

News

Smoke from cigarette tip is more toxic than main inhaled smoke

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Unpublished research by the tobacco industry shows that inhaled "sidestream" cigarette smoke—the smoke that rises from the tip of the burning cigarette between puffs—is more toxic than the "mainstream" smoke inhaled by the smoker.



Lighting up: the smoke from someone else's cigarette may be more toxic than your own

Credit: PAT SULLIVAN/AP/EMPICS

It found that inhaled fresh sidestream smoke, which makes up around 85% of secondhand smoke, is four times more toxic per gram of total particulate matter than inhaled mainstream smoke.

A report in *Tobacco Control* (2005;14: 396-404 [[Abstract/Free Full Text](#)]) describing the research conducted by Philip Morris Tobacco in the 1980s says: "The tobacco industry has vigorously challenged the link between secondhand smoke and lung cancer, including funding of research published in 2003 challenging the evidence linking secondhand smoke and lung cancer. However, while it publicly challenged the link, Philip Morris Co privately performed extensive in vivo toxicological testing of sidestream smoke at its secret Institut für Biologische Forschung (INBIFO) in Germany."

"The number, variety, and results of the fundamental toxicological experiments done by Philip Morris at INBIFO are without parallel in the open scientific literature. These studies were neither published nor revealed to the government in... hearings by the US Occupational Safety and Health Administration."

The authors say that although exposure to secondhand smoke causes lung cancer and 53 000 deaths a year in the United States, few data exist in the open literature on the toxicology of fresh sidestream smoke.

In the study the authors, from the University of California at San Francisco, analysed research they found among 40 million pages of tobacco industry documents that were made public as a result of litigation against tobacco companies.

They say that between 1981 and 1989 the German centre did at least 115 studies of sidestream smoke. The centre's research showed that sidestream condensate caused two to six times more tumours per gram than mainstream condensate. The research also showed that inhaled fresh sidestream cigarette smoke is about four times more toxic per gram of total particulate matter than mainstream cigarette smoke.

Sidestream tar also caused two to six times more tumours per gram when painted on the skin of mice. Fresh sidestream smoke was found to inhibit normal weight gain in developing animals and, at low levels, to cause damage to the respiratory epithelium. Damage to the epithelium increased with longer exposure. The toxicity of whole sidestream smoke was found to be higher than the sum of the toxicities of its major constituents.

The authors say the research used full flavour cigarettes and may underestimate the toxicity of sidestream smoke from current cigarettes. They say evidence shows that sidestream smoke from filtered "light" cigarettes, which now constitute most of the market, is significantly more toxic than that from full flavour cigarettes.

The unpublished research supports the institution of smoke-free policies in public places, the authors say.

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Active smoker is affected more than the passive smoker

19 December
2005



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[Re: Active smoker is
affected more than the
passive smoker](#)

The smoke coming out from the cigarette tip is more dangerous than the inhaled smoke. The smoke that passes through the filter of the cigarette is less harmful because some of the carbon particles are deposited in the filter of the cigarette or the tobacco in the cigarette.

When the smoke is inhaled, most of the carbon will get deposited in the alveoli. This can be demonstrated by blowing the smoke forcefully against the finger nail. You take the smoke in mouth and blow it against the finger nail and you can see the formation of a dark spot. Next you take the smoke into your lungs and then blow it against the finger nail. This time it will fail to produce a stain or spot on your nail.

There is a general belief that the passive smoker is affected more than the active smoker because he inhales the smoke coming from the cigarette tip. This is not true. Because the active smoker inhales both smokes; passing thorough the filter and the tip of the cigarette, where as the passive smoker inhales the smoke from the cigarette tip and also the carbon free smoke released from the lung of the smoker. Since the nose of the active smoker is nearer to the tip of the cigarette that he is smoking, he should get more direct smoke from cigarette tip than the passive smokers. So the belief that "the passive smoker is affected more" is meaningless.

Competing interests: None declared

Passive smokers are severely affected

19 December
2005



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are severely affected](#)

Is the passive smoker more affected by tobacco smoke than the active smoker himself? That is not the question. The main point is that the passive smoker is affected at all. The smoker knows or at least should know about the risks of tobacco and he takes this risk consciously, but the passive smoker is harmed innocently. Another point is that one smoker could harm many passive smokers close-by. Often some passive smokers are surrounded by some active smokers in a small room so the air is charged with lot's of toxic particles so that everyone gets the same amount of smoke from burning cigarette tips – and smokers get their filtered mainstream smoke additionally. Regardless of active or passive smokers are

affected more this article gives reasons for banishing smoking on places where passive smokers could be harmed.

Competing interests: None declared



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RESEARCH PAPER

Philip Morris toxicological experiments with fresh sidestream smoke: more toxic than mainstream smoke

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Background: Exposure to secondhand smoke causes lung cancer; however, there are little data in the open literature on the in vivo toxicology of fresh sidestream cigarette smoke to guide the debate about smoke-free workplaces and public places.

Objective: To investigate the unpublished in vivo research on sidestream cigarette smoke done by Philip Morris Tobacco Company during the 1980s at its Institut für Biologische Forschung (INBIFO).

Methods: Analysis of internal tobacco industry documents now available at the University of California San Francisco Legacy Tobacco Documents Library and other websites.

Results: Inhaled fresh sidestream cigarette smoke is approximately four times more toxic per gram total particulate matter (TPM) than mainstream cigarette smoke. Sidestream condensate is approximately three times more toxic per gram and two to six times more tumourigenic per gram than mainstream condensate by dermal application. The gas/vapour phase of sidestream smoke is responsible for most of the sensory irritation and respiratory tract epithelium damage. Fresh sidestream smoke inhibits

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normal weight gain in developing animals. In a 21day exposure, fresh sidestream smoke can cause damage to the respiratory epithelium at concentrations of 2 µg/l TPM. Damage to the respiratory epithelium increases with longer exposures. The toxicity of whole sidestream smoke is higher than the sum of the toxicities of its major constituents.

Conclusion: Fresh sidestream smoke at concentrations commonly encountered indoors is well above a 2 µg/m³ reference concentration (the level at which acute effects are unlikely to occur), calculated from the results of the INBIFO studies, that defines acute toxicity to humans. Smoke-free public places and workplaces are the only practical way to protect the public health from the toxins in sidestream smoke.

Abbreviations: CalEPA, California Environmental Protection Agency; DMBA, 7,12 dimethylbenz(α)anthracene; FTC, Federal Trade Commission; INBIFO, Institut für Biologische Forschung; LOAEL, lowest observed adverse effect level; NOEL, no observable effect level; SHS, secondhand smoke; TPM, total particulate matter

Keywords: tobacco smoke pollution; environmental tobacco smoke pollution; passive smoking; toxicology; inhalation

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