Biggest benzene risks hide close to home

The Environmental Protection Agency announced sweeping regulations this summer to reduce nonoccupational exposures to benzene (SN: 9/9/89, p.165). But those regulations don't address the most important sources of public exposure to this known carcinogen, a new EPA study indicates. Nor do carcinogen-curbing provisions in the recently introduced Clean Air Act legislation (SN: 6/17/89, p.375). According to the latest analysis, the greatest benzene risks for most people come from smoking, passive smoking, auto exhaust and emissions from consumer products such as household solvents and latex paints.

The finding that industrial emissions are not the primary source of benzene risk to the general population "is extremely new, extremely surprising and countered all our preconceived notions about benzene's risk," says Wayne Ott, an EPA engineer who helped oversee the TEAM (Total Exposure Assessment Monitoring) project that collected the baseline data used in the study.

"Most people really did believe – without evidence – that people living near oil refineries and petrochemical installations had higher exposures to toxic organics like benzene," says chemist Joan M. Daisey, who heads the indoor-air program at Lawrence Berkeley (Calif.) Laboratory. Since all of the air that ends up indoors comes from outdoors, she says air-pollution analysts reasoned that household air in highly industrialized communities should, nationally, have the highest organic-chemical contamination. But TEAM data show that most of the volatile organic compounds measured in indoor air come from unregulated indoor sources.

In the just-released July Environmental Health Perspectives, EPA's Lance A. Wallace calculates that these nonindustrial and predominantly indoor sources cause roughly 99 percent of the 960 benzene-induced leukemias estimated to occur in the United States each year. In contrast, he says workplace benzene exposures cause only about 10 leukemias a year. And other EPA estimates indicate that industrial benzene emissions cause only 4 leukemias per year. About 25,000 U.S. adults will develop leukemia in 1989, according to the American Cancer Society.

While "there are certainly more potent carcinogens" than benzene, the new data show those sources are "not nearly as pervasive or found at quite the same concentrations" in environments to which the general public is exposed, says Steven D. Colome, an Irvine, Calif.-based environmental health consultant. As a result, "benzene very quickly emerges as probably the single most important chemical carcinogen to the general population."

Wallace derived his risk estimates from data collected by personal monitors worn for 24 hours by roughly 700 residents of Elizabeth-Bayonne, N.J.; Los Angeles; Antioch-Pittsburg, Calif.; Greensboro, N.C.; Devils Lake, N.D.; and Baltimore. Similar monitors installed in participants' backyards measured benzene outdoors. TEAM researchers measured benzene levels in tapwater from each subject's home. And at the end of the 24-hour monitoring period, each subject provided a diary of the day's activities and a deeply exhaled breath sample. Holding the breath in the lungs for about 20 seconds before exhaling allows "a nice [gas exchange] between your blood and the lung," Ott explains. "Your breath then contains most of the gases that are in your blood."

Taken together, these measurements showed that personal exposures to benzene generally do not correlate well with outdoor levels but instead relate to such everyday activities as filling up the car with gasoline, living in a home with an attached garage, or working with a smoker. For most smokers, cigarettes vastly overwhelmed other sources. On average, a smoker could expect to inhale about 600 micrograms of benzene daily – 36 times as much as a nonsmoker unintentionally inhaling cigarette smoke.

Wallace says his data suggest that "more than half of the entire nationwide exposure to benzene results from smoking tobacco or being exposed to tobacco smoke" and that these two sources contribute 500 and 50 leukemias, respectively, each year. Remaining exposures are split nearly evenly between outdoor sources and other personal activities, including riding in cars or using products (such as solvents) that emit benzene. According to Wallace, "The main outdoor source is likely to be automobile exhaust, based on the lack of evidence for increased exposure in areas near petroleum refining and petrochemical operations." He estimates benzene in auto exhaust may cause roughly 150 leukemias annually in the United States.

"Our traditional approach to air-pollution control was to limit outdoor sources," says Paul J. Lioy of the Environmental and Occupational Health Sciences Institute, which is run by Rutgers University and the University of Medicine and Dentistry of New Jersey in Piscataway. But he says the new data show that unless regulators consider total exposures, they may spend fortunes to "clean up the outdoor air, only to find they have not reduced toxic risks from compounds, like benzene, that come from indoor sources."

Daisey agrees, but points out that the degree to which personal choices and lifestyle influence benzene exposures also "makes it difficult [for regulators] to judge what makes any of these sources an unacceptable risk." For benzene especially, she says, it now appears that "people facing the greatest risks are generally not only the ones controlling that risk but also the ones getting some perceived benefit" from the polluting activity.

– J. Raloff

Schizophrenia drug gains FDA approval

The Food and Drug Administration last week approved a drug for treating severe schizophrenics who fail to respond to standard antipsychotic medications. The action followed detailed review of a study in which nearly one-third of formerly untreatable schizophrenics given the drug clozapine at hospitals throughout the United States improved markedly (SN: 5/23/87, p.324).

"The severity and hopelessness of chronic schizophrenia was an important factor in the decision to approve clozapine," says FDA Commissioner Frank E. Young.

Because about 1 percent of those given clozapine develop agranulocytosis – a potentially fatal drop in infection-fighting white blood cells – the FDA says physicians can prescribe the drug only for patients who have not responded to at least two standard antipsychotic drugs. Clozapine can also cause seizures, but it rarely produces the severe movement disorders associated with standard antipsychotic drugs (SN: 7/20/85, p.45). About 200,000 people in the United States are candidates for clozapine treatment, according to the FDA.

Clozapine, like other antipsychotic drugs, does not cure schizophrenia. Among patients who improved in the study, however, it reduced hallucinations, delusions, disordered thinking, social withdrawal and apathy. Those individuals can now leave the hospitals to enter community rehabilitation programs.

Schizophrenics who receive clozapine must participate in a special testing program. A home health care company will deliver the medication to patients each week and collect blood samples for analysis by a national laboratory. If early signs of agranulocytosis show up, the laboratory will notify the patient's physician immediately.

The medication will be sold under the trade name Clozaril by Sandoz Pharmaceutical Corp. of East Hanover, N.J.

– B. Bower