Many strokes could be prevented, physicians agree, if people stopped smoking and took steps to control high blood pressure. However, nearly 5 percent of Americans over age 65 suffer from AF—a fast, erratic beat in the upper left chamber of the heart that causes blood to pool in the chamber and clot. People with AF run an increased risk of stroke from these clots.

Physicians have refrained from widespread use of warfarin to prevent stroke, Matchar says, because the drug can cause severe bleeding. Since there's no way to tell which patients will suffer strokes, many doctors questioned whether warfarin's ability to prevent stroke outweighed the risks of taking it. Moreover, each person requires an individual dosage schedule and monthly monitoring.

Matchar and his colleagues on the federal stroke prevention study examined records from eight centers across the country and found that "for every one person who suffers a serious bleeding complication, warfarin prevents 20 strokes and deaths," says Matchar.

The finding was so dramatic that the federal agency took the unusual step of announcing its results early. The warfarin work represents only one aspect of the overall study, which is designed to test a variety of methods for preventing strokes of all kinds.

Clifton R. Gaus, an administrator at the agency, says that caring for stroke victims costs an estimated $30 billion a year. Giving AF patients anticoagulants would reduce health care costs by some $600 million a year, he notes.

Roger L. Weir of Howard University College of Medicine in Washington, D.C., who represents the American Heart Association, points out that warfarin requires careful monitoring to prevent serious bleeding complications. Matchar agrees but notes that nurse practitioners, physician assistants, and nurses could provide appropriate monitoring under a physician's supervision.

— L. Seachrist

Steps up the ladder to superconductivity

Ladder compounds—chains of atoms connected by atomic rungs—have a simplicity and symmetry that make them useful structures for studying how the spins of atoms in a material interact to produce an electric conductor or even a superconductor.

More often than not, however, such handy arrangements of atoms are just hypothetical structures created by theorists to clarify their ideas and make predictions. Now, researchers have synthesized a particular ladder structure made of copper, oxygen, and lanthanum atoms—key components of high-temperature superconductors—to check their theories.

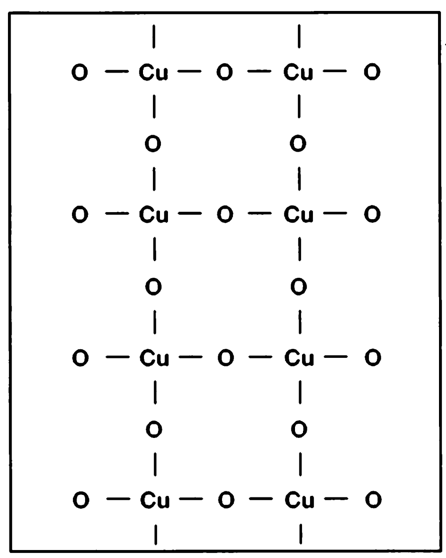
Z. Hiroi and M. Takano of the Institute for Chemical Research at Kyoto University in Japan describe their findings in the Sept. 7 NATURE.

The researchers produced a material consisting of two-leg ladders made of oxygen and copper atoms (see diagram). Lanthanum atoms occupy sites between adjacent ladders.

This lanthanum copper oxide compound is an electric insulator. Replacing some of the lanthanum atoms with strontium atoms modifies the spin interactions between copper atoms to turn the material into an electric conductor. But contrary to predictions by some theorists, the researchers observed no transition to superconductivity.

"In addition to the intrinsic interest in ladder compounds, there is also the more general hope that studies of such systems can provide new insights into the nature of the mechanism responsible for [superconductivity in high-temperature superconductors]," comments Douglas J. Scalapino of the University of California, Santa Barbara, in the same issue of NATURE.

— I. Peterson



Adapted from NATURE

Atomic ladder compound.

Carbon wires grow from tiny graphite tubes

Short chains of carbon sticking out from the ends of tiny tubes of graphite may one day form the ultimate in miniature electronic components—atom-sized sensors and probes. Scientists have found that when they send an electric charge across the graphite tubes, a more concentrated stream of electrons moves away from the carbon tails than from the tubes alone.

The graphite tubes—called carbon nanotubes because of their nanometer-scale dimensions (SN: 4/3/93, p.214)—actually consist of 10 to 20 concentric tubes nested inside one another. Because they conduct electricity well, the nanotubes sparked the interest of researchers who wanted to grow them into long wires.

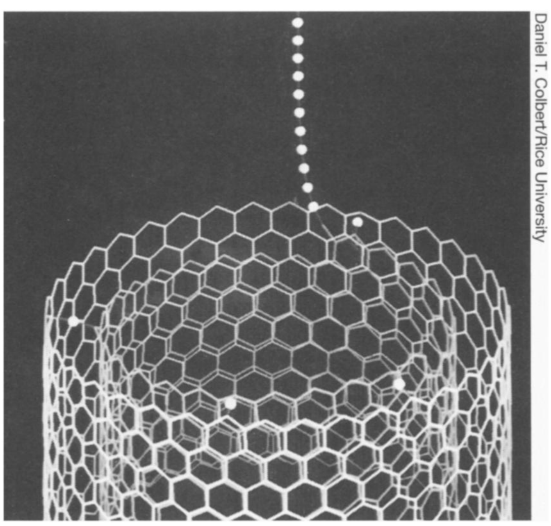
In the Sept. 15 SCIENCE, Richard E. Smalley of Rice University in Houston and his colleagues describe the carbon chains pulling away from the nanotubes "in a process that resembles unraveling the sleeve of a sweater." Heating the closed, dome-shaped ends of the nanotubes with a laser caused them to open and made the edges jagged and sharp. As the tubes cooled back to room temperature, carbon chains came away from the ends like loose threads pulled taut by the electric field.

Although the researchers cannot observe the chains directly, they believe the chains can be only 10 to 100 atoms long, says coauthor Andrew G. Rinzler of Rice. After unraveling a bit, each chain essentially hits a snag—a carbon atom that bridges adjacent layers of the nanotube. As a chain unravels from one layer, it eventually hits one of these "spot welds" and stops.

Rice's group found that the intensity of the electric current coming off the carbon chains on a nanotube was a million times greater than that from a nanotube alone. They now plan to measure the energy of the emitted electrons. Because the tips of the chains are so sharp—only one atom wide—Rice thinks the electron energies should also peak sharply. This could open the way to "laser beams of electrons," Rinzler says.

Though that application is far in the future, just being able to handle and manipulate the nanotubes "represents a step forward," says Hongjie Dai of Harvard University.

— C. Wu



Daniel T. Colbert/Rice University

Computer model shows two layers of a carbon nanotube with a linear carbon chain extending out from the inner layer. Carbon atom spot welds connect one layer to the other.