More jobs linked to asbestos hazards

Since the turn of the century, U.S. companies have installed an estimated 30 million tons of asbestos, primarily as fireproof insulation. A number of studies now indicate that workplace exposure to this "asbestos-in-place" represents a far more pervasive hazard than previously recognized. At a meeting in New York City last week, researchers described evidence of asbestos-related lung changes and disease in such diverse occupations as firefighting, refinery work, custodial service and cafeteria work. Several scientists also argued for expanding the definition of asbestos-related disease.

The new findings reaffirm the need to identify asbestos in schools and occupational settings, says Henry A. Anderson, chief of environmental and chronic diseases at the Wisconsin State Division of Health in Madison. Perhaps more importantly, he says, these studies underscore the need to teach workers "to treat whatever's there with a great deal of respect." Anderson was one of about 60 scientists presenting data on asbestos disease at the conference, which was sponsored by Collegium Ramazzini, an international organization of environmental scientists based in Bentivoglio, Italy.

"We've never considered firefighters an asbestos-exposed trade," says Stephen M. Levin of the Occupational Health Clinical Center at Mount Sinai Medical Center in New York City. Yet he reports that a surprising rate of abnormal scarring – "consistent with prior asbestos exposure" – showed up in chest X-rays of 226 veteran firefighters, most of whom had at least a quarter-century's worth of experience in combing through the wreckage of New York's charred buildings. Among those with no known occupational exposure to asbestos prior to firefighting, 14 percent showed scarring of the lung or its lining. And among the 60 who had previously worked in settings known to contain asbestos, 35 percent showed a similar scarring. This is a "relatively surprising rate," Levin told SCIENCE NEWS. Researchers would expect to see such scarring in less than 2 percent of the general population, he says.

Asbestosis, a well-recognized respiratory disease from asbestos exposure, is generally defined as a scarring of lung tissue that can eventually cause serious shortness of breath. In contrast, pleural plaques – scars in the membrane covering the lung and chest wall – have traditionally been viewed only as a marker of asbestos exposure, not as evidence of "disease," notes Kenneth D. Rosenman, a specialist in occupational medicine at the Michigan State University Clinical Center in East Lansing.

But several physicians have now gathered data linking pleural plaques – without X-ray evidence of lung-tissue scarring – to measurable decreases in the ability to move normal amounts of air into and out of the lung. For example, L. Christine Oliver and her co-workers at the Harvard Medical School in Boston found a strong link between pleural plaques and reduced lung function in 121 school custodians. Of the 57 men who had no known exposure to asbestos outside the schools, 12 showed pleural plaques and 10 showed at least a 20 percent reduction in lung function. Oliver reports even higher rates of pleural plaques and breathing restrictions among the 64 custodians with prior exposure.

Rosenman says he has identified "significant" lung-function decreases among "many" of the 995 workers studied at an oil and petrochemical refinery. Because a number of these individuals – primarily electricians, painters, carpenters and other maintenance workers – showed pleural scarring without evidence of lung-tissue scarring, Rosenman now believes X-ray evidence of pleural scarring alone may signal the onset of asbestosis.

The most likely explanation for the seeming lack of lung scarring is that X-rays simply don't register incipient lung scarring well, suggests David A. Schwartz of the University of Iowa in Iowa City, who studied lung impairments in 24 people with asbestos-induced pleural plaques. His findings indicate that high-resolution CAT scans or examination of materials rinsed out of the lung's bronchioles can provide an earlier indication of lung scarring, or asbestosis, than can X-rays or breathing tests.

Asbestos-related cancers also appeared at higher-than-expected rates in workers not ordinarily considered at high risk. For instance, epidemiologist Thomas F. Mancuso of the University of Pittsburgh found that one out of every 12 machinists hired between 1920 and 1929 by a railroad company he studied eventually developed mesothelioma. This rare cancer of the lining of the lung has been linked almost exclusively to asbestos exposure.

"That's a fantastically high rate," Mancuso says, noting that the spontaneous incidence is only about one in every 10,000 people. He attributes the apparent epidemic among the railroad machinists to working around the massive quantities of asbestos – about 6,000 pounds – typically used in those days to to insulate each locomotive steam engine.

– J. Raloff

Galactic magnetism on a gigantic scale

Astronomers have long known that an entire cluster of galaxies may sometimes lie buried within a vast, dense ball of gas whose temperature exceeds 10 million kelvins. Two teams of radio astronomers have now uncovered evidence that this hot gas also appears associated with a significant magnetic field.

Although such a magnetic field appears much weaker than the Earth's, it extends over an area several million light-years across. And because cluster magnetic fields pack a lot of energy, they may play an important role in cluster evolution as galaxies merge and hot gas gradually collapses toward the cluster's center.

Richard A. Perley and Gregory B. Taylor of the National Radio Astronomy Observatory (NRAO) in Socorro, N.M., studied a bright radio source known as Hydra A. The radio waves come from an apparent massive black hole at the center of a large elliptical galaxy about 1 billion light-years from Earth. This galaxy in turn lies at the center of about 40 smaller galaxies spread across a region some 8 million light-years in diameter.

"What makes Hydra A exceptionally interesting to us is what happens to the radio emission between the time it is emitted and the time we receive it at the [Very Large Array radiotelescope]," Taylor says.

A black hole produces tightly focused beams of highly energetic electrons moving at relativistic speeds. These accelerated particles generate polarized radio waves with electromagnetic fields that tend to vibrate in a certain direction. Because an ambient magnetic field would shift the polarization direction, researchers can detect the field's presence and infer its strength by measuring how much the polarization direction changes as the radio waves pass through the hot, ionized gas.

Radio emissions from Hydra A reveal that if the magnetic field is distributed throughout the cluster, it has a strength of 10 microgauss. Earth's surface magnetic field is roughly 30,000 times stronger.

Jing-Ping Ge and Frazer N. Owen, also at NRAO, combined radio-wave, optical and X-ray observations of A1795, a radio source in a different galaxy cluster, to deduce that this particular cluster has a magnetic field of 40 microgauss. The large cluster, about 800 million light-years from Earth, contains several hundred galaxies held together by gravity.

The origin of the cluster magnetic fields, each about 100 times stronger than expected, remains unclear.

Both groups reported their findings this week at the American Astronomical Society meeting in Albuquerque, N.M.

– I. Peterson