Biomedicine

Kathy Fackelmann reports from Anaheim, Calif., at the American Heart Association's 64th scientific sessions

Heart risk: The long and short of it

Doctors trying to size up a person's risk of heart attack may soon look to height. A new study suggests that shorter men run a higher risk of heart attack than taller ones; last year, researchers reported a similar trend in women.

"Height is definitely associated with risk of heart attack," says epidemiologist Patricia Hebert of Harvard Medical School in Boston. She and her colleagues culled data from the Physicians' Health Study, an investigation begun in 1982 that has involved more than 22,000 male physicians between the ages of 40 and 84. Upon entering the study, each volunteer answered questions about his height and cardiac risk factors. During a five-year follow-up period, the researchers recorded 378 first heart attacks among the recruits. After controlling for smoking, high cholesterol levels and other factors known to increase the heart attack threat, the team discovered that the shortest men in the study (5 foot 7 or shorter) had more heart attacks than the tallest men (6 foot 1 or taller). Indeed, the risk of a first heart attack was 60 percent greater among the shortest men than among the tallest.

Hebert says she doesn't know why short stature seems to correlate with heightened heart risk, but she speculates that short people may have smaller blood vessels, which might increase the chance that a blood clot will lodge in the coronary arteries leading to the heart. Such a clot can precipitate a heart attack if it blocks a vessel already narrowed by plaque.

Hebert cautions, however, that short stature probably represents a relatively minor risk factor for heart attack. She advises short and tall people alike to concentrate on eating a low-fat diet, avoiding smoking, getting lots of exercise and making other heart-healthy lifestyle changes.

Prime-time clot-busting

Although most heart attacks strike in the morning, a new study indicates that a clot-busting drug works best in the afternoon. This finding, if confirmed, suggests that the body's circadian rhythm may affect the efficacy of drugs.

Cardiologist Peter Kurnik of the Robert Wood Johnson Medical School branch in Camden, N.J., studied 692 men and women who received tissue plasminogen activator (TPA) within six hours of suffering a heart attack. TPA and other thrombolytic drugs work by dissolving the jelly-like blood clot that blocks a coronary artery. Kurnik discovered that people who received TPA between noon and midnight had a better chance of their clot dissolving than did people who got the drug in the morning.

Kurnik notes that TPA-inhibiting substances that occur naturally in the blood reach a zenith in the morning, and that blood components called platelets are stickier in the morning, making it harder for TPA to do its job. "I strongly suspect that you need a higher dose of TPA in the morning," he says.

At the same time, Kurnik says people who get chest pains in the morning can't afford to wait until their biological clock signals an optimal time for TPA injection.

"No matter what time of day you have a heart attack, it's best to get treatment early, preferably within two hours," Kurnik says.

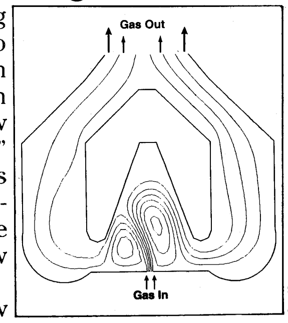
While early treatment remains a crucial message, many female heart attack victims may not receive clot-busting drugs at all, according to the results of a separate study. Charles Maynard and his colleagues at the University of Washington in Seattle studied 1,659 women and 3,232 men treated for heart attacks at 19 Seattle-area hospitals. While 26 percent of the men received clot-busting drugs, such as TPA, only 14 percent of the women got this lifesaving therapy. Those findings raise the possibility of some bias against using the drugs to treat women suffering from heart attacks, Maynard says.

Technology

Janet Raloff reports from Chicago at the Council for the Advancement of Science Writing's annual research briefing

Oscillating eddies help meter gas

The frequency with which a flag flaps in any given breeze relates to the weight of its fabric. So "if you can tell me how rapidly a flag waves, I can give you a very good estimate of how much the flag weighs or how big it is," says Hassan Nagib of the Illinois Institute of Technology (IIT) in Chicago. Researchers at the school have tapped this principle to design a new residential gas meter.



Williams

New meter's gas flow.

Unlike current gas meters, the new IIT model contains no moving parts. Indeed, only the metered gas moves. As it enters the meter, the gas slams into a closed, triangular chamber. Finding no exit, the gas stream splits in two and doubles back, creating two counter-rotating vortices. As these whirling eddies push against one another, each alternately grows and shrinks in a pattern of pulsing oscillations.

"Why these oscillations occur was part of Hussein Mansy's Ph.D. thesis," explains David R. Williams. Mansy worked with Williams in the new meter's initial design. A tiny microphone listens for the oscillations — the gas equivalent of a flapping flag — and a microprocessor maintains a running tally of each pulse, which corresponds to a unit of methane consumed.

While the new digital devices should simplify installation and long-distance meter reading, size is the main advantage. "The gas industry is sensitive to the fact that its meters are ugly," Williams says. "So we tried to make ours small enough to hide between the studs in an apartment wall." One unit now undergoing tests measures just 50 cubic inches, 1/15th the volume of standard gas meters, notes Carl Griffis of the Chicago-based Gas Research Institute (GRI), which is helping finance development of the new meter. GRI has funded Alnor Instrument Co. in Skokie, Ill., to produce a few more units by year's end for testing to establish the meter's reliability.

'Scuba gear' for biotech bugs

Biotechnologists have genetically engineered many bacteria to behave as little chemical factories. Under the direction of their foreign genes, these microbes inexpensively produce commercially important proteins — from hormones to enzymes. However, genetically engineered aerobic bacteria tend to consume a lot more oxygen than non-engineered bacteria, studies have shown. And as those microbial factories deplete their oxygen supplies, their production of proteins slows dramatically, notes IIT biologist Benjamin C. Stark.

His team believes it has found a solution in hemoglobin, the same protein that carries oxygen in human red blood cells.

Five years ago, IIT's Dale A. Webster shared in the discovery of a bacterium with hemoglobin (SN: 8/23/86, p.120). Though this *Vitreoscilla* needs oxygen to survive, the bacterium often resides in low-oxygen environments, such as cow dung. The microbe survives by using hemoglobin "sort of like scuba gear for bacteria" — to help it breathe, Stark says. He and his colleagues are now working to imbue genetically engineered bacteria with the same oxygen-support system.

They have spliced the *Vitreoscilla* hemoglobin gene into another bacterial strain that has been genetically engineered to produce alpha-amylase, an enzyme used in the commercial production of high-fructose corn syrup. In recent tests, Stark says, those bugs engineered to make hemoglobin grew better and produced more alpha amylase than the same engineered bacteria lacking hemoglobin: "Under the best circumstances, you get more than a 200 percent increase in the alpha amylase produced."