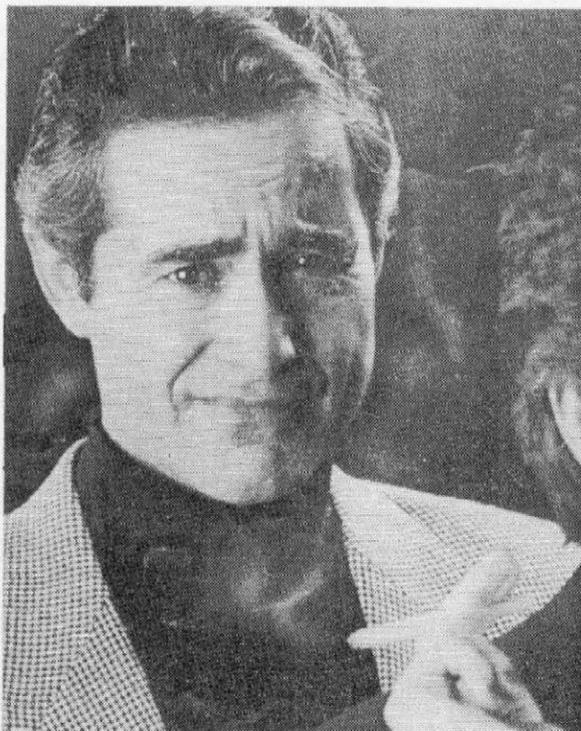


# SECONDHAND SMOKE

## IS IT A HAZARD?



In the 1950's and 60's, as scientists piled up a mountain of evidence on the life-threatening health consequences of smoking, the tobacco industry mounted a fierce and sophisticated campaign to keep doubt alive in the public mind.

The effort ultimately flopped; even scientists funded by tobacco-industry money today concede that smoking is bad for you. But it did succeed in putting off that day of reckoning when everyone acknowledged the hazard. That delay bought many years of robust sales.

The industry is at it again, only this time the target is secondhand smoke. A review of the record shows that tobacco companies are doing exactly what they did with "firsthand" smoke: They're using a little bit of scientific uncertainty and a lot of public relations to suggest there is still a serious debate about the health hazards of breathing smoke from other people's cigarettes.

At one time, such a controversy was real. When we reported on the subject 10 years ago, we described the evidence as "sparse and often conflicting." That's no longer true. A number of studies make a consistent case that secondhand smoke, like firsthand smoke, causes lung cancer. Many reputable groups that have inspected the evidence have reached this conclusion, including the U.S. Surgeon General's office, the National Research Council, the National Institute of Occupational Safety and

Health, the International Agency for Research on Cancer, and the U.S. Occupational Safety and Health Administration (OSHA).

Other studies have found strong links between passive smoking and a host of other ills, such as asthma and bronchitis in children. Furthermore, evidence is accumulating that secondhand smoke contributes to the development of heart disease.

Early in 1993, the U.S. Environmental Protection Agency, after a painstaking and wide-ranging scientific review, declared secondhand smoke a known—not just "probable," or "possible"—human carcinogen. The EPA estimated that such smoke is responsible for several thousand cases of lung cancer in U.S. nonsmokers each year. Passive smoke joins a select company of only about a dozen other environmental pollutants in this risk category.

For the \$48-billion U.S. tobacco

industry, the EPA decision has been the worst setback since 1964, when the Surgeon General first declared that smoking causes cancer.

The EPA decision added momentum to widespread efforts to limit or ban smoking in public or at work. It gave employers a reason to fear workers' compensation claims based on exposure to workplace smoke. Businesses and organizations ranging from Taco Bell to the U.S. military have already banned or restricted smoking in their facilities. Seventy percent of the nation's shopping malls are now smoke-free.

Several states, including California, Maryland, Utah, Vermont, and Washington, have proposed or enacted strict controls on workplace smoking. As this report went to press, OSHA was considering nationwide rules that would, in effect, ban smoking on the job except in specially ventilated areas. Pending in the courts are at least two lawsuits brought against tobacco companies by relatives of nonsmokers who died of lung cancer after long exposure to secondhand smoke at work.

All those developments have helped to turn smoking from a public activity to a practice increasingly indulged in private. What's more, they have helped persuade many smokers to cut back or quit. The smoking rate has dropped significantly, from one in three adults in 1980 to one in four today, cutting deeply into the tobacco industry's domestic market.

The tobacco merchants claim there's still a controversy. We don't buy it.

# Choice



AMERICA'S 45 MILLION SMOKERS.  
IS IT A MOANER OR A WHINER?  
IS IT GETTING TO THE GOVERNMENT?  
NOW THE EPA REGULATED SCIENCE TO SERVE A POLITICAL CAUSE.

"THE SMELL OF CIGARETTE SMOKE ANNOYS ME. NOT NEARLY AS MUCH AS THE GOVERNMENT TELLING ME WHAT TO DO."

Going public with ads from tobacco companies have tried to recast the secondhand smoke issue in terms of rights and courtesy, while casting doubt on scientific evidence. These and similar ads have appeared in many newspapers and magazines during the past year.

The industry is fighting back. It has sued in Federal court in an effort to overturn the EPA's decision. It has spent millions to block or roll back state and local public-smoking restrictions. Its public-relations firms are creating bogus "grassroots" organizations as fronts for lobbying against smoking restrictions. (See "Public-Interest Pretenders," CONSUMER REPORTS, May 1994.)

In its most visible effort, a months-long national advertising campaign, the industry has attempted to spread doubt about the science behind the EPA decision and to recast the issue of secondhand smoke as one of individual rights versus an overzealous government agency.

### The evidence?

For years, researchers have accumulated information about the effects of the compounds in secondhand smoke. Cigarette smoke and tars condensed from it induce cancer in laboratory animals. The smoke causes genetic mutations in bacteria, another common test for carcinogenic potential. And several of its components are known or probable human carcinogens.

If scientists had only this animal and laboratory evidence to go on, secondhand smoke would still qualify as a "probable" or "possible" human carcinogen. But in addition, tobacco smoke is among a handful of substances—*asbestos, vinyl chloride, and radon* are

others—for which abundant human evidence exists. That evidence comes from epidemiology, the study of disease patterns in human populations. It's the scientific field responsible for identifying all the known human carcinogens.

There are 33 published epidemiological studies of secondhand smoke, 13 of which were conducted in the U.S. Most used standard epidemiological technique: They looked at nonsmoking women who developed lung cancer, to see whether they were more likely to be married to smokers than were women who didn't get the disease. (Other re-

searchers studied cancer rates in people exposed to smoke at work or from other family members; a few also studied husbands of women smokers.)

In all such studies, it is difficult to accurately measure every variable. Most of the smoking occurred decades ago, and the details can't be learned. Some women whose husbands didn't smoke might still have breathed smoke at work or with friends. And some wives of smokers might have been able to avoid their spouses' smoke. But both of those factors would tend to hide any true relationship between exposure and disease. So, if anything, the studies should underestimate the risk of secondhand smoke.

Nevertheless, 26 of the 33 studies indicated a link between secondhand smoke and lung cancer. Those studies estimated that people breathing secondhand smoke were 8 to 150 percent more likely to get lung cancer sometime later. Of the remaining seven studies, one found no connection with lung-cancer rates. Six suggested that people exposed to secondhand smoke had *lower* rates of lung cancer, although no one suggests passive smoking really reduces the risk.

Seven of the 26 positive studies included enough subjects, and found a sufficient effect, to attain "statistical significance"—meaning there was no more than a 5 percent probability that the results in those studies occurred by chance. In contrast, just one of the negative studies reached statistical significance.

### Strength in numbers

The nonsignificant studies can still be valuable when combined with all the rest for analysis. This technique, called meta-analysis, is commonly used with carefully designed clinical trials of drugs. But its use in epidemiology is controversial, since no two studies have identical designs and the analysts must make certain assumptions as they combine data. So, the result of a meta-analysis is supporting evidence but is not definitive by itself.

Six different meta-analyses have been carried out on the secondhand-smoke studies. Every one of them yielded a statistically significant increase in lung-cancer risk of approximately 20 to 40 percent. The EPA's study is the most recent of these meta-analyses. It found an increased risk of 19 percent among U.S.

nonsmokers married to smokers.

More evidence for a link between cancer and secondhand smoke comes from 19 of the studies, which grouped subjects into exposure categories. In every one of those, women exposed to the most smoke for the most years had higher cancer risks than women exposed to less smoke. That dose-response relationship—an increase in risk with an increase in exposure—is an important indication of a true cause-effect relationship.

Evidence for a dose-response relationship got important support from the most recent secondhand-smoke study, published last summer by epidemiologist Elizabeth Fontham of Louisiana State University Medical Center. The largest such study ever done, it's also considered by experts in the field to be the best in design and execution. Fontham found increased risks of lung cancer with increasing exposure to secondhand smoke, whether it took place at home, at work, or in a social setting. A spouse's smoking alone produced an overall 30 percent increase in lung-cancer risk. Women with the greatest lifetime exposure—from smoking by parents, husbands, friends, and coworkers—had a 225 percent increase in risk. (That's much less than the hazard posed by active smoking, which confers a 1100 to 2400 percent increase in lung-cancer risk.)

For any given nonsmoker, the lifetime risk of getting lung cancer remains small—4 to 5 in 1000 ordinarily, 6 to 7 in 1000 if he or she has a smoking spouse. But exposure to secondhand smoke is so commonplace that, according to the EPA's calculations, it produces an extra 3000 lung-cancer deaths among adults in the U.S. each year.

That makes secondhand smoke the third-ranking known cause of lung cancer, after active smoking and indoor radon.

### Lung problems

Despite all the attention given to lung cancer, it may not be the most significant health effect of secondhand smoke. Two others stand out as well—respiratory disorders in children and heart disease in adults.

The ill effects of smoke on children begin even before birth, since many of the components of smoke reach the developing fetus through the mother. Infants born to smoking mothers weigh less and have weaker lungs than unexposed newborns. Regardless of birth weight, babies

born to smoking mothers are more likely to die in infancy than unexposed infants.

Whether from these prenatal effects or from secondhand exposure to smoke after birth, children reared around smoking parents have about twice as many respiratory infections—bronchitis and croup, for example—as the children of nonsmokers. After reviewing a number of studies, the EPA's risk analysis concluded that secondhand smoke causes an extra 150,000 to 300,000 respiratory infections a year among the nation's 5.5 million children under the age of 18 months.

Asthma, the other major childhood respiratory ailment, also turns out to be about twice as common in children exposed to high levels of secondhand smoke. Wheezing from asthma and cough from bronchial irritation occur more frequently among children of smokers. And among children with asthma, living with smoking parents markedly worsens the disease. The EPA blames secondhand smoke for causing between 8000 and 26,000 new cases of childhood asthma a year, and for aggravating the condition in about 200,000 children. "Children just should not be around people smoking," says Ross Brownson, professor of epidemiology at the St. Louis University School of Public Health.

### Heart disease

The epidemiological evidence on secondhand smoke and heart disease is not as abundant as that on lung cancer, and the experts are still debating the implications. But about a dozen studies exist, and they consistently show an elevated risk. Among nonsmokers who are exposed to their spouses' smoke, the chance of death from heart disease increases by about 30 percent. (The effects of active smoking on the heart were established some years ago. Smoking about doubles a person's chance of dying from a cardiovascular condition.)

Although the heart-disease evidence isn't as strong as that for lung cancer, a number of authorities have already declared secondhand smoke a risk factor for heart disease. They include the states of California and Maryland, OSHA, the American Heart Association, and the American

College of Cardiology. They point not only to the epidemiological evidence, but to animal studies, which have shown that exposure to specific elements of secondhand smoke causes blood to clot more easily and damages arterial linings—two critical steps in the development of heart disease. In addition, human studies show that the carbon monoxide in secondhand smoke decreases the supply of oxygen reaching the heart muscle, which could cause serious problems for someone with coronary heart disease.



If exposure to secondhand smoke does increase the risk of heart disease by 30 percent, then it is causing an estimated 35,000 to 40,000 heart-disease deaths a year in the U.S.—about 10 times the number of lung-cancer deaths attributed to secondhand smoke. That would make the annual toll from secondhand smoke comparable to that from motor-vehicle accidents.

### The industry's campaign

The tobacco industry foresaw the health debate over secondhand smoke—and the problems it would cause for cigarette makers. In 1978, a Roper poll commissioned by the Tobacco Institute, the industry's trade group, called growing public concern about secondhand smoke "the most dangerous development yet to the viability of the tobacco industry" and recommended "developing and widely publicizing clear-cut, credible medical evidence that passive smoking is not harmful."

In 1986, Imperial Tobacco Ltd., Canada's largest cigarette company, commissioned a secret study on how to combat the growing success of antismoking activists. The study documents, made public in the course of a lawsuit, lay out in prescient detail the industry's current strategy on secondhand smoke:

"Passive smoking [should be] used as the focal point . . . Of all the health issues surrounding smoking . . . the one which the tobacco industry has the most chance of winning [is] that the evidence proclaimed by the anti-group is flawed. . . . It is highly desirable to control the focus of the debate." The document goes on to urge "an attack on the credibility of evidence presented to date." The ideal advocate would be a medical

professional, the report said, but "the challenge will be to find a sympathetic doctor who can be demonstrated to take a largely independent stance."

The recommended message on secondhand smoke: "Now that you have seen that all which has been said is not true, let's be adult and get down to the real business, a respect for each other's choices and space."

Whether or not U.S. tobacco companies ever saw the Canadian report, their current public-relations campaign is following its advice.

### Influencing science

In its efforts to construct the sort of "credible medical evidence" its pollsters recommended, the tobacco industry has commissioned research from sympathetic scientists, sponsored scientific meetings carefully tailored to bring out their point of view, and published the results in the medical literature.

The research support comes through various channels: direct grants from companies or industry-funded research institutes—such as the Council for Tobacco Research and the Center for Indoor Air Research—and consulting contracts from tobacco companies, public-relations firms, and law firms. To get favorable research on the record, the industry has borrowed a technique from the pharmaceutical industry: sponsoring scientific symposia and seeing to it that their findings end up on medical library shelves.

Lisa Bero, a health policy analyst at the University of California, San Francisco, has documented the results of such symposia. She identified four symposia on passive smoking held between 1974 and 1990 that were paid for by the tobacco industry. She then compared the articles generated by the symposia with a random sample of articles on secondhand smoke that appeared in other scientific journals over the same period.

Only 4 percent of the articles from the industry-funded symposia said that passive smoking was unhealthy, compared with 65 percent of the other journal articles. Fully 72 percent of symposia reports argued that secondhand smoke wasn't harmful, compared with 20 percent of independent journal articles. (The balance of the articles were neutral.)

The symposium reports did not undergo the standard scientific process of peer review, meaning they were not scrutinized by other ex-

**Campaign tactics**  
New York City arts groups that receive millions in grants from Philip Morris were asked by company executives to remind city lawmakers, who were considering a tough new anti-smoking bill, how important the grants were to the city's cultural scene.

**More clues  
Autopsies of  
nonsmoking wives  
of smokers in  
Greece found more  
pre-cancerous  
cells in their lungs  
than in wives of  
nonsmokers.**

perts in the field. Instead, they were published as non-peer-reviewed supplements to journals, or as freestanding books or monographs. Nevertheless, they can be found in the computerized databases of the medical literature. That makes them available for citation by others.

This careful construction of a citable scientific record came in handy when the tobacco industry set out to attack early drafts of the EPA's report on secondhand smoke. Bero found that two-thirds of comments critical of the report came from industry scientists, who drew heavily on industry-generated literature. The Tobacco Institute's own submission, for instance, cited 32 papers from symposia, but only seven peer-reviewed articles.

As the industry has learned, however, research support doesn't guarantee that a scientist will go along with the company line. At least five members of an independent scientific advisory board that reviewed the EPA report had ties to industry research groups, either as advisers or grant recipients, including a scientist awarded a \$1.2-million grant from Philip Morris during the review period. Yet the board unanimously agreed that passive smoking was a cancer risk.

### Public persuasion

In a public-relations campaign, scientific articles don't mean much if only scientists read them. The industry is bringing its perspective to a much wider audience, with the help of a few journalists. This became clear when we studied industry-generated material on secondhand smoke and looked over newspaper and magazine articles sympathetic to the industry's position.

To read this material is to enter a house of mirrors that endlessly reflects the same set of opinions, voiced by the same few people, again and again. A person who saw nothing else could conclude that there were only four or five scientists in all of North America qualified to speak about secondhand smoke—all of them skeptical of its danger.

You can see how this works by tracing the public utterances of one of those scientists, Gary Huber, a lung specialist at the University of Texas. Shook, Hardy & Bacon, the

tobacco industry's longtime law firm, pays Huber's university to support his group's compilation of research on lung disease. Despite this, he told us, his views are his own.

In 1991, Huber wrote an article for *Consumers' Research*—a small-circulation magazine not connected to

CONSUMER REPORTS—in which he argued that the scientific evidence on the hazards of passive smoking is "shoddy and poorly conceived." He felt the epidemiological studies were too weak and the composition of secondhand smoke too poorly understood to reach a conclusion on any risk.

In early 1993, Huber was prominently quoted in an article in *Investor's Business Daily*. Writer Michael Fumento stated that "many in the scientific and medical community" dispute the EPA's opinion. All five scientists quoted to back up this viewpoint have received some type of industry support.

Both Huber's and Fumento's articles became, in turn, sources for a series of opinion pieces written by another journalist, Jacob Sullum. In *The Wall Street Journal* and *Forbes Media Critic*, Sullum built on Fumento's arguments and quoted three of the same scientists, including Huber. When we asked the Tobacco Institute for material on secondhand smoke, it sent us a packet that included Fumento's article.

R.J. Reynolds reprinted Sullum's *Wall Street Journal* article nationwide in a full-page ad. The ad's headline: "If We Said It, You Might Not Believe It." Philip Morris went even further, buying full-page ads in major national publications for six straight days to reprint Sullum's longer *Forbes Media Critic* article.

The effect: Huber's argument has undoubtedly now been seen by millions more people than ever read the original EPA report, never mind any of the hundreds of scientific articles on the subject in medical journals.

The industry's strategy has been effective. John Pierce, a researcher at the University of California, San Diego, who specializes in tobacco issues, checked the calls made to a statewide smokers' hotline immediately after the Reynolds and Philip Morris ads started appearing in print. Although the hotline was intended

to give support to smokers who wanted to quit, the calls coming in during that period were overwhelmingly accusatory. "We had a whole heap of people calling us, asking why we were misleading them," Pierce recalls. "There are all too many people willing to believe the industry when it says this thing's not really bad for you."

### Attacking the science

The heart of the cigarette makers' campaign appears to be their attack on the scientific methods used to measure the risk of secondhand smoke. In its advertising, its public statements, and its lawsuit against the EPA, the industry argues that the agency "cherry-picked" data to reach a foregone conclusion and violated the rules of statistical analysis. That's a clever strategy; it takes advantage of the public's unfamiliarity with research methods and the common perception that one week's scientific report will be debunked the following week.

To evaluate the industry arguments, we consulted CU's own professional statisticians and also turned to Charles Hennekens and Julie Buring, epidemiologists at Harvard Medical School and coauthors of a leading epidemiology textbook. They have no ties to the tobacco industry, and their own research includes studying various causes of heart disease and cancer. Here's what they said about the criticisms.

□ **Pooling studies.** The industry argues that the EPA had no business pooling smaller studies, many failing the "statistical significance" test, into one large collection of data. This is the meta-analysis technique we described above. "They've combined studies as different as night and day, which is not an accepted way to do a meta-analysis," says Walker Merryman, vice president of the Tobacco Institute.

In truth, the EPA made an effort to compare comparable studies. It sorted them by country or region, excluded the poorest-quality studies, and then pooled data only within each geographical group. The pooled results for Greece, Hong Kong, Japan, and the U.S. all showed statistically significant risk increases. The pooled results from Western Europe and China, though positive, didn't reach significance.

"Having a number of studies that show similar results but are not large enough individually to be statistically



significant on their own is exactly the situation where meta-analysis is appropriate," Buring says.

□ **The significance level.** When they analyze their data, most researchers try to set their "statistical significance" hurdle at 5 percent. In everyday language, that means there is less than a 5 percent probability the results occurred by happenstance.

However, the tobacco industry argues that the EPA lowered its hurdle to 10 percent when it pooled the various studies. Jacob Sullum said it "in effect doubles the odds of being wrong." An industry scientific consultant called it a "confidence game."

But here too, the EPA played fair.

It did set a 5 percent significance level. The agency used a standard statistical technique, called a one-tailed test, that allowed a 5 percent chance of wrongly concluding that secondhand smoke increases the risk of cancer. This technique, taught in every introductory statistics course, is appropriate when, as in this case, there is already independent evidence that a substance is harmful.

What's more, when Hennekens and Buring analyzed pooled data from the 11 U.S. studies on which the EPA relied most heavily, they found that the data do meet the even tougher standard the critics are demanding.

□ **Confounding factors.** Since epidemiologists can't control everything that happens in the lives of their subjects, they have to be wary of confounding factors, possible alternative causes for the results. Relatively small risks, like that from secondhand smoke, are especially vulnerable to confounding.

The tobacco industry and its defenders have raised just such a possibility. "There are numerous, and in many cases unaccounted for, factors which makes the whole process exceedingly difficult," Merryman says. "Since we're dealing with an issue of such magnitude, I think it's proper to insist they be accounted

## READING BETWEEN THE LINES

### HOW TO COUNT CIGARETTES

A persuasive newspaper ad that R.J. Reynolds published last spring offered to shed light on the secondhand smoke issue by considering how many "cigarette equivalents" nonsmokers are exposed to when they live or work with smokers. For instance, it said, a nonsmoker working among smoking colleagues inhales the equivalent of just 1¼ cigarettes a month. A waiter working full-time in a restaurant breathes just 2 cigarettes' worth. A reasonable person might wonder how that could be harmful.

It might not be harmful, if it were the whole story. The numbers look benign because the cigarette company counted only a part of the smoke that doesn't harm nonsmokers. Here's the trick:

Secondhand smoke is different from inhaled smoke. It consists mostly of the "sidestream" smoke that curls from the smoldering end of the cigarette when the smoker isn't inhaling. Sidestream smoke contains higher concentrations of certain toxic substances, including several cancer-causing ones, than mainstream smoke.

The RJR ad focused on nicotine in the smoke. Good choice. Nicotine is addictive to active smokers, but it's not a carcinogen. What's more, it happens to be found in about the same concentrations in mainstream and sidestream smoke. A nonsmoker can breathe diluted, secondhand nicotine all month and, as the ad pointed out, only get a couple of cigarettes' worth.

In the fine print, the ad revealed that "use of other compounds may give different results." What if RJR had instead counted "cigarette equivalents" using the more car-

cinogenic components of sidestream smoke? Katharine Hammond, an environmental health expert at the University of California, Berkeley, did just that. In testimony she submitted to the U.S. Occupational Safety and Health Administration, she considered the hypothetical nonsmoking office worker in the ad and added up a month's exposure.

She found that: "In that same room, at that same time, the nonsmoker is getting as much benzene [a known human carcinogen] as a smoker gets in smoking six cigarettes; as much 4ABP, a known human carcinogen, as if smoking 17 cigarettes; and as much NDMA, the potent animal carcinogen, as one who smoked 75 cigarettes."

Hammond told OSHA, "R.J. Reynolds is using the complex chemistry of tobacco smoke to obscure the truth."

"We're not trying to hoodwink people. The main thing is that the concentrations are very very small," an RJR scientist told us.

A Tobacco Institute official told us it's wrong to assume that nonsmokers are breathing the same mix of compounds as that measured in laboratory studies of sidestream smoke. However, there is evidence that nonsmokers are taking in harmful smoke constituents. A New York research team reported in 1993 that it had measured the metabolic products of a tobacco carcinogen, NNK, in the urine of nonsmokers exposed to the conditions of a very smoky bar. The measurements were 10 times as high as those taken before the volunteers were exposed to smoke.

#### SIDESTREAM SMOKE DIFFERS

"Sidestream" smoke, which curls off the end of a smoldering cigarette, is the main component of secondhand smoke and is different in composition from the "mainstream" smoke that smokers inhale. Sidestream smoke contains higher concentrations of several known or probable human carcinogens. Among them:

Component	How much more is in sidestream smoke
Polonium-210	1 to 4 times
Benzo[a]pyrene	2.5 to 3.5 times
Hydrazine	3 times
1,3-butadiene	3 to 6 times
Benzene	5 to 10 times
N-nitrosopyrrolidine	6 to 30 times
Cadmium	7.2 times
Nickel	13 to 30 times
N-nitrosodimethylamine	20 to 100 times
Aniline	30 times
2-Naphthylamine	30 times
4-Aminobiphenyl	31 times
N-nitrodiethylamine	up to 40 times

Source: U.S. Occupational Safety and Health Administration

for." The critics have usually focused on diet or socioeconomic status, both of which have been linked to the incidence of cancer. If people exposed to secondhand smoke were more likely to be poor or to have poor diets, data could be muddled.

In fact, the EPA considered possible confounding factors. Five of the studies it analyzed included information on diet. None of those five studies suggested that diet could account for the increased risk in people exposed to secondhand smoke.

The studies the EPA relied on didn't record socioeconomic status, but Fontham's newer study did—and found no link to risk. She also looked at diet and found that a diet high in fruits and vegetables did seem to protect people from lung cancer. But even after accounting for that, there was still a significant relationship between secondhand smoke and lung cancer.

Epidemiologists readily concede they can never account for all the factors that affect health. But since studies done in many countries with different cultures and habits all point to

an elevated risk, confounding factors are not likely to be the explanation.

□ **The 'excluded' studies.** The industry has repeatedly implied that the EPA ignored two 1992 studies because they didn't support the agency's conclusions. In fact, both studies were published during the seven-month period after the EPA report was written but before the agency released it. And neither study suggests the EPA is wrong.

In one, University of South Florida researcher Heather Stockwell found that nonsmoking women married to smokers had a 60 percent higher risk of lung cancer than women married to nonsmokers. The most highly exposed group—women exposed for 40 years or more—had a 130 percent increase in risk. In the other study, Ross Brownson, then of the Missouri Department of Health, found no risk increase for all exposed women as a group—but the most highly exposed

had a 30 percent increase.

Both the EPA and the industry have calculated, but not published, re-analyses that include all the new studies. The EPA says it still finds a statistically significant risk; R.J. Reynolds says it doesn't.

### The bottom line

There's no question that all epidemiological studies have a built-in imprecision, Buring told us. "But when you see different investigators, using different definitions and study designs, all showing similar results, then you have to believe there's something going on."

The case against secondhand smoke has reached that point. Short of conducting an impossible experiment—deliberately exposing thousands of people to secondhand smoke for decades, to see what happens—this is about as good as the human evidence on secondhand smoke is likely to get.

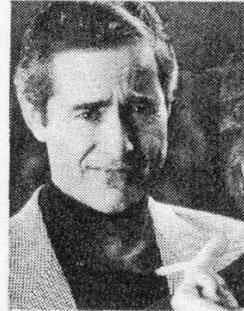
When those results are combined with the laboratory studies, the abundant evidence that firsthand smoke causes cancer, and the evidence for a dose-response relationship, the health implications are clear—and the EPA's conclusion inescapable.

"If we didn't have the tobacco companies spending millions of dollars to confuse the facts, this issue would be an open-and-shut case," says Stanton Glantz, a longtime tobacco researcher at the University of California, San Francisco. "The fact is that passive smoking causes lung cancer."

Your personal risk? Since the amount of smoke inhaled appears related to the risk of disease, there probably is a minimal hazard from brief exposure. But steady doses of secondhand smoke at home or on the job aren't so benign.

A nonsmoker's individual risk of dying from lung cancer, normally small, is increased slightly by living or working for years among people who smoke heavily. And although the individual risk is relatively small, the numbers add up to an issue of public health. Thousands of people in the U.S. may be dying or made sick every year from other people's smoking.

James Repace and Alfred Lowrey, two statistical researchers who study the effects of secondhand smoke,



## QUITTING SMOKING

### IF AT FIRST YOU DON'T SUCCEED

As any heavy smoker who's tried to quit knows all too well, nicotine dependence is one of the toughest addictions to shake. Little wonder, since every puff provides not only a psychological reinforcement of the habit but also a satisfying micro-dose of nicotine.

Nevertheless, about half of all Americans alive today who ever smoked have managed to quit—and the overwhelming majority of those who still smoke want to do likewise. Here's what we know about the best ways to stop smoking:

■ **Keep trying.** Most smokers try to quit—and fail—several times before succeeding. There's some evidence that the more times a smoker has tried and failed to quit, the better the chance of success the next time.

■ **Go cold turkey.** Most ex-smokers did it that way. Cutting back gradually doesn't seem to work as well, probably because it continues to reinforce the habit. There's also evidence that addicted smokers who try to cut back end up inhaling more of the cigarettes they do smoke in order to keep their nicotine levels up.

■ **Get support.** Especially for the most highly addicted smokers, support programs

can make a crucial difference. These group programs generally feature a combination of lectures, behavioral management techniques, and peer support. Low-cost or free programs are offered by many hospitals as well as local chapters of the American Lung Association (call 800 586-4872 for information) and the American Cancer Society (800 227-2345).

Support at home is important, too. Nonsmokers: Tell your smoking friends and relatives how happy and proud you'd be if they tried to quit. If they make the effort, support it with praise, small favors, and help with concrete strategies like exercising and staying away from smoke-filled rooms. If they fail, encourage them to try again later.

■ **Consider the patch.** On the market for more than three years, the nicotine replacement patches, although not a magical solution, have proven to be a helpful adjunct to other treatment methods for smokers who can't seem to quit on their own. The skin patches provide a steady stream of nicotine that takes the edge off the craving for cigarettes. One warning: There have been a few reports of heart attacks among people who continued to smoke while wearing the patches.

have concluded that a lifetime increase in lung-cancer risk of 1 in 1000 could be caused by long-term occupational exposure to air containing more than 6.8 micrograms of nicotine per cubic meter of air. (The nicotine itself doesn't cause lung disease but is a marker for smoke concentration.) Concentrations that heavy occur regularly in many homes and workplaces.

For its study, the EPA found 19 reports of measurements of nicotine levels in enclosed spaces where people smoked. Nicotine levels in homes of smokers had averages that ranged, from study to study, between 2 and about 11 micrograms; in offices, the range of averages was about 1 to 13. Restaurants were even smokier, with averages between about 6 and 18 micrograms.

### What should be done

If secondhand tobacco smoke were not connected to the profits of a powerful industry, we doubt there would be much argument about drastically restricting people's exposure to it.

The lifetime added risk of developing lung cancer from prolonged exposure to secondhand smoke is roughly 1 in 1000—1000 times greater than the one-in-a-million lifetime cancer risk considered unacceptable for many other environmental contaminants. Even in small doses, it can be an uncomfortable irritant, at the very least.

In response to the data, the tobacco industry has accelerated its campaign against public smoking restrictions. For instance, five companies together laid out nearly \$8-million last year in an unsuccessful effort to persuade California voters to approve a smoking-control law that would have invalidated stronger state and local restrictions.

The 1994 elections greatly improved the industry's legislative prospects. Out as chairman of the House Subcommittee on Health and Environment is Democrat Henry Waxman of California. His hearings last year produced the widely seen image of tobacco-company chiefs swearing they didn't think cigarettes were addictive. His likely replacement is Republican Thomas Bliley. The major employer in Bliley's Virginia district is Philip Morris, and Bliley has already said, "I don't think we need any more legislation concerning tobacco."

We disagree. We believe non-

smokers have a right to breathe smoke-free air, and we have long favored restrictions on where people may smoke. The medical evidence makes it imperative to impose such limits. In particular, we support measures to keep smoke out of the workplace—not just offices and factories but also restaurants, stores, and public transportation, because of the risk to the millions of Americans who work there, too.

We support OSHA's efforts to limit workplace smoking to certain ventilated rooms. OSHA calculates that over the next 45 years a workplace smoking ban would eliminate between 5500 and 32,500 lung-cancer deaths and 98,000 to 578,000 deaths from heart disease. (The variation comes from uncertainty about current levels of exposure to second-hand smoke.)

That makes control of smoke one of the great public-health bargains. Getting rid of workplace smoke requires posting signs, putting a few chairs and an ashtray outdoors, or putting an appropriate ventilation fan into a special smoking room—an improvement that OSHA estimates would cost \$4000 per building. In contrast, the bill for removing asbestos from a commercial building averages \$300,000.

### Stopping, and starting

Though the intended beneficiaries of smoking restrictions are non-smokers, smokers may benefit, as well. That's because, as many studies have now confirmed, the imposition of smoking restrictions is enough to motivate some smokers to quit.

Those who smoke at home, we think, should make heroic efforts to quit for the sake of their families, if not themselves. (For advice on quitting, see the facing page.)

The declining rates of smoking in the U.S. show that people can quit. But unfortunately, one group of smokers has stopped shrinking. Teen-age smoking rates, after years of decline, seem to have leveled off and may even have begun growing again, especially among girls. This phenomenon, and the ways cigarette makers' messages are delivered to teens, will be the focus of our next report on smoking. ■

*Reprints of these reports will be available. For pricing information, write: CU/Reprints, 101 Truman Ave., Yonkers, NY 10703-1057. Or call: 914 378-2448.*

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