Smokers who quit will breathe easier

Middle-aged smokers who kick the cigarette habit can stave off a deadly lung disease, according to a study published this week.

Chronic obstructive pulmonary disease, a condition that includes emphysema and chronic bronchitis, occurs almost exclusively in smokers. It is the fourth leading cause of death in the United States, killing about 90,000 Americans each year.

Nicholas R. Anthonisen of the University of Manitoba in Winnipeg and his colleagues at 10 clinical centers in the United States and Canada began the Lung Health Study by recruiting 5,887 smokers, age 35 to 60, with mild airway obstruction but no noticeable breathing trouble. The recruits were all at high risk of developing full-blown chronic obstructive pulmonary disease, which is characterized by lung tissue damage and airway narrowing.

The team randomly assigned volunteers to one of three groups. One group underwent an aggressive smoking cessation program and received a prescription bronchodilator that, when inhaled, opens the lung's airways. Another group participated in the antismoking program but got a placebo inhaler with an inactive solution. The final group received the usual care for people at risk of this disease — advice to stop smoking.

About 22 percent of the people in the antismoking programs successfully quit their habit, compared to 6 percent of people in the usual care group.

During the study, the researchers monitored lung function, or the ability to move air in and out of the lungs. As time goes on, people with chronic obstructive pulmonary disease may experience breathlessness when walking even a short distance. Eventually, they may become bedridden and require the administration of oxygen.

At the end of 5 years, the researchers found significantly less loss of lung function in the smoking cessation groups than in the usual care group. On average, volunteers assigned to the antismoking programs experienced a 7.4 percent drop in lung function, compared to a 10 percent decline in the usual care group.

When the researchers homed in on a subgroup — those who quit smoking early in the program and stayed smokefree for 5 years — a bigger benefit emerged. These exsmokers experienced a 2.5 percent decline in lung function during the study, a rate similar to the age-related drop in lung function seen in people who have never smoked. People who smoked throughout the study had an 11.4 percent drop.

Previous studies had hinted that regular use of a bronchodilator might mitigate this lung disease. The Lung Health Study's data showed that people using this inhaler experienced a slight improvement in their lung function during the first year of the study. That edge disappeared as soon as the bronchodilator treatment was stopped. "The bronchodilator did not change the underlying course of the disease," Anthonisen says. The team describes its findings in the Nov. 16 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

"The study is a landmark in chronic obstructive pulmonary disease research," says Nicholas J. Gross of the Loyola University of Chicago School of Medicine in Maywood, Ill. Gross wrote an editorial in the same issue of the journal.

Researchers know that chronic obstructive pulmonary disease includes a long period, from 20 to 40 years, in which the smoker experiences no definitive symptoms except smoker's cough. Nonetheless, where there is smoke, there is irreversible damage to the lungs.

This study shows that smokers who quit during that at-risk period can reap substantial benefits. "If you stop smoking, you virtually eliminate your chance of getting this disease," Anthonisen says.

— K.A. Fackelmann

Are indoor gases sickening microcircuits?

Tiny electronic circuits are extremely vulnerable to corrosion and failure from the buildup of nitrate salts. To protect their sensitive switches from such deposits — which can enter buildings with dust — telephone companies typically install sophisticated dust filters. Yet switches continue to suffer from transient processing glitches and sometimes a catastrophic shorting out.

A trio of chemists now suggests a new reason for the salty circuits plaguing telephone companies — and probably, unknowingly, consumers as well.

Although these salts can be a constituent of outdoor dust, they also can form after their parent gases slip unchallenged through dust filters, the researchers now find. Moreover, their new data show, under these circumstances, salt-forming acids can develop directly on vulnerable indoor surfaces — including electronic circuitry. The group, led by Charles J. Weschler of Bell Communications Research in Red Bank, N.J., reports its findings in the November ENVIRONMENTAL SCIENCE & TECHNOLOGY.

For 14 months, the scientists monitored the air inside and outside a telephone switching facility in California for concentrations of ozone, nitric oxide (NO), and nitrogen dioxide (NO_2) — all major components of smog.

Depending on the time of day and season, indoor concentrations of these pollutants could be high, notes Weschler. Indoor ozone tended to fluctuate between 25 and 60 percent of outdoor concentrations. And indoor NO_2 typically ran 70 to 90 percent of outdoor concentrations.

Because the building lacked the usual indoor sources of these gases, such as photocopiers, laser printers, cigarette smoke, and gas ranges, Weschler's group believes the pollutants came from outdoors.

When present together, ozone and NO_2 formed the reactive nitrate radical. If the relative humidity was high enough — and it typically was, in summer — this radical could foster reactions between a kindred molecule and water on the surfaces of materials, Weschler's team found. The resulting nitric acid is corrosive and a source of nitrate salts. At the same humidity, NO_2 can also react directly with surfaces to form the weaker — though still salt-producing — nitrous acid.

Though NO_2 played a principal role in creating both nitrogen-salt-forming acids, barring its infiltration from outside may not prevent acid buildup, the data suggest. For one thing, NO_2 also forms indoors from ozone and NO.

Indeed, Weschler concludes, these pollutants — and their effects on the health of building occupants and on possessions — can only be predicted by graphing the "intricate dance" that each gas performs about the others.

That these reactions can occur indoors "has been largely unrecognized," observes atmospheric chemist Chet Spicer of Battelle Memorial Institute in Columbus, Ohio. Why? Few chemists "expected as much ozone to exist in buildings as shown here — and that [ozone] really triggers these reactions."

Indeed, this "is not a deeply mined topic," observes Glen R. Cass of the California Institute of Technology in Pasadena. Moreover, the few related studies that he and others have performed monitored smog-gas interactions for only a few days. "It's been hard to tell from such experiments if what you're looking at is an anomaly or typical," Cass says.

But the take-home message for most consumers, Weschler believes, should be to keep living areas moderately dry and to isolate vulnerable electronics — especially computers — from indoor NO and NO_2 sources, such as gas ranges.

— J. Raloff