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Cardiovascular Disease Risk Factors Part I: Introduction

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Your Life Your Health

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Chronic diseases are the largest cause of death in the world, led by:

- Cardiovascular disease with 17 million deaths in 2002
- Cancer 7 million deaths
- Chronic lung diseases 4 million)
- Diabetes mellitus almost 1 million

Not only are cardiovascular disease and Type 2 diabetes leading causes of death and illness in developed countries, but these chronic diseases are becoming the dominating health problem worldwide.

With this article, we begin a multi-part series which will first deal with the general concept of cardiovascular risk and in subsequent weeks will deal with each particular cardiovascular disease risk. When we finish, appropriate decisions about the prevention and/or self-guided treatment of each of these disease risks should become obvious.

According to the American Heart Association and the American College of Cardiology, the major and independent risk factors for CHD are:

- cigarette smoking of any amount
- elevated blood pressure
- elevated serum total cholesterol
- elevated low-density lipoprotein cholesterol (LDL-C)
- low serum high-density lipoprotein cholesterol (HDL-C)
- diabetes mellitus
- advancing age
- obesity (AHA)
- sedentary life style (AHA)

The designation of these risk factors as “independent,” means that each one is a risk factor in and of itself. No other complication is necessary to augment any one of these factors in order to place a person at risk for heart disease. For instance, if all of conditions or circumstances named above are negative or normal in a particular person, but they smoke, they are at risk, as smoking is an independent risk factor requiring no other abnormality in order to increase one’s risk of heart disease.

Beyond these major, independent factors there are two other categories of factors which are

associated with increased risk for cardiovascular heart disease. The categories and the risk factors in each are:

Conditional risk factors

These factors are associated with an increased risk for CHD but their direct causative, independent, and quantitative contributions to CHD not been documented.

- Obesity
- Abdominal obesity
- Physical inactivity
- Family history of premature coronary heart disease
- Ethnic characteristics
- Psychosocial factors

You will notice that obesity and physical inactivity are listed as both major, independent risk factors and as conditional risk factors. This is because the American Heart Association identifies them as major, independent risk factors while the American College of Cardiology does not.

Predisposing risk factors

These are conditions which worsen the independent risk factors, but which are not in and of themselves presently identified as risk factors for cardiovascular heart disease. In the future and perhaps in the new future some of them will move to either the conditional or the major/independent categories of cardiovascular risk. The factors which are predisposing are:

- Elevated serum triglycerides
- Small LDL particles
- Elevated serum homocysteine
- Elevated serum lipoprotein(a)
- Prothrombotic factors (eg, fibrinogen)
- Inflammatory markers (eg, C-reactive protein)

Primary and Secondary Prevention

There are two approaches to prevention of cardiovascular disease. There is primary prevention and there is secondary prevention. It is secondary prevention which we must often associate with “treating” an illness as it addresses those who already have cardiovascular disease. Aggressive medical therapy substantially reduces the likelihood of recurrent major coronary syndromes in patients with established cardiovascular heart disease. Primary prevention addresses the steps which are taken to prevent the development of cardiovascular disease in those who do not have it.

Secondary prevention is relatively easy as far as the determination to treat and to treat aggressively. All patients with established cardiovascular disease and particularly those who have had a prior cardiovascular event – a heart attack, stroke, etc. – are at high risk and should

be treated aggressively.

The decision is not as obvious for primary prevention. For those individuals who are health conscious and who adopt life styles which promote healthy cardiovascular systems, their desires may make the decision easier. They may request aggressive treatment for an independent, major risk factor which is only marginally elevated where the data supporting such treatment from random, controlled studies is not clear.

However, for those individuals who are not self-motivated to promote their own health, the healthcare provider must initiate the discussion. It is here that the healthcare provider needs guidance in how aggressive to be in recommending life-style changes and even medications to modify risk factors. That guidance can be obtained from global estimates of cardiovascular risk.

Clinical Importance of Global Estimates for CHD Risk

In appraising “global estimates for cardiovascular risk,” it must never be forgotten that preventive efforts should target each major risk factor, as any major risk factor, if left untreated for many years, has the potential to produce cardiovascular disease.

Nonetheless, an assessment of total (global) risk based on the summation of all major risk factors can be clinically useful for 3 purposes

1. identification of high-risk patients who deserve immediate intervention
2. motivation of patients to adhere to risk-reduction therapies
3. modification of intensity of risk-reduction based on the total risk estimate

In reality, patients at high risk because of multiple risk factors may require intensive modification of more than one risk factor to maximize risk reduction. This is why healthcare providers must not only be prepared to address a patient’s blood pressure but also in the same visit to address their cholesterol, their diabetes, their weight, their smoking, their exercise and their insulin resistance. And, it is necessary to address these in the context of a patient visit which was scheduled because of an acute sinus infection, as the patient is unlikely to return for these potentially lethal but virtually symptom-less conditions.

Guidelines for the management of individual risk factors

There are many sources for excellent guidelines for the treatment of each of the cardiovascular risk factors identified above. While these guidelines can be complex, their use is facilitated by electronic medical records systems which can reduce these tools to useful forms which are easy to apply to all patients in any clinical setting. Some of the guidelines which should be in daily use are:

- The Second Adult Treatment Panel report (ATP II) of the National Cholesterol Education Program (NCEP)
- The seventh report of the Joint National Committee (JNC VI) of the National High Blood Pressure Education Program
- The standards of excellence in diabetic care published by the American Diabetes Association (ADA).

Framingham investigators have recommended a global risk assessment

The Framingham Study is a longitudinal – this means a study of the same people over a long period of time – multi-generational – this means a study of the children and even grandchildren of the original subjects of the Framingham Study. It is a study of the residents of Framingham, Massachusetts. It has looked at a number of cardiovascular risk factors over a period of time which now exceeds fifty years.

Out of the Framingham Study has come a Framingham Risk Score for short-term risk of the development of cardiovascular disease. "Short-term" means that the Framingham Risk Score only estimates the risk for ten years. However, further analysis suggests that the 20-year cardiovascular risk is approximately double the 10-year Framingham Risk. This means that while a 15% 10-year risk would place a patient in a moderate risk category and might suggest that aggressive risk modification is not warranted, the 20- year risk being twice that or 30% would justify aggressive risk factor modification.

The Framingham Risk Score is based on graded-risk factors which means that higher and lower values of individual risk factors are taken into account in assessing your total risk.

The use of categorical risk factors has the advantage of simplicity but may be lacking in some of the accuracy provided by graded risk factors. Some researchers and clinicians believe that the summation of graded risk factors provides advantages over the addition of categorical risk factors. Advocates of this approach contend that the increased accuracy provided by the grading of risk factors outweighs the increased complexity of the scoring procedures.

Primary versus Secondary Prevention

Framingham Scores estimate risk for persons without clinical cardiovascular disease. The scores apply only to primary prevention, i.e., to prevention in persons without established cardiovascular disease. Once CHD becomes clinically manifest, the risk for future coronary events is much higher than that for patients without CHD, regardless of other risk factors, and in this case, Framingham scoring no longer applies.

Interpretation of risk estimates for CHD requires a precise definition of CHD.

- Framingham estimates traditionally predict total CHD, which includes:
 1. angina pectoris,
 2. recognized and unrecognized myocardial infarction,
 3. coronary insufficiency (unstable angina), and
 4. CHD deaths.

Definition of Low Risk

The Framingham report defined low risk as the risk for CHD at any age that is conferred by a

combination of all the following parameters:

1. blood pressure <120/<80 mm Hg,
2. total cholesterol 160 to 199 mg/dL (or LDL-C 100 to 129 mg/dL), and
3. HDL-C 45 mg/dL for men in a nonsmoking person with no diabetes
4. 55 mg/dL for women in a nonsmoking person with no diabetes.

Therapeutic efforts to reestablish a very-low-risk state appear to be justified for secondary prevention. In primary prevention, however, a very low LDL-C level is not currently deemed necessary.

Framingham scoring does not adequately account for severe abnormalities of risk factors, e.g., severe hypertension, severe hypercholesterolemia, or heavy cigarette smoking. In such cases, Framingham scores can underestimate absolute risk. This underestimation is particularly evident when only 1 severe risk factor is present. Thus, heavy smoking or severe hypercholesterolemia can lead to premature CHD even when the summed score for absolute risk is not high. Likewise, the many dangers of prolonged, uncontrolled hypertension are well known. These dangers underscore the need to control severe risk factors regardless of absolute short-term risk estimates

Framingham and Aging

One of the more prominent features of the Framingham risk scoring is the progressive increase in absolute risk with advancing age. This increase undoubtedly reflects the cumulative nature of atherogenesis (hardening of the arteries). With advancing age, people typically accumulate increasing amounts of coronary atherosclerosis. Increased plaque burden itself becomes a risk factor for future coronary events.

Framingham scoring for age reflects this impact of plaque burden on risk. Average scores mask extent of variability in plaque burden in general population. To apply average risk scores for age to individual patients may lead to miscalculation of true risk, particularly because Framingham applies so much weight to age as a risk factor.

Miscalculation of risk could lead to inappropriate selection of patients for aggressive risk-reduction therapies. This points to need for flexibility in adapting guidelines to older persons. The tempering of treatment recommendations with clinical judgment becomes increasingly important with advancing age, particularly after the age of 65.

Conclusion

In coming weeks, we will look at each of the risk factors for cardiovascular disease and what you can do about them. Each time you see your healthcare provider, you should ask him/her to give you your Framingham Risk Score for short term and long term cardiovascular and stroke risk, and ask him/her to give you your risk relative to someone with low cardiovascular disease risk. At SETMA, we do this for you electronically.

Remember, it is your life and it is your health.