

CAMPAIGN For TOBACCO-FREE Kids®

WHAT IS IN SECONDHAND SMOKE?

To understand secondhand smoke and get a better understanding of the harms it causes, it is important to know both what is in a cigarette and what, in turn, is in cigarette smoke.

What is in a cigarette?¹

To know what is in secondhand smoke, we first have to know what is in a cigarette. To that end, the following is a basic description of what is found in most cigarettes sold in the United States:

- Tobacco for “American blend” cigarettes – the type of cigarettes sold and consumed in the United States and becoming increasingly popular worldwide -- is blended from two main leaf varieties: Virginia tobacco that contains 2.5-3% nicotine; and ‘burley’ tobacco that has a higher nicotine content (3.5-4%). U.S. blends also contain up to 10% of imported ‘oriental’ tobacco that is aromatic but relatively low in nicotine (less than 2%).
- In addition to the leaf blend, cigarettes contain ‘fillers’ which are made from the stems and other bits of tobacco that would otherwise be waste products. These are mixed with water and various flavorings and additives. The ratio of filler varies among brands.
- Additives are used to make tobacco products more acceptable to the consumer. They include humectants (moisturizers) to prolong shelf life; sugars to make the smoke seem milder and easier to inhale; and flavorings such as chocolate and vanilla.
- Additives are used to make cigarettes that provide high levels of ‘free’ nicotine that increases the addictive ‘kick’ of the nicotine. Ammonium compounds can fulfill this role by raising the alkalinity of smoke.
- Additives are used to enhance the taste of tobacco smoke, to make the product more desirable to consumers. Although seemingly innocuous, the addition of flavorings making the cigarette ‘attractive’ and ‘palatable’ is in itself cause for concern. Furthermore, sweeteners and chocolate may help to make cigarettes more palatable to children and first time users; eugenol and menthol numb the throat so the smoker cannot feel the smoke’s aggravating effects. Also, additives such as cocoa may be used to dilate the airways allowing the smoke an easier and deeper passage into the lungs exposing the body to more nicotine and higher levels of tar.

What is in Cigarette Smoke?

Cigarette smoke is toxic soup of more than 4,000 known chemical compounds.² Cigarette smoke is made up of “sidestream” smoke from the burning tip of the cigarette and “mainstream” smoke from the filter or mouth end. Tobacco smoke contains thousands of different chemicals that are released into the air as particles and gases. The particulate phase of cigarette smoke includes nicotine, “tar” (itself composed of many chemicals), benzene and benzo(a)pyrene. The gas phase includes carbon monoxide, ammonia, dimethylnitrosamine, formaldehyde, hydrogen cyanide and acrolein. According to a November 2001 report issued by the National Cancer Institute³, there are 69 known or probable carcinogens in cigarette smoke⁴. The complete list of these carcinogens appears in the table below.

LIST OF KNOWN, PROBABLE, & POSSIBLE CANCER CAUSING CHEMICALS IN SECONDHAND SMOKE	
<u>Polycyclic Aromatic Hydrocarbons</u>	<u>Miscellaneous Organic Compounds</u>
Benz(a)anthracene Benzo(b)fluoranthene Benzo(j)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Dibenz(a,h)anthracene Dibenzo(a,l)pyrene Dibenzo(a,e)pyrene Indeno(1,2,3-cd)pyrene 5-Methylchrysene	Acetamide Acrylonitrile DDT Catechol 1,1-Dimethylhydrazine 2-Nitropropane Ethyl carbamate Ethylene oxide Propylene oxide Methyleugenol MeAaC (2-amino-3-methyl-9- <i>H</i> -pyrido[2,3- <i>b</i>]indole) Acrylamide Vinyl chloride DDE Caffeic acid Nitromethane Nitrobenzene
<u>N-Nitrosamines</u>	<u>Inorganic Compounds</u>
N-Nitrosodimethylamine N-Nitrosoethylmethylamine N-Nitrosodiethylamine N-Nitrosodi-n-propylamine N-Nitroso-di-n-butylamine N-Nitrosopyrrolidine N-Nitrosopiperidine N-Nitrosodiethanolamine N-Nitrosornicotine 4-(Methylnitrosamino)-1-(3pyridyl)-1-butanone	Hydrazine Arsenic Beryllium Nickel Chromium (only hexavalent) Cadmium Cobalt Lead Polonium-210
<u>N-Heterocyclic Amines</u>	<u>Aldehydes</u>
AaC Trp-P-1 Glu-P-1 PhIP IQ Trp-P-2 Glu-P-2	Formaldehyde Acetaldehyde
<u>Volatile Hydrocarbons</u>	<u>Heterocyclic Compounds</u>
1,3-Butadiene Isoprene Benzene Styrene	Quinoline Dibenz(a,j)acridine Benzo(b)furan Dibenz(a,h)acridine Dibenzo(c,g)carbazole Furan
<u>Aromatic Amines</u>	
2-Toluidine 2-Naphthylamine 2,6-Dimethylaniline 4-Aminobiphenyl	

Not surprisingly, given these ingredients, the scientific evidence on the health risks associated with exposure to secondhand smoke is clear, convincing, and overwhelming. Secondhand smoke (also referred to as involuntary smoking, environmental tobacco smoke, and passive smoking) is a known cause of lung cancer, heart disease, low birth-weight births, and chronic lung ailments such as bronchitis and asthma (particularly in children), as well as other health problems. In fact, exposure to secondhand smoke has been estimated to result in at least 38,000 annual deaths in the United States and over one million illnesses in children (see table).

Annual Toll From Exposure to Secondhand Smoke in the United States⁵		
Condition	Estimated Annual Deaths	Estimated Annual Diseases
Ischemic Heart Disease	35,000	NA
Lung Cancer	3,000	NA
Sudden Infant Death Syndrome	1,900	NA
Low Birthweight Births	--	9,700
Asthma Exacerbation in Children	--	400,000
Acute Lower Respiratory Illness (children < 18 mo.)	--	150,000
Otitis Media in Children	--	700,000

The National Center for Tobacco-Free Kids, January 20, 2004 / Matt Barry

Related Campaign Fact Sheets

[All TFK Factsheets available at <http://tobaccofreekids.org/research/factsheets>.]

Health Harms from Secondhand Smoke

<http://tobaccofreekids.org/research/factsheets/pdf/0103.pdf>

Secondhand Smoke Harms to Kids

<http://tobaccofreekids.org/research/factsheets/pdf/0104.pdf>

Clean Indoor Air Laws Encourage Smokers To Quit And Discourage Youth From Starting,

<http://tobaccofreekids.org/research/factsheets>

Smoke-Free Workplace Laws Reduce Smoking Rates – and the Cigarette Companies Know It,

<http://www.tobaccofreekids.org/research/factsheets/pdf/0196.pdf>

Smoke-free Restaurant & Bar Laws Do Not Harm Business,

<http://tobaccofreekids.org/research/factsheets/pdf/0144.pdf>

Ventilation Technology Does Not Protect People From Secondhand Smoke,

<http://tobaccofreekids.org/research/factsheets/pdf/0145.pdf>

Secondhand Smoke, EPA, & the Courts - Cigarette Company Lawsuits Cannot Change the Facts:

Secondhand Smoke is Deadly, <http://tobaccofreekids.org/research/factsheets/pdf/0038.pdf>

¹ This section is largely based from a document prepared by Action on Smoking and Health/United Kingdom entitled, *Fact Sheet No. 12, What's In A Cigarette?*, August 2001, <http://www.ash.org.uk/html/factsheets/html/fact12.html>.

² National Cancer Institute. *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine*. Smoking and Tobacco Control Monograph No. 13. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Pub. No. 02-5074, October 2001.

http://dcccps.nci.nih.gov/tcrb/monographs/13/m13_5.pdf; personal communication, dated October 28, 2003, from Dietrich Hoffmann, Ph.D., Associate Director, Institute for Cancer Prevention, co-author of Chapter 5 of NCI Monograph 13, clarifying that Table 5.4 of the Monograph (that lists the 69 carcinogens) is missing a carcinogen, namely MeAaC (2-amino-3-methyl-9-H-pyrido[2,3-b]indole, and it should be inserted under “under “Miscellaneous Organic Compounds”.

³ National Cancer Institute. *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine*. Smoking and Tobacco Control Monograph No. 13. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Pub. No. 02-5074, October 2001.

http://dcccps.nci.nih.gov/tcrb/monographs/13/m13_5.pdf.

⁴ National Cancer Institute. *Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine*. Smoking and Tobacco Control Monograph No. 13. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Pub. No. 02-5074, October 2001.

http://dcccps.nci.nih.gov/tcrb/monographs/13/m13_5.pdf.

⁵ National Cancer Institute. *Health Effects of Exposure to Environmental Tobacco Smoke: The Report of the California Environmental Protection Agency. Smoking and Tobacco Control Monograph no. 10*. Bethesda, MD. U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, NIH Pub. No. 99-4645, 1999, http://cancercontrol.cancer.gov/tcrb/nci_monographs/MONO10/MONO10.HTM.