

LETTERS TO THE EDITOR

Letters intended for publication should be a maximum of 500 words, 10 references, and one table or figure, and should be sent to the editor at the address given on the inside front cover. Those responding to articles or correspondence published in the journal should be received within six weeks of publication.

Variation within global cigarette brands in tar, nicotine, and certain nitrosamines: analytic study

EDITOR,—While the content of food, pharmaceutical products, drugs, and many other consumer goods are tightly regulated by governments, tobacco products, surprisingly, are not.

Tar and nicotine yields of cigarettes have progressively, but not universally, appeared on cigarette packets and advertising since 1967. These figures have been used to justify terms such as "light" and "mild" in descriptive advertising. In 1981 a US public health report concluded: "the preponderance of scientific evidence strongly suggests that the lower the "tar" and nicotine content of the cigarette, the less harmful would be the effect."¹

Some early reports concluded, plausibly, that a decrease in lung cancer mortality could be ascribed to smoking reduced tar cigarettes, although more recent data² suggest that there is little if any difference in the long term outcome of smoking "low tar" as against "regular" cigarettes. Further there has been an increase in adenocarcinoma relative to squamous carcinoma, more pronounced in women than men, and this may be caused by the increases in tobacco specific nitrosamines in cigarettes plus more intense (compensatory) smoking and deeper inhalation associated with modern cigarettes.^{3,4}

We decided to test three global brands (Camel, Lucky Strike, and Marlboro) for consistency of tar and nicotine yields and for two tobacco specific nitrosamines, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK), and N-nitrosornicotin (NNN). The former is a powerful lung adenocarcinogen, regardless of route of administration, and the latter is an established oesophageal carcinogen in

animals. The methods used have been described by Hoffmann.^{5,6}

The cigarettes were purchased in 29 countries by volunteers (the International Cigarette Variation Group), who purchased the premium example available, which were, in most cases, filtered. No "light", "mild", "menthol" or other variants were purchased. Forty cigarettes of each brand were analysed at the Institute of Carcinogenesis in Moscow. Not all brands were available in each country and it is not known whether those purchased were locally produced, imported or smuggled, or how long they had been stored before sale. This is not a representative sample—the cigarettes were acquired as they would be by the person in the street. Our aim was to investigate international variation.

The results of the tar and nicotine testing were unremarkable. Generally they conformed to the packet statement (where present). Tar yield ranged from 10.6 mg/cig to 15.7 mg/cig for Camel, 11.8 mg/cig to 20.4 mg/cig for Lucky Strike, and 8.4 mg/cig to 15.9 mg/cig for Marlboro. Nicotine yield ranged from 0.85 mg/cig to 1.3 mg/cig for Camel and Lucky Strike, and 0.68 mg/cig to 1.25 mg/cig for Marlboro.

Differences in nitrosamine yields were substantial. There is a threefold difference between the lowest and highest yields of NNK for Camel, a fivefold difference for Lucky Strike, and ninefold for Marlboro (fig 1). NNK and NNN yields are highly correlated (correlation 0.88, 95% confidence interval 0.83 to 0.93), so only NNK is shown in the figure.

We have shown that a three- to ninefold variation in carcinogen dose can be given to the smoker, without any warning, in products that are trademarked and globally advertised. In 1998⁷ some of us proposed the setting of upper limits on such carcinogens by establishing the market median as an initial upper limit. Clearly lower nitrosamine cigarettes can be, and are, produced, and there is no excuse for the wide, within brand, variations described here.

We see these results as a compelling and urgent argument for government regulation of carcinogen concentrations in cigarettes. Obviously such regulation should go beyond carcinogens to other toxic, modifiable substances, and to nicotine.

We thank the members of the International Cigarette Variation Group, who purchased and supplied the cigarettes at their own expense. They are: Professor JG McVie (UK), Dr AK Kubik (Czech Republic),

Dr P Bjuher (France), Professor I Plesko (Slovakia), Professor LJ Denis (Belgium), Professor H Senn (Switzerland), Professor H Zur Hausen (Germany), Professor H Hansen (Denmark), Professor U Veronesi (Italy), Dr K Bjartveit (Norway), Mr S Woodward (Australia), Dr V Tkeshelashvili (Georgia), Mr B De Blij (Netherlands), Professor M Dicato (Luxembourg), Professor S Eckhardt (Hungary), Mr T Hudson (Ireland), Dr J Mackay (Hong Kong), Professor Niu Shiuru (China), Dr I Tannock (Canada), Dr H Vertio (Finland), Dr Zakelj (Slovenia), Professor W Zatonski (Poland), Ms M Ziv (Israel), Mr M Pertschuk (USA), Dr Estevez (Argentina), Dr A Junquiera (Brazil), and Professor Abdrahmanov (Kasakhstan). This work was conducted within the framework of support from the Italian Association for Cancer Research (*Associazione per la Ricerca sul Cancro*).

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- 1 US Department of Health and Human Services. *The health consequences of smoking: the changing cigarette. A report of the Surgeon General, 1981*. Rockville, Maryland: Public Health Service, Office of the Assistant Secretary for Health, Office on Smoking and Health, 1981. (DHHS Publication No (PHS) 81-50156.)
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- 5 Brunneemann KD, Genoble L, Hoffmann D. Identification and analysis of a new tobacco-specific N-nitrosamine - 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone. *Carcinogenesis* 1987;8:465-9.
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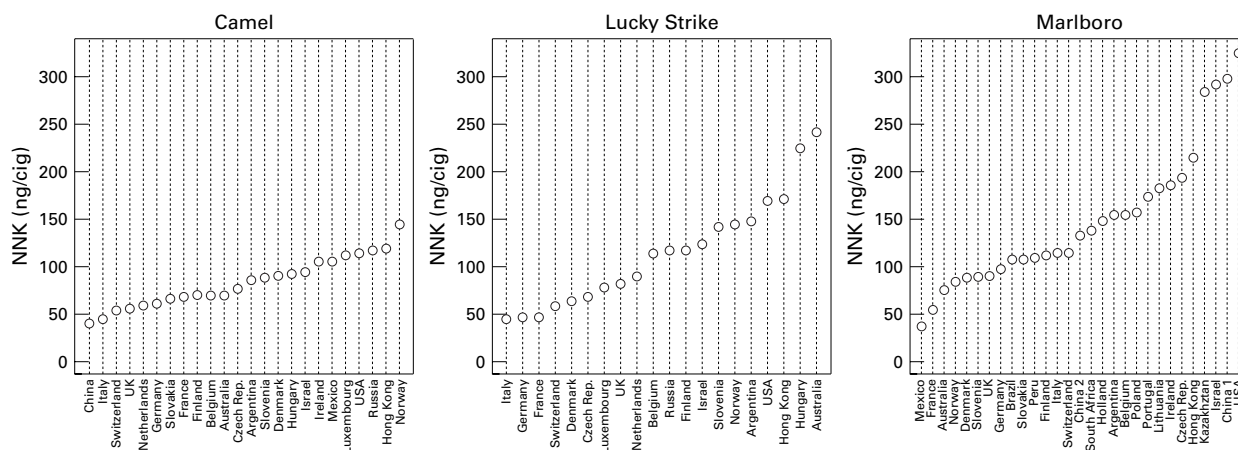


Figure 1 Results of testing for NNK yields from three brands of cigarettes in various countries.

Carbon monoxide in the expired air of smokers who smoke so-called "light" brands of cigarettes

EDITOR,—Tobacco smoke is an important source of carbon monoxide (CO). Smokers with expired CO values of 11–21 parts per million (ppm) are defined as mild smokers, whereas those with expired CO values of more than 21 ppm are defined as heavy smokers.¹ We report on the expired CO readings of smokers who smoke "light" brands compared to those who smoke regular brands. The approach chosen was designed to reflect real smoking habits, and was not laboratory based. Many health agencies measure tar and CO values using smoking machines under standardised laboratory conditions.² However, cigarettes are not smoked by machines, and smokers may titrate their nicotine intake by varying their smoke inhalation and cigarette consumption.^{3,4} Here we show that there is no difference in CO concentrations in the expired air of smokers who smoke "light" brands versus smokers who smoke regular brands.

The study assessed 178 smokers (83 males, 95 females; mean age 49.05 years), whose cigarette consumption was diagnosed according to the Vienna Standard Protocol.⁵ (This protocol includes the measurement of CO in expired air). The sample consisted of first visit clients attending publicised information meetings held by the Nicotine Institute, Vienna during a three week sampling period. The smokers were divided into two groups: those who smoked a brand of cigarette with the word "light" indicated on the packaging ($n = 63$), and those who smoked a brand that did not carry this message ($n = 115$). This information was gained by asking smokers whether they smoked "light" cigarettes, and by checking their cigarette packs. There was no difference in sex distribution between the two groups. Tobacco dependence was measured by the Fagerström test for nicotine dependence (FTND).⁶ The two groups ("light" and regular smokers) did not differ in this respect. Expired CO measurements were obtained with the Bedfont EC-50-Micro Carbon Monoxide Monitor. The smokers were not informed of the test before the measurement, which was performed at 5 pm. None of the smokers refused this measurement, and none were excluded from the analysis. None of them had changed their cigarette brand during the previous three months.

Analysis of the data focused on the relation between the "light" claim and the expired CO measurement, intentionally not taking into account the (relatively unreliable) information on cigarette consumption reported by the smokers. Reported cigarette consumption is not very reliable compared to objective measurements of CO concentrations, because these concentrations depend on the puff rate and inhalation habits of the individual. No significant difference ($p > 0.55$) was found in the distribution of CO readings of the "light" cigarette smokers compared to regular cigarette smokers (fig 1). The mean CO value achieved by the regular cigarette smokers was 27.85 ppm (SD 12.34, SE 1.15), and the mean value of the "light" cigarette smokers was 29.63 ppm (SD 10.90, SE 1.37). These results support the findings of other studies that questioned the possible advantage of cigarette brands claiming to be "light".^{7,8}

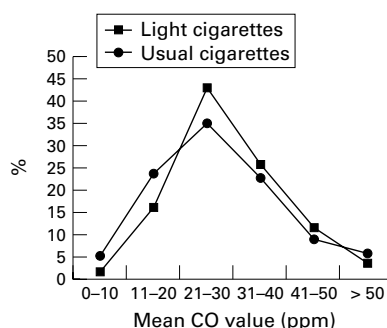


Figure 1 Distribution of carbon monoxide (CO) readings of "light" cigarette smokers and regular cigarette smokers.

The method used in this study was very much related to the situation in real life, where consumers might be attracted by "light" cigarettes because they assume these will reduce their health risk.⁹ Other variables may affect the present results, but it is likely that further studies will confirm the present assumption that tobacco consumers are misled by the information on the packages. If expired CO values are indicative of the intake of harmful substances, this might indicate some limitations in the CO haemoglobin saturation curve. (From the machine measurement of these values there is a correlation between tar and expired CO—letter from laboratory government chemist, London). Different tobacco markets may also differ in the labelling of cigarette brands, but as the smokers in this study were all exposed to the same information about cigarettes (in Austria), these findings are at least reliable for this market. These results support the suggestion that smokers titrate their nicotine intake by varying their inhalation habits.

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BOOKS

Book reviews and books of interest to "Tobacco Control" should be sent to the editor at the address given on the inside front cover.

Tobacco war

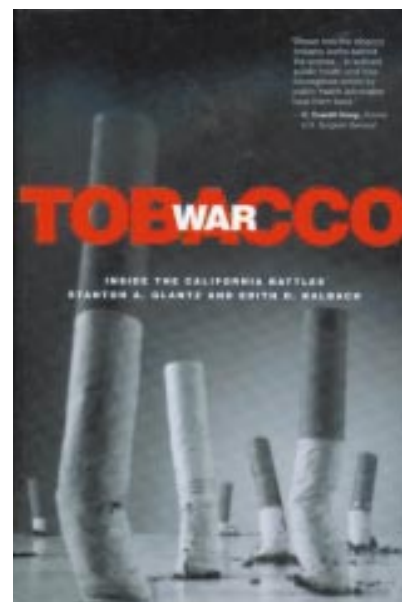
Tobacco war: inside the California battles. Stanton A Glantz, Edith D Balbach. Berkeley, California, University of California Press, 2000. ISBN 0-520-22285-7. 469 pages.

For a decade, since voters there approved a referendum question raising the state's cigarette excise tax and assigning a portion of the revenue to a campaign to reduce tobacco use, California has been a cockpit of conflict between public health forces and the tobacco industry. For most of that time, Stanton Glantz, Professor of Medicine at the University of California, San Francisco, has been an important figure in the struggle. This is his history of it, written with Edith Balbach, Director of the Community Health Program at Tufts University in Boston.

For readers of this journal, *Tobacco war* is most useful not for its accounts of tobacco industry perfidy, but for describing the evolution of tactics used by health advocates to counter the industry's political strategy. In California, the war has been fought at the local and state levels, and in the electoral, legislative, and administrative arenas.

The authors' main theme is that tobacco control advocates most effectively influence public policy by mobilising public opinion, rather than employing traditional lobbying techniques. Glantz and Balbach repeatedly demonstrate that the conventional insider tactics of influence, persuasion, and compromise result in setbacks for tobacco control, while an aggressive public posture that confronts not only the tobacco industry but also its political allies leads to victory.

Their argument is that public health agencies, which do not make political campaign contributions or employ influential lobbyists,



cannot compete at the insider game with the cigarette manufacturers, which do both to an almost unparalleled extent. But, "[t]he agencies . . . enjoy high name recognition and credibility with the public. By contrast, the tobacco industry has very low public credibility. This difference in public standing means that outside strategies are likely to be the public health community's best means to achieve good tobacco policy, because the skills and resources of the voluntary health agencies tend to be amplified in public arenas while those of the tobacco industry are muted. But outsider strategies require a commitment of resources to a continuous public information effort. Equally important, they require a willingness to anger powerful politicians and interest groups by publicizing their misdeeds."

Glantz and Balbach understate the importance and necessity of effectively playing the inside game. Effective legislative advocacy helps assure that public opinion is translated into effective, not cosmetic, policy. And they may overestimate the depth and durability of the public's goodwill, once health agencies begin to use it. But the point is well taken. Their halo of disinterested concern for public health is the best weapon voluntary agencies have in fighting the tobacco industry, and its judicious use, combined with effective lobbying, is the surest path to success.

The recent infusion of tobacco settlement money into the US states has changed the political dynamics of tobacco control advocacy. Voluntary agencies, which only recently adopted an aggressive stance towards Big Tobacco, are now learning that they must confront both the industry's allies in public office and other interests, some of them quite worthy, competing for the funds. The California experience is sure to be repeated, and careful attention to the history recounted in *Tobacco war* will help others avoid some of the mistakes made there.

A most depressing element of the California story is the role played by organised medicine. The California Medical Association (CMA) paid lip service to the 1988 Proposition effort while working behind the scenes to undermine it because the CMA wanted to avoid alienating the tobacco industry, with which it had made common cause in weakening medical and product liability laws. When the Proposition won, the CMA embarked on a years long effort to shift money from the tobacco control programme into medical care accounts (and, incidentally, doctor's pockets).

One hopes that most physicians would not endorse this kind of political deal making at the expense of public health. But the people they hire through their associations to represent them, committed to playing the inside game, will continue to sell out tobacco control over pocketbook issues until the membership tells them to do otherwise. Providers concerned about tobacco control need to do more to hold their professional organisations accountable for tobacco control advocacy.

Despite Glantz's involvement in many of the events described, *Tobacco war* is a largely even-handed account of the major issues confronted by California's tobacco control movement, particularly during the 1990s. In writing *Tobacco war*, the authors drew on interviews with many of the players (including some from the other side), contemporaneous memoranda and news

reports, and internal company documents uncovered through state lawsuits against the cigarette manufacturers. These last help elucidate the industry's strategy and its analysis of the health advocates' activities.

This reader would have appreciated a brief description of the research methodology, particularly the interview procedures. Not everyone's viewpoint is adequately represented, and there are occasions when the actions of tobacco control advocates are questioned by the authors or by other participants, without any response from the accused. This is jarring in view of how much of the text consists of verbatim quotes from participants.

But, all in all, this is an important book for the tobacco control movement. It is an interesting, at times compelling, narrative, containing many object lessons that anyone engaged in tobacco control policy advocacy will benefit from.

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Political history of smoking and health

Denial and Delay—The Political History of Smoking and Health, 1951–64; Scientists, Governments and Industry as seen in the papers at the Public Records Office. David Pollock. London: Action on Smoking and Health, 1999. ISBN 1 872428 444.

The British Civil Service documents everything, and eventually makes its papers available to researchers. David Pollock has used some of the papers provided in the Public Records Office at Kew in London to tell the story of how action on smoking was delayed between 1951 and 1964, coincidentally a period of Conservative government. Little did we know at the time how true the 1964 Labour election slogan "Thirteen Wasted Years" would prove to be.

Pollock's story is limited, for as he points out he has essentially investigated only one of the various sets of documents available, and his book is less a "political history" than an illustrated journey through official documents. But it is riveting reading and provides much splendid material to demonstrate the caution of civil servants, the short sightedness of politicians, and—as ever—the iniquities of the tobacco industry.

The story has plenty of gems but few stars. In 1947, when "a large scale statistical study" on smoking and lung cancer was under consideration, Austin Bradford Hill recommended ". . . a very good worker to whom it is well worth giving a wider experience in medical statistical work with an eye to the future . . .": a judgement about Richard Doll with which none would now argue. A few researchers such as Doll, Hill, Wynder, and Graham recognised the importance of tobacco. A desperately limited number of medical administrators and civil servants (especially in Scotland) sought early action. Horace Joules, a distinguished chest physician, led the early medical campaigners, but his views were often discounted because of his perceived "left wing bias". Among the bureaucrats, Sir George Godber characteristically became involved long before he was entitled to do so, and pressed every available

lever from behind the scenes. Charles Fletcher and Robert Platt set the first Royal College of Physicians report in train. But heroes such as these are few and far between.

Even some of the heroes were naive: they did little lobbying, and made the mistake of thinking that the industry's leaders were honourable. So the manufacturers received advance copies of Royal College of Physicians (RCP) and other reports, enabling their supporters and scientific lackeys to minimise any political damage.

Some of the early politicians did their best. They may not have got it all right (and who can blame them, given the paucity of information at the time) but some credit surely belongs to health ministers such as Iain Macleod and Enoch Powell, who refused to prevaricate and pressed for immediate action. And as science minister, Lord Hailsham reluctantly agreed to meet the industry, but told his office to "give me some nasty things to say . . .".

For the rest, there are villains and prevaricators. Prime ministers, cabinets, and ministers found every possible reason to avoid doing anything, from worrying that telling the public about the dangers of smoking might generate "cancer phobia" to concern for the Rhodesian economy. Even in 1962, the chancellor of the exchequer, Selwyn Lloyd, persuaded his colleagues that "it would be preferable that the government should not at this stage appear to be assuming a responsibility for 'discouraging' adults from smoking". Civil servants were generally cautious: some simply didn't like doctors ("by habit and training inclined to the pontifical in expressing their views", according to Miss Boyes of the Board of Trade), while a Mr Selby-Boothroyd felt that the first RCP report could be dismissed on the basis that people were divided into "soft shells", who were vulnerable to lung cancer, and "hard shells".

The tobacco manufacturers, of course used every possible device to question, deny, undermine, and oppose both the evidence and any worthwhile action. Mr (later Sir John) Partridge of Imperial Tobacco would not now be allowed by his company to concede, as he did in 1962, that the industry advertised "to young people"—but he and his colleagues used all the same techniques their successors use today: deny the evidence; denigrate the researchers; offer funding for irrelevant research; defend all forms of promotion; accept no restrictions; assert that the only worthwhile approach is (carefully limited) school based education. There is nothing new about the arguments they use today or their lobbying techniques.

What are the lessons? Perhaps above all, it is distressing to see how little has changed: only a few doctors and health professionals campaign for action on tobacco; most bureaucrats remain cautious; health generally loses out when it comes into conflict with more important government departments; politicians with the determination to act on tobacco are rare and are soon moved; and the tobacco manufacturers and their agents are if anything tougher and nastier than ever.

And in the UK, 50 years after Doll and Hill's first published reports and nearly 30 years after the first RCP report, just under 30% of adults still smoke, and literally millions have died because they smoked. *Denial and delay* shows that much of the responsibility for these deaths rests not only

with the tobacco industry, but also with its many active and passive allies in government.

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The horrors of smoking

Blood and smoke. Stephen King. New York: Simon & Schuster Audio, 1999, \$23.50 (audiocassette), \$27.50 (CD), 3.5 hours. ISBN 0671046160 (cassette)/0671046179 (CD)

I have never read a book by Stephen King. But I couldn't resist buying *Blood and smoke*, available only as an audiobook and read engagingly by King himself. It comes in a flip top box resembling a pack of Marlboros, and contains a CD or three audiocassette tapes, depending on the version you buy. The "book" is actually a series of three short stories, which, according to the packaging, take the listener "inside the world of yearning and paranoia, isolation and addiction . . . the world of the smoker". "The now politically incorrect habit plays a key role in the fates of three different men in three unabridged stories of unfiltered suspense."

In *Lunch at the Gotham Café*, Steve Davis is distraught after his wife leaves him. Two days later he quits smoking, after a 20 year history of smoking 20–40 cigarettes a day. For the next two weeks he suffers intense withdrawal from nicotine and his wife, until he meets her and her divorce lawyer for lunch at a Manhattan restaurant. While arguing at the table, they are attacked suddenly by a psychotic, knife-wielding maître d'. Davis fights him off bravely, saving his own life and that of his ungrateful wife. Afterwards he buys a pack of Marlboros and lights one up, but then tosses the cigarette in the gutter and stamps the pack with his foot. "I hadn't gone through this day just to start killing myself with tobacco again," he explains.

1408 is about Mike Enslin, a bestselling author of "true" ghost stories. While researching his book about haunted hotels, he stays in New York City's most haunted hotel room. Enslin quit smoking nine years ago after his brother died of lung cancer—"another fallen soldier in the tobacco wars". But the writer always carries a cigarette behind his ear, replacing it each day with a fresh one, explained as "part affectation, part superstition". In his 70 minutes in room 1408, Enslin experiences horrifying distortions of reality, and finds himself vanquished by "the room". He ignites his shirt with a hotel matchbook, and the room—perhaps

because of its distaste for "cooked meat"—allows him to flee into the corridor. The matches and the fire, ironically, save him from an "unspeakable end". Another hotel guest, returning from the ice machine, puts out Enslin's flames. However, Enslin is left with severe emotional and physical scars, and can no longer write—another in the long list of victims of room 1408.

In *the Deathroom* features Mr Fletcher, a *New York Times* reporter being interrogated in a Central American stronghold. Authorities are using electric shock to extract information from him about an upcoming Communist coup against the country's fascist dictatorship. Escobar, his chief interrogator, offers Fletcher a Marlboro—"the preferred cigarette of third world peoples everywhere". At first Fletcher, having quit smoking three years previously, declines. But at the moment of greatest peril, he accepts Escobar's offer. In launching his dramatic escape, he thrusts his lit Marlboro into the eye of one of his captors, grabs his gun, shoots three of his captors, and kills the fourth with his own electric shock machine. One month later, back home in New York City, Fletcher lives out a vision he had during his captivity. He buys a pack of Marlboro from a newsstand kiosk, smokes a cigarette, and then discards the rest of the pack. In a brief exchange, Fletcher and the vendor agree that smoking is a "very bad habit" and that "We're lucky to be alive".

Each of these stories is creative, suspenseful, and well narrated. Character

development is quite strong. As one reviewer on amazon.com commented, "this is bloody good stuff". My main interest in the stories, though, was in their portrayal of smoking. And King's treatment of the subject is unmistakably pro-health. Listeners are left with the clear message that smoking is harmful and addictive. A particularly compelling example is this excerpt from *Lunch at the Gotham Café*:

"There are two phases of withdrawal from tobacco, and I'm convinced that it's the second that causes most cases of recidivism. The physical withdrawal lasts 10 days to two weeks, and then most of the symptoms—sweats, headaches, muscle twitches, pounding eyes, insomnia, irritability—disappear.

"What follows is a much longer period of mental withdrawal. These symptoms might include mild to moderate depression, mourning, some degree of anhedonia (emotional flatness, in other words), forgetfulness, even a species of transient dyslexia. . . . The most common symptom of phase two withdrawal is a feeling of mild unreality. Nicotine improves synaptic transferral and improves concentration—widens the brain's information highway, in other words. It's not a big boost and not really necessary to successful thinking, although most confirmed cigarette junkies believe differently. But when you take it away, you're left with a feeling—a pervasive feeling in my case—that the world has taken on a decidedly dreamy cast."

Why has King focused on the evils of tobacco in *Blood and smoke*? The most likely reason is the trauma he suffered when he was hit by a Dodge van in June 1999, while walking alongside a country road in his hometown of Bangor, Maine. He was hospitalised for three weeks, underwent at least six operations to repair broken bones in his right leg and hip, and suffered broken ribs, a punctured lung, and a laceration of the scalp. He told the *Bangor Daily News* in August that he hadn't had a cigarette since the night before the crash. "I took the Dodge van cure," he quipped (www.bangornews.com/cgi-bin/article.cfm?storynumber=10392).

Two months later King told the Associated Press: "to be able to walk and talk and occasionally crawl on my belly like a reptile has made me intensely grateful to be alive." No doubt he recognises that smoking is incompatible with the joy of being alive. Now, with his message about tobacco in *Blood and smoke*, King aims to preach that gift of life to millions of others.

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