Aspirin and Heart Health: a white paper on this groundbreaking discovery from Brigham and Women’s Hospital

Aspirin and the human body

Aspirin-like remedies have been used in the field of medicine for centuries. From its origins as a pain reliever derived from willow bark, aspirin was first synthesized in its modern form at the turn of the 20th century. In the time since, it has been found to have a number of medical uses. Lab studies were able to demonstrate aspirin’s effect on blood’s properties, finding that the drug aids in thinning blood and limiting the ability of platelets to clump together. Because of these properties, clinical researchers began to investigate the potential for aspirin to reduce the risk of dangerous cardiovascular events like heart attacks and strokes. By the late 1970s there was substantial evidence that aspirin was beneficial to high-risk individuals who had suffered previous heart attacks. This form of secondary prevention allowed physicians to prescribe the drug to populations that are known to be at high risk. At the time, however, there was no rigorous research on the potential for aspirin to reduce risk in the general population, a strategy known as primary prevention.

The Physicians’ Health Study

In 1980, researchers at Brigham and Women’s Hospital launched the Physicians’ Health Study to test whether aspirin had the potential to reduce the risk of a first heart attack or other cardiovascular events in the general population. The study was designed as a randomized controlled trial, meaning that the sample of about 22,000 participants were randomly assigned (like a flip of a coin) to either the low-dose aspirin group or the placebo group. All participants were American male physicians between

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the ages of 40 and 84 who were recruited through the American Medical Association. The study also was groundbreaking in its use of mailed study pills (in calendar packs) and other mailed materials in a large randomized controlled trial.

Researchers collected blood samples from participants early in the study (also by mail, using overnight cool packs) and confirmed reported health outcomes by medical record review. Comparison of the aspirin and placebo groups showed a statistically significant 44 percent reduction in the risk of having a first myocardial infarction (heart attack) and an 18 percent reduction in the risk of total cardiovascular events in the aspirin group. The collected data did not indicate a significant effect on the risk of a stroke.

These groundbreaking discoveries marked the first time that aspirin had been proven to reduce the risk of first heart attack or cardiovascular event, indicating the drug’s potential in primary prevention. Use of low-dose daily aspirin is not without risk, though, as daily use can increase the risk of gastrointestinal bleeding and hemorrhagic stroke due to the blood-thinning capabilities. For this reason, it was determined that patients should always engage in personalized decision making with their physician before beginning regular aspirin use. The Physicians’ Health Study confirmed that for some individuals who were not yet at high risk, low-dose aspirin could still reduce the risk of a cardiovascular event.

The Women’s Health Study

In 1993, researchers at Brigham and Women’s Hospital began the Women’s Health Study. The Women’s Health Study had a design similar to the Physicians’ Health Study, this time focusing on about 39,000 female health professionals ages 45 and older. The Women’s Health Study was the first randomized controlled trial to examine the effect of low-dose aspirin on the risk of cardiovascular events among healthy women.

Follow-up data collection indicated that there was a significant reduction in the risk of stroke with aspirin, but that the effect on the risk of heart attack was significantly different between women aged 65 and older and those women below the age of 65. Women 65 and older saw reduced risk of heart attack with aspirin, while there was little evidence to indicate heart benefits for women under 65. The Women’s Health Study took the next step in clarifying the benefits and risks of aspirin for healthy women. Based on the results of the study and the side effects of taking the drug, it was determined that few women under 65 should be treated with aspirin for cardiovascular disease prevention, unless they had particularly high baseline risk. For women over 65, in contrast, the Women’s Health Study found a reduction in risk of both stroke and heart attack. Therefore the same personalized decision making process with a healthcare provider is recommended for women deciding whether or not to start taking low-dose aspirin.
Other Research

The Nurses’ Health Study is an ongoing observational study conducted by Brigham and Women’s Hospital and Harvard Medical School. The study collects information by questionnaire from female nursing professionals, who report on their lifestyle practices and risk factors – unlike the randomized controlled trial structure of the Physicians’ and Women’s health studies. One analysis indicated that prolonged use of aspirin may play a role in reducing the risk of colorectal cancer. This finding demonstrates the complexity of the drug and the diversity of organs and tissues it can affect. Long-term follow-up in the Women’s Health Study and other randomized trials are consistent in finding a connection between aspirin and reduced risk of colorectal cancer. There is some evidence from studies in Boston and elsewhere in the United States and around the world that aspirin may have a role in reducing the risk of breast cancer or preventing recurrence or death from breast cancer in women with a history of the disease. Also, research from the Women’s Health Study randomized trial of aspirin suggested a possible role of aspirin in lowering risk of age-related macular degeneration, a major cause of blindness. There has been a suggestion from a few studies that individuals who take aspirin may have a slower decline in cognitive function and less memory loss. Studies at Brigham and Women’s Hospital continue to investigate the potential benefits and risks of aspirin in healthy populations.

Research in Action

While previous research indicated a benefit for high-risk individuals using the model of secondary prevention, the studies conducted at Brigham and Women’s were the first to prove aspirin’s role in primary prevention of heart disease and stroke. Since then there has been a body of evidence supporting a role of aspirin in reducing the risk of first heart attack, stroke and major cardiovascular events.

Individuals who feel that they may benefit from the long-term use of low-dose aspirin are encouraged to speak to their physician. While the results of research at Brigham and Women’s Hospital have indicated significant benefits, a personalized decision making process will allow a medical professional to fully evaluate the benefits and risks for each individual.

Additional online information:
• Brigham and Women’s Hospital – brighamandwomens.org
• Physicians’ Health Study – phs.bwh.harvard.edu
• Women’s Health Study – whs.bwh.harvard.edu
• Nurses’ Health Study – www.channing.harvard.edu/nhs