

### Heart worries? Skip that fourth coffee

High coffee consumption in countries where coronary artery disease is rampant – such as the United States – led several researchers in the early 1960s to suspect a connection between the two. However, subsequent investigations of that link have proven equivocal (SN: 4/16/88, p.252). Now a major study points a more certain finger at coffee – but only heavy consumption – as an independent risk factor in heart attacks.

Kaiser Permanente (KP) periodically administers comprehensive health exams, which include a detailed questionnaire, to subscribers of its prepaid medical program. Arthur L. Klatsky and his colleagues at KP's Oakland, Calif., medical center followed 101,774 individuals from the time they received a "multiphasic" exam (between 1978 and 1986) until December 1986, their hospitalization for heart disease or their decision to leave the program – whichever came first. Among 1,914 people hospitalized for heart disease, the 740 who had heart attacks "were more likely to have been daily coffee drinkers," they report in the September *AMERICAN JOURNAL OF EPIDEMIOLOGY*.

However, they note, heart attack risk increased only in persons who habitually drank four or more cups daily of regular or decaffeinated coffee. Among heavy coffee drinkers, women showed a 63 percent increase in heart attack risk – twice that seen in men; blacks experienced roughly twice the increase (73 percent) of whites; and smokers incurred a risk roughly one-third higher (66 percent) than nonsmokers. Because the researchers found no similar link between high tea consumption and heart disease, they believe some factor other than caffeine lies behind coffee's risk.

Klatsky's team recommends that persons at high risk of heart attacks limit their coffee consumption, but they see no harm in "the solace of a cup or two" each day.

### Nicotine-gum users: Watch what you drink

Many people attempting to break tobacco's addictive hold chew medically prescribed nicotine-laced gum. It can reduce tobacco withdrawal, a desire to smoke, and such side effects as weight gain – but only when sufficient nicotine is absorbed. As a result, patients usually receive instructions on how and when to chew the gum. But when some people who followed these rules still obtained little benefit from the chewing therapy, researchers at the University of Kentucky in Lexington and the National Institute on Drug Abuse's Addiction Research Center in Baltimore decided to investigate the effects of diet. In the Sept. 25 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION*, they report that these individuals may have "received the equivalent of placebo therapy" if they consumed acidic foods or beverages prior to chewing the gum.

Eight male, long-term smokers volunteered for a series of three-hour test sessions. Prior to each session, the men abstained from nicotine and caffeine for 12 hours. At the start of each test, the subjects rinsed their mouth with coffee, cola or distilled water. Then they chewed gum containing 4 milligrams of nicotine at a prescribed pace for 15 minutes. Blood pressure, heart rate, skin temperature and subjective responses – such as tingling sensations – were assayed before, during and 20 minutes after each chewing cycle. The researchers sampled blood and saliva from the men at frequent intervals.

In contrast to the distilled water rinse, the coffee and cola mouth rinses "virtually eliminated" absorption of the chewing gum's nicotine, the team reports. That makes sense, they point out, since coffee and carbonated drinks are both very acidic, and oral nicotine absorption depends on limiting saliva's acidity. The researchers conclude that many smokers may inadvertently thwart gum therapy – especially in the morning, when the craving for cigarettes is strong and the tendency to consume fruit, juice, coffee or tea is high.

### NASA identifies what hobbled Hubble

Two errors – one human, one mechanical – worked in tandem to cripple the Hubble Space Telescope's primary mirror, a NASA-appointed investigative team announced last month. But in contrast to the human goof – upside-down insertion of a precision measuring tool into an optical system that guided mirror grinding – the flawed construction of that measuring tool alone would have likely resulted in a defective primary mirror, says Roger Angel, a panel member and a telescope-mirror designer at the University of Arizona in Tucson.

Hubble's mirror makers used laser light and the precision measuring tool – called a metering rod – to determine how far apart to space two components of the grinding guide, a device known as the reflective null corrector (SN: 7/21/90, p.39). Measuring distances this way should have provided far greater precision than using a micrometer. However, the technique required passing a laser beam through a tiny hole in a non-reflecting sleeve capping one end of the precision metering rod, so that the beam would bounce off the rod and not its sleeve. And in cutting the millimeter-sized hole in that sleeve, technicians accidentally chipped the cap's nonreflecting coat. This caused the laser beam to erroneously bounce off both the sleeve and the rod. The extra signal returning from the sleeve confused scientists, and inadvertently led them to improperly position the null corrector's components.

Human error appears to have confounded the spacing error, the panel notes. Accidentally inverting the metering rod before capping it – so that the sleeve loosely covered the opposite, more poorly machined end – caused scientists to place the test lens and small mirror in the null corrector 1.3 millimeters farther apart than intended, Angel says. Those errors, the panel says, led to the spherical aberration that today renders Hubble's primary mirror virtually useless – without corrective lenses – for resolving faint, distant objects in the universe.

As the NASA panel prepares its final report, due next month, it will examine how the measuring error escaped detection. Several clues that were dismissed or ignored hinted something might be awry, Angel told *SCIENCE NEWS*. Examples he cited include a test of the reflective null corrector that spotted what appeared to be errors in its assembly, and measurements taken with a second type of null corrector indicating that the primary mirror was indeed misshapen.

### HACing out a dusty light source

Studying the spectra of a tough compound that coats some electrodes and the fuel pellets used in fusion experiments has helped solve a long-standing astronomical mystery – the emission of red light from interstellar dust clouds.

The curious interstellar emissions appear to arise from a solid form of a diamond-like compound known as hydrogenated amorphous carbon (HAC), report David A. Williams of the University of Manchester in England and his colleagues at York University in Ontario. Their laboratory experiments show that HAC absorbs short-wavelength light and reradiates it at red and infrared wavelengths closely matching the spectra emitted by interstellar dust.

The researchers point out that differing properties of the two known forms of HAC may explain observed variations in absorption and emission properties of interstellar dust clouds. Polymeric HAC, for example, contains an abundance of hydrogen and strongly absorbs ultraviolet. Graphitic HAC contains less hydrogen and absorbs visible light. Such telltale differences in the spectra of each HAC may allow scientists to calculate the hydrogen in a given region of interstellar dust, the investigators say. They will detail their work in upcoming publications of the Royal Astronomical Society.