CO levels high in Americans' blood

Air pollution is sometimes visible, sometimes odorous and often irritating, but its effects on health usually go undetected. A major study now indicates that air pollution—to an unanticipated degree—is leaving its mark on human blood.

Blood samples from 29,000 blood donors in U.S. cities, suburbs and rural areas reveal "astoundingly" high levels of a hemoglobin-carbon monoxide complex called carboxyhemoglobin (COHb), seven authors report in the Aug. 26 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. This complex interferes with the normal oxygen-carrying capacity of the red blood cell, and even low levels can exacerbate the symptoms of persons with heart disease. Active, healthy adults usually show no ill effects.

Forty-five percent of the nonsmokers tested had COHb contents of 1.5 percent or more, matching the maximum level recommended by the quality standards of the Clean Air Act of 1971. Most smokers averaged about 5 percent COHb content, a level so high that in some cases they should not be allowed to donate blood, the researchers state.

Physician Richard D. Stewart and six colleagues from the Medical College of Wisconsin at Milwaukee conducted the four-year study. Two of the researchers gathered blood and breath samples and demographic data at blood bank collection sites in dozens of U.S. locations, including all of the major metropolitan areas. The samples were analyzed for COHb content in Milwaukee and the demographic variables were assessed.

Donors in three cities, Los Angeles, Chicago and Denver, emerged with the gloomiest statistics. Seventy-five percent of the nonsmokers in these metropolitan areas had COHb levels over the permissible 1.5 percent. All three cities have high automobile densities, a major contributing factor, the report states. More than half of the residents tested in Anchorage, New Orleans, San Francisco and Seattle exceeded the standards.

While the team anticipated that none of the major metropolitan areas surveyed could meet Government standards for CO concentration in the air, they found it "surprising" that smaller towns in New Hampshire and Vermont also exceed the air standards. Nonsmoking residents in these towns, however, usually fell on the safe side of the COHb standards.

Analysis showed that many factors influence COHb levels, including tobacco smoking, geographical location, occupation and meteorological conditions. (Other factors such as race, sex, age, height and weight do not.) It appears that, as a rule, the more one smokes while living in a heavily polluted city, the higher the COHb content in the blood. For example, nonsmokers in Chicago averaged 2.0 percent COHb; one-pack-per-day smokers averaged 6.3 percent and two-pack smokers 7.7 percent. A two-pack smoker in Milwaukee would average much less—4.7 percent COHb.

A major study reveals that blood poison levels are 'astoundingly high'—and implicates the failure of CO pollution-control efforts.

Analyzing by occupation, the group concludes that vehicle-related occupations such as driving a cab or working at an airport, or industrial jobs in the metal, glass, chemical, stone, printing, welding, electronics or graphic arts industries incur the highest risks for CO exposure and thus higher COHb levels. Students and housewives have the lowest occupationally related exposures.

Stewart says the study's analytical methods may also be a useful way for small cities to monitor pollution control efforts. Small cities often lack air testing equipment, but he says CO levels could be assessed by analyzing the COHb contents of residents' blood and working backward with standard mathematical equations to approximate the CO contents in the air.

In the face of such convincing proof that Americans are exposed to excessive amounts of poisonous carbon monoxide and carry the chemical evidence in their blood, SCIENCE NEWS asked Government scientists what steps would be taken. Nicholas Rummo, a carbon monoxide researcher at the National Institute of Environmental Health Sciences (NIEHS), praised the report as a valuable piece of information in assessing the overall pollution problem. But the Government is not rushing to change air quality standards as a result, he says. The Stewart study, although an indication of "total population burden" of COHb, can't be used as a technique for measuring air pollution and should not be taken as an imperative for standard changes, Rummo says.

"First of all, the study only measured one type of pollutant, CO, and the standards regulate them all. Second, the methods used were not the most accurate available for assessing COHb levels. And third, knowing what a person's COHb level is doesn't tell where the person got the bulk of the CO." For example, a nonsmoker may work in an office with several smokers, or may live in a house with a defective space heater or drive a car with a defective muffler. In all of these cases, his COHb levels could be high, and the implication that the bulk of his exposure was due to ambient air would be wrong. The Stewart study did not determine exact exposure sites for the individuals tested.

"Stewart's data gives information on the total CO burden to a large number of persons, and it is apparently higher than expected for whatever the reasons," Rummo says. "CO exposure should be looked at in total, but in our opinion, it is not justified from this study to change air quality standards at this time."

Bernard J. Steigerwald, NIEHS deputy administrator for air quality, underscores this statement, saying the problem is not with current air quality standards but with the implementation of those standards. The EPA has been given until 1977 to reduce CO in ambient air to 9 parts per million, much lower than now found in most major cities. The agency is "proceeding as fast as is technically and socially possible to reduce the CO levels within the time limit without shutting down whole cities with gas rationing or truck delivery bans or massive tollway charges.

"If anything," Steigerwald says, "this new report will help us beat down the arguments of the auto industry and others who feel the standards are too stringent. This may give us the tools we need not to backslide any further on air quality." □