

## The CardioVision 2020 Baseline Community Report Card

THOMAS E. KOTTKE, MD, MSPH; MARK J. BREKKE, MA; LEE N. BREKKE, PhD; LOWELL C. DALE, MD; CATHERINE L. BRANDEL, BSN; STEPHEN W. DEBOER, MPH; SHARONNE N. HAYES, MD; REBECCA S. HOFFMAN, BA; PEGGY A. MENZEL, BS; TU T. NGUYEN, MD; AND RANDAL J. THOMAS, MD

• **Objective:** To establish baseline data for the CardioVision 2020 program, a collaborative project in Olmsted County, Minnesota, organized to reduce cardiovascular disease rates by altering 5 health-related items: (1) eliminating tobacco use and exposure, (2) improving nutrition, (3) increasing physical activity, (4) lowering serum cholesterol level, and (5) controlling blood pressure.

• **Subjects and Methods:** Data about tobacco use, diet, and physical activity were collected by random digit dial interview and follow-up questionnaire from a sample of the population. Blood pressure data were collected from medical records at Mayo Clinic, and serum cholesterol data were derived from the Mayo Clinic laboratory database. Data were stratified into 6 age groups.

• **Results:** A total of 624 women and 608 men responded to the questionnaire. Population blood pressure data were available for 1956 women and 1084 men. Population serum cholesterol data were available for 17,042 women and 12,511 men. Except for women in the 30- to 39-year-old age group, less than 10% of the population sampled met 4 or 5 goals. Conversely, about 90% of the population met at least 1 goal, and about 80% met 1, 2, or 3 of the goals.

• **Conclusion:** The data from the Olmsted County population indicate considerable opportunity to reduce this population's burden of cardiovascular disease.

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Death rates from coronary heart disease vary by more than 20-fold worldwide, and those in the United States are near the middle for both men and women.<sup>1</sup> Although mortality rates have declined sharply since the 1960s, most of the decrease in the past 10 years appears to have been due to improved survival after myocardial infarction rather than from primary prevention of heart disease.<sup>2-4</sup> Additionally, there are ominous signs that heart disease rates may increase again in the future: more young people are using tobacco<sup>5</sup>; the population is becoming more obese and sedentary<sup>6</sup>; both the incidence and the prevalence of type 2 diabetes mellitus are increasing<sup>7,8</sup>; hypertension control is slipping<sup>9</sup>; and total energy intake and consumption of fat have begun to increase.<sup>10</sup> Because a favorable risk factor profile is associated with substantially lower rates of cardiovascular disease, lower mortality rates, and up to a decade of increased life expectancy,<sup>11</sup> elevated

risk factors represent an important overlooked opportunity to reduce the burden of cardiovascular disease through primary prevention.

In populations similar to those of Olmsted County, Minnesota, most disease events occur among the group of individuals at average risk, and a major decrement in disease burden can be achieved only by addressing all risk factor elevations in all individuals.<sup>12-15</sup> Therefore, CardioVision 2020 was developed as a collaborative, comprehensive, population-wide initiative for Olmsted County.<sup>16</sup>

The goals for the community focus on 4 broad areas: a public environment that is free of tobacco smoke, promotion of tobacco products, and sale of tobacco products to youth; nutritious foods that are clearly labeled, readily available, and widely promoted; widespread and widely promoted opportunities for physical activity; and clinical care systems for secondary prevention and treatment of elevated risk factors. In addition to these goals for the community, individuals are encouraged to adopt 5 personal goals: (1) to be free from exposure to tobacco smoke and use of tobacco; (2) to consume a total of 5 servings of fruits and vegetables per day, only lean or extra-lean meats, and 1% or skim dairy products; (3) to have a total cholesterol level lower than 200 mg/dL if no coronary heart disease exists or a low-density lipoprotein level lower than 100 mg/dL if coronary heart disease is present; (4) to have a systolic blood pressure lower than 130 mm Hg and diastolic blood pressure lower than 85 mm Hg; and (5) to perform 30

From the Division of Cardiovascular Diseases and Internal Medicine (T.E.K., S.N.H., R.S.H., P.A.M., R.J.T.), Division of Community Internal Medicine (L.C.D.), Department of Health Sciences Research (T.E.K.), and Division of Endocrinology, Metabolism, Nutrition and Internal Medicine (C.L.B., S.W.D., T.T.N.), Mayo Clinic, Rochester, Minn; and Brekke Associates, Inc, Minneapolis, Minn (M.J.B., L.N.B.).

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Individual reprints of this article are not available. Address correspondence to Thomas E. Kottke, MD, MSPH, Division of Cardiovascular Diseases, Mayo Clinic, 200 First St SW, Rochester, MN 55905 (e-mail: tkottke@mayo.edu).

Table 1. Data Sources and Criteria for the Community Report Card

Data	Source	Criterion
Serum cholesterol		
Measurement interval	Random digit dial interview	Measured within 5 y
Serum cholesterol values	Mayo Clinic laboratory database	Total serum cholesterol level <200 mg/dL
Blood pressure		
Measurement interval	Random digit dial interview	Measured within 2 y
Blood pressure values	Medical record	Systolic blood pressure <130 mm Hg; diastolic blood pressure <85 mm Hg
Tobacco-free lifestyle		
Exposure to tobacco smoke	Random digit dial interview	Reported no exposure
Tobacco use	Random digit dial interview	Reported no tobacco use in prior year
Diet		
Fruit and vegetable consumption	Random digit dial interview	Reported eating at least 5 servings of fruits and vegetables daily
Dietary fat	Quick Check for Diet Progress	≤30% of energy from fat, ≤10% of energy from saturated fat, and ≤300 mg of cholesterol per day
Physical activity levels	Random digit dial interview	Reported daily physical activity to maintain fitness

minutes of physical activity on most, if not all days of the week.

These goals have been selected to reflect consensus goals and priorities established by the federal government and voluntary health agencies. Specifically, they reflect the US Department of Health and Human Services *Healthy People 2010* goals that pertain to CardioVision 2020.<sup>17</sup>

To track progress and guide program development, population levels for each of the behaviors and risk factors will be followed up throughout the course of the project. When possible, questions from national surveys like the Behavioral Risk Factor Surveillance System sponsored by the Centers for Disease Control and Prevention<sup>18</sup> or from published studies<sup>19,20</sup> have been used; thus, data from Olmsted County can be compared to statewide and national patterns. This article reports the baseline data for the CardioVision 2020 personal goals stratified by sex and 6 age groups of adults. More detailed data appear on the CardioVision 2020 Web site ([www.cardiovision2020.org](http://www.cardiovision2020.org)).

## SUBJECTS AND METHODS

The data were collected from 4 sources (Table 1). Blood pressure data were abstracted from Mayo Clinic medical records, and serum cholesterol data were obtained from the Mayo Clinic Department of Laboratory Medicine and Pathology electronic database. Data on tobacco use and exposure, nutrition, and physical activity are not systematically recorded in the medical record. Therefore, CardioVision 2020 conducted a telephone interview of a stratified random sample of Olmsted County residents.

The CardioVision 2020 survey and data collection protocol was reviewed and approved by the Mayo Clinic Institutional Review Board. Use of serum cholesterol and blood pressure data was limited to Olmsted County residents who had signed a Mayo Clinic research authorization form. About 94% of the population has authorized use of the medical record for research purposes.<sup>21</sup> Because almost all individuals living in Olmsted County are seen at the Mayo Clinic within a 3-year period, the medical record data can be interpreted as reasonably representative of the true values in the community.<sup>22</sup>

## Random Digit Dial Interview

Questions about tobacco use, exposure to environmental tobacco smoke, diet, and physical activity for the random digit dial interview were collected from the Behavioral Risk Factor Surveillance Study survey to the greatest extent possible to allow comparisons between Olmsted County and state and national data. A single question on physical activity used by a longitudinal follow-up study was included because of its association with future cardiovascular disease events.<sup>16</sup> Data collection for the random digit dial interview was subcontracted to SNG Research, a survey research organization based in Rochester, Minn. The sampling frame consisted of 6000 telephone numbers purchased from Survey Sampling, Inc (Fairfield, Conn). All telephoning was conducted from an office under the observation of a supervisor between March 1 and April 21, 1999. The following procedure was used to identify interview respondents: If only 1 eligible respondent was identified in a household, that individual was interviewed if the

Table 2. Numbers Used for Analysis by Age and Sex Within Data Source

Age group	Data source and sex							
	Random digit dial interview		Quick Check for Diet Progress		Serum cholesterol measurement		Blood pressure measurement	
	Women	Men	Women	Men	Women	Men	Women	Men
20-29	101	100	60	27	2618	1285	292	107
30-39	104	101	63	49	3429	2440	438	234
40-49	114	105	72	47	3485	2562	396	230
50-59	101	100	72	63	2874	2497	286	182
60-69	101	101	73	71	2249	2017	207	152
≥70	103	101	64	71	2387	1710	337	179
Total	624	608	404	328	17,042	12,511	1956	1084

age-sex cell to which he or she belonged had fewer than 100 completed interviews. If several adults lived in the household and 1 was a man aged 70 years or older, a request was made to speak to him since that age-sex group was the smallest in the population. If more than 1 adult lived in the household but there was no man aged 70 years or older, the person who celebrated his or her birthday most recently was selected to be the respondent.

#### Quick Check for Diet Progress

To collect additional data about dietary fat consumption, the Quick Check for Diet Progress (Nutrition Scientific, South Pasadena, Calif), a validated self-administered nutrition questionnaire,<sup>23</sup> was mailed to random digit dial interview respondents who had indicated their willingness to complete it. A more detailed analysis of the nutrition patterns of the population will be reported in a subsequent publication.

#### Serum Cholesterol Measurement

As part of its clinical service program, the Mayo Clinic Department of Laboratory Medicine and Pathology maintains a computerized database of all clinical chemistry studies. To avoid oversampling of individuals who have their serum cholesterol level determined frequently, the data reported in this article include a serum cholesterol value for any Olmsted County resident aged 20 years or older who had a total cholesterol level determined in 1995, 1996, or 1997. If more than 1 value was recorded for an individual, the most recent value was used in this analysis. Because of invalid or questionable data, 91 records were excluded, leaving a final count of 29,553 (Table 2).

#### Blood Pressure Measurement

As part of its quality improvement program, the Mayo Clinic continuously samples for abstraction the medical records of patients who have been seen at one of its primary care outpatient services. A random sample of 30 patients is

abstracted for each month. Abstracted values for residents of Olmsted County who had an office visit between October 1994 and April 1999 have been used to estimate the distribution of blood pressure levels in the community. Table 2 shows the age and sex distribution of records used in the analysis.

#### Combining Goal Information

The serum cholesterol data, blood pressure data, telephone interview, and Quick Check for Diet Progress questionnaire data were collected from 3 different samples of the population, which were not linked. As a result, combinations of goals were estimated by assuming independent goal proportions from each of the 3 samples, ie, proportions from different samples were simply multiplied together. In addition, when goals from the Quick Check data (ie, dietary fat and cholesterol goals) were combined with goals from the interview data, only the subset of the records with valid Quick Check data was used. Finally, the special goal of a low-density lipoprotein level lower than 100 mg/dL for individuals with known coronary heart disease was ignored since specific data for individuals with coronary heart disease were not available.

#### Statistical Testing and Confidence Intervals

The significance of between-strata differences in proportions can be estimated by comparing the difference in proportions to their 95% confidence intervals (CIs). Since sample sizes varied across the 4 data sources (Table 2), CIs varied accordingly. Table 3 gives the 95% CIs for proportions of 10% and 90%, 25% and 75%, and 50% for each of the data sources.

## RESULTS

#### Random Digit Dial Interview

Of the 6000 telephone numbers in the sample, 5668 were required to complete 1232 interviews (Table 4). The target of 1200 was exceeded slightly because the number of

Table 3. 95% Confidence Intervals by Data Source\*

Proportion	Data source			
	Random digit dial interview	Quick Check for Diet Progress	Serum cholesterol measurement	Blood pressure measurement
10%, 90%	±6%	±8%	±1%	±4%
25%, 75%	±9%	±11%	±2%	±5%
50%	±10%	±13%	±2%	±6%

\*The following example shows how this table is used to determine the 95% confidence intervals around the estimated proportions reported in this article: Figure 1 reports that 68% of women aged 70 years or older met the tobacco-free lifestyle goal, information that was ascertained by random digit dial interview. The 95% confidence interval around this estimate is determined by selecting the cell that pertains to the random digit dial interview and the row with the percentage closest to 68% (the second row). Thus, the 95% confidence interval around the estimate of 68% is ±9%.

completed interviews in each age-sex group was tallied only at the end of each night of interviewing. Of those eligible to be interviewed, 808 refused to participate; 1333 individuals were screened out because the quota for their age-sex group had been met. The remainder were ineligible phone numbers or phone numbers for which there was no response, even after multiple attempts. All completed interviews were used in the analysis.

#### Quick Check for Diet Progress

Of the 1232 respondents, 1095 agreed to complete the Quick Check for Diet Progress, and 770 returned completed questionnaires. Of the 770 questionnaires, 732 were used for analysis; 38 were excluded because of sex or age responses that indicated a person different from the intended respondent had completed the questionnaire. Counts of respondents in each age-sex sampling group varied significantly ( $P=.03$ ) because of the voluntary completion of the questionnaire (Table 2). Between 59% and 72% of all women and men older than 49 years re-

sponded to the Quick Check questionnaire. However, as is typical of mailed survey responses among younger men, response rates decreased to 47% of men between the ages of 30 and 49 years and to 27% of those in the 20- to 29-year age group.

#### Tobacco-Free Lifestyle

The proportion of women simultaneously meeting both measures of the CardioVision 2020 lifestyle goal related to tobacco (zero exposure to tobacco smoke and no use of tobacco) increased from 30% in the 20- to 29-year age group to 68% in the group aged 70 years or older (Figure 1). Of the men in the 20- to 29-year age group, 23% met the CardioVision 2020 lifestyle goal related to tobacco. This proportion increased to 49% of men in the 50- to 59-year age group but declined to 35% in the 60- to 69-year age group and to 43% of those aged 70 years or older.

#### Nutrition

The proportion of both women and men meeting both the fruit and vegetable (5 servings a day) and the dietary fat goals ( $\leq 30\%$  of energy from fat,  $\leq 10\%$  of energy from saturated fat, and  $\leq 300$  mg of dietary cholesterol per day) tended to increase with age (Figure 2). However, in any age group, 2 to 3 times as many women as men met the goal.

#### Serum Cholesterol Measurement and Values

About two thirds of women younger than 40 years reported having a cholesterol measurement within 5 years. This proportion increased to 90% of women aged 50 to 69 years and then declined to 78% of women aged 70 years or older. For men, the proportion increased monotonically from 53% of those in the 20- to 29-year age group meeting the measurement guideline to 92% of those aged 60 years or older.

Table 4. Random Digit Dial Interview Sample Selection and Participation Rate

Random digit dial numbers used	5668
Not an Olmsted County, Minnesota, resident	11
Group home, nursing home, or dormitory	30
No person in household aged $\geq 20$ y	7
Disconnected number, cellular phone, modem, etc	826
Business number	574
Deaf, hard of hearing, language barrier	68
Screened out, quota for age-sex group filled	1333
Never reached, No. of attempts	
1-5	123
6-11	132
$\geq 12$	524
Refused to participate	808
Completed interview	1232

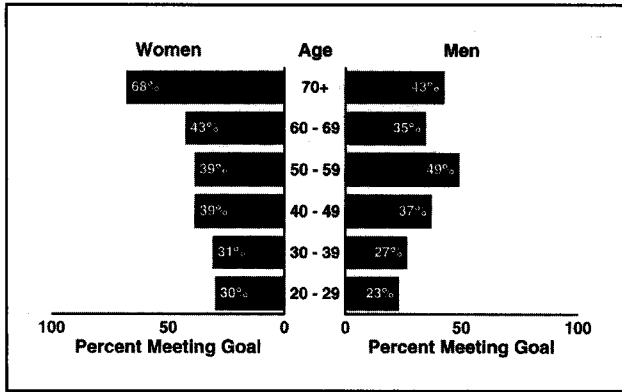


Figure 1. Proportion of Olmsted County, Minnesota, population who reported meeting the CardioVision 2020 tobacco goals, 1999: zero exposure to environmental tobacco smoke and no tobacco use in the prior year.

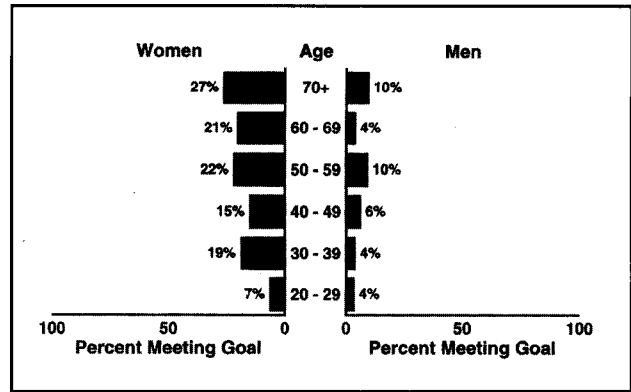


Figure 2. Proportion of Olmsted County, Minnesota, population who reported meeting the CardioVision 2020 dietary goals, 1999: eating 5 servings of fruits and vegetables daily with no more than 30% of energy from fat, 10% of energy from saturated fat, and 300 mg of cholesterol per day.

The proportion of women who had both a serum cholesterol measurement within 5 years and a value lower than 200 mg/dL declined from 47% of those in the 20- to 29-year age group to 26% of those aged 60 years or older (Figure 3). For men, the pattern was U-shaped. The proportion of men meeting both the measurement and the serum level goals declined from 40% of those in the 20- to 29-year age group to 30% in the 40- to 49-year age group and then increased to 54% of those aged 70 years or older.

**Blood Pressure Measurement and Control**

Almost all the women who responded to the interview reported that their blood pressure had been measured within the previous 2 years. For men younger than 60 years, the proportion meeting the blood pressure measurement goal was 5 to 10 percentage points lower than the

proportion of women in the same age group. Of men aged 60 to 69 years, 97% reported meeting the measurement goal, and all those aged 70 years or older met the goal.

The proportion of individuals who had their blood pressure measured and simultaneously met the systolic and diastolic blood pressure goals decreased monotonically from 71% of women in the 20- to 29-year age group to 21% of those aged 70 years or older (Figure 4). With the exception of those in the group aged 70 years or older, the pattern for men was similar: 50% of those in the 20- to 29-year age group met the goal, as did 24% of those in the 60- to 69-year age group. Of men aged 70 years or older, 30% had their blood pressure measured within 2 years and met the systolic blood pressure goal of less than 130 mm Hg and the diastolic blood pressure goal of less than 85 mm Hg.

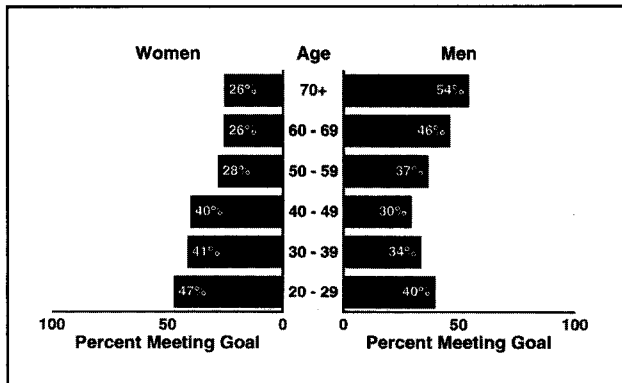


Figure 3. Proportion of the measured population of Olmsted County, Minnesota, meeting the CardioVision 2020 cholesterol goal, 1995-1997: serum cholesterol measured within 5 years and total serum cholesterol level lower than 200 mg/dL.

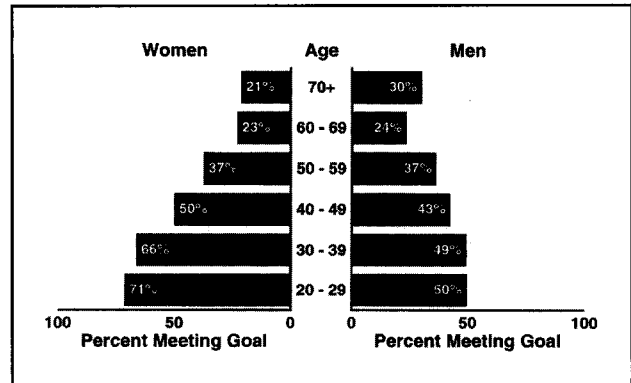


Figure 4. Proportion of Olmsted County, Minnesota, population meeting the CardioVision 2020 blood pressure goals, 1994-1999: blood pressure measured and systolic blood pressure lower than 130 mm Hg and diastolic blood pressure lower than 85 mm Hg.

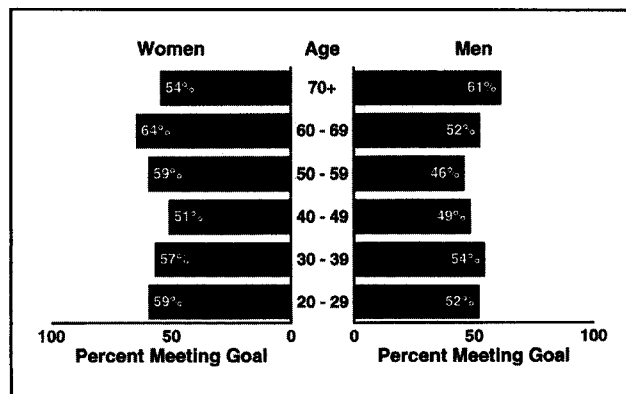


Figure 5. Proportion of Olmsted County, Minnesota, population who reported meeting the CardioVision 2020 physical activity goal, 1999: 30 minutes of physical activity performed on most, if not all days of the week.

### Physical Activity

For all age groups except those aged 70 years or older, the proportion of women in Olmsted County who reported daily physical activity to keep physically fit was higher than the proportion of men (Figure 5). For women, the lowest proportion was in the 40- to 49-year age group—51%. The lowest proportion among men was in the 50- to 59-year age group—46%.

Weighted to the Mayo Clinic 1995 Olmsted County population estimates, 62% of the population reported daily physical activity to maintain fitness. Walking was the predominant physical activity, and the subpopulation reporting daily physical activity said that, on average, they walked 1.9 miles 4.4 times per week and spent 42.4 minutes per session. In addition to walking, they reported participating in another type of physical activity 2 times per week. Less than 10% of the subpopulation that reported they were physically active on a daily basis said that they ran or jogged (8.6%), lifted weights (4.2%), or exercised on a bicycle ergometer (3.4%). All other types of physical activity were reported by less than 3% of the physically active subpopulation. A more detailed analysis will be presented in other publications.

### Proportions Meeting the Combination of 5 Goals

Except for women in the 30- to 39-year age group, less than 10% of the population met 4 or 5 goals. Conversely, about 90% of the population met at least 1 of the goals, and about 80% of the population met 1, 2, or 3 of the goals.

### DISCUSSION

The baseline data collected for the CardioVision 2020 Community Report Card indicate that almost every individual in Olmsted County would benefit if the entire popu-

lation met the CardioVision 2020 goals. While only about 10% of the population in any of the age-sex groups met none of the personal goals, almost none of the population met all the goals.

Although the data from Olmsted County indicate considerable opportunity for the community to reduce its burden of heart disease, the data are limited in several ways. The indicators based on self-report are subject to an undefined level of bias. Although the blood pressure values represent a random sample and the serum cholesterol data are based on all available measurements, these data are also biased to some extent because they are based on measurements of individuals who visited the Mayo Clinic during the observation period rather than random samples of the population. Additionally, we were unable to define the extent to which goal accomplishment clusters within individuals in the population because the interview data, blood pressure data, and serum cholesterol data are from 3 different samples of the population. This affects our estimates of the number of people meeting none, 1, 2, 3, 4, or all 5 of the CardioVision 2020 goals. Because the correlation coefficients among risk factors have been small in other populations,<sup>24</sup> we feel justified in assuming that they are not highly correlated in Olmsted County.

Long-term follow-up of cohorts in the United States has demonstrated that the 5% to 10% of individuals who have the most favorable risk factor profiles have coronary heart disease incidence rates that are 80% to 90% lower than those for the rest of the population.<sup>11</sup> Total mortality rates for these individuals are about half the population average, and life expectancy is almost a decade longer. Data from eastern Finland demonstrate that declines in disease rates coincide with population-wide changes in cardiovascular disease risk factor levels.<sup>25</sup> Population-wide changes are necessary because the bulk of cardiovascular disease arises from the mid-range of the risk distribution.<sup>12-15</sup> Population-wide approaches are necessary because the behaviors that cause cardiovascular disease are reinforced by socially defined behavior goals.<sup>26</sup>

Even though we sense that there is widespread agreement to prevent cardiovascular disease, we also recognize that disease prevention requires a lifelong commitment. This is the challenge we have assumed for ourselves and are presenting to Olmsted County through CardioVision 2020.

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# Proven Protection Against



Rose, age 72, recent MI

James, age 64, recent stroke

Marvin, age 71, established PAD

PLAVIX is contraindicated in patients with active pathologic bleeding such as peptic ulcer or intracranial hemorrhage. As with other antiplatelet agents, PLAVIX should be used with caution in patients who may be at risk of increased bleeding from trauma, surgery, or other drug therapy.

As part of the worldwide postmarketing experience with PLAVIX, suspected cases of thrombotic thrombocytopenic purpura (TTP) have been reported at a rate of about 4 cases per million patients exposed. See WARNINGS.

In CAPRIE, the most common clinically important side effects were pruritus, purpura, diarrhea, and rash; infrequent events included intracranial hemorrhage (0.4%) and severe neutropenia (0.04%).

\*The CAPRIE (Clopidogrel vs Aspirin in Patients at Risk of Ischemic Events) study was a prospective, randomized, double-blind, multicenter clinical trial comparing once-daily doses of PLAVIX 75 mg and aspirin 325 mg in 19,185 patients with atherosclerosis documented by recent MI, recent ischemic stroke, or established PAD.

Reference: 1. CAPRIE Steering Committee. A randomized, blinded, trial of clopidogrel versus aspirin in patients at risk of ischaemic events (CAPRIE). *Lancet*. 1996;348:1329-1339.

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