

## HEART NEWS FOR YOU

# The ABCs of Preventing Heart and Vascular Disease

## A is for antiplatelet therapy

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As the No. 1 killer of Americans, cardiovascular disease is our present-day pandemic – but it’s also preventable. It might not be quite as simple as A-B-C, but there is increasing evidence that an optimal lifestyle and appropriate medical therapy can prevent or halt cardiovascular disease.

But first, as Mary Poppins said, “Let’s start at the very beginning.”

What is cardiovascular disease, and when and how does it begin and progress? It is now clear that most cardiovascular disease is caused by “atherosclerosis,” a process that leads to blockage of the arteries. Blockage of the arteries in the heart causes heart attacks, while blockage of the arteries to the brain causes stroke. Blockage of the arteries to the legs causes peripheral arterial disease, and blockage of the arteries to the kidneys can cause kidney (renal) failure.

The word atherosclerosis is from “atheroma” (a deposit or accumulation of pulpy, lipid or fat-containing materials, especially in the arterial walls) and “sclerosis,” which means “thickening or hardening.” Why this process occurs only in the arteries is one focus of cardiovascular research.

Figure 1 depicts a blockage of an artery from atherosclerosis. In the top half of this illustration, there is a 50 percent blockage of this artery. This degree of blockage does not limit blood flow. In fact, one can have 50 percent blockage of all three major coronary arteries and run a marathon. Obviously, and unfortunately, such a person can also go to the doctor, have

a normal examination, a normal electrocardiogram, and a normal treadmill test and be told that they are “fine” only to have a heart attack within the next few weeks. What happened? This atherosclerotic blockage in the coronary artery breaks down (bottom half of illustration), exposing its contents to the blood flowing through the artery. The interaction of the contents of the atherosclerotic plaque and the blood may result in a blood clot that

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then partially or completely blocks the artery, causing “angina” (chest pain) or a heart attack. When this occurs, and the patient develops symptoms (see page 10), he or she should immediately go to the hospital, where physicians can treat the condition. If there is complete blockage of a coronary artery, there are two ways that doctors can try to open the artery: by giving the patient “clot buster” drugs, which work in half of patients, or by taking the patient to the heart catheterization laboratory, where they are able to open the blocked artery more than 90 percent of the time.

What causes the breakdown or disruption of the atherosclerotic plaque?

The cause of “plaque” breakdown or rupture is a focus of intense cardiovascular research. One factor is inflammation, as these so-called vulnerable plaques have more inflammatory cells than do stable plaques. A number of blood tests, such as high sensitivity C-reactive protein (hs-CRP) reflect inflammation, but this test does not tell us where the inflammation is. Other makers of inflammation are being investigated. (See Heart News for You, Issue 37, for more information on CRP.)

It is also clear that once these plaques are weakened, stress can cause them to rupture. But I will address stress in a future issue.

Once this so-called vulnerable plaque breaks down, its contents are exposed to the blood and clotting begins. The first step in the blood clotting process is activation of the platelets. This brings me to the first letter of the “ABCs”: A for antiplatelet therapy.

Platelets are small discs, much smaller than red blood cells, that when activated can initiate the development of a blood clot. If the damage to the artery is due to trauma, this is good, as it prevents us from bleeding to death. On the other hand, if the damage is inside of the artery, as occurs with a broken or ruptured atherosclerotic plaque, this protective mechanism can threaten our very existence!

There are a number of things that can make the platelets more active, including adrenalin, stress, vigorous exercise, smoking, etc. As noted above, the “active” or “activated” platelet may initiate the clotting process. Antiplatelet agents make the platelets more difficult to activate. The most

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widely used antiplatelet agent is aspirin.

The platelets are made in our bone marrow, and have a definite life span. Aspirin inactivates the platelets for their life span of approximately seven days and thus has to be taken on a regular basis, as new platelets are created all the time.

In 1988, the aspirin component of the Physicians' Health Study (a randomized, double-blind, placebo-controlled – the best kind of scientific study – trial) of 22,071 apparently healthy men was stopped early, due principally to an extreme reduction (44 percent) in the risk of a first myocardial infarction, or heart attack. In this study, an adult aspirin (325 mg) was given every other day.

A smaller study (5,139 men) published the same year, the British Doctors' Trial, showed no significant benefit of aspirin.

Since these two landmark studies, there have been three additional studies. An analysis of all five of these studies (Arch Intern Med 2003; 163: 2006), found that aspirin was associated with a statistically significant reduction (32 percent) in the risk of a first heart attack and a significant reduction (15 percent) in the risk of all important vascular events (heart attack, stroke, etc.). There is increased risk, although small, of gastrointestinal bleeding and hemorrhagic stroke (bleeding into the brain) with aspirin therapy, so aspirin should be recommended only to those who are known to be at a higher risk of cardiovascular disease.

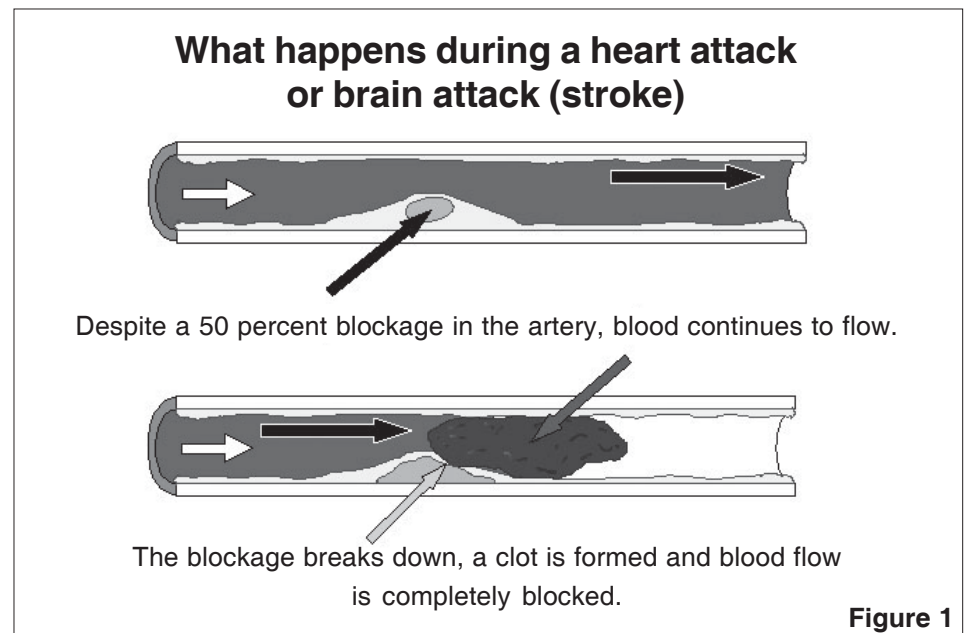
It is of interest that there is not enough data in women to routinely recommend aspirin therapy for primary prevention (e.g. prevention of a first cardiovascular event, such as a heart attack or bypass surgery). The

effect of low dose aspirin in women is presently being studied in the Women's Health Study.

In contrast, there is conclusive data that aspirin is effective in both men and women for secondary prevention (e.g. prevention of cardiovascular events in people who already have cardiovascular disease, and diabetes). Unfortunately, there also is con-

sults from the Physicians' Health Study showed a greater aspirin benefit in those with elevated hs-CRP. Those with very low hs-CRP had no benefit, as their risk was low.

Another problem is that many patients told to take aspirin are taking other, ineffective antiplatelet medications. It has been reported that 11 percent of patients told to take aspirin



clusive evidence that only half of the patients who should be taking aspirin (after a heart attack, bypass surgery, diabetes, angioplasty, stroke, etc.) are following this recommendation.

Is there a way to make sure that the benefit of aspirin outweighs the risk? One approach is to evaluate the patient's overall risk; if they have a greater than 10 percent chance of developing cardiovascular disease over the next 10 years, aspirin is recommended.

(Calculate your risk profile by going to the Sarver Heart Center website – [www.heart.arizona.edu](http://www.heart.arizona.edu) – and visiting the "Patient Information" area.)

Another approach is to measure the patient's hs-CRP to determine if chronic inflammation is present. Re-

are actually taking acetaminophen (Tylenol), which has no antiplatelet effect. An additional 10 percent are taking non-steroidal anti-inflammatory drugs (NSAIDs), such as Advil (ibuprofen) and Alleve (naproxen). These have an antiplatelet effect only as long as they are in the bloodstream, and ibuprofen blocks the antiplatelet effects of aspirin. Therefore aspirin (at least 81 mg) must be taken at least two hours before ibuprofen or naproxen to maintain aspirin's antiplatelet effect.

There is a new type of pain medication called "COX-2 inhibitors." These medications are used for arthritic-type pain and are said to cause fewer stomach ulcers or gastrointestinal

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## To Prevent Heart Disease and Stroke ... I Need to Know My Numbers

**My blood pressure** ideally should be 120/80 mm Hg or less. In general, my blood pressure is acceptable if it is less than 140/90 at the doctor's office and less than 130/90 at home. If I am diabetic or have renal disease, my blood pressure at my doctor's office needs to be 130/80 or lower.

**My tobacco use** should be zero.

**My LDL** (bad) cholesterol should be less than 100 mg/dL (and perhaps less than 80 ) if I have cardiovascular disease or am at high risk (coronary bypass, angioplasty, carotid disease, peripheral vascular disease, heart attack, strong family history, etc.).

**My fasting triglyceride** should be less than 150 mg/dL.

**My HDL** (good) cholesterol should be at least 40 mg/dL if I am male and at least 50 if I am female.

**My high sensitivity C-reactive protein** (if test is indicated) should be less than 1.0 mg/L or less than .1 mg/dL.

**My exercise** ideally should include walking 2 miles a day most days of the week.

**My body mass index** should be less than 25. (To calculate, go to [www.heart.arizona.edu](http://www.heart.arizona.edu))

**My fasting blood glucose** should be less than 100 mg/dL. Fasting glucose 100-125 = pre-diabetic. Fasting glucose of 126 or greater = diabetic.

**My hemoglobin A1c** should be 6.5 mg/dL or less. If 7.0 or greater = diabetic.

**My "Ejection Fraction"** (heart function) ideally should be over 55%. If less than 40%, I am at risk for heart failure.

This information is presented for educational purposes only.

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bleeding. COX-1 is expressed in platelets, the stomach lining and other tissues, and helps to protect the stomach lining. Inhibition of COX-1 inhibits platelet aggregation, but increases the chance of stomach irritation. COX-2 is produced at the site of inflammation and causes pain and inflammation. Aspirin, ibuprofen and naproxen block both, but COX-2 inhibitors such as Celebrex (celecoxib) and Vioxx (rofecoxib) block just COX-2. These COX-2 inhibitors lack the heart protective benefits of regular aspirin. For example, a recent study found that stopping aspirin and starting Vioxx appears to put one at a slightly higher risk of a heart attack.

More research is needed to determine platelet survival and overactive platelet function, so we can determine who needs aspirin and what dose.

The Physicians' Health Study used 325 mg of aspirin every other day. Current clinical guidelines from the American Heart Association and the American Diabetes Association recommend 81mg to 162 mg of aspirin a

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day for primary prevention of cardiovascular disease.

One cannot conclude a discussion on antiplatelet therapy without mentioning clopidogrel, or Plavix. This is a stronger antiplatelet drug given with aspirin for patients who have had stents placed in their coronary arteries. With the bare metal stents, this combination is continued for a month. However, a much longer duration of therapy is recommended in those with the new drug-eluting stents – nine months to a year.

Clopidogrel also is recommended with aspirin for other patients at high risk, such as those with peripheral vascular disease. The major drawback of clopidogrel or Plavix is the cost.

"A," the first letter of the ABCs for the prevention heart and vascular disease is for antiplatelet therapy. Subsequent issues of the *Sarver Heart Center Newsletter* will cover additional approaches to the primary or secondary prevention of atherosclerotic cardiovascular disease.♥

**Up next ... B for Blood Pressure.**

## Symptoms of Heart Attack

### men

Chest Pressure, Tightness, Burning, Expanding, and/or Pain

Radiation to Neck, Jaw and or Arms (Especially Left Arm)

Shortness of Breath

Severe Fatigue, Cold Sweats

Nausea and Near Faint

### women

Shortness of Breath

Weakness

Unusual Fatigue

Cold Sweats

Dizziness

Chest Tightness or Pain