Blood Thinners Lower Stroke Risk for Some

People whose upper heart chambers beat irregularly, putting them at high risk of stroke, might sharply reduce that risk with a daily aspirin or an anticlotting drug called warfarin, according to preliminary research results. The study's two co-leaders estimate that aspirin or warfarin treatment could prevent up to 30,000 strokes annually in U.S. patients with the abnormality, known as atrial fibrillation.

Those early findings, which the coauthors and others call "very dramatic," prompted an independent panel of scientists appointed by the National Institute of Neurological Disorders and Stroke (NINDS) to recommend halting one part of the study last November so that researchers could provide aspirin or warfarin to most participants with atrial fibrillation. With colleagues from 15 U.S. medical institutions, study co-leaders Robert G. Hart and David G. Sherman, both at the University of Texas Health Science Center in San Antonio, report the preliminary results in the March 22 NEW ENGLAND JOURNAL OF MEDICINE.

This common cardiac abnormality afflicts about 1 million people in the United States, raising their stroke risk to five times that of people with a normal heart rhythm. In atrial fibrillation, the upper heart chambers quiver rather than beat regularly. This allows pooled blood to form clots, which can get pumped into the bloodstream. If a clot blocks an artery to the brain, a disabling stroke can result.

"There are about 70,000 strokes [in the United States] each year related to atrial fibrillation, and if we can prevent half of them, that's more than 100 strokes [prevented] per day," says Hart. NINDS Director Murray Goldstein calls the study a "significant accomplishment."

The findings include data on 1,244 people enrolled in 15 medical centers nationwide who showed sporadic or constant atrial fibrillation. Most had not suffered a stroke prior to enrolling in the study. The researchers assigned people eligible to receive warfarin – a strong blood-thinning agent that can cause severe internal bleeding – to Group 1, in which participants received an average daily dose of 4.8 milligrams warfarin or 325 mg aspirin or a placebo pill. People at high risk of internal bleeding, such as ulcer patients, were assigned to Group 2, receiving aspirin or a placebo daily.

The team discovered that Group 1 participants taking aspirin or warfarin had a per-year stroke rate of 1.6 percent during the first year of the study – 81 percent lower than that of Group 1's placebo subjects, whose stroke rate was 8.3 percent. Continued study may help determine whether one drug has significant advantages over the other.

In Group 1 and 2 participants taking aspirin, the team found a stroke rate of 3.2 percent per year – 49 percent lower than the 6.3 percent stroke rate of placebo patients in the two groups. However, aspirin provided no benefit to participants over the age of 75 – another finding that needs more study, Hart says.

This is the first study suggesting aspirin prevents stroke among people with atrial fibrillation, says Hermes A. Kontos, a cardiologist at the Virginia Commonwealth University Medical College in Richmond. He points to a report in the Jan. 28, 1989 LANCET by Danish researchers who found that warfarin provided stroke protection to people with atrial fibrillation but aspirin did not. Kontos says he is not yet convinced by the U.S. researchers' preliminary analysis of aspirin's efficacy, and he still recommends warfarin to patients who can take it.

Hart and Sherman maintain the new data argue strongly for aspirin's stroke-prevention power. They advise people with atrial fibrillation to consult with a physician before considering treatment with either drug. While noting that both drugs have side effects, the authors suggest that physicians view aspirin as a less dangerous alternative for some atrial fibrillation patients who can't take warfarin. – *K.A. Fackelmann*

Bouncing cold hydrogen atoms to a focus

When a slow-moving hydrogen atom splashes down on a liquid-helium surface, it usually bounces away in much the same way as a light beam reflects from a mirror. Physicists have now used that effect to focus a beam of hydrogen atoms by letting the atoms reflect from a concave, hemispherical mirror coated with liquid helium. The achievement opens up the possibility of manipulating atomic hydrogen beams in the same way as researchers manipulate light beams today.

"We believe the present work clearly demonstrates that the hydrogen atom could play a prominent role in particle optics experiments," says J.T.M. Walraven of the University of Amsterdam in the Netherlands. He described the research at last week's American Physical Society meeting in Anaheim, Calif.

According to classical theory, incoming hydrogen atoms cooled to temperatures of much less than 1 kelvin should stick to a liquid-helium surface. Quantum theory, however, allows several other possibilities. If the liquid helium is cold enough, the incoming atoms may bounce away as if the liquid's surface were a perfect mirror. Alternatively, if the surface happens to be rough – perhaps because of tiny ripples induced by the approaching particles – the atoms may scatter in widely varying directions.

To focus hydrogen atoms, Walraven and his colleagues use a quartz mirror ground and polished to optical precision, then coated with a liquid-helium film about 125 angstroms thick. The hydrogen atoms, cooled to less than 600 millikelvins and stored in a special reservoir, fan out from an orifice 0.5 millimeter in diameter.

To determine how perfectly the liquid-helium mirror reflects hydrogen atoms, the researchers measure how long it takes for the reservoir to lose its hydrogen atoms. When the mirror's center coincides with the center of the orifice, all the escaping hydrogen atoms should reflect back into the reservoir, meaning the reservoir would never empty.

Walraven's group finds that when the orifice sits far from the mirror's center, the reservoir's decay time is only slightly longer than that expected in the absence of a mirror. Moving the mirror to bring the orifice into focus increases the decay times dramatically.

The results show that under optimal focusing conditions, at least 80 percent of the atoms are reflected perfectly. The researchers attribute much of the reflectivity loss to uncertainties in the mirror's position.

However, a small proportion of that loss may arise from scattering caused by a slight surface roughness. Because of an attractive force between incoming hydrogen atoms and the liquid helium, an approaching atom tends to pull on the surface, sometimes generating one or more quantized ripples. These "ripplons" could deflect a certain number of atoms, causing them to go off in unpredictable directions.

"This experiment demonstrates that it's possible to make high-reflectivity mirrors for cold hydrogen atoms, especially if we go to lower temperatures," Walraven says. Such precise control of atomic hydrogen beams could help scientists investigate a variety of quantum-mechanical effects. – *I. Peterson*