82 (0.46-1.47)	29	3029.7	1.22 (0.64-2.31)
Pack-years (among ever smokers)		3859	270	25175.6	1.01 (1.00-1.01)	245	25213.3	0.99 (0.99-1.01)
Total Cholesterol, mg/l		3859	270	25175.6	1.09 (0.88-1.36)	245	25213.3	1.04 (0.81-1.33)
HDL, mg/l		3859	270	25175.6	0.92 (0.74-1.14)	245	25213.3	0.96 (0.75-1.23)
LDL, mg/l		3859	270	25175.6	0.92 (0.74-1.14)	245	25213.3	0.97 (0.76-1.24)
Triglyceride, mg/dl		3859	270	25175.6	0.98 (0.94-1.03)	245	25213.3	0.99 (0.95-1.04)
Fibrinogen, mg/dl		3859	270	25175.6	1.00 (0.90-1.00)	245	25213.3	0.99 (0.99-1.00)
Fasting Glucose, mg/dl		3859	270	25175.6	0.99 (0.99-1.01)	245	25213.3	1.00 (0.99-1.01)
Total Alcohol per week*		3859	270	25175.6	0.97 (0.93-0.99)	245	25213.3	0.99 (0.97-1.02)
BMI**, kg/m ²		3859	270	25175.6	0.98 (0.94-1.03)	245	25213.3	0.96 (0.92-1.00)

* Total alcohol per week among drinkers: Number of alcoholic beverages (beer, wine, or liquor) consumed per week.

** BMI: body mass index

Table 16. Association of Baseline CRP with Incident CHD Over 8 years among 3859 old adults, CHS 1989-1997.

Incident CHD	Baseline CRP level (mg/l)			Total	P-value
	< 1	1-3	>3		For trend
Events / total number	66/1113	116/1729	88/1017	270/3859	
Cumulative Incidence %	5.9	6.7	8.7	7	
Incidence Rate/1000 Person-Years	8.8	10.2	14.1	10.7	0.0029
Model 1	1.0(ref)	1.16 (0.86-1.58)	1.62 (1.18-2.23)		
Model 2	1.0(ref)	1.21 (0.90-1.64)	1.80 (1.31-2.49)		
Model 3	1.0(ref)	1.09(0.79-1.49)	1.47 (1.05-2.06)		
		CRP= 1-3 mg/l	CRP >3 mg/l		
Model 4 *		P-value for Gender and CRP interaction			
		0.3379	0.1398		
Model 5 *		P-value for Race and CRP interaction			
		0.9384	0.7086		

Model 1 is a crude model.

Model 2 is adjusted for age (categorized by 65-66, 67-68, 69-70, 71-72, 73-74, 75-76, 77-78, 79-80, 80+), gender, and race (white, black, others).

Model 3 is adjusted for the same model 2 variables, and education status (high school education or less and college education or higher), diabetic status (normal, impaired glucose tolerance, and diabetes), isolated systolic hypertension status (normal, borderline isolated systolic hypertension, isolated systolic HTN), pack-years smoked, total cholesterol, and total alcohol per week.

* Model 4 is adjusted for model 3 variables plus Gender-CRP interaction, but excluding race.

* Model 5 is adjusted for model 3 variables plus Race-CRP interaction, excluding gender.

** Adjusted risk ratios were derived from a multiple Cox proportional hazards analysis in which each risk ratio was adjusted for all other factors listed.

A risk ratio higher than 1 indicates that the elderly with elevated CRP have a higher risk for CHD than those with normal CRP levels.

Table 17. Association of Baseline CRP with Incident CHD by Gender Over 8 years among 3859 old adults, CHS 1989-1997.

Incident CHD	Baseline CRP level (mg/l)			log-rank test for trend	Total	Cumulative Incidence (Events/Total)
	< 1	1-3	>3			
Incidence rate / 1000 Person-Years, (n of events)						
Men	11.1 (36)	14.9 (69)	23.2 (52)	0.0006	15.5 (157)	10%
Women	7.0 (30)	7.0 (47)	9.0 (36)	0.2859	7.5 (113)	5%
White	8.8 (61)	10.7 (109)	15.1 (78)	0.0015	11.3 (248)	8%
Black	8.6 (5)	5.4 (6)	8.5 (9)	0.8580	7.3 (20)	3%
Among Men						
Model 1	1.0(ref)	1.34 (0.90–2.01)	2.09 (1.37–3.20)			
Model 2*	1.0(ref)	1.36 (0.91–2.04)	2.19 (1.43–3.36)			
Model 3 *	1.0(ref)	1.23 (0.80–1.87)	1.78 (1.14–2.80)			
Among Women						
Model 1	1.0(ref)	0.99 (0.63–1.57)	1.30 (0.80–2.11)			
Model 2*	1.0(ref)	1.04 (0.66–1.64)	1.38 (0.85–2.26)			
Model 3 *	1.0(ref)	0.93 (0.58–1.48)	1.11 (0.66–1.86)			
Among Whites						
Model 1	1.0(ref)	1.21 (0.88–1.65)	1.72 (1.23–2.40)			
Model 2 **	1.0(ref)	1.25 (0.92–1.72)	1.85 (1.32–2.59)			
Model 3 **	1.0(ref)	1.10 (0.79–1.52)	1.43 (1.01–2.04)			
Among Blacks						
Model 1	1.0(ref)	0.63 (0.19–2.05)	0.99 (0.34–2.98)			
Model 2 **	1.0(ref)	0.60 (0.18–2.00)	1.16 (0.38–3.51)			
Model 3 **	1.0(ref)	0.48 (0.13–1.84)	1.18(0.35–3.94)			

Model 1 is a crude model.

* Model 2 is adjusted for age (categorized by 65-66, 67-68, 69-70, 71-72, 73-74, 75-76, 77-78, 79-80, 80+), and race.

* Model 3 is adjusted for age, race, education status (high school education or less and college education or higher), diabetic status (normal, impaired glucose tolerance, and diabetes), isolated systolic hypertension status (normal, borderline isolated systolic hypertension), pack-years smoked, total cholesterol, and total alcohol per week.

** Model 2 is adjusted for age (categorized by 65-66, 67-68, 69-70, 71-72, 73-74, 75-76, 77-78, 79-80, 80+), and gender.

** Model 3 is adjusted for age, gender, education status (high school education or less and college education or higher), diabetic status (normal, impaired glucose tolerance, and diabetes), isolated systolic hypertension status (normal, borderline isolated systolic hypertension), pack-years smoked, total cholesterol, and total alcohol per week.

Table 18. Association of Baseline CRP with Incident Ischemic Stroke Over 8 years among 3859 old adults, CHS 1989-1997.

Incident Ischemic Stroke	Baseline CRP level (mg/l)			total	P-value for trend
	< 1	1-3	>3		
Events/total number	55/1113	110/1729	80/1017	245/3859	
Cumulative Incidence %	4.9	6.4	7.9	6%	
Incidence Rate / 1000 Person-Years	7.3	9.6	12.8	9.7	0.0008
Model 1	1.0(ref)	1.33 (0.96-1.84)	1.79 (1.27-2.52)		
Model 2	1.0(ref)	1.39 (1.01-1.93)	1.88 (1.33-2.66)		
Model 3	1.0(ref)	1.27 (0.91-1.78)	1.58 (1.10-2.29)		
Model 4	1.0(ref)	1.49 (1.00-2.23)	1.82 (1.18-2.82)		
		CRP= 1-3 mg/l	CRP >3 mg/l		
Model 5 *		P-value for Gender and CRP interaction 0.534	P-value for CRP >3 mg/l interaction 0.1721		
Model 6 *		P-value for Race and CRP interaction 0.771	P-value for CRP >3 mg/l interaction 0.5486		

Model 1 is a crude model.

Model 2 is adjusted for age (categorized by 65-66, 67-68, 69-70, 71-72, 73-74, 75-76, 77-78, 79-80, 80+), race, and gender.

Model 3 is adjusted for age, gender, race, diabetic status (normal, impaired glucose tolerance, and diabetes), hypertension status (normal, borderline hypertension, hypertension), LDL, HDL cholesterol, fasting glucose, and BMI.

Model 4 is adjusted for age, gender, race, diabetic status, hypertension, systolic blood pressure, total cholesterol, and smoking status.

* Model 5 is adjusted for model 3 variables plus Gender-CRP interaction, but excluding race.

* Model 6 is adjusted for model 3 variables plus Race-CRP interaction, excluding gender.

Table 19. Association of Baseline CRP with Incident Ischemic Stroke by Gender Over 8 years among 3859 old adults, CHS 1989-1997.

Incident Ischemic Stroke	Baseline CRP level (mg/l)			Log-rank test	Total	Cumulative Incidence (Events/Total)
	< 1	1-3	>3	for trend		
Incidence rate / 1000 Person-Years, (n of events)						
Men	6.4 (21)	9.8 (46)	15.1 (34)	0.0016	9.9 (101)	6%
Women	7.9 (34)	9.6 (64)	11.5 (46)	0.0806	9.6 (144)	6%
White	7.0 (49)	9.5 (97)	12.8 (66)	0.0012	9.5 (212)	7%
Black	10.3 (6)	10.9 (12)	13.4 (14)	0.5979	11.7 (32)	6%
Among Men						
Model 1	1.0(ref)	1.52 (0.91–2.55)	2.36 (1.37–4.06)			
Model 2 *	1.0(ref)	1.57 (0.94–2.64)	2.47 (1.43–4.27)			
Model 3 *	1.0(ref)	1.43 (0.84–2.43)	2.11 (1.20–3.72)			
Among Women						
Model 1	1.0(ref)	1.21 (0.80–1.83)	1.48 (0.95–2.31)			
Model 2 *	1.0(ref)	1.30 (0.86–1.97)	1.54 (0.99–2.42)			
Model 3 *	1.0(ref)	1.16 (0.76–1.79)	1.25 (0.76–2.06)			
Among Whites						
Model 1	1.0(ref)	1.34 (0.95–1.90)	1.83 (1.27–2.65)			
Model 2 **	1.0(ref)	1.34 (0.95–1.90)	1.98 (1.37–2.87)			
Model 3 **	1.0(ref)	1.34 (0.95–1.90)	1.65 (1.11–2.45)			
Among Blacks						
Model 1	1.0(ref)	1.06 (0.40–2.82)	1.30 (0.50–3.39)			
Model 2 **	1.0(ref)	1.40 (0.51–3.81)	1.31 (0.50–3.40)			
Model 3 **	1.0(ref)	1.17 (0.42–3.30)	1.33 (0.47–3.77)			

Model 1 is a crude model.

* Model 2 is adjusted for age (categorized by 65-66, 67-68, 69-70, 71-72, 73-74, 75-76, 77-78, 79-80, 80+) and race.

Model 3 is adjusted for age, race, diabetic status (normal, impaired glucose tolerance, and diabetes), hypertension status (normal, borderline hypertension, hypertension), LDL, HDL cholesterol, fasting glucose, and BMI.

** Model 2 is adjusted for age (categorized by 65-66, 67-68, 69-70, 71-72, 73-74, 75-76, 77-78, 79-80, 80+) and gender.

Model 3 is adjusted for age, gender, diabetic status (normal, impaired glucose tolerance, and diabetes), hypertension status (normal, borderline hypertension, hypertension), LDL, HDL cholesterol, fasting glucose, and BMI.

Figures 1-2:

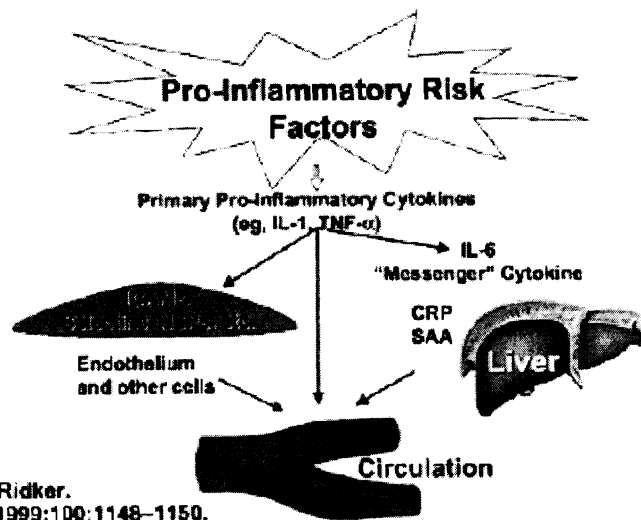


Figure 1. The inflammatory cascade. IL indicates interleukin; ICAM, intercellular adhesion molecule; and HSP, heat shock protein.

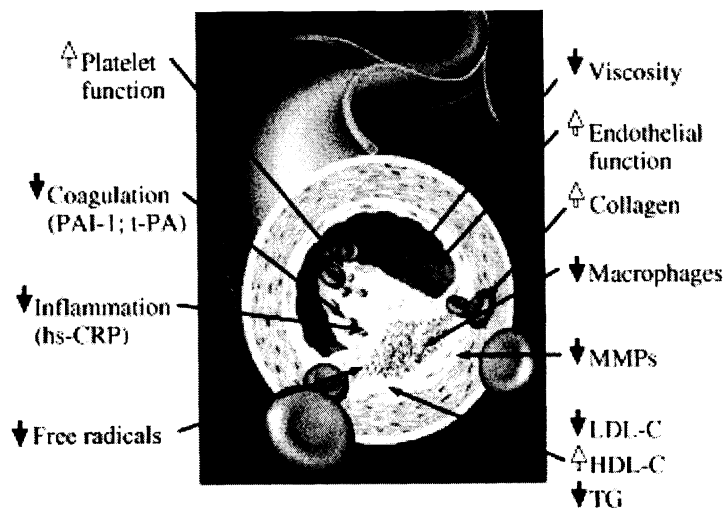


Figure 2. Pleiotropic effects of statins. Cholesterol-independent vasoprotective effects of statins. Plasminogen activator inhibitor-1 (PAI-1), tissue-plasminogen activator (t-PA), matrix metalloproteinases (MMPs), low-density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C) and triglycerides (TG).
 (Ref: Endres M. Statins and stroke. *J Cereb Blood Flow Metab* 2005;25(9):1093–110.)

APPENDIX I — SAS SYNTAX

```

libname event 'F:\CHS data\original datafile\events';
option nofmterr;

proc format;
  value EVTYPE 0='no event'
              1='MI'
              2='angina'
              3='stroke'
              4='chf'
              5='claudication'
              6='TIA'
              7='angioplasty'
              8='coronary artery bypass surgery'
              9='other deaths'
              10='ECG MI(silent)'
              11='other CHD deaths';

  value TTOEVENT 0='UNKNOWN';
  value INCREC 0='RECURRENT'
              1='INCIDENT'
              2='NOT ASSESSED'
              9='UNKNOWN';
  value FATAL 0='NOT FATAL'
              1='FATAL'
              9='UNKNOWN';
  value DEFPROB 0='PROBABLE'
               1='DEFINITE'
               2='NOT ASSESSED'
               9='UNKNOWN';
  value PROCREL 0='NON-PROCEDURE RELATED'
               1='PROCEDURE RELATED'
               2='NOT ASSESSED'
               9='UNKNOWN';
  value STKTYPE 0='HEMORRHAGIC'
               1='ISCHEMIC'
               9='MISSING';
  value DEATH 0='ALIVE'
              1='DEATH';

  value MIBLMOD 0='INCIDENT'
               1='PREVALENT';
  value ANBLMOD 0='INCIDENT'

```

```

        1='PREVALENT';
value CHBLMOD 0='INCIDENT'
        1='PREVALENT';
value CLBLMOD 0='INCIDENT'
        1='PREVALENT';
value STBLMOD 0='INCIDENT'
        1='PREVALENT';
value TIBLMOD 0='INCIDENT'
        1='PREVALENT';
value BPSSUR 0='INCIDENT'
        1='PREVALENT';
value CAROTI 0='INCIDENT'
        1='PREVALENT';
value CORART 0='INCIDENT'
        1='PREVALENT';

label EVTYPE = 'Event type';
label TTOEVENT = 'event time, in days, from study entry to event';
label CENSTIME='censor time';
label INCREC = 'Incident or recurrent';
label FATAL = 'fatal or non-fatal';
label DEFPROB = 'definite or probable';
label PROCREL = 'procedure related to non-related procedure';
label STKTYPE = 'stroke type (missing if the event is not stroke)';
label DEATH = 'all death';
label MIBLMOD = 'MI(myocardial infarction)baseline modified status';
label ANBLMOD = 'Angina baseline modified status';
label CHBLMOD = 'CHF(congestive heart failure) baseline modified status';
label CLBLMOD = 'CLAUD(Claudication)baseline modified status';
label STBLMOD = 'Stroke baseline modified status';
label TIBLMOD = 'TIA(transient ischemic attack)baseline modified status';
label BPSSUR = 'coronary bypass surgery';
label CAROTI = 'carotid endarterectomy';
label CORART = 'coronary artery angioplasty';

RUN;
proc print data=event.ssd;
    var EVTYPE TTOEVENT CENSTIME;
run;

libname chd 'F:\CHS data\chd';
DATA chd.all;

```

```

set event.ssd (KEEP=IDNO EVTYPE TTOEVENT CENSTIME INCREC FATAL DEFPROB DEATH MIBLMOD ANBLMOD
              STBLMOD TIBLMOD);
where MIBLMOD NE 1 and (EVTYPE=1 or EVTYPE= 11) and DEFPROB=1;
by IDNO ttoevent;

RUN;

libname chd 'F:\CHS data\chd';
DATA chd.all;
  set event.ssd (KEEP=IDNO EVTYPE TTOEVENT CENSTIME INCREC FATAL DEFPROB DEATH MIBLMOD ANBLMOD CHBLMOD
                CLBLMOD
                STBLMOD TIBLMOD);
  where MIBLMOD NE 1 and (EVTYPE=1 or EVTYPE= 11) and DEFPROB=1;
  by IDNO ttoevent;
RUN;
proc sort data=chd.all;
  by IDNO TTOEVENT;
run;

DATA chd.ssd;
  set chd.all;
  by IDNO TTOEVENT;
  IF FIRST.IDNO;
run;
data chd.ssd;
  set chd.ssd;
  if EVTYPE=1 and FATAL=0 then nonfatalMI=1;
  else if (EVTYPE=1 and Fatal=1) or EVTYPE=11 then CHDdeath=1;
  if nonfatalMI=1 or CHDdeath=1 then Inc_CHD=1;
  else Inc_CHD=0;

label Inc_CHD = 'Incident CHD, first MI or CHD death';
run;

libname stk 'F:\CHS data\stk';
data stk.ssd;
  set event.ssd (KEEP=IDNO EVTYPE TTOEVENT CENSTIME INCREC FATAL DEFPROB STKTYPE STBLMOD);
  where STBLMOD NE 1 and EVTYPE=3 and STKTYPE=1 and DEFPROB=1;
  by IDNO TTOEVENT;
run;

```

```

proc sort data=stk.ssd;
  by IDNO TTOEVENT;
run;
data stk.ssd;
  set stk.ssd;
  by IDNO TTOEVENT;
  IF FIRST.IDNO;
run;
data stk.ssd;set stk.ssd;
  if STBLMOD NE 1 and EVTYPE=3 and STKTYPE=1 and DEFPROB=1 then ish_stroke=1;
  else ish_stroke=0;

label ish_stroke = 'Incident ischemic stroke';
run;

libname chdstk 'F:\CHS data\event';
data chdstk.evt;
MERGE chd.ssd
      stk.ssd;
  by IDNO;
run;

data chd.censtime;
  set event.ssd (KEEP= IDNO CENSTIME TTOEVENT);
  by IDNO;
  IF FIRST.IDNO;
run;

libname BL 'F:\CHS data\original datafile\baseboth';
libname base 'F:\CHS data\base';
data base.ssd;
MERGE chd.censtime
      BL.ssd (KEEP = IDNO GEND01 AGE2 CRP STTN06 ANYACE ANYBETA ASPIRIN
              ANYDIUR CCB06 HTNMED06 ANYVASO CAROTI BPSSUR CORART EXTART
              CHDBLMOD STBLMOD MIBLMOD ANBLMOD CLBLMOD TIBLMOD CHBLMOD
              ESTBLNC ESTBL RACE01 EDUC SMOKE PKYRS DIABADA HYPER FHHA
              CHOLADJ HDL44 LDLADJ BMI ALCOH FIB44 GLUADJ TRIG44 IHYPER
              ASPIRIN MAJABN AAI);
  by IDNO;

```

```

label CRP = 'c-reactive protein';
label STTN06 = 'HMG COA Reducatace Inhibitors (statin)';
label ANYACE = 'any ACE inhibitor';
label ANYBETA = 'any beta blocker';
label ASPIRIN = 'aspirin use >2 days in 2 weeks';
label ANYDIUR = 'any diuretic';
label CCB06 = 'any calcium channel blocker';
label HTNMED06 = 'any hypertension medicine';
label ANYVASO = 'any VASO dilator';

run;
data base.ssd;set base.ssd;
  where CRP > 0;

  if AGE2=1 then AGE3=1;
  if AGE2=2 then AGE3=2;
  if AGE2=3 then AGE3=3;
  if AGE2=4 then AGE3=4;
  if AGE2=5 then AGE3=5;
  if AGE2=6 then AGE3=6;
  if AGE2=7 then AGE3=7;
  if AGE2=8 then AGE3=8;
  if AGE2=9 or AGE2=10 or AGE2 = 11 or AGE2= 12 or AGE2 = 13 then AGE3=9;

  if CRP<1 then CRP1=1;
  Else if CRP>=1 and CRP<=3 then CRP1=2;
  Else if CRP>3 then CRP1=3;

  if ANYACE=1 or ANYBETA=1 or ASPIRIN=1 or ANYDIUR=1 or CCB06=1 or HTNMED06=1 or ANYVASO=1 then CVDRUG=1;
  Else if ANYACE=0 and ANYBETA=0 and ASPIRIN=0 and ANYDIUR=0 and CCB06=0 and HTNMED06=0 and ANYVASO=0
    then CVDRUG=0;

  if ESTBLNC=1 then HORMONE=1;
  else if ESTBLNC=0 then HORMONE=0;

  if CRP>3 then HCRP=1;
  else if CRP<=3 then HCRP=0;

  if RACE01=1 then RACE02=1;
  if RACE01=2 or RACE01=3 then RACE02=0;

  if EDUC=1 then EDUCLV=1;

```

```

if EDUC=2 or EDUC=3 then EDUCLV=2;
if EDUC=4 or EDUC=5 or EDUC=6 then EDUCLV=3;

if EDUCLV = 1 or EDUCLV = 2 then EDUC01 = 1;
else EDUC01 = 0;

LOGCRP = LOG(CRP);

run;

libname crp 'F:\CHS data\baseline';
data crp.ssd;
MERGE chdstk.evt
      base.ssd;
      by IDNO;
run;
data crp.ssd;set crp.ssd;
      where CRP > 0;
run;

/*****To define categorical variables with more than 2 categories*****/

DATA crp.ssd;set crp.ssd;

      ARRAY dummies {*} 4. AGECat1 - AGECat9;

      DO i=1 TO 9;
          dummies(i) = 0;
      END;
      dummies( AGE3 ) = 1;

RUN;

PROC FREQ DATA=crp.ssd;
      TABLES AGE3*AGECat1*AGECat2*AGECat3*AGECat4*AGECat5*AGECat6*AGECat7*AGECat8*AGECat9 / list ;
RUN;

data crp.ssd;set crp.ssd;
      if RACE01=2 then do;
          RACECat1=0;

```



```

        RACECat2=0;
    end;
else if RACE01=1 then do;
    RACECat1=1;
    RACECat2=0;
end;
else if RACE01=3 then do;
    RACECat1=0;
    RACECat2=1;
end;

label RACECat1='White vs Black';
label RACECat2='Other vs Black';
run;
data crp.ssd;set crp.ssd;
if HYPER=0 then do;
    HYPERCat1=0;
    HYPERCat2=0;
end;
else if HYPER=1 then do;
    HYPERCat1=1;
    HYPERCat2=0;
end;
else if HYPER=2 then do;
    HYPERCat1=0;
    HYPERCat2=1;
end;

label HYPERCat1='Borderline HTN vs Normal';
label HYPERCat2='Hypertension vs Normal';
run;
PROC FREQ DATA=crp.ssd;
    TABLES HYPERCat1*HYPERCat2 / list ;
RUN;
data crp.ssd;set crp.ssd;
if IHYPER=0 then do;
    IHYPERCat1=0;
    IHYPERCat2=0;
end;
else if IHYPER=1 then do;
    IHYPERCat1=1;
    IHYPERCat2=0;
end;

```

```

        end;
    else if IHYPER=2 then do;
        IHYPERCat1=0;
        IHYPERCat2=1;
        end;

    label IHYPERCat1='Borderline Isolated Systolic HTN vs Normal';
    label IHYPERCat2='Isolated Systolic Hypertension vs Normal';
run;

data crp.ssd;set crp.ssd;
    if SMOKE=1 then do;
        SMOKECat1=0;
        SMOKECat2=0;
        end;
    else if SMOKE=2 then do;
        SMOKECat1=1;
        SMOKECat2=0;
        end;
    else if SMOKE=3 then do;
        SMOKECat1=0;
        SMOKECat2=1;
        end;

    label SMOKECat1='Former smoker vs Never smoked';
    label SMOKECat2='Current smoker vs Never smoked';
run;

data crp.ssd;set crp.ssd;
    if DIABADA=1 then do;
        DIABADACat1=0;
        DIABADACat2=0;
        end;
    else if DIABADA=2 then do;
        DIABADACat1=1;
        DIABADACat2=0;
        end;
    else if DIABADA=3 then do;
        DIABADACat1=0;
        DIABADACat2=1;
        end;

```

```

label DIABADACat1='Impaired Fasting Glucose vs Normal';
label DIABADACat2='Diabetes vs Normal';
run;

data crp.ssd;set crp.ssd;
if IHYPER=2 then IHTN=1;
  else IHTN=0;
run;

/***** 3859 Subjects free of CVD *****/

libname chdstk 'F:\CHS data\event';
data chdstk.ssd;set crp.ssd;
  where MIBLMOD=0 and ANBLMOD=0 and CHDBLMOD=0 and CHBLMOD=0 and CLBLMOD=0 and STBLMOD=0
    and TIBLMOD=0 and BPSSUR=0 and CAROTI=0 and CORART=0;

label CHDBLMOD='CHD baseline modified status';
run;

data chdstk.ssd;set chdstk.ssd;
  where ESTBLNC NE 2;

label ESTBLNC='ESTROGEN at baseline, No CREAMS';
run;

data chdstk.ssd;set chdstk.ssd;
  if CRP<1 then do;
    CRPCat1=0;
    CRPCat2=0;
  end;
  else if CRP>=1 and CRP<=3 then do;
    CRPCat1=1;
    CRPCat2=0;
  end;
  else if CRP>3 then do;
    CRPCat1=0;
    CRPCat2=1;
  end;

  label CRPCat1='CRP 1-3 vs <1';
  label CRPCat2='CRP >3 vs <1';
run;

```

```

data chdstk.ssd; set chdstk.ssd;
  crp_gend1 = CRPCat1*GEND01;
  crp_gend2 = CRPCat2*GEND01;
  crp_race1 = CRPCat1*RACE01;
  crp_race2 = CRPCat2*RACE01;

label crp_gend1 = 'interaction of gender and CRP 1-3 mg/l';
label crp_gend2 = 'interaction of gender and CRP >3 mg/l';
label crp_race1 = 'interaction of race and crp 1-3 mg/l';
label crp_race2 = 'interaction of race and crp >3 mg/l';
run;

/**** TO calculate Follow-up time*****/
data chdstk.ssd; set chdstk.ssd;
  if Inc_CHD=1 then chddays = TTOEVENT;
  else do;
    Inc_CHD=0;
    chddays = CENSTIME;
  end;

  if ish_stroke=1 then strokedays = TTOEVENT;
  else do;
    ish_stroke=0;
    strokedays = CENSTIME;
  end;

label chddays = 'follow-up time of incident CHD, in days';
label strokedays = 'follow-up time of incident ischemic stroke, in days';
run;
/**** Same results of Follow-up Time from different SAS code****/
data chdstk.ssd; set chdstk.ssd;
  chddays=0;
  if Inc_CHD=1 then chddays = TTOEVENT;
  else if Inc_CHD=0 then chddays = CENSTIME;

  strokedays=0;
  if ish_stroke=1 then strokedays = TTOEVENT;
  else if ish_stroke=0 then strokedays = CENSTIME;

label TTOEVENT = 'event time, in days, from study entry to event';
label CENSTIME = 'censor time';

```

```

run;
proc print data=chdstk.ssd;
  var EVTYPE CENSTIME TTOEVENT chddays strokedays;
run;

/***** the whole cohorts (n=5713)*****/
Data crp.ssd; set crp.ssd;
  if (MIBLMOD=1 or ANBLMOD=1 or CHDBLMOD=1 or CHBLMOD=1 or CLBLMOD=1 or STBLMOD=1
      or TIBLMOD=1 or BPSSUR=1 or CAROTI=1 or CORART=1) then CVD=1;
  else if (MIBLMOD=0 and ANBLMOD=0 and CHDBLMOD=0 and CHBLMOD=0 and CLBLMOD=0 and STBLMOD=0
          and TIBLMOD=0 and BPSSUR=0 and CAROTI=0 and CORART=0) then CVD=0;

run;
data crp.ssd;set crp.ssd;
  if RACE01= 2 then RACE_W=1;
  else RACE_W=0;

  if DIABADA=3 then DIAB=1;
  else DIAB=0;

  if IHYPER=2 then IHTN=1;
  else IHTN=0;

  if SMOKE=3 then SMK=1;
  else SMK=0;
run;

/***** 1104 subjects of prevalent CHD *****/
libname crp_chd 'F:\CHS data\prechd';
data crp_chd.ssd; set crp.ssd;
  where CHDBLMOD=1;
run;

/***** To create new data for calculating P-Y *****/
/**** Data=chddays ****/
data strokedays (keep=ish_stroke GEND01 ALCOH  FIB44 CHOLADJ TRIG44 HDL44 IHYPER LDLADJ
                SMOKE PKYRS DIABADA GLUADJ HYPERS RACE01 BMI AGE3
                crp1 EDUC01 strokedays);

set chdstk.ssd;
run;

```

```

proc print data=strokedays;
run;

/** data=strokedays ***/
data chddays (keep= Inc_CHD GEND01 ALCOH FIB44 CHOLADJ TRIG44 HDL44 IHYPER LDLADJ
                SMOKE PKYRS DIABADA GLUADJ HYPER RACE01 BMI AGE3 crp1 EDUC01
                chddays);
    set chdstk.ssd;
run;
proc print data=chddays;
run;

/***** TABLE 1: Distribution of CV risk factors by baseline CRP concentration*****/

/***** Categorical variables*****/
proc sort data=chdstk.ssd;
    by AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8;
run;
proc freq data=crp.ssd;
    tables AGE3*CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
    where GEND01=1;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
    where RACE01=1;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
    where RACE01=2;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
    where EDUC01=1;
    tables CRP1/CHISQ CMH;

```

```

run;
proc freq data=crp.ssd;
  where EDUC01=0;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  where DIABADA=3;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  where HYPER=2;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  where IHYPER=2;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  where SMOKE=3;
  tables CRP1/CHISQ CMH;
run;

```

```

/*** Continuous variables*****/
proc means data=crp.ssd n mean std stderr median prt maxdec=2;
  class CRP1;
  var BMI;
run;
PROC ANOVA DATA=crp.ssd;
  CLASS CRP1;
  MODEL BMI=CRP1;
RUN;
proc means data=crp.ssd n mean std stderr median prt maxdec=2;
  class CRP1;
  var CHOLADJ;
run;
PROC ANOVA DATA=crp.ssd;
  CLASS CRP1;
  MODEL CHOLADJ=CRP1;
RUN;

```

```

proc means data=crp.ssd n mean std stderr median prt maxdec=2;
  class CRP1;
  var HDL44;
run;
PROC ANOVA DATA=crp.ssd;
  CLASS CRP1;
  MODEL HDL44=CRP1;
RUN;
proc means data=crp.ssd n mean std stderr median prt maxdec=2;
  class CRP1;
  var LDLADJ;
run;
PROC ANOVA DATA=crp.ssd;
  CLASS CRP1;
  MODEL LDLADJ=CRP1;
RUN;
proc means data=crp.ssd n mean std stderr median prt maxdec=2;
  class CRP1;
  var TRIG44;
run;
PROC ANOVA DATA=crp.ssd;
  CLASS CRP1;
  MODEL TRIG44=CRP1;
RUN;
proc means data=crp.ssd n mean std stderr median prt maxdec=2;
  class CRP1;
  var FIB44;
run;
PROC ANOVA DATA=crp.ssd;
  CLASS CRP1;
  MODEL FIB44=CRP1;
RUN;
proc means data=crp.ssd n mean std stderr median prt maxdec=2;
  class CRP1;
  var GLUADJ;
run;
PROC ANOVA DATA=crp.ssd;
  CLASS CRP1;
  MODEL GLUADJ=CRP1;
RUN;
proc means data=crp.ssd n mean std stderr median prt maxdec=2;
  class CRP1;

```



```

    var PKYRS;
run;
PROC ANOVA DATA=crp.ssd;
  CLASS CRP1;
  MODEL PKYRS=CRP1;
RUN;
proc means data=crp.ssd n mean std stderr median prt maxdec=2;
  class CRP1;
  var ALCOH;
run;
PROC ANOVA DATA=crp.ssd;
  CLASS CRP1;
  MODEL ALCOH=CRP1;
RUN;
proc means data=crp.ssd n mean std stderr median prt maxdec=2;
  class CRP1;
  var CRP;
run;
PROC ANOVA DATA=crp.ssd;
  CLASS CRP1;
  MODEL CRP=CRP1;
RUN;

/***** TABLE 2-3: Distribution of hsCRP among the elderly from CHS*****/

proc means data=crp.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  var CRP LOGCRP;
run;
proc means data=crp.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  class GEND01;
  var CRP LOGCRP;
run;
proc ttest data=crp.ssd;
  class GEND01;
  var CRP;
run;
proc ttest data=crp.ssd;
  class GEND01;
  var LOGCRP;
run;
proc means data=crp.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;

```

```

class AGE3;
var CRP LOGCRP;
run;
PROC ANOVA DATA=crp.ssd;
CLASS AGE3;
MODEL LOGCRP=AGE3;
RUN;

proc means data=crp.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
class RACE01;
var CRP LOGCRP;
run;
PROC ANOVA DATA=crp.ssd;
CLASS RACE01;
MODEL LOGCRP=RACE01;
RUN;

proc means data=crp.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
class CVDRUG;
var CRP LOGCRP;
run;
proc ttest data=crp.ssd;
class CVDRUG;
var CRP;
run;
proc ttest data=crp.ssd;
class CVDRUG;
var LOGCRP;
run;

/***** TABLE 4: Population Distribution of hsCRP in the elderly *****/
proc freq data=crp.ssd;
tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
tables GEND01*CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
where GEND01=0;
tables CRP1/CHISQ CMH;
run;

```

```

proc freq data=crp.ssd;
  where GEND01=1;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  tables AGE3*CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  tables RACE01*CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  where RACE01=1;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  where RACE01=2;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  where RACE01=3;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  tables CVDRUG*CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  where CVDRUG=1;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  where CVDRUG=0;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  tables STTN06*CRP1/CHISQ CMH;
run;

```

```

/***** TABLES 5 and 7: hsCRP concentrations in 1104 subjects with CHD *****/
proc means data=crp.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  class CHDBLMOD;
  var CRP LOGCRP;

```

```

run;
proc means data=crp.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  class CHDBLMOD GEND01;
  var CRP LOGCRP;
run;
proc ttest data=crp_chd.ssd;
class GEND01;
var CRP;
run;
proc ttest data=crp_chd.ssd;
class GEND01;
var LOGCRP;
run;
proc means data=crp.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  class CHDBLMOD AGE3;
  var CRP LOGCRP;
run;
PROC ANOVA DATA=crp_chd.ssd;
  CLASS AGE3;
  MODEL LOGCRP=AGE3;
RUN;

proc means data=crp.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  class CHDBLMOD RACE01;
  var CRP LOGCRP;
run;
PROC ANOVA DATA=crp_chd.ssd;
  CLASS RACE01;
  MODEL CRP=RACE01;
RUN;
PROC ANOVA DATA=crp_chd.ssd;
  CLASS RACE01;
  MODEL LOGCRP=RACE01;
RUN;
proc means data=crp.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  class CHDBLMOD CVDRUG;
  var CRP LOGCRP;
run;
proc ttest data=crp_chd.ssd;
class CVDRUG;
var CRP;
run;

```

```

proc ttest data=crp_chd.ssd;
class CVDRUG;
var LOGCRP;
run;

/***** TABLE 9: Proportions among the 1104 CHD patients *****/
proc sort data=crp.ssd;
  by CHDBLMOD;
run;
proc freq data=crp.ssd;
  tables CRP1/CHISQ CMH;
  by CHDBLMOD;
run;
proc freq data=crp_chd.ssd;
  where GEND01=0;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
  where GEND01=1;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
  tables AGE3*CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
  where AGE3=1;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
  where AGE3=2;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
  where AGE3=3;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
  where AGE3=4;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;

```

```

    where AGE3=5;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
    where AGE3=6;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
    where AGE3=7;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
    where AGE3=8;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
    where AGE3=9;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
    where RACE01=1;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
    where RACE01=2;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
    where RACE01=3;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
    where CVDRUG=1;
    tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
    where CVDRUG=0;
    tables CRP1/CHISQ CMH;
run;

```

/***** TABLES 6 and 8: Range of hsCRP levels among 3859 subjects free of CVD *****/

```

proc means data=chdstk.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  var CRP LOGCRP;
run;
proc means data=chdstk.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  class GEND01;
  var CRP LOGCRP;
run;
proc ttest data=chdstk.ssd;
class GEND01;
var LOGCRP;
run;
proc means data=chdstk.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  class AGE3;
  var CRP LOGCRP;
run;
PROC ANOVA DATA=chdstk.ssd;
  CLASS AGE3;
  MODEL LOGCRP=AGE3;
RUN;
proc means data=chdstk.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  class RACE01;
  var CRP LOGCRP;
run;
PROC ANOVA DATA=chdstk.ssd;
  CLASS RACE01;
  MODEL LOGCRP=RACE01;
RUN;
proc means data=chdstk.ssd n mean std stderr median min p25 p75 max t prt maxdec=2;
  class CVDRUG;
  var CRP LOGCRP;
run;
proc ttest data=chdstk.ssd;
class CVDRUG;
var LOGCRP;
run;

/***** TABLE 10: Proportions among the 3859 elderly free of CVD *****/
proc freq data=chdstk.ssd;
  tables CRP1/CHISQ CMH;
run;
proc freq data=chdstk.ssd;

```

```

    where GEND01=0;
    tables CRP1/CHISQ CMH;
run;
proc freq data=chdstk.ssd;
    where GEND01=1;
    tables CRP1/CHISQ CMH;
run;
proc freq data=chdstk.ssd;
    tables AGE3*CRP1/CHISQ CMH;
run;
proc freq data=chdstk.ssd;
    where RACE01=1;
    tables CRP1/CHISQ CMH;
run;
proc freq data=chdstk.ssd;
    where RACE01=2;
    tables CRP1/CHISQ CMH;
run;
proc freq data=chdstk.ssd;
    where RACE01=3;
    tables CRP1/CHISQ CMH;
run;
proc freq data=chdstk.ssd;
    where CVDRUG=1;
    tables CRP1/CHISQ CMH;
run;
proc freq data=chdstk.ssd;
    where CVDRUG=0;
    tables CRP1/CHISQ CMH;
run;

```

```

/***** TABLE 11: hsCRP distribution by statin uses ***/
/**** Crude Analyses ****/
PROC MEANS DATA=crp.ssd N MEAN STD STDERR MEDIAN T PRT;
    CLASS STTN06;
    VAR CRP LOGCRP;
RUN;
proc ttest data=crp.ssd;
class STTN06;
var LOGCRP;
run;

```



```

/***** Lease-square-adjusted mean of CRP levels *****/
PROC GLM DATA=crp.ssd;
  CLASS AGE3 GEND01 RACE01 STTN06;
  MODEL LOGCRP = STTN06 AGE3 GEND01 RACE01 / SS3 SOLUTION;
  MEANS STTN06;
  LSMEANS STTN06/COV out=logcrp;
  *ESTIMATE 'Adjusted Mean Dif' STTN06 0 1;
RUN;
proc print data=logcrp;
run;

PROC GLM DATA=crp.ssd;
  CLASS AGE3 GEND01 RACE01 STTN06;
  MODEL CRP = AGE3 GEND01 RACE01 STTN06 / SS3 SOLUTION;
  MEANS STTN06;
  LSMEANS STTN06/COV out=hscrp;
  *ESTIMATE 'Adjusted Mean Dif' STTN06 0 1;
RUN;
proc print data=hscrp;
run;

/***** Table 12: Propotions by 3 categories of hsCRP levels *****/
proc freq data=crp.ssd;
  where STTN06=1;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp.ssd;
  where STTN06=0;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
  where STTN06=1;
  tables CRP1/CHISQ CMH;
run;
proc freq data=crp_chd.ssd;
  where STTN06=0;
  tables CRP1/CHISQ CMH;
run;

```

```

/***** Table 13: trend test for CRP risk categories and categorical CV risk factors *****/
proc freq data=crp.ssd;
  tables GEND01*CRP1 / trend measures cl;
  test smdcr;
  exact trend / maxtime=60;
run;
proc freq data=crp.ssd;
  tables RACE_W*CRP1 / trend measures cl;
  test smdcr;
  exact trend / maxtime=60;
run;
proc freq data=crp.ssd;
  tables EDUC01*CRP1 / trend measures cl;
  test smdcr;
  exact trend / maxtime=60;
run;
proc freq data=crp.ssd;
  tables DIAB*CRP1 / trend measures cl;
  test smdcr;
  exact trend / maxtime=60;
run;
proc freq data=crp.ssd;
  tables HTN*CRP1 / trend measures cl;
  test smdcr;
  exact trend / maxtime=60;
run;
proc freq data=crp.ssd;
  tables IHTN*CRP1 / trend measures cl;
  test smdcr;
  exact trend / maxtime=60;
run;
proc freq data=crp.ssd;
  tables SMK*CRP1 / trend measures cl;
  test smdcr;
  exact trend / maxtime=60;
run;
proc freq data=crp.ssd;
  tables STTN06*CRP1 / trend measures cl;
  test smdcr;
  exact trend / maxtime=60;
run;

```

```

/***** TABLE 14: MLR for the correlation of CRP and continuous CV risk factors *****/
data crp.ssd; set crp.ssd;
  if GEND01=0 then GEND=1;
  else GEND=0;
run;
proc sort data=crp.ssd;
  by LOGCRP;
run;

/*****correlation between continous variables and CRP*****/
proc reg data=crp.ssd;
  model LOGCRP = PKYRS BMI CHOLADJ HDL44 LDLADJ TRIG44 FIB44 GLUADJ ALCOH;
run;

/***** TO BUILD FINAL MODEL *****/
PROC REG data=crp.ssd;
  MODEL LOGCRP = AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    IHYPERCat2 HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2
    PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ;
PROC RSQUARE;
  MODEL LOGCRP = AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    IHYPERCat2 HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2
    PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ / ADJRSQ;
PROC REG data=crp.ssd;
  MODEL LOGCRP = AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    IHYPERCat2 HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2
    PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ
  / SELECTION=FORWARD SLENTRY= .25;
RUN;
QUIT;
PROC REG data=crp.ssd;
  MODEL LOGCRP = AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    IHYPERCat2 HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2
    PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ
  / SELECTION=BACKWARD SLSTAY=.10;
RUN;

```

```

QUIT;
PROC REG data=crp.ssd;
  MODEL LOGCRP = AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    IHYPERCat2 HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2 STTN06
    PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ
    / SELECTION=STEPWISE SLENTY=.25 SLSTAY= .10;

RUN;
QUIT;

PROC REG DATA=crp.ssd;
  MODEL LOGCRP = GEND01 AGE2 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    HYPERCat1 HYPERCat2 IHYPERCat1 IHYPERCat2 SMOKECat1 SMOKECat2 STTN06
    PKYRS BMI HDL44 LDLADJ TRIG44 ALCOH FIB44 GLUADJ / P R;
    OUTPUT OUT=REG P=PRED R=RESID PRESS=PRESS;

PROC PRINT DATA=REG;
  VAR LOGCRP RESID PRESS;
PROC REG;
  MODEL LOGCRP = GEND01 AGE2 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    HYPERCat1 HYPERCat2 IHYPERCat1 IHYPERCat2 SMOKECat1 SMOKECat2 STTN06
    BMI HDL44 LDLADJ TRIG44 ALCOH FIB44 GLUADJ
    / SELECTION=STEPWISE;

PROC RSQUARE;
  MODEL LOGCRP = GEND01 AGE2 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    HYPERCat1 HYPERCat2 IHYPERCat1 IHYPERCat2 SMOKECat1 SMOKECat2 STTN06
    BMI HDL44 LDLADJ TRIG44 ALCOH FIB44 GLUADJ / CP;

RUN;
QUIT;

/**FINAL MODEL***/
proc reg data=crp.ssd;
  model LOGCRP = AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    GEND RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2
    PKYRS BMI LDLADJ TRIG44 ALCOH FIB44 GLUADJ;

run;

/** Full model***/
proc reg data=crp.ssd;
  model LOGCRP = AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    GEND RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    IHYPERCat2 HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2

```

```

PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ;

run;

/***** Table 15: Covariated variables for CRP-CHD and CRP-Ish_stroke associations *****/
/***** chddays and strokedays *****/
proc univariate data=chdstk.ssd;
  var chddays strokedays;
run;

/**** HR of CRP-CHD assoc *****/
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
  AGECat8
                                GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2 IHYPERCat2
                                HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2
                                PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ
                                / rl ties=breslow;

run;

/***** CHD Events *****/
proc lifetest data=chdstk.ssd plot=(s, lls);
  time chddays*Inc_CHD(0);
  strata AGE3;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time chddays*Inc_CHD(0);
  strata RACE01;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time chddays*Inc_CHD(0);
  strata GEND01;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time chddays*Inc_CHD(0);
  strata EDUC01;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time chddays*Inc_CHD(0);

```

```

    strata DIABADA;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
    time chddays*Inc_CHD(0);
    strata IHYPER;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
    time chddays*Inc_CHD(0);
    strata SMOKE;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
    time chddays*Inc_CHD(0);
    strata HYPER;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
    time chddays*Inc_CHD(0);
    test PKYRS;
run;

/***** HR of CRP-Ish_stroke assoc *****/
proc phreg data=chdstk.ssd;
    model strokedays*ish_stroke(0) = CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8
                                GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2 IHYPERCat2
                                HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2
                                PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ
                                / rl ties=breslow;
run;

/***** Ischemic stroke events *****/
proc lifetest data=chdstk.ssd plot=(s, lls);
    time strokedays*ish_stroke(0);
    strata AGE3;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
    time strokedays*ish_stroke(0);
    strata RACE01;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
    time strokedays*ish_stroke(0);
    strata GEND01;
run;

```

```

proc lifetest data=chdstk.ssd plot=(s, lls);
  time strokedays*ish_stroke(0);
  strata EDUC01;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time strokedays*ish_stroke(0);
  strata DIABADA;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time strokedays*ish_stroke(0);
  strata HYPER;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time strokedays*ish_stroke(0);
  strata IHYPER;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time strokedays*ish_stroke(0);
  strata SMOKE;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time strokedays*ish_stroke(0);
  test PKYRS;
run;

/***** To calculate total P-Y *****/
/****P-Y: CHD person-days of following up total 3859 subjects *****/

proc iml;
use chddays;
read all where(crpl=1) into y1;
read all where(crpl=2) into y2;
read all where(crpl=3) into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondays1 var("var1":"var20");
append from sum1;

```

```

print y2;
sum2=y2[+,,];
print sum2;

create persondays2 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,,];
print sum3;

create persondays3 var("var1":"var20");
append from sum3;

run;

proc print data=persondays1;
proc print data=persondays2;
proc print data=persondays3;
run;

data chd_group1;
set persondays1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group1;
run;

data chd_group2;
set persondays2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group2;
run;

data chd_group3;
set persondays3;
person_yrs=var20/365;

```



```

ID=var1/person_yrs;
run;
proc print data=chd_group3;
run;

/*****P-Y: CHD person-days FOR men and women *****/
proc iml;
use chddays;
read all where(GEND01=1) into y1;
read all where(GEND01=0) into y2;

print y1;
sum1=y1[+,];
print sum1;

create persondaysM var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysF var("var1":"var20");
append from sum2;

run;

proc print data=persondaysM;
proc print data=persondaysF;
run;

data chd_group_m;
set persondaysM;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_m;
run;

```

```

data chd_group_f;
set persondaysF;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_f;
run;

/*****P-Y: CHD person-days FOR Whites and Blacks *****/
proc iml;
use chddays;
read all where(RACE01=1) into y1;
read all where(RACE01=2) into y2;
read all where(RACE01=3) into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondaysW var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysB var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondaysO var("var1":"var20");
append from sum3;

run;

```

```
proc print data=persondaysW;  
proc print data=persondaysB;  
proc print data=persondaysO;  
run;
```

```
data chd_group_w;  
set persondaysW;  
person_yrs=var20/365;  
ID=var1/person_yrs;  
run;  
proc print data=chd_group_w;  
run;
```

```
data chd_group_b;  
set persondaysB;  
person_yrs=var20/365;  
ID=var1/person_yrs;  
run;  
proc print data=chd_group_b;  
run;
```

```
data chd_group_o;  
set persondaysO;  
person_yrs=var20/365;  
ID=var1/person_yrs;  
run;  
proc print data=chd_group_o;  
run;
```

```
/******P-Y: CHD person-days FOR women *****/
```

```
data chd_women (keep=chddays Inc_CHD crp1 RACE01 GEND01);  
set chdstk.ssd;  
where GEND01=0;  
run;  
proc print data=chd_women;  
run;
```

```

proc iml;
use chd_women;
read all where(crpl=1)into y1;
read all where(crpl=2)into y2;
read all where(crpl=3)into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondays1f var("var1":"var5");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondays2f var("var1":"var5");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondays3f var("var1":"var5");
append from sum3;

run;

proc print data=persondays1f;
proc print data=persondays2f;
proc print data=persondays3f;
run;

data chd_group1_f;
set persondays1f;
person_yrs=var5/365;
ID=var1/person_yrs;

```

```
run;
proc print data=chd_group1_f;
run;
```

```
data chd_group2_f;
set persondays2f;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=chd_group2_f;
run;
```

```
data chd_group3_f;
set persondays3f;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=chd_group3_f;
run;
```

```
/******P-Y: CHD person-days FOR men *****/
```

```
data chd_men (keep=chddays Inc_CHD crp1 RACE01 GEND01);
set chdstk.ssd;
where GEND01=1;
run;
proc print data=chd_men;
run;
```

```
proc iml;
use chd_men;
read all where(crp1=1) into y1;
read all where(crp1=2) into y2;
read all where(crp1=3) into y3;
```

```
print y1;
sum1=y1[+,];
print sum1;
```

```
create persondays1m var("var1":"var5");
```

```

append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondays2m var("var1":"var5");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondays3m var("var1":"var5");
append from sum3;

run;

proc print data=persondays1m;
proc print data=persondays2m;
proc print data=persondays3m;
run;

data chd_group1_m;
set persondays1m;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=chd_group1_m;
run;

data chd_group2_m;
set persondays2m;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=chd_group2_m;
run;

```

```
data chd_group3_m;
set persondays3m;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=chd_group3_m;
run;
```

```
/*****P-Y: CHD person-days FOR whites *****/
```

```
data chd_white (keep=chddays Inc_CHD crp1 RACE01 GEND01);
set chdstk.ssd;
where race01=1;
run;
proc print data=chd_white;
run;
```

```
proc iml;
use chd_white;
read all where(crp1=1) into y1;
read all where(crp1=2) into y2;
read all where(crp1=3) into y3;
```

```
print y1;
sum1=y1[+,];
print sum1;
```

```
create persondays1w var("var1":"var5");
append from sum1;
```

```
print y2;
sum2=y2[+,];
print sum2;
```

```
create persondays2w var("var1":"var5");
append from sum2;
```

```
print y3;
```

```

sum3=y3[+,];
print sum3;

create persondays3w var("var1":"var5");
append from sum3;

run;

proc print data=persondays1w;
proc print data=persondays2w;
proc print data=persondays3w;
run;

data chd_group1_w;
set persondays1w;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=chd_group1_w;
run;

data chd_group2_w;
set persondays2w;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=chd_group2_w;
run;

data chd_group3_w;
set persondays3w;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=chd_group3_w;
run;

/*****P-Y: CHD person-days FOR Blacks *****/

```



```
data chd_black (keep=chddays Inc_CHD crpl RACE01 GEND01);
set chdstk.ssd;
where race01=2;
run;
proc print data=chd_black;
run;
```

```
proc iml;
use chd_black;
read all where(crpl=1)into y1;
read all where(crpl=2)into y2;
read all where(crpl=3)into y3;
```

```
print y1;
sum1=y1[+,];
print sum1;
```

```
create persondays1b var("var1":"var5");
append from sum1;
```

```
print y2;
sum2=y2[+,];
print sum2;
```

```
create persondays2b var("var1":"var5");
append from sum2;
```

```
print y3;
sum3=y3[+,];
print sum3;
```

```
create persondays3b var("var1":"var5");
append from sum3;
```

```
run;
```

```
proc print data=persondays1b;
proc print data=persondays2b;
proc print data=persondays3b;
```

```
run;
```

```
data chd_group1_b;  
set persondays1b;  
person_yrs=var5/365;  
ID=var1/person_yrs;  
run;  
proc print data=chd_group1_b;  
run;
```

```
data chd_group2_b;  
set persondays2b;  
person_yrs=var5/365;  
ID=var1/person_yrs;  
run;  
proc print data=chd_group2_b;  
run;
```

```
data chd_group3_b;  
set persondays3b;  
person_yrs=var5/365;  
ID=var1/person_yrs;  
run;  
proc print data=chd_group3_b;  
run;
```

```
/******P-Y: total person-years by AGE groups *****/  
proc iml;  
use chddays;  
read all where(AGE3=1) into y1;  
read all where(AGE3=2) into y2;  
read all where(AGE3=3) into y3;  
read all where(AGE3=4) into y4;  
read all where(AGE3=5) into y5;  
read all where(AGE3=6) into y6;  
read all where(AGE3=7) into y7;  
read all where(AGE3=8) into y8;  
read all where(AGE3=9) into y9;  
  
print y1;
```

```
sum1=y1[+,,];
print sum1;

create persondaysAGE_1 var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,,];
print sum2;

create persondaysAGE_2 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,,];
print sum3;

create persondaysAGE_3 var("var1":"var20");
append from sum3;

print y4;
sum4=y4[+,,];
print sum4;

create persondaysAGE_4 var("var1":"var20");
append from sum4;

print y5;
sum5=y5[+,,];
print sum5;

create persondaysAGE_5 var("var1":"var20");
append from sum5;

print y6;
sum6=y6[+,,];
print sum6;

create persondaysAGE_6 var("var1":"var20");
append from sum6;

print y7;
```

```

sum7=y7[+,];
print sum7;

create persondaysAGE_7 var("var1":"var20");
append from sum7;

print y8;
sum8=y8[+,];
print sum8;

create persondaysAGE_8 var("var1":"var20");
append from sum8;

print y9;
sum9=y9[+,];
print sum9;

create persondaysAGE_9 var("var1":"var20");
append from sum9;

run;

proc print data=persondaysAGE_1;
proc print data=persondaysAGE_2;
proc print data=persondaysAGE_3;
proc print data=persondaysAGE_4;
proc print data=persondaysAGE_5;
proc print data=persondaysAGE_6;
proc print data=persondaysAGE_7;
proc print data=persondaysAGE_8;
proc print data=persondaysAGE_9;
run;

data chd_group_age_1;
set persondaysAGE_1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_age_1;
run;

```

```
data chd_group_age_2;
set persondaysAGE_2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_age_2;
run;
```

```
data chd_group_age_3;
set persondaysAGE_3;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_age_3;
run;
```

```
data chd_group_age_4;
set persondaysAGE_4;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_age_4;
run;
```

```
data chd_group_age_5;
set persondaysAGE_5;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_age_5;
run;
```

```
data chd_group_age_6;
set persondaysAGE_6;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_age_6;
run;
```

```
data chd_group_age_7;
set persondaysAGE_7;
```

```

person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_age_7;
run;

data chd_group_age_8;
set persondaysAGE_8;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_age_8;
run;

data chd_group_age_9;
set persondaysAGE_9;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_age_9;
run;

/*****P-Y: total person-years by education status*****/
proc iml;
use chddays;
read all where(EDUC01=0) into y1;
read all where(EDUC01=1) into y2;

print y1;
sum1=y1[+,];
print sum1;

create persondaysE_C var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysE_H var("var1":"var20");
append from sum2;

```

```

run;

proc print data=persondaysE_C;
proc print data=persondaysE_H;
run;

data chd_group_E_C;
set persondaysE_C;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_E_C;
run;

data chd_group_E_H;
set persondaysE_H;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_E_H;
run;

/*****P-Y: total person-years by Diabetic status*****/
proc iml;
use chddays;
read all where(DIABADA=1) into y1;
read all where(DIABADA=2) into y2;
read all where(DIABADA=3) into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondaysDIAB_1 var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

```

```

create persondaysDIAB_2 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondaysDIAB_3 var("var1":"var20");
append from sum3;

run;

proc print data=persondaysDIAB_1;
proc print data=persondaysDIAB_2;
proc print data=persondaysDIAB_3;
run;

data chd_group_diab_1;
set persondaysDIAB_1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_diab_1;
run;

data chd_group_diab_2;
set persondaysDIAB_2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_diab_2;
run;

data chd_group_diab_3;
set persondaysDIAB_3;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_diab_3;
run;

```



```

/*****P-Y: total person-years by Isolated systolic hypertension status*****/
proc iml;
use chddays;
read all where(IHYPER=0) into y1;
read all where(IHYPER=1) into y2;
read all where(IHYPER=2) into y3;
read all where(IHYPER=3) into y4;

print y1;
sum1=y1[+,];
print sum1;

create persondaysIHTN_0 var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysIHTN_1 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondaysIHTN_2 var("var1":"var20");
append from sum3;

print y4;
sum4=y4[+,];
print sum4;

create persondaysIHTN_3 var("var1":"var20");
append from sum4;

run;

proc print data=persondaysIHTN_0;

```

```
proc print data=persondaysIHTN_1;
proc print data=persondaysIHTN_2;
proc print data=persondaysIHTN_3;
run;
```

```
data chd_group_ihtn_0;
set persondaysIHTN_0;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_ihtn_0;
run;
```

```
data chd_group_ihtn_1;
set persondaysIHTN_1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_ihtn_1;
run;
```

```
data chd_group_ihtn_2;
set persondaysIHTN_2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_ihtn_2;
run;
```

```
data chd_group_ihtn_3;
set persondaysIHTN_3;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_ihtn_3;
run;
```

```
/******P-Y: total person-years by hypertension status*****/
proc iml;
use chddays;
read all where(HYPER=0) into y1;
```

```

read all where(HYPER=1) into y2;
read all where(HYPER=2) into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondaysHTN_0 var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysHTN_1 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondaysHTN_2 var("var1":"var20");
append from sum3;

run;

proc print data=persondaysHTN_0;
proc print data=persondaysHTN_1;
proc print data=persondaysHTN_2;
run;

data chd_group_htn_0;
set persondaysHTN_0;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_htn_0;
run;

data chd_group_htn_1;

```

```

set persondaysHTN_1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_htn_1;
run;

data chd_group_htn_2;
set persondaysHTN_2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_htn_2;
run;

/*****P-Y: total person-years of follow up by SMOKE status*****/
proc iml;
use chddays;
read all where(SMOKE=1)into y1;
read all where(SMOKE=2)into y2;
read all where(SMOKE=3)into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondaysSMK_1 var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysSMK_2 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondaysSMK_3 var("var1":"var20");

```

```

append from sum3;

run;

proc print data=persondaysSMK_1;
proc print data=persondaysSMK_2;
proc print data=persondaysSMK_3;
run;

data chd_group_smk_1;
set persondaysSMK_1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_smk_1;
run;

data chd_group_smk_2;
set persondaysSMK_2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_smk_2;
run;

data chd_group_smk_3;
set persondaysSMK_3;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=chd_group_smk_3;
run;

/*****P-Y: Ischemic stroke person-days FOR total 3859 subjects *****/

proc iml;
use strokedays;
read all where(crpl=1)into y1;

```

```

read all where(crpl=2) into y2;
read all where(crpl=3) into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondays1 var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondays2 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondays3 var("var1":"var20");
append from sum3;

run;

proc print data=persondays1;
proc print data=persondays2;
proc print data=persondays3;
run;

data stk_group1;
set persondays1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group1;
run;

data stk_group2;
set persondays2;

```

```
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group2;
run;
```

```
data stk_group3;
set persondays3;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group3;
run;
```

```
/******P-Y: Ischemic Stroke person-days FOR men and women *****/
```

```
proc iml;
use strokedays;
read all where(GEND01=1) into y1;
read all where(GEND01=0) into y2;
```

```
print y1;
sum1=y1[+,];
print sum1;
```

```
create persondaysM var("var1":"var20");
append from sum1;
```

```
print y2;
sum2=y2[+,];
print sum2;
```

```
create persondaysF var("var1":"var20");
append from sum2;
```

```
run;
```

```
proc print data=persondaysM;
proc print data=persondaysF;
```

```

run;

data stk_group_m;
set persondaysM;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_m;
run;

data stk_group_f;
set persondaysF;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_f;
run;

/*****P-Y: Ischemic Stroke person-days FOR Whites and Blacks *****/
proc iml;
use strokedays;
read all where(RACE01=1)into y1;
read all where(RACE01=2)into y2;
read all where(RACE01=3)into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondaysW var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysB var("var1":"var20");
append from sum2;

print y3;

```



```
sum3=y3[+,];
print sum3;

create persondays0 var("var1":"var20");
append from sum3;
```

```
run;
```

```
proc print data=persondaysW;
proc print data=persondaysB;
proc print data=persondaysO;
run;
```

```
data stk_group_w;
set persondaysW;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_w;
run;
```

```
data stk_group_b;
set persondaysB;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_b;
run;
```

```
data stk_group_o;
set persondaysO;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_o;
run;
```

```
/*****P-Y: Ischemic stroke person-days FOR men *****/
```

```

data stk_men (keep=strokedays ish_stroke crpl RACE01 GEND01);
set chdstk.ssd;
where GEND01=1;
run;
proc print data=stk_men;
run;

proc iml;
use stk_men;
read all where(crpl=1) into y1;
read all where(crpl=2) into y2;
read all where(crpl=3) into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondays1m var("var1":"var5");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondays2m var("var1":"var5");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondays3m var("var1":"var5");
append from sum3;

run;

proc print data=persondays1m;
proc print data=persondays2m;
proc print data=persondays3m;

```

```
run;
```

```
data stk_group1_m;  
set persondays1m;  
person_yrs=var5/365;  
ID=var1/person_yrs;  
run;  
proc print data=stk_group1_m;  
run;
```

```
data stk_group2_m;  
set persondays2m;  
person_yrs=var5/365;  
ID=var1/person_yrs;  
run;  
proc print data=stk_group2_m;  
run;
```

```
data stk_group3_m;  
set persondays3m;  
person_yrs=var5/365;  
ID=var1/person_yrs;  
run;  
proc print data=stk_group3_m;  
run;
```

```
/******P-Y: Ischemic stroke FOR women *****/  
data stk_women (keep=strokedays ish_stroke crpl RACE01 GEND01);  
set chdstk.ssd;  
where GEND01=0;  
run;  
proc print data=stk_women;  
run;
```

```
proc iml;  
use stk_women;  
read all where(crpl=1) into y1;  
read all where(crpl=2) into y2;  
read all where(crpl=3) into y3;
```

```

print y1;
sum1=y1[+,,];
print sum1;

create persondays1f var("var1":"var5");
append from sum1;

print y2;
sum2=y2[+,,];
print sum2;

create persondays2f var("var1":"var5");
append from sum2;

print y3;
sum3=y3[+,,];
print sum3;

create persondays3f var("var1":"var5");
append from sum3;

run;

proc print data=persondays1f;
proc print data=persondays2f;
proc print data=persondays3f;
run;

data stk_group1_f;
set persondays1f;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=stk_group1_f;
run;

data stk_group2_f;
set persondays2f;
person_yrs=var5/365;

```

```
ID=var1/person_yrs;
run;
proc print data=stk_group2_f;
run;
```

```
data stk_group3_f;
set persondays3f;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=stk_group3_f;
run;
```

```
/******P-Y: Ischemic stroke person-days FOR whites *****/
```

```
data stk_white (keep=strokedays ish_stroke crp1 RACE01 GEND01);
set chdstk.ssd;
where race01=1;
run;
proc print data=stk_white;
run;
```

```
proc iml;
use stk_white;
read all where(crpl=1)into y1;
read all where(crpl=2)into y2;
read all where(crpl=3)into y3;
```

```
print y1;
sum1=y1[+,];
print sum1;
```

```
create persondays1w var("var1":"var5");
append from sum1;
```

```
print y2;
sum2=y2[+,];
print sum2;
```

```
create persondays2w var("var1":"var5");
```

```

append from sum2;

print y3;
sum3=y3[+,,];
print sum3;

create persondays3w var("var1":"var5");
append from sum3;

run;

proc print data=persondays1w;
proc print data=persondays2w;
proc print data=persondays3w;
run;

data stk_group1_w;
set persondays1w;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=stk_group1_w;
run;

data stk_group2_w;
set persondays2w;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=stk_group2_w;
run;

data stk_group3_w;
set persondays3w;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=stk_group3_w;
run;

```

```

/*****P-Y: Ischemic stroke person-days FOR blacks *****/

data stk_black (keep=strokedays ish_stroke crpl RACE01 GEND01);
set chdstk.ssd;
where race01=2;
run;
proc print data=stk_black;
run;

proc iml;
use stk_black;
read all where(crpl=1)into y1;
read all where(crpl=2)into y2;
read all where(crpl=3)into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondays1b var("var1":"var5");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondays2b var("var1":"var5");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondays3b var("var1":"var5");
append from sum3;

run;

```

```
proc print data=persondays1b;
proc print data=persondays2b;
proc print data=persondays3b;
run;
```

```
data stk_group1_b;
set persondays1b;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=stk_group1_b;
run;
```

```
data stk_group2_b;
set persondays2b;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=stk_group2_b;
run;
```

```
data stk_group3_b;
set persondays3b;
person_yrs=var5/365;
ID=var1/person_yrs;
run;
proc print data=stk_group3_b;
run;
```

```
/******P-Y: total person-years by AGE groups *****/
proc iml;
use strokedays;
read all where(AGE3=1) into y1;
read all where(AGE3=2) into y2;
read all where(AGE3=3) into y3;
read all where(AGE3=4) into y4;
read all where(AGE3=5) into y5;
read all where(AGE3=6) into y6;
```



```
read all where(AGE3=7)into y7;
read all where(AGE3=8)into y8;
read all where(AGE3=9)into y9;

print y1;
sum1=y1[+,];
print sum1;

create persondaysAGE_1 var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysAGE_2 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondaysAGE_3 var("var1":"var20");
append from sum3;

print y4;
sum4=y4[+,];
print sum4;

create persondaysAGE_4 var("var1":"var20");
append from sum4;

print y5;
sum5=y5[+,];
print sum5;

create persondaysAGE_5 var("var1":"var20");
append from sum5;

print y6;
sum6=y6[+,];
print sum6;
```

```
create persondaysAGE_6 var("var1":"var20");
append from sum6;
```

```
print y7;
sum7=y7[+,,];
print sum7;
```

```
create persondaysAGE_7 var("var1":"var20");
append from sum7;
```

```
print y8;
sum8=y8[+,,];
print sum8;
```

```
create persondaysAGE_8 var("var1":"var20");
append from sum8;
```

```
print y9;
sum9=y9[+,,];
print sum9;
```

```
create persondaysAGE_9 var("var1":"var20");
append from sum9;
```

```
run;
```

```
proc print data=persondaysAGE_1;
proc print data=persondaysAGE_2;
proc print data=persondaysAGE_3;
proc print data=persondaysAGE_4;
proc print data=persondaysAGE_5;
proc print data=persondaysAGE_6;
proc print data=persondaysAGE_7;
proc print data=persondaysAGE_8;
proc print data=persondaysAGE_9;
run;
```

```
data stk_group_age_1;
set persondaysAGE_1;
```

```
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_age_1;
run;
```

```
data stk_group_age_2;
set persondaysAGE_2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_age_2;
run;
```

```
data stk_group_age_3;
set persondaysAGE_3;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_age_3;
run;
```

```
data stk_group_age_4;
set persondaysAGE_4;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_age_4;
run;
```

```
data stk_group_age_5;
set persondaysAGE_5;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_age_5;
run;
```

```
data stk_group_age_6;
set persondaysAGE_6;
person_yrs=var20/365;
ID=var1/person_yrs;
```

```
run;
proc print data=stk_group_age_6;
run;
```

```
data stk_group_age_7;
set persondaysAGE_7;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_age_7;
run;
```

```
data stk_group_age_8;
set persondaysAGE_8;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_age_8;
run;
```

```
data stk_group_age_9;
set persondaysAGE_9;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_age_9;
run;
```

```
/******P-Y: total person-years by education status*****/
proc iml;
use strokedays;
read all where(EDUC01=0) into y1;
read all where(EDUC01=1) into y2;

print y1;
sum1=y1[+,];
print sum1;

create persondaysE_C var("var1":"var20");
append from sum1;
```

```

print y2;
sum2=y2[+,];
print sum2;

create persondaysE_H var("var1":"var20");
append from sum2;

run;

proc print data=persondaysE_C;
proc print data=persondaysE_H;
run;

data stk_group_E_C;
set persondaysE_C;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_E_C;
run;

data stk_group_E_H;
set persondaysE_H;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_E_H;
run;

/*****P-Y: total person-years by Diabetic status*****/
proc iml;
use strokedays;
read all where(DIABADA=1)into y1;
read all where(DIABADA=2)into y2;
read all where(DIABADA=3)into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondaysDIAB_1 var("var1":"var20");

```

```

append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysDIAB_2 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondaysDIAB_3 var("var1":"var20");
append from sum3;

run;

proc print data=persondaysDIAB_1;
proc print data=persondaysDIAB_2;
proc print data=persondaysDIAB_3;
run;

data stk_group_diab_1;
set persondaysDIAB_1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_diab_1;
run;

data stk_group_diab_2;
set persondaysDIAB_2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_diab_2;
run;

data stk_group_diab_3;

```

```

set persondaysDIAB_3;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_diab_3;
run;

```

```

/*****P-Y: total person-years by Isolated systolic hypertension status*****/
proc iml;
use strokedays;
read all where(IHYPER=0)into y1;
read all where(IHYPER=1)into y2;
read all where(IHYPER=2)into y3;
read all where(IHYPER=3)into y4;

print y1;
sum1=y1[+,];
print sum1;

create persondaysIHTN_0 var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysIHTN_1 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondaysIHTN_2 var("var1":"var20");
append from sum3;

print y4;
sum4=y4[+,];
print sum4;

create persondaysIHTN_3 var("var1":"var20");

```

```
append from sum4;

run;

proc print data=persondaysIHTN_0;
proc print data=persondaysIHTN_1;
proc print data=persondaysIHTN_2;
proc print data=persondaysIHTN_3;
run;

data stk_group_ihtn_0;
set persondaysIHTN_0;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_ihtn_0;
run;

data stk_group_ihtn_1;
set persondaysIHTN_1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_ihtn_1;
run;

data stk_group_ihtn_2;
set persondaysIHTN_2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_ihtn_2;
run;

data stk_group_ihtn_3;
set persondaysIHTN_3;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_ihtn_3;
```



```

run;

/*****P-Y: total person-years by hypertension status*****/
proc iml;
use strokedays;
read all where(HYPER=0)into y1;
read all where(HYPER=1)into y2;
read all where(HYPER=2)into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondaysHTN_0 var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysHTN_1 var("var1":"var20");
append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondaysHTN_2 var("var1":"var20");
append from sum3;

run;

proc print data=persondaysHTN_0;
proc print data=persondaysHTN_1;
proc print data=persondaysHTN_2;
run;

data stk_group_htn_0;
set persondaysHTN_0;

```

```

person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_htn_0;
run;

data stk_group_htn_1;
set persondaysHTN_1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_htn_1;
run;

data stk_group_htn_2;
set persondaysHTN_2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_htn_2;
run;

/*****P-Y: total person-years by SMOKE status*****/
proc iml;
use strokedays;
read all where(SMOKE=1)into y1;
read all where(SMOKE=2)into y2;
read all where(SMOKE=3)into y3;

print y1;
sum1=y1[+,];
print sum1;

create persondaysSMK_1 var("var1":"var20");
append from sum1;

print y2;
sum2=y2[+,];
print sum2;

create persondaysSMK_2 var("var1":"var20");

```

```

append from sum2;

print y3;
sum3=y3[+,];
print sum3;

create persondaysSMK_3 var("var1":"var20");
append from sum3;

run;

proc print data=persondaysSMK_1;
proc print data=persondaysSMK_2;
proc print data=persondaysSMK_3;
run;

data stk_group_smk_1;
set persondaysSMK_1;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_smk_1;
run;

data stk_group_smk_2;
set persondaysSMK_2;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_smk_2;
run;

data stk_group_smk_3;
set persondaysSMK_3;
person_yrs=var20/365;
ID=var1/person_yrs;
run;
proc print data=stk_group_smk_3;
run;

```

```

/**** Table 16: To examine CRP-CHD association in the 3859 elderly *****/
/**** Incidence rates of CHD and Log-Rank Test for trend *****/
proc lifetest data=chdstk.ssd plot=(s, lls);
  time chddays*Inc_CHD(0);
  strata CRP1 / trend;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time strokedays*ish_stroke(0);
  strata CRP1 / trend;
run;

/***** TABLE 16: Cox Proportional Hazards Model for CRP-CHD association *****/
/**** Model 1 *****/
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 / rl ties=breslow;
run;
/**** Model 2 *****/
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 GEND01 RACECat1 RACECat2
    AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    / rl ties=breslow; .
run;
/**** Model 3 *****/
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
    AGECat8
    GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2 IHTN
    CHOLADJ PKYRS ALCOH / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
    AGECat8
    GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2 IHYPERNY
    CHOLADJ PKYRS ALCOH / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
    AGECat8

```

```

                                GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
                                IHYPERCat1 IHYPERCat2 CHOLADJ PKYRS  ALCOH / rl ties=breslow;
run;

/***** model 4 *****/
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 GEND01 crp_gend1 crp_gend2
                            AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                            RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
                            IHYPERCat1 CHOLADJ PKYRS  ALCOH / rl ties=breslow;
run;
/***** model 5 *****/
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 RACE01 crp_race1 crp_race2
                            AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                            GEND01 EDUC01 DIABADACat1 DIABADACat2
                            IHYPERCat1 CHOLADJ PKYRS  ALCOH / rl ties=breslow;
run;

/***** STRATIFIED ANALYSES*****/
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 EDUC01 DIABADACat1 DIABADACat2
                            AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                            IHYPERCat1 CHOLADJ PKYRS ALCOH / rl ties=breslow;

  strata GEND01 RACE01;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
                            AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                            IHYPERCat1 CHOLADJ PKYRS ALCOH / rl ties=breslow;

  strata GEND01;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 GEND01 EDUC01 DIABADACat1 DIABADACat2
                            AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                            IHYPERCat1 CHOLADJ PKYRS  ALCOH / rl ties=breslow;

  strata RACE01;
run;

/***** RR of CHD associated with a 1-ln-unit-higher baseline of CRP*****/

```

```

proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= LOGCRP AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
    IHYPERCat1 CHOLADJ PKYRS ALCOH / rl ties=breslow;
run;

/***** PHREG Procedure provides 4 model selection methods for predictors of CHD*****/
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8
    GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2 IHYPERCat1 IHYPERCat2
    HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2 STTN06
    PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ
  / selection=forward slentry=0.25 details;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8
    GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2 IHYPERCat1 IHYPERCat2
    HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2 STTN06
    PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ
  / selection=stepwise slentry=0.25 slstay=0.15 details;
run;

/***** to select confounding by CV risk factors*****/
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8 / rl
ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= GEND01 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= RACECat1 RACECat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= EDUC01 / rl ties=breslow;

```

```

run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= DIABADACat1 DIABADACat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= HYPERCat1 HYPERCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= IHYPERCat1 IHYPERCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= SMOKECat1 SMOKECat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= STTN06 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= PKYRS / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= BMI / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= HDL44 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= LDLADJ / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CHOLADJ / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= TRIG44 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= ALCOH / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= FIB44 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= GLUADJ / rl ties=breslow;

```

```

run;

/***** Table 17: CRP-CHD association in the 3859 elderly *****/
/**** Incidence rate of CHD for elevated CRP in 4 subgroups *****/
/*** by Gender****/
proc lifetest data=chdstk.ssd plot=(s, lls);
  time chddays*Inc_CHD(0);
  strata GEND01 / group=CRP1;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  where GEND01=1;
  time chddays*Inc_CHD(0);
  strata CRP1 / trend;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  where GEND01=0;
  time chddays*Inc_CHD(0);
  strata CRP1 / trend;
run;

/***** by Race *****/
libname chd1 'E:\CHS data\base';
DATA chd1.ssd;SET chdstk.ssd;
  if RACE01=1 then RACE2=0;
  if RACE01=2 then RACE2=1;
RUN;
PROC SORT data=chd1.ssd;
  BY RACE2;
RUN;
proc lifetest data=chd1.ssd plot=(s, lls);
  time chddays*Inc_CHD(0);
  strata RACE2 / group=CRP1;
run;
proc lifetest data=chd1.ssd plot=(s, lls);
  time chddays*Inc_CHD(0);
  strata RACE01 / group=CRP1;
run;
proc phreg data=chdstk.ssd;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 RACE_W RACE_B / rl ties=discrete;
  RACE_W= (RACE01=1);
  RACE_B = (RACE01=2);

```



```

RACE01: TEST RACE_W, RACE_B;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  where RACE01=1;
  time chddays*Inc_CHD(0);
  strata CRP1 / trend;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  where RACE01=2;
  time chddays*Inc_CHD(0);
  strata CRP1 / trend;
run;

/*****Cox Proportional Hazards Model for CRP-CHD association *****/
/***** Gender subgroups (1=male, 0=female)*****/
proc phreg data=chdstk.ssd;
  where GEND01=1;
  model chddays*Inc_CHD(0) = CRPCat1 CRPCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where GEND01=1;
  model chddays*Inc_CHD(0) = CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8
                                RACECat1 RACECat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where GEND01=1;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8
                                RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2 IHYPERCat1 PKYRS ALCOH
CHOLADJ / rl ties=breslow;
run;

proc phreg data=chdstk.ssd;
  where GEND01=0;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where GEND01=0;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8

```

```

                                RACECat1 RACECat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where GEND01=0;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2
                                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                                IHYPERCat2 PKYRS CHOLADJ ALCOH / rl ties=breslow;
run;

/***** Racial subgroup (1=White, 2=Black)*****/
proc phreg data=chdstk.ssd;
  where RACE01=1;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where RACE01=1;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8
                                GEND01 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where RACE01=1;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8
                                GEND01 EDUC01 DIABADACat1 DIABADACat2 IHYPERCat2 PKYRS CHOLADJ ALCOH / rl
ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where RACE01=2;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where RACE01=2;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8
                                GEND01 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where RACE01=2;
  model chddays*Inc_CHD(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8

```

```

                                GEND01 EDUC01 DIABADACat1 DIABADACat2 IHYPERCat2 PKYRS CHOLADJ ALCOH / rl
ties=breslow;
run;

/***** Table 18: CRP-Ish_stroke association in the 3859 elderly *****/
/*****Incidence rates of Ischemic Stroke and Log-Rank Test for trend *****/
proc lifetest data=chdstk.ssd plot=(s, lls);
  time strokedays*ish_stroke(0);
  strata CRP1 / trend;
run;

/***** Cox Proportional Hazards Model for CRP-Ish_stroke association *****/
/***** Model 1 *****/
proc phreg data=chdstk.ssd;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 / rl ties=breslow;
run;
/***** Model 2 *****/
proc phreg data=chdstk.ssd;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 GEND01 RACECat1 RACECat2
                                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                                / rl ties=breslow;
run;
/***** Model 3 *****/
proc phreg data=chdstk.ssd;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 GEND01 RACECat1 RACECat2 DIABADACat1 DIABADACat2
                                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                                HYPERCat1 HYPERCat2 LDLADJ HDL44 GLUADJ BMI
                                / rl ties=breslow;
run;
/***** Model 4: TO adjust the same variables as Cao et al *****/
proc phreg data=chdstk.ssd;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 GEND01 RACECat1 RACECat2 DIABADACat1 DIABADACat2
                                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                                HYPERCat1 HYPERCat2 IHYPERCat1 IHYPERCat2 SMOKECat1 SMOKECat2
                                CHOLADJ / rl ties=breslow;
run;
/***** Model 5: Gender-CRP Interactions *****/
proc phreg data=chdstk.ssd;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 GEND01 crp_gend1 crp_gend2
                                RACECat1 RACECat2 DIABADACat1 DIABADACat2

```

```

                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                HYPERCat1 HYPERCat2 LDLADJ HDL44 GLUADJ BMI
                / rl ties=breslow;
run;
/***** Model 6: Race-CRP Interactions *****/
proc phreg data=chdstk.ssd;
    model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 RACE01 crp_race1 crp_race2
                GEND01 DIABADACat1 DIABADACat2
                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                HYPERCat1 HYPERCat2 LDLADJ HDL44 GLUADJ BMI
                / rl ties=breslow;
run;

/***** RR of ischemic stroke associated with a 1-ln-unit-higher baseline of CRP*****/
proc phreg data=chdstk.ssd;
    model strokedays*ish_stroke(0)= LOGCRP GEND01 RACECat1 RACECat2 DIABADACat1 DIABADACat2
                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                HYPERCat1 HYPERCat2 LDLADJ HDL44 GLUADJ BMI
                / rl ties=breslow;
run;

/***** PHREG Procedure provides 4 model selection methods*****/
proc phreg data=chdstk.ssd;
    model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8
                GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2 IHYPERCat1
IHYPERCat2
                HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2 STTN06
                PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ
                / selection=forward slentry=0.25 details;
run;
proc phreg data=chdstk.ssd;
    model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7
AGECat8
                GEND01 RACECat1 RACECat2 EDUC01 DIABADACat1 DIABADACat2 IHYPERCat1
IHYPERCat2
                HYPERCat1 HYPERCat2 SMOKECat1 SMOKECat2 STTN06
                PKYRS BMI HDL44 LDLADJ CHOLADJ TRIG44 ALCOH FIB44 GLUADJ
                / selection=stepwise slentry=0.25 slstay=0.15 details;
run;

```

```

/***** Table 19: Further stratified analyses by gender or race *****/
/*****Incidence rates of Ischemic Stroke in 4 subgroups *****/
/**** by Gender****/
proc lifetest data=chdstk.ssd plot=(s, lls);
  time strokedays*ish_stroke(0);
  strata GEND01 / group=CRP1;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  time strokedays*ish_stroke(0);
  strata GEND01 / group=CRP1;
  test AGE2 RACE01 EDUC DIABADA HYPER IHYPER CHOLADJ BMI;
run;
proc phreg data=chdstk.ssd;
  model strokedays*ish_stroke(0) = CRPCat1 CRPCat2 / rl ties=breslow;
  strata GEND01;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  where GEND01=1;
  time strokedays*ish_stroke(0) ;
  strata CRP1 / trend;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  where GEND01=0;
  time strokedays*ish_stroke(0) ;
  strata CRP1 / trend;
run;

/***** by Race *****/
proc lifetest data=chd1.ssd plot=(s, lls);
  time strokedays*ish_stroke(0) ;
  strata RACE2 / group=CRP1;
run;
proc lifetest data=chd1.ssd plot=(s, lls);
  time strokedays*ish_stroke(0) ;
  strata RACE2 / group=CRP1;
  test AGE2 GEND01 EDUC DIABADA HYPER IHYPER CHOLADJ BMI;
run;
proc phreg data=chdstk.ssd;
  model strokedays*ish_stroke(0) = CRPCat1 CRPCat2 RACE_W RACE_B / rl ties=discrete;

```

```

RACE_W= (RACE01=1);
RACE_B = (RACE01=2);
RACE01: TEST RACE_W, RACE_B;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  where RACE01=1;
  time strokedays*ish_stroke(0) ;
  strata CRP1 / trend;
run;
proc lifetest data=chdstk.ssd plot=(s, lls);
  where RACE01=2;
  time strokedays*ish_stroke(0) ;
  strata CRP1 / trend;
run;

/*****TABLE 19: Cox Proportional Hazards Model for CRP-Ish_stroke association among gender- or racial
subgroups *****/
/***** Gender subgroups (1=male, 0=female)*****/
proc phreg data=chdstk.ssd;
  where GEND01=1;
  model strokedays*ish_stroke(0) = CRPCat1 CRPCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where GEND01=1;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 RACECat1 RACECat2
    AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where GEND01=1;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 RACECat1 RACECat2 DIABADACat1 DIABADACat2
    AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    HYPERCat1 HYPERCat2 LDLADJ HDL44 GLUADJ BMI
    / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where GEND01=0;
  model strokedays*ish_stroke(0) = CRPCat1 CRPCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where GEND01=0;

```

```

model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 RACECat1 RACECat2
                                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                                / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where GEND01=0;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 RACECat1 RACECat2 DIABADACat1 DIABADACat2
                                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                                HYPERCat1 HYPERCat2 LDLADJ HDL44 GLUADJ BMI
                                / rl ties=breslow;
run;

/***** Racial subgroup (1=White, 2=Black)*****/
proc phreg data=chdstk.ssd;
  where RACE01=1;
  model strokedays*ish_stroke(0) = CRPCat1 CRPCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where RACE01=1;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 GEND01
                                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                                / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where RACE01=1;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 GEND01 DIABADACat1 DIABADACat2
                                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                                HYPERCat1 HYPERCat2 LDLADJ HDL44 GLUADJ BMI
                                / rl ties=breslow;
run;

proc phreg data=chdstk.ssd;
  where RACE01=2;
  model strokedays*ish_stroke(0) = CRPCat1 CRPCat2 / rl ties=breslow;
run;
proc phreg data=chdstk.ssd;
  where RACE01=2;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 GEND01
                                AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
                                / rl ties=breslow;
run;

```

```
proc phreg data=chdstk.ssd;
  where RACE01=2;
  model strokedays*ish_stroke(0)= CRPCat1 CRPCat2 GEND01 DIABADACat1 DIABADACat2
    AGECat1 AGECat2 AGECat3 AGECat4 AGECat5 AGECat6 AGECat7 AGECat8
    HYPERCat1 HYPERCat2 LDLADJ HDL44 GLUADJ BMI
    / r1 ties=breslow;
run;
```


APPENDIX II — SAS OUTPUT

Table 14

The REG Procedure
 Model: MODEL1
 Dependent Variable: LOGCRP

Number of Observations Read	5713
Number of Observations Used	5373
Number of Observations with Missing Values	340

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	1984.69930	220.52214	310.23	<.0001
Error	5363	3812.15410	0.71082		
Corrected Total	5372	5796.85341			

Root MSE	0.84310	R-Square	0.3424
Dependent Mean	0.67689	Adj R-Sq	0.3413
Coeff Var	124.55648		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	Intercept	1	-3.47756	0.12346	-28.17	<.0001
PKYRS	PACK YEARS SMOKED	1	0.00290	0.00043938	6.61	<.0001
BMI	BODY MASS INDEX	1	0.05134	0.00300	17.12	<.0001
CHOLADJ	CHOLESTEROL (ADJUSTED)	1	0.00776	0.01420	0.55	0.5846
HDL44	HDL	1	-0.00642	0.01422	-0.45	0.6515
LDLADJ	CALCULATED LDL	1	-0.00940	0.01420	-0.66	0.5077
TRIG44	TRIGLYCERIDE	1	0.00013801	0.00285	0.05	0.9614
FIB44	FIBRINOGEN	1	0.00755	0.00017603	42.89	<.0001
GLUADJ	new cohort glu44 adjusted	1	0.00177	0.00033184	5.33	<.0001
ALCOH	TOTAL ALCOHOL PER WK	1	0.00285	0.00190	1.50	0.1336

Table 15-- CHD

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	
CRPCat1	1	0.06239	0.19185	0.1058	0.7450	1.064	0.731	1.550
CRPCat2	1	0.32461	0.22905	2.0085	0.1564	1.383	0.883	2.167
AGECat1	1	-0.70396	0.37346	3.5532	0.0594	0.495	0.238	1.028
AGECat2	1	-0.33276	0.30245	1.2104	0.2712	0.717	0.396	1.297
AGECat3	1	-0.54842	0.31614	3.0093	0.0828	0.578	0.311	1.074
AGECat4	1	-0.16516	0.30389	0.2954	0.5868	0.848	0.467	1.538
AGECat5	1	-0.15255	0.32227	0.2241	0.6360	0.859	0.456	1.615
AGECat6	1	-0.30595	0.34627	0.7807	0.3769	0.736	0.374	1.452
AGECat7	1	0.12089	0.33279	0.1320	0.7164	1.129	0.588	2.167
AGECat8	1	0.25662	0.34205	0.5629	0.4531	1.293	0.661	2.527
GEND01	1	0.78381	0.17826	19.3338	<.0001	2.190	1.544	3.106
RACECat1	1	0.35723	0.29072	1.5100	0.2191	1.429	0.809	2.527
RACECat2	1	1.27283	0.76579	2.7626	0.0965	3.571	0.796	16.019
EDUC01	1	0.31916	0.15502	4.2388	0.0395	1.376	1.015	1.865
DIABADACat1	1	0.45519	0.20849	4.7668	0.0290	1.576	1.048	2.372
DIABADACat2	1	0.87680	0.26874	10.6453	0.0011	2.403	1.419	4.069
IHYPERCat2	1	0.39222	0.25245	2.4138	0.1203	1.480	0.903	2.428
HYPERCat1	1	0.24642	0.31118	0.6271	0.4284	1.279	0.695	2.354
HYPERCat2	1	0.14733	0.21145	0.4855	0.4859	1.159	0.766	1.754
SMOKECat1	1	-0.18910	0.19766	0.9154	0.3387	0.828	0.562	1.219
SMOKECat2	1	-0.19515	0.29583	0.4352	0.5095	0.823	0.461	1.469
PKYRS	1	0.00783	0.00314	6.1961	0.0128	1.008	1.002	1.014
BMI	1	-0.01648	0.02124	0.6022	0.4377	0.984	0.944	1.025
HDL44	1	-0.08330	0.11114	0.5617	0.4536	0.920	0.740	1.144
LDLADJ	1	-0.08401	0.11097	0.5731	0.4490	0.919	0.740	1.143
CHOLADJ	1	0.08772	0.11099	0.6246	0.4294	1.092	0.878	1.357
TRIG44	1	-0.01619	0.02231	0.5267	0.4680	0.984	0.942	1.028
ALCOH	1	-0.03464	0.01690	4.2027	0.0404	0.966	0.934	0.998
FIB44	1	0.00107	0.00124	0.7435	0.3885	1.001	0.999	1.004
GLUADJ	1	-0.00142	0.00308	0.2136	0.6440	0.999	0.993	1.005

Table 16 ----- model3

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits
CRPCat1	1	0.08226	0.16030	0.2633	0.6078	1.086	0.793 1.487
CRPCat2	1	0.38465	0.17197	5.0029	0.0253	1.469	1.049 2.058
AGECat1	1	-1.05603	0.30040	12.3582	0.0004	0.348	0.193 0.627
AGECat2	1	-0.80161	0.24379	10.8117	0.0010	0.449	0.278 0.723
AGECat3	1	-0.86732	0.24649	12.3814	0.0004	0.420	0.259 0.681
AGECat4	1	-0.54369	0.24090	5.0938	0.0240	0.581	0.362 0.931
AGECat5	1	-0.31388	0.23922	1.7217	0.1895	0.731	0.457 1.168
AGECat6	1	-0.82259	0.29312	7.8755	0.0050	0.439	0.247 0.780
AGECat7	1	-0.17423	0.25883	0.4531	0.5009	0.840	0.506 1.395
AGECat8	1	-0.11991	0.27938	0.1842	0.6678	0.887	0.513 1.534
GEND01	1	0.74285	0.13929	28.4421	<.0001	2.102	1.600 2.762
RACECat1	1	0.54062	0.24938	4.6995	0.0302	1.717	1.053 2.799
RACECat2	1	0.76291	0.75032	1.0338	0.3093	2.145	0.493 9.333
EDUC01	1	0.49661	0.13660	13.2178	0.0003	1.643	1.257 2.148
DIABADACat1	1	0.21772	0.17953	1.4707	0.2252	1.243	0.874 1.768
DIABADACat2	1	0.72522	0.15298	22.4731	<.0001	2.065	1.530 2.787
IHYPERNY	1	0.35432	0.13556	6.8319	0.0090	1.425	1.093 1.859
CHOLADJ	1	0.00362	0.00167	4.7062	0.0301	1.004	1.000 1.007
PKYRS	1	0.00742	0.00211	12.3526	0.0004	1.007	1.003 1.012
ALCOH	1	-0.03032	0.01332	5.1769	0.0229	0.970	0.945 0.996

Table 16 ----- model4

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits
CRPCat1	1	-0.09204	0.23814	0.1494	0.6991	0.912	0.572 1.455
CRPCat2	1	0.10018	0.25577	0.1534	0.6953	1.105	0.670 1.825
GEND01	1	0.44624	0.26220	2.8965	0.0888	1.562	0.935 2.612
crp_gend1	1	0.30679	0.32015	0.9183	0.3379	1.359	0.726 2.545
crp_gend2	1	0.49971	0.33840	2.1806	0.1398	1.648	0.849 3.199
AGECat1	1	-1.04907	0.30035	12.1999	0.0005	0.350	0.194 0.631
AGECat2	1	-0.79010	0.24378	10.5041	0.0012	0.454	0.281 0.732
AGECat3	1	-0.86072	0.24643	12.1994	0.0005	0.423	0.261 0.685
AGECat4	1	-0.53341	0.24094	4.9011	0.0268	0.587	0.366 0.941
AGECat5	1	-0.30758	0.23916	1.6541	0.1984	0.735	0.460 1.175
AGECat6	1	-0.82146	0.29311	7.8546	0.0051	0.440	0.248 0.781
AGECat7	1	-0.16883	0.25883	0.4255	0.5142	0.845	0.509 1.403
AGECat8	1	-0.12875	0.27938	0.2124	0.6449	0.879	0.508 1.520
RACECat1	1	0.53044	0.24953	4.5189	0.0335	1.700	1.042 2.772
RACECat2	1	0.78233	0.75011	1.0878	0.2970	2.187	0.503 9.512
EDUC01	1	0.49195	0.13668	12.9541	0.0003	1.636	1.251 2.138
DIABADACat1	1	0.22434	0.17969	1.5589	0.2118	1.252	0.880 1.780
DIABADACat2	1	0.73587	0.15335	23.0254	<.0001	2.087	1.545 2.819
IHTN	1	0.35259	0.13565	6.7563	0.0093	1.423	1.091 1.856
CHOLADJ	1	0.00354	0.00167	4.5053	0.0338	1.004	1.000 1.007
PKYRS	1	0.00724	0.00212	11.6691	0.0006	1.007	1.003 1.011
ALCOH	1	-0.03043	0.01337	5.1797	0.0229	0.970	0.945 0.996

Table 16 ----- model5

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	
CRPCat1	1	0.12863	0.68037	0.0357	0.8501	1.137	0.300	4.315
CRPCat2	1	0.13541	0.65732	0.0424	0.8368	1.145	0.316	4.153
RACE01	1	-0.47820	0.49197	0.9448	0.3310	0.620	0.236	1.626
crp_race1	1	-0.04796	0.62073	0.0060	0.9384	0.953	0.282	3.218
crp_race2	1	0.21827	0.58396	0.1397	0.7086	1.244	0.396	3.907
AGECat1	1	-1.05473	0.30046	12.3230	0.0004	0.348	0.193	0.628
AGECat2	1	-0.80908	0.24384	11.0096	0.0009	0.445	0.276	0.718
AGECat3	1	-0.87780	0.24638	12.6931	0.0004	0.416	0.256	0.674
AGECat4	1	-0.55077	0.24096	5.2247	0.0223	0.577	0.360	0.925
AGECat5	1	-0.32837	0.23883	1.8905	0.1692	0.720	0.451	1.150
AGECat6	1	-0.83237	0.29314	8.0625	0.0045	0.435	0.245	0.773
AGECat7	1	-0.17963	0.25885	0.4816	0.4877	0.836	0.503	1.388
AGECat8	1	-0.14095	0.27907	0.2551	0.6135	0.869	0.503	1.501
GEND01	1	0.74992	0.13955	28.8800	<.0001	2.117	1.610	2.783
EDUC01	1	0.49227	0.13664	12.9792	0.0003	1.636	1.252	2.138
DIABADACat1	1	0.22848	0.17960	1.6182	0.2033	1.257	0.884	1.787
DIABADACat2	1	0.72467	0.15299	22.4355	<.0001	2.064	1.529	2.786
IHTN	1	0.35921	0.13569	7.0077	0.0081	1.432	1.098	1.869
CHOLADJ	1	0.00369	0.00167	4.8477	0.0277	1.004	1.000	1.007
PKYRS	1	0.00740	0.00212	12.2453	0.0005	1.007	1.003	1.012
ALCOH	1	-0.03029	0.01332	5.1714	0.0230	0.970	0.945	0.996

Table 17 ----- model3 among men

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits
CRPCat1	1	0.20313	0.21662	0.8793	0.3484	1.225	0.801 1.873
CRPCat2	1	0.57820	0.23008	6.3154	0.0120	1.783	1.136 2.799
AGECat1	1	-0.88826	0.40900	4.7166	0.0299	0.411	0.185 0.917
AGECat2	1	-0.61703	0.32947	3.5074	0.0611	0.540	0.283 1.029
AGECat3	1	-0.67935	0.32049	4.4932	0.0340	0.507	0.270 0.950
AGECat4	1	-0.42292	0.31970	1.7500	0.1859	0.655	0.350 1.226
AGECat5	1	-0.07950	0.30719	0.0670	0.7958	0.924	0.506 1.686
AGECat6	1	-0.79916	0.40800	3.8366	0.0501	0.450	0.202 1.001
AGECat7	1	-0.26637	0.36219	0.5409	0.4621	0.766	0.377 1.558
AGECat8	1	-0.08274	0.37382	0.0490	0.8248	0.921	0.442 1.915
RACECat1	1	0.61533	0.35000	3.0909	0.0787	1.850	0.932 3.674
RACECat2	1	-11.71625	513.36368	0.0005	0.9818	0.000	0.000 .
EDUC01	1	0.45794	0.17977	6.4889	0.0109	1.581	1.111 2.249
DIABADACat1	1	0.33880	0.22458	2.2759	0.1314	1.403	0.904 2.179
DIABADACat2	1	0.68793	0.20029	11.7971	0.0006	1.990	1.344 2.946
IHTN	1	0.33746	0.18464	3.3403	0.0676	1.401	0.976 2.012
PKYRS	1	0.00823	0.00246	11.1669	0.0008	1.008	1.003 1.013
ALCOH	1	-0.02395	0.01397	2.9378	0.0865	0.976	0.950 1.003
CHOLADJ	1	0.00274	0.00233	1.3873	0.2389	1.003	0.998 1.007

Table 17 ----- model3 among women

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	
CRPCat1	1	-0.07644	0.23978	0.1016	0.7499	0.926	0.579	1.482
CRPCat2	1	0.10258	0.26350	0.1516	0.6971	1.108	0.661	1.857
RACECat1	1	0.46431	0.35835	1.6788	0.1951	1.591	0.788	3.211
RACECat2	1	1.55618	0.79142	3.8663	0.0493	4.741	1.005	22.361
EDUC01	1	0.55032	0.21363	6.6360	0.0100	1.734	1.141	2.635
DIABADACat1	1	0.05692	0.30453	0.0349	0.8517	1.059	0.583	1.923
DIABADACat2	1	0.79564	0.24094	10.9045	0.0010	2.216	1.382	3.553
AGECat1	1	-1.19951	0.44680	7.2073	0.0073	0.301	0.126	0.723
AGECat2	1	-0.99525	0.36431	7.4631	0.0063	0.370	0.181	0.755
AGECat3	1	-1.13203	0.39031	8.4117	0.0037	0.322	0.150	0.693
AGECat4	1	-0.66389	0.36977	3.2235	0.0726	0.515	0.249	1.063
AGECat5	1	-0.64566	0.39119	2.7241	0.0988	0.524	0.244	1.129
AGECat6	1	-0.93935	0.42404	4.9072	0.0267	0.391	0.170	0.897
AGECat7	1	-0.06927	0.37369	0.0344	0.8529	0.933	0.449	1.941
AGECat8	1	-0.13805	0.42426	0.1059	0.7449	0.871	0.379	2.001
IHTN	1	0.37363	0.20180	3.4279	0.0641	1.453	0.978	2.158
PKYRS	1	0.00502	0.00440	1.3007	0.2541	1.005	0.996	1.014
CHOLADJ	1	0.00444	0.00243	3.3436	0.0675	1.004	1.000	1.009
ALCOH	1	-0.07245	0.04044	3.2096	0.0732	0.930	0.859	1.007

Table 17 ----- model3 among Whites

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	
CRPCat1	1	0.09358	0.16562	0.3193	0.5720	1.098	0.794	1.519
CRPCat2	1	0.35886	0.18014	3.9687	0.0464	1.432	1.006	2.038
AGECat1	1	-1.19676	0.32423	13.6240	0.0002	0.302	0.160	0.570
AGECat2	1	-0.78514	0.25125	9.7656	0.0018	0.456	0.279	0.746
AGECat3	1	-0.86951	0.25408	11.7116	0.0006	0.419	0.255	0.690
AGECat4	1	-0.55700	0.24792	5.0475	0.0247	0.573	0.352	0.931
AGECat5	1	-0.36429	0.24950	2.1319	0.1443	0.695	0.426	1.133
AGECat6	1	-0.83348	0.30170	7.6322	0.0057	0.435	0.241	0.785
AGECat7	1	-0.24308	0.27124	0.8031	0.3702	0.784	0.461	1.334
AGECat8	1	-0.02561	0.28618	0.0080	0.9287	0.975	0.556	1.708
GEND01	1	0.74502	0.14519	26.3316	<.0001	2.106	1.585	2.800
EDUC01	1	0.50582	0.14156	12.7685	0.0004	1.658	1.257	2.189
DIABADACat1	1	0.25768	0.18474	1.9455	0.1631	1.294	0.901	1.858
DIABADACat2	1	0.74467	0.16090	21.4189	<.0001	2.106	1.536	2.886
IHTN	1	0.37936	0.14095	7.2442	0.0071	1.461	1.109	1.926
PKYRS	1	0.00790	0.00216	13.3893	0.0003	1.008	1.004	1.012
CHOLADJ	1	0.00294	0.00175	2.8235	0.0929	1.003	1.000	1.006
ALCOH	1	-0.03236	0.01396	5.3730	0.0205	0.968	0.942	0.995

Table 17 ----- model3 among Blacks

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	
CRPCat1	1	-0.73173	0.68528	1.1401	0.2856	0.481	0.126	1.843
CRPCat2	1	0.16242	0.61634	0.0694	0.7922	1.176	0.351	3.937
AGECat1	1	0.21152	0.95720	0.0488	0.8251	1.236	0.189	8.065
AGECat2	1	-1.26971	1.04540	1.4752	0.2245	0.281	0.036	2.180
AGECat3	1	-1.28780	1.03622	1.5445	0.2139	0.276	0.036	2.103
AGECat4	1	-0.63819	1.03336	0.3814	0.5368	0.528	0.070	4.003
AGECat5	1	-0.10221	0.89436	0.0131	0.9090	0.903	0.156	5.211
AGECat6	1	-15.11066	1068	0.0002	0.9887	0.000	0.000	.
AGECat7	1	0.17012	1.02924	0.0273	0.8687	1.185	0.158	8.912
AGECat8	1	-1.22478	1.25074	0.9589	0.3275	0.294	0.025	3.410
GEND01	1	1.07637	0.54368	3.9196	0.0477	2.934	1.011	8.516
EDUC01	1	0.35328	0.54369	0.4222	0.5158	1.424	0.491	4.133
DIABADACat1	1	-0.33053	0.80439	0.1688	0.6811	0.719	0.149	3.477
DIABADACat2	1	0.55771	0.53434	1.0894	0.2966	1.747	0.613	4.978
IHTN	1	0.00141	0.59101	0.0000	0.9981	1.001	0.314	3.189
PKYRS	1	-0.00117	0.01209	0.0094	0.9229	0.999	0.975	1.023
CHOLADJ	1	0.01483	0.00631	5.5179	0.0188	1.015	1.002	1.028
ALCOH	1	-0.01864	0.05384	0.1198	0.7292	0.982	0.883	1.091

Table 18

Model1

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	Variable Label
CRPCat1	1	0.28606	0.16516	3.0000	0.0833	1.331	0.963 1.840	CRP 1-3 vs <1
CRPCat2	1	0.58056	0.17526	10.9738	0.0009	1.787	1.268 2.519	CRP >3 vs <1

Model2

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits
CRPCat1	1	0.33213	0.16529	4.0376	0.0445	1.394	1.008 1.927
CRPCat2	1	0.63143	0.17682	12.7523	0.0004	1.880	1.330 2.659
GEND01	1	0.00104	0.13030	0.0001	0.9936	1.001	0.775 1.292
RACECat1	1	-0.18631	0.19535	0.9096	0.3402	0.830	0.566 1.217
RACECat2	1	-0.63329	1.01699	0.3878	0.5335	0.531	0.072 3.896
AGECat1	1	-2.06411	0.41078	25.2488	<.0001	0.127	0.057 0.284
AGECat2	1	-1.61804	0.27574	34.4322	<.0001	0.198	0.116 0.340
AGECat3	1	-1.22292	0.25081	23.7738	<.0001	0.294	0.180 0.481
AGECat4	1	-0.66531	0.23146	8.2624	0.0040	0.514	0.327 0.809
AGECat5	1	-0.62951	0.24107	6.8193	0.0090	0.533	0.332 0.855
AGECat6	1	-0.53406	0.25079	4.5348	0.0332	0.586	0.359 0.958
AGECat7	1	-0.14741	0.24091	0.3744	0.5406	0.863	0.538 1.384
AGECat8	1	-0.02675	0.25132	0.0113	0.9152	0.974	0.595 1.593

Model3

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	
CRPCat1	1	0.24075	0.17006	2.0042	0.1569	1.272	0.912	1.775
CRPCat2	1	0.45961	0.18798	5.9781	0.0145	1.583	1.095	2.289
GEND01	1	0.01122	0.14289	0.0062	0.9374	1.011	0.764	1.338
RACECat1	1	-0.02721	0.20277	0.0180	0.8933	0.973	0.654	1.448
RACECat2	1	-0.45196	1.01954	0.1965	0.6576	0.636	0.086	4.694
DIABADACat1	1	0.38897	0.18806	4.2778	0.0386	1.475	1.021	2.133
DIABADACat2	1	0.72273	0.22276	10.5260	0.0012	2.060	1.331	3.188
AGECat1	1	-1.87627	0.41529	20.4124	<.0001	0.153	0.068	0.346
AGECat2	1	-1.44485	0.27878	26.8616	<.0001	0.236	0.137	0.407
AGECat3	1	-1.08388	0.25385	18.2309	<.0001	0.338	0.206	0.556
AGECat4	1	-0.58508	0.23383	6.2610	0.0123	0.557	0.352	0.881
AGECat5	1	-0.57367	0.24527	5.4708	0.0193	0.563	0.348	0.911
AGECat6	1	-0.50373	0.25429	3.9243	0.0476	0.604	0.367	0.995
AGECat7	1	-0.11779	0.24401	0.2330	0.6293	0.889	0.551	1.434
AGECat8	1	0.03750	0.25271	0.0220	0.8820	1.038	0.633	1.704
HYPERCat1	1	0.87128	0.20065	18.8558	<.0001	2.390	1.613	3.541
HYPERCat2	1	0.93834	0.16515	32.2822	<.0001	2.556	1.849	3.533
LDLADJ	1	0.00340	0.00186	3.3388	0.0677	1.003	1.000	1.007
HDL44	1	-0.00304	0.00503	0.3648	0.5458	0.997	0.987	1.007
GLUADJ	1	0.00254	0.00207	1.5095	0.2192	1.003	0.998	1.007
BMI	1	-0.04764	0.01820	6.8513	0.0089	0.953	0.920	0.988

Model4

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits
CRPCat1	1	0.24075	0.17006	2.0042	0.1569	1.272	0.912 1.775
CRPCat2	1	0.45961	0.18798	5.9781	0.0145	1.583	1.095 2.289
GEND01	1	0.01122	0.14289	0.0062	0.9374	1.011	0.764 1.338
RACECat1	1	-0.02721	0.20277	0.0180	0.8933	0.973	0.654 1.448
RACECat2	1	-0.45196	1.01954	0.1965	0.6576	0.636	0.086 4.694
DIABADACat1	1	0.38897	0.18806	4.2778	0.0386	1.475	1.021 2.133
DIABADACat2	1	0.72273	0.22276	10.5260	0.0012	2.060	1.331 3.188
AGECat1	1	-1.87627	0.41529	20.4124	<.0001	0.153	0.068 0.346
AGECat2	1	-1.44485	0.27878	26.8616	<.0001	0.236	0.137 0.407
AGECat3	1	-1.08388	0.25385	18.2309	<.0001	0.338	0.206 0.556
AGECat4	1	-0.58508	0.23383	6.2610	0.0123	0.557	0.352 0.881
AGECat5	1	-0.57367	0.24527	5.4708	0.0193	0.563	0.348 0.911
AGECat6	1	-0.50373	0.25429	3.9243	0.0476	0.604	0.367 0.995
AGECat7	1	-0.11779	0.24401	0.2330	0.6293	0.889	0.551 1.434
AGECat8	1	0.03750	0.25271	0.0220	0.8820	1.038	0.633 1.704
HYPERCat1	1	0.87128	0.20065	18.8558	<.0001	2.390	1.613 3.541
HYPERCat2	1	0.93834	0.16515	32.2822	<.0001	2.556	1.849 3.533
LDLADJ	1	0.00340	0.00186	3.3388	0.0677	1.003	1.000 1.007
HDL44	1	-0.00304	0.00503	0.3648	0.5458	0.997	0.987 1.007
GLUADJ	1	0.00254	0.00207	1.5095	0.2192	1.003	0.998 1.007
BMI	1	-0.04764	0.01820	6.8513	0.0089	0.953	0.920 0.988

Model5

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits
CRPCat1	1	0.14805	0.21797	0.4613	0.4970	1.160	0.756 1.778
CRPCat2	1	0.24447	0.24393	1.0045	0.3162	1.277	0.792 2.060
GEND01	1	-0.24684	0.28660	0.7418	0.3891	0.781	0.445 1.370
crp_gend1	1	0.21226	0.34134	0.3867	0.5340	1.236	0.633 2.414
crp_gend2	1	0.49772	0.36450	1.8646	0.1721	1.645	0.805 3.361
RACECat1	1	-0.02951	0.20268	0.0212	0.8842	0.971	0.653 1.444
RACECat2	1	-0.41731	1.01972	0.1675	0.6824	0.659	0.089 4.861
DIABADACat1	1	0.38620	0.18807	4.2167	0.0400	1.471	1.018 2.127
DIABADACat2	1	0.72225	0.22283	10.5059	0.0012	2.059	1.330 3.187
AGECat1	1	-1.88963	0.41532	20.7006	<.0001	0.151	0.067 0.341
AGECat2	1	-1.44001	0.27873	26.6906	<.0001	0.237	0.137 0.409
AGECat3	1	-1.09032	0.25396	18.4325	<.0001	0.336	0.204 0.553
AGECat4	1	-0.58222	0.23384	6.1995	0.0128	0.559	0.353 0.883
AGECat5	1	-0.57437	0.24520	5.4871	0.0192	0.563	0.348 0.910
AGECat6	1	-0.51961	0.25455	4.1669	0.0412	0.595	0.361 0.980
AGECat7	1	-0.11757	0.24395	0.2323	0.6299	0.889	0.551 1.434
AGECat8	1	0.02567	0.25284	0.0103	0.9191	1.026	0.625 1.684
HYPERCat1	1	0.86924	0.20066	18.7657	<.0001	2.385	1.610 3.534
HYPERCat2	1	0.93677	0.16505	32.2119	<.0001	2.552	1.846 3.526
LDLADJ	1	0.00328	0.00186	3.1245	0.0771	1.003	1.000 1.007
HDL44	1	-0.00306	0.00502	0.3703	0.5428	0.997	0.987 1.007
GLUADJ	1	0.00269	0.00207	1.6873	0.1940	1.003	0.999 1.007
BMI	1	-0.04459	0.01835	5.9071	0.0151	0.956	0.923 0.991

Model6

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits
CRPCat1	1	0.14805	0.21797	0.4613	0.4970	1.160	0.756 1.778
CRPCat2	1	0.24447	0.24393	1.0045	0.3162	1.277	0.792 2.060
GEND01	1	-0.24684	0.28660	0.7418	0.3891	0.781	0.445 1.370
crp_gend1	1	0.21226	0.34134	0.3867	0.5340	1.236	0.633 2.414
crp_gend2	1	0.49772	0.36450	1.8646	0.1721	1.645	0.805 3.361
RACECat1	1	-0.02951	0.20268	0.0212	0.8842	0.971	0.653 1.444
RACECat2	1	-0.41731	1.01972	0.1675	0.6824	0.659	0.089 4.861
DIABADACat1	1	0.38620	0.18807	4.2167	0.0400	1.471	1.018 2.127
DIABADACat2	1	0.72225	0.22283	10.5059	0.0012	2.059	1.330 3.187
AGECat1	1	-1.88963	0.41532	20.7006	<.0001	0.151	0.067 0.341
AGECat2	1	-1.44001	0.27873	26.6906	<.0001	0.237	0.137 0.409
AGECat3	1	-1.09032	0.25396	18.4325	<.0001	0.336	0.204 0.553
AGECat4	1	-0.58222	0.23384	6.1995	0.0128	0.559	0.353 0.883
AGECat5	1	-0.57437	0.24520	5.4871	0.0192	0.563	0.348 0.910
AGECat6	1	-0.51961	0.25455	4.1669	0.0412	0.595	0.361 0.980
AGECat7	1	-0.11757	0.24395	0.2323	0.6299	0.889	0.551 1.434
AGECat8	1	0.02567	0.25284	0.0103	0.9191	1.026	0.625 1.684
HYPERCat1	1	0.86924	0.20066	18.7657	<.0001	2.385	1.610 3.534
HYPERCat2	1	0.93677	0.16505	32.2119	<.0001	2.552	1.846 3.526
LDLADJ	1	0.00328	0.00186	3.1245	0.0771	1.003	1.000 1.007
HDL44	1	-0.00306	0.00502	0.3703	0.5428	0.997	0.987 1.007
GLUADJ	1	0.00269	0.00207	1.6873	0.1940	1.003	0.999 1.007
BMI	1	-0.04459	0.01835	5.9071	0.0151	0.956	0.923 0.991

Table 19--model3 among men

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	
CRPCat1	1	0.35669	0.27154	1.7256	0.1890	1.429	0.839	2.432
CRPCat2	1	0.74870	0.28866	6.7274	0.0095	2.114	1.201	3.723
RACECat1	1	0.34004	0.36252	0.8799	0.3482	1.405	0.690	2.859
RACECat2	1	-10.60024	408.28984	0.0007	0.9793	0.000	0.000	.
DIABADACat1	1	0.46086	0.28782	2.5639	0.1093	1.585	0.902	2.787
DIABADACat2	1	0.90473	0.35590	6.4621	0.0110	2.471	1.230	4.964
AGECat1	1	-2.81815	1.03228	7.4530	0.0063	0.060	0.008	0.452
AGECat2	1	-1.26215	0.43317	8.4899	0.0036	0.283	0.121	0.662
AGECat3	1	-0.88486	0.37646	5.5247	0.0187	0.413	0.197	0.863
AGECat4	1	-0.62569	0.35550	3.0976	0.0784	0.535	0.266	1.074
AGECat5	1	-0.56288	0.37456	2.2584	0.1329	0.570	0.273	1.187
AGECat6	1	-0.94847	0.45368	4.3707	0.0366	0.387	0.159	0.942
AGECat7	1	-0.25431	0.38085	0.4459	0.5043	0.775	0.368	1.636
AGECat8	1	0.11254	0.37367	0.0907	0.7633	1.119	0.538	2.328
HYPERCat1	1	0.89418	0.30706	8.4804	0.0036	2.445	1.340	4.464
+ HYPERCat2	1	0.93973	0.24775	14.3879	0.0001	2.559	1.575	4.159
LDLADJ	1	0.00126	0.00310	0.1651	0.6845	1.001	0.995	1.007
HDL44	1	-0.01317	0.00905	2.1180	0.1456	0.987	0.970	1.005
GLUADJ	1	0.0001428	0.00410	0.0012	0.9722	1.000	0.992	1.008
BMI	1	-0.07260	0.03260	4.9591	0.0260	0.930	0.872	0.991

Table 19--model3 among women

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	
CRPCat1	1	0.35669	0.27154	1.7256	0.1890	1.429	0.839	2.432
CRPCat2	1	0.74870	0.28866	6.7274	0.0095	2.114	1.201	3.723
RACECat1	1	0.34004	0.36252	0.8799	0.3482	1.405	0.690	2.859
RACECat2	1	-10.60024	408.28984	0.0007	0.9793	0.000	0.000	.
DIABADACat1	1	0.46086	0.28782	2.5639	0.1093	1.585	0.902	2.787
DIABADACat2	1	0.90473	0.35590	6.4621	0.0110	2.471	1.230	4.964
AGECat1	1	-2.81815	1.03228	7.4530	0.0063	0.060	0.008	0.452
AGECat2	1	-1.26215	0.43317	8.4899	0.0036	0.283	0.121	0.662
AGECat3	1	-0.88486	0.37646	5.5247	0.0187	0.413	0.197	0.863
AGECat4	1	-0.62569	0.35550	3.0976	0.0784	0.535	0.266	1.074
AGECat5	1	-0.56288	0.37456	2.2584	0.1329	0.570	0.273	1.187
AGECat6	1	-0.94847	0.45368	4.3707	0.0366	0.387	0.159	0.942
AGECat7	1	-0.25431	0.38085	0.4459	0.5043	0.775	0.368	1.636
AGECat8	1	0.11254	0.37367	0.0907	0.7633	1.119	0.538	2.328
HYPERCat1	1	0.89418	0.30706	8.4804	0.0036	2.445	1.340	4.464
HYPERCat2	1	0.93973	0.24775	14.3879	0.0001	2.559	1.575	4.159
LDLADJ	1	0.00126	0.00310	0.1651	0.6845	1.001	0.995	1.007
HDL44	1	-0.01317	0.00905	2.1180	0.1456	0.987	0.970	1.005
GLUADJ	1	0.0001428	0.00410	0.0012	0.9722	1.000	0.992	1.008
BMI	1	-0.07260	0.03260	4.9591	0.0260	0.930	0.872	0.991

Table 19--model3 among whites

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	
CRPCat1	1	0.27347	0.18090	2.2852	0.1306	1.315	0.922	1.874
CRPCat2	1	0.50188	0.20168	6.1928	0.0128	1.652	1.112	2.453
GEND01	1	0.01496	0.15216	0.0097	0.9217	1.015	0.753	1.368
DIABADACat1	1	0.46769	0.19980	5.4792	0.0192	1.596	1.079	2.362
DIABADACat2	1	0.74744	0.25810	8.3866	0.0038	2.112	1.273	3.502
AGECat1	1	-1.89536	0.44573	18.0816	<.0001	0.150	0.063	0.360
AGECat2	1	-1.39112	0.29423	22.3535	<.0001	0.249	0.140	0.443
AGECat3	1	-1.10799	0.27176	16.6230	<.0001	0.330	0.194	0.563
AGECat4	1	-0.63035	0.25156	6.2789	0.0122	0.532	0.325	0.872
AGECat5	1	-0.58359	0.26116	4.9936	0.0254	0.558	0.334	0.931
AGECat6	1	-0.59936	0.27690	4.6854	0.0304	0.549	0.319	0.945
AGECat7	1	-0.06275	0.25503	0.0605	0.8056	0.939	0.570	1.548
AGECat8	1	0.12135	0.27044	0.2013	0.6537	1.129	0.665	1.918
HYPERCat1	1	0.94693	0.20699	20.9279	<.0001	2.578	1.718	3.868
HYPERCat2	1	0.88660	0.17435	25.8578	<.0001	2.427	1.724	3.416
LDLADJ	1	0.00235	0.00201	1.3722	0.2414	1.002	0.998	1.006
HDL44	1	-0.00592	0.00550	1.1577	0.2820	0.994	0.983	1.005
GLUADJ	1	0.00282	0.00263	1.1548	0.2825	1.003	0.998	1.008
BMI	1	-0.05489	0.02010	7.4617	0.0063	0.947	0.910	0.985

Table 19--model3 among blacks

The PHREG Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Chi-Square	Pr > ChiSq	Hazard Ratio	95% Hazard Ratio Confidence Limits	
CRPCat1	1	0.16009	0.52692	0.0923	0.7613	1.174	0.418	3.296
CRPCat2	1	0.28795	0.53022	0.2949	0.5871	1.334	0.472	3.770
GEND01	1	0.05252	0.44448	0.0140	0.9059	1.054	0.441	2.519
DIABADACat1	1	-0.30954	0.64319	0.2316	0.6303	0.734	0.208	2.589
DIABADACat2	1	0.27175	0.56274	0.2332	0.6292	1.312	0.436	3.954
AGECat1	1	-1.55570	1.19756	1.6876	0.1939	0.211	0.020	2.207
AGECat2	1	-1.69494	0.88045	3.7059	0.0542	0.184	0.033	1.031
AGECat3	1	-0.94563	0.74048	1.6309	0.2016	0.388	0.091	1.658
AGECat4	1	-0.19141	0.67169	0.0812	0.7757	0.826	0.221	3.080
AGECat5	1	-0.42925	0.73718	0.3391	0.5604	0.651	0.153	2.761
AGECat6	1	0.15469	0.69329	0.0498	0.8234	1.167	0.300	4.543
AGECat7	1	-1.28393	1.13216	1.2861	0.2568	0.277	0.030	2.547
AGECat8	1	-0.24209	0.72603	0.1112	0.7388	0.785	0.189	3.257
HYPERCat1	1	0.00800	0.87900	0.0001	0.9927	1.008	0.180	5.645
HYPERCat2	1	1.10995	0.55567	3.9900	0.0458	3.034	1.021	9.016
LDLADJ	1	0.00626	0.00509	1.5126	0.2187	1.006	0.996	1.016
HDL44	1	0.01512	0.01183	1.6335	0.2012	1.015	0.992	1.039
GLUADJ	1	0.00246	0.00379	0.4220	0.5159	1.002	0.995	1.010
BMI	1	-0.02279	0.04711	0.2340	0.6286	0.977	0.891	1.072