

What's in cigarettes and roll-your-own tobacco?

Cigarette smoke is a complex mixture of over 7000 chemicals.¹ These chemicals are present as:

- gases, such as carbon monoxide and hydrogen sulphide
- volatile organic compounds (VOCs), such as benzene, acetone and hydrogen cyanide
- part of tiny solid particles, such as nicotine and naphthalene.¹

Many of the chemicals in cigarette smoke come from burning tobacco; the remainder come from burning cigarette paper, agricultural chemicals left on the tobacco leaves, and chemicals added during the cigarette making process.¹⁻⁴

Once inhaled into the lungs, many of these chemicals pass through the lungs walls into the blood stream and go to every part of the body.⁵

Roll-your-own (RYO) tobacco

Research suggests that roll-your-own tobacco is at least as harmful, or possibly more harmful, than smoking factory-made cigarettes.⁶⁻⁹

Roll-your-own tobacco is similar to tobacco in factory-made cigarettes in that:

- Tobacco companies add similar additives to roll-your-own tobacco as they do to cigarettes, often in higher amounts than in factory-made cigarettes.¹⁰
- Most of the toxic chemicals in tobacco smoke come from burning the tobacco.⁴ Even smoking tobacco without any additives would be very harmful.

Tar

Tar is the sticky brown substance which can stain smokers' fingers and teeth yellow-brown.^{4, 11} It also stains the lung tissue.^{1, 12}

'Tar' describes the solid particles someone inhales when they draw on a lit cigarette.¹³ Each particle consists of a large variety of chemicals, including a number of cancer causing substances (carcinogens). The make-up of tar in smoke can vary between different types of cigarettes and tobacco: it may contain different ratios of carcinogens and other substances.^{1, 14, 15}

Nicotine

Nicotine is the drug in tobacco which causes addiction in people who smoke.¹ It is a highly toxic chemical and its manufacture, use and sale is controlled under the State Poisons Acts, except where it occurs in tobacco.^{16, 17} This exception of tobacco is for political reasons, not because nicotine is deemed 'safe' in cigarettes.¹⁸

Nicotine, once inhaled, affects the body very quickly. Within seconds, nicotine reaches the brain releasing dopamine, a 'brain reward' chemical. It causes changes to the structure and the working of the brain, which lead to and maintain nicotine addiction.^{1, 19}

Nicotine also raises heart rate, blood pressure, releases hormones affecting the central nervous system and affects the immune system.^{1, 16} It constricts small blood vessels under the skin so that the fingertips of people who smoke lose warmth after having a cigarette.¹ In the long term, nicotine plays a role in causing heart disease and other diseases of the blood vessels. It contributes to problems during pregnancy and affects the development of the baby's brain and lungs. Nicotine also harms the developing adolescent brain.¹⁶

Nicotine replacement therapy products, used as quitting aids, are regulated.¹⁷ These safer forms of nicotine, that is nicotine gum, patches, lozenges, mouth spray and the inhalator, are sold by pharmacies and some supermarkets.

Carbon monoxide

Carbon monoxide is a poisonous gas which is also found in car exhaust fumes. In large quantities, carbon monoxide quickly causes death. It is created when burning something containing carbon, such as tobacco.^{1, 20}

Carbon monoxide binds to red blood cells replacing some of the oxygen they normally carry. It also makes it harder for red blood cells to release oxygen to cells in the body. This means it harder for the body to get oxygen to the organs and muscles, especially during exercise. People who smoke can have up to 10 times the amount of carbon monoxide in their bloodstream than non-smokers.^{1, 21}

Metals

Several metals have been detected in tobacco smoke.¹ Some are known to cause cancer including cadmium, arsenic, beryllium, chromium, nickel, cobalt, lead, and the radioactive element polonium 210.²

For more information about the chemicals in cigarettes, you can read Chapter 3, A report of the U.S. Surgeon General. How tobacco causes disease. Available at

<https://www.ncbi.nlm.nih.gov/books/NBK53017/>

Chemicals in tobacco smoke and disease

Tobacco smoke has many different effects on health. It causes or is associated with over forty different diseases or conditions, including cancer, emphysema, heart disease and stroke.^{5, 13, 16} A single disease may be caused by several different chemicals in cigarette smoke.¹

Cancer

More than 70 carcinogens (cancer causing substances) have been identified in tobacco smoke.¹³ Smoking causes cancer of the lung, throat, voice box, mouth, tongue, nose, nasal sinus, oesophagus, pancreas, bladder, stomach, liver, kidney, ureter, cervix, ovary, bowel and bone marrow.^{5, 13, 16} Research shows that the greater the number of cigarettes and years a person smokes, the higher the risk of developing a smoking related cancer.^{5.}¹³ Carcinogens in tobacco smoke include 1,3-butadiene, polycyclic aromatic hydrocarbons (PAHs), N-nitrosamines, aromatic amines, benzene, aldehydes, metals, and more.^{2, 13}

Heart disease, stroke and diseases of the blood vessels

These diseases result from chemicals in tobacco smoke damaging blood vessel walls, causing blood clots and reducing the supply of oxygen to the body. Tobacco smoking speeds up the build-up of fatty material on blood vessel walls, which over time blocks the blood vessels.^{1, 5}

Chemicals in tobacco smoke responsible for these diseases include carbon monoxide, cyanide, arsenic, nicotine, nitrous oxides, oxidising chemicals, free radicals and the particles of tar.¹

Lung disease (other than cancer)

Chemicals in tobacco smoke damage the lungs' cleaning system. Every time we breathe, we inhale particles including dust, toxic substances, viruses and bacteria.¹ These particles become trapped on a blanket of mucus on the surface of the airways and are swept out of the lung by tiny hairs (cilia) beating together like a wave. Chemicals in smoke directly

damage cilia and affect the mucus layer.²²⁻²⁴ When this cleaning system is impaired, it increases the risk of infection and allows toxic substances to build up in the lungs over time.¹

Tobacco smoke also damages the protective layer of lung cells under the mucus layer and impairs the immune system. This leads to the lungs becoming inflamed and also increases the risk for infection.^{1, 12, 25}

People who smoke are more likely to develop chest illnesses such as bronchitis, influenza, legionnaires disease and pneumonia.^{5, 26} Long term lung disease caused by smoking includes chronic bronchitis (coughing with phlegm) and chronic obstructive pulmonary disease (COPD) where it becomes increasingly difficult to breathe. COPD is caused by narrowing and thickening of the small airways and permanently damaged air sacs (emphysema).¹ Smoking also worsens asthma.¹⁶

Chemicals in smoke involved in lung disease are many, and include hydrogen cyanide, formaldehyde, acrolein, acetaldehyde, nitrous oxides, cadmium, free radicals, and oxidising agents.¹

Agricultural chemicals and additives

In Australia, tobacco is not classified as a food or a drug.^{17, 27} Therefore there are no standards or controls on what may be used or left on tobacco, including agricultural chemicals and additives.

Herbicides, insecticides, fungicides, fertilisers and other agricultural chemicals are routinely used in tobacco growing.^{3, 28, 29} As Australia imports all of its tobacco,³⁰ it is unknown which agricultural chemicals may be present in cigarettes made and sold here.

Additives are chemicals added to cigarettes in the manufacturing process.¹⁶ They serve a number of different purposes.

- To add flavour. Flavourings include sugar, honey, liquorice, cocoa, and chocolate liquor. These sweeteners lessen the harshness of the smoke.^{1, 31} Tobacco companies also put flavour 'capsules' in the filters of some cigarettes, which release a burst of flavour when crushed by the person smoking it.^{32, 33} They appear to be a marketing tool which tends to appeal to younger people who smoke.^{32, 34, 35}
- To lessen the irritating effects of smoke, especially for people new to smoking. Menthol and eugenol numb the throat.^{1, 31, 36}
- To change the chemistry of nicotine. Ammonium salts and acetaldehyde (from burning added sugar) increase nicotine's addictive potential.^{1, 31}

- To change smoker's bodies. Chemicals in liquorice and cocoa act to open the airways, so that more nicotine and tar goes deeper into smokers' lungs. Other additives affect the brain of people who smoke to make them more receptive to nicotine.³¹
- To mask the smell and visibility of smoke from the end of a burning cigarette. This might reduce other people's annoyance, but it doesn't reduce the health risks of secondhand smoke.^{31, 37}
- To keep the tobacco moist, to control the burn temperature, and to treat the cigarette paper.^{1, 3}

There are a number of problems with additives:

- Additives such as sugar and honey might seem harmless because we are used to eating them. But when additives in cigarettes are burnt, they can change into different chemicals, and some are toxic. For example, liquorice and sugar produce cancer-causing chemicals when burnt. Also, these substances are inhaled into the lungs, which are delicate and much more vulnerable to harm than the stomach and intestines.^{1, 31} Blood carrying harmful substances coming from the gut is detoxified by the liver before being sent around the body. However, blood from the lungs goes straight into the body without passing through the liver first.¹
- The health effects of additives on people who smoke are not made public by the tobacco companies, and many may not be known at all.³¹
- Some additives make tobacco smoke less harsh and taste better. It may make it easier for children to learn to smoke and make smoking more agreeable to people who smoke.^{1, 31}

Cigarettes that claim to have no additives are not necessarily safer than those that have them. The cigarette smoke will still contain agricultural chemicals, carbon monoxide, cancer-causing tar, and more.^{1, 3}

Disclosure of and restrictions on additives

In 2023, the Australian Parliament passed the Public Health (Tobacco and Other Products) Bill. This legislation requires that tobacco companies submit a report listing the ingredients in their tobacco products to the Department of Health and Aged Care who will publish the results. The Bill enables the Australian government to restrict ingredients added to tobacco, including flavours, and bans accessories such as flavour capsules in filters.³⁸ This law will come into full effect from April 1st 2025.³⁹

Tobacco companies had provided lists of their ingredients to the Department of Health and Aged Care under a voluntary agreement.^{40, 41} These were published up to 2020 [here](#).⁴²

Other countries such as New Zealand, the United States and the European Union have legislation requiring companies to inform the governments of all additives they use.^{16, 43, 44} [Several countries](#), including the United States, Canada and the European Union, restrict which additives tobacco companies are allowed to use.⁴¹

Currently most Australian states and territories have legislation that allows the ban of tobacco products with an obvious 'fruity, sweet or confectionary-like character'.⁴⁵⁻⁵¹ The legislation doesn't ban any particular additive, menthol flavoured products or products with subtle flavours or sweeteners.

Cigarette design

How much do smokers inhale?

There is no 'set' amount of nicotine, tar and other chemicals delivered by any cigarette to the person smoking it. Different people can inhale very different amounts of chemicals from a similar cigarette, depending how they smoke it. This means they can inhale high amounts of chemicals from a cigarette that tastes less harsh or weaker than others.^{1, 14, 52}

Nicotine

Addiction to nicotine is a major reason for continuing to smoke.¹ In general, people who smoke will absorb between 0.3mg to 2mg of nicotine per cigarette: the average dose is about 1 mg to 1.5 mg per cigarette.^{53, 54} Most cigarettes are designed by tobacco companies to deliver as much nicotine as the person needs to maintain their addiction, regardless whether the cigarette tastes weak or harsh.^{52, 55}

Weaker-tasting cigarettes

The main way to make a cigarette taste weaker is to dilute the cigarette smoke with air, by putting air vent holes in the filter.^{14, 52} Most cigarette brands in Australia have air vents in the filter.⁵⁵ Tests show that in brands of weaker-tasting cigarettes it is common for up to half of the 'smoke' to be made up of air sucked in via the vents (when they are not blocked). For the weakest-tasting cigarettes, most of the 'smoke' is made up of air from the vents.⁵⁶

Smoking behaviour and smoke intake

In order to get the nicotine they need, people who switch from their usual brand to weaker-tasting cigarettes may increase the amount of smoke they inhale by doing the following:

- They learn to compensate by taking larger and longer puffs, and by taking more puffs from a cigarette. More intensive smoking also increases the ratio of tar to nicotine.⁵²

- They can easily block the air vent holes in the filter, usually by accident with their lips and fingers, and so they receive more smoke and less air.⁵²
- Some people will smoke more cigarettes per day.⁵²

In this way, people who smoke weaker-tasting cigarettes can inhale just as much toxic chemicals as people who smoke harsher cigarettes.

Health risks of weaker-tasting cigarettes

There is no evidence that people who smoke weaker-tasting cigarettes have less risk of smoking-related diseases than people who smoke other cigarettes.^{16, 52} Research estimates that two in three people who smoke all their life will die from their addiction.⁵⁷⁻⁶⁰

In 2005 the Australian Competition and Consumer Commission (ACCC) ruled that labelling cigarette packets 'light' or 'mild' was misleading conduct, as such descriptions may mislead consumers into thinking they are less harmful. The ACCC obtained undertakings from the tobacco companies to remove these descriptions on cigarette packets.⁵⁵

However, the tobacco companies now use other words and phrases on some packs which continue to suggest that some cigarettes may be safer than others.⁶¹ They include white, yellow, silver, gold, ultimate, fine, subtle, and phrases such as "infinite white" or "silver fine scent".⁶² Under the Public Health (Tobacco and Other Products) Bill, these types of misleading terms will be restricted.³⁸

In summary, there is no safe cigarette and no safe level of use.¹

Please note: this information is for general use only. Please consult your health professional for further advice.

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References

1. United States. Dept. of Health and Human Services. How tobacco smoke causes disease: the biology and behavioral basis for smoking-attributable disease: a report of the Surgeon General. Rockville, MD: U.S. Dept. of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2010.
2. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. Tobacco smoke and involuntary smoking. Lyon, France: International Agency for Research on Cancer; 2004.
3. Chapman S. "Keep a low profile": pesticide residue, additives, and freon use in Australian tobacco manufacturing. *Tobacco Control* 2003;12 Suppl 3:iii45-53.
4. Bates C, McNeill A, Jarvis M, Gray N. The future of tobacco product regulation and labelling in Europe: implications for the forthcoming European Union directive. *Tobacco Control* 1999;8(2):225-35.
5. United States. Department of Health and Human Services. The health consequences of smoking: a report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2004.
6. Shahab L, West R, McNeill A. A comparison of exposure to carcinogens among roll-your-own and factory-made cigarette smokers. *Addiction Biology* 2009;14(3):315-20.
7. Young D, Borland R, Hammond D, Cummings KM, Devlin E, Yong HH, et al. Prevalence and attributes of roll-your-own smokers in the International Tobacco Control (ITC) Four Country Survey. *Tobacco Control* 2006;15 (Suppl 3):iii76-iii82.
8. Koszowski B, Rosenberry ZR, Viray LC, Potts JL, Pickworth WB. Make your own cigarettes: toxicant exposure, smoking topography, and subjective effects. *Cancer Epidemiology, Biomarkers & Prevention* 2014;23(9):1793-803.
9. Young D, Wilson N, Borland R, Edwards R, Weerasekera D. Prevalence, correlates of, and reasons for using roll-your-own tobacco in a high RYO use country: findings from the ITC New Zealand survey. *Nicotine & Tobacco Research* 2010;12(11):1089-98.
10. Edwards R. Roll your own cigarettes are less natural and at least as harmful as factory rolled tobacco. *BMJ* 2014;348:f7616.
11. Hausteil K-O. Tobacco or health? : Physiological and social damages caused by tobacco smoking. Berlin New York: Springer; 2003.
12. Hogg JC. Pathophysiology of airflow limitation in chronic obstructive pulmonary disease. *Lancet* 2004;364(9435):709-21.
13. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. A review of human carcinogens. Part E: Personal habits and indoor combustions. Lyons, France: International Agency for Research on Cancer; 2012.
14. Shopland DR, National Cancer Institute (U.S.). Smoking and Tobacco Control Program. The FTC cigarette test method for determining tar, nicotine, and carbon monoxide yields of U.S. cigarettes. Bethesda, Md.: U.S. Dept. of Health and Human Services Public Health Service National Institutes of Health; 1996.
15. Burns DM, Dybing E, Gray N, Hecht S, Anderson C, Sanner T, et al. Mandated lowering of toxicants in cigarette smoke: a description of the World Health Organization TobReg proposal. *Tobacco Control* 2008;17(2):132-41.

16. United States. Dept. of Health and Human Services. The health consequences of smoking - 50 years of progress: a report of the Surgeon General. Rockville, MD: U.S. Dept. of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.
17. Therapeutic Goods Administration. Standard for the Uniform Scheduling for Medicines and Poisons. No.16. February 2017. In. Canberra: Australian Government Department of Health; 2017. p. 667.
18. Gray N. Reflections on the saga of tar content: why did we measure the wrong thing? *Tob Control* 2000;9(1):90-4.
19. Benowitz NL. Nicotine addiction. *New England Journal of Medicine* 2010;362(24):2295-2303.
20. Weaver LK. Clinical practice. Carbon monoxide poisoning. *N Engl J Med* 2009;360(12):1217-25.
21. Rodrigo C. The effects of cigarette smoking on anesthesia. *Anesthesia Progress* 2000;47(4):143-150.
22. Leopold PL, O'Mahony MJ, Lian XJ, Tilley AE, Harvey BG, Crystal RG. Smoking is associated with shortened airway cilia. *PLoS One* 2009;4(12):e8157.
23. United States. Department of Health and Human Services. The health consequences of smoking: chronic obstructive lung disease : a report of the Surgeon General. Rockville, Maryland: U.S. Dept. of Health and Human Services, Public Health Service, Office on Smoking and Health; 1984.
24. Stanley PJ, Wilson R, Greenstone MA, MacWilliam L, Cole PJ. Effect of cigarette smoking on nasal mucociliary clearance and ciliary beat frequency. *Thorax* 1986;41(7):519-23.
25. Stampfli MR, Anderson GP. How cigarette smoke skews immune responses to promote infection, lung disease and cancer. *Nature reviews. Immunology* 2009;9(5):377-84.
26. Arcavi L, Benowitz NL. Cigarette smoking and infection. *Archives of internal medicine* 2004;164(20):2206-2216.
27. Australian Pesticides and Veterinary Medicines Authority. Agricultural and Veterinary Chemicals Code Instrument No. 4 (MRL Standard) 2012. In: Part 1 - Preliminary. Canberra: Australian Government; 2017.
28. Chapman S. Come to where the flavour is: additives and pesticide residue in cigarettes. *Drug Alcohol Rev* 1992;11(1):3-6.
29. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Tobacco smoking. Volume 38. France: World Health Organisation; 1986.
30. Winstanley M, Freeman B. Chapter 10. The tobacco industry in Australian society. In: Scollo M, Winstanley M, eds. Tobacco in Australia: Facts and Issues. Melbourne: Cancer Council Victoria; 2010. Available from: <http://www.tobaccoinaustralia.org.au/chapter-10-tobacco-industry>.
31. Bates C, Jarvis DM, Connolly DG. Tobacco additives: cigarette engineering and nicotine addiction. A survey of the additive technology used by cigarette manufacturers to enhance the appeal and addictive nature of their product. London: Action on Smoking and Health, UK. Imperial Cancer Research Fund; 1999. Available from: <http://ash.org.uk/information-and-resources/tobacco-industry-information-and-resources/tobacco-additives-cigarette-engineering-and-nicotine-addiction/>. Accessed 4th April, 2017.
32. Thrasher JF, Abad-Vivero EN, Moodie C, O'Connor RJ, Hammond D, Cummings KM, et al. Cigarette brands with flavour capsules in the filter: trends in use and brand perceptions among smokers in the USA, Mexico and Australia, 2012-2014. *Tobacco Control* 2016;25(3):275-83.
33. Scollo M, Occleston J, Bayly M, Lindorff K, Wakefield M. Tobacco product developments coinciding with the implementation of plain packaging in Australia. *Tobacco Control* 2015;24(e1):e116-22.

34. White V, Williams T, Centre for Behavioural Research in Cancer, The Cancer Council Victoria. Australian secondary school students' use of tobacco in 2014 Canberra: Tobacco Control Taskforce, Australian Government Department of Health; October 2015. Available from: [http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/Publishing.nsf/content/BCBF6B2C638E1202CA257ACD0020E35C/\\$File/Tobacco%20Report%202014.PDF](http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/Publishing.nsf/content/BCBF6B2C638E1202CA257ACD0020E35C/$File/Tobacco%20Report%202014.PDF).
35. Hanley-Jones S, Wood L, Letcher T, Winstanley M. 5.13 Products and packaging created to appeal to new users. In: Greenhalgh E, Scollo M, Winstanley M, editors. Tobacco in Australia: Facts & issues. Melbourne: Cancer Council Victoria; 2022. Available from: <https://www.tobaccoinaustralia.org.au/chapter-5-uptake/5-13-products-and-packaging-created-to-appeal-to-n>.
36. Tobacco Products Scientific Advisory Committee. Menthol cigarettes and public health: Review of the scientific evidence and recommendations. Rockville, MD: U.S. Food and Drug Administration, U.S. Department of Health and Human Services; 2011. Available from: <https://www.fda.gov/downloads/advisorycommittees/committeesmeetingmaterials/tobaccoproductsscificadvisorycommittee/ucm269697.pdf>.
37. Connolly GN, Wayne GD, Lymperis D, Doherty MC. How cigarette additives are used to mask environmental tobacco smoke. *Tobacco Control* 2000;9(3):283-291.
38. Parliament of Australia. Public Health (Tobacco and Other Products) Bill 2023. A Bill for an Act to discourage the use of tobacco and other products, and for related purposes. Dec 2023. Available from: [https://www.aph.gov.au/Parliamentary_Business/Bills_LEGislation/Bills_Search_Results/Result?bld=r7083#:~:text=Summary,-cigarette%20\(vaping\)%20products](https://www.aph.gov.au/Parliamentary_Business/Bills_LEGislation/Bills_Search_Results/Result?bld=r7083#:~:text=Summary,-cigarette%20(vaping)%20products).
39. Butler M. Laws begin a new era of tobacco control. Canberra: Ministers, Department of Health and Aged Care; 7 December 2023. Available from: <https://www.health.gov.au/ministers/the-hon-mark-butler-mp/media/laws-begin-a-new-era-of-tobacco-control>.
40. Commonwealth of Australia, Department of Health and Aged Care. Voluntary agreement for the disclosure of the ingredients of cigarettes. In: Australian Department of Health and Aged Care, editor. Canberra: Australian Government. Department of Health; December 2000.
41. Winnall W. 12.6 Additives and flavourings in tobacco products. In: Greenhalgh E, Scollo M, Winstanley M, editors. Tobacco in Australia: Facts & issues. Melbourne: Cancer Council Victoria; 2022. Available from: <https://www.tobaccoinaustralia.org.au/chapter-12-tobacco-products/12-6-additives-and-flavourings-in-tobacco-products>.
42. Australian Government. Department of Health and Aged Care. Australian cigarette ingredient information. Canberra: Australian Government. Department of Health and Aged Care; 2018. Available from: <https://www.health.gov.au/resources/collections/australian-cigarette-ingredient-information>.
43. Smoke-free Environments Act 1990. Reprint as at 4 April 2016. New Zealand. 1990. Available from: <http://www.legislation.govt.nz/act/public/1990/0108/latest/DLM223191.html#DLM224377>.
44. Directive 2014/40/EU of the European Parliament and the Council of 3 April 2014 on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related products and repealing Directive 2001/37/EC. European Union. 2014. Available from: https://ec.europa.eu/health/sites/health/files/tobacco/docs/dir_201440_en.pdf.
45. Tobacco Act 1987. Version No. 084. No. 81 of 1987. Version incorporating amendments as at 1 July 2015. Victoria. 1987. Available from: http://www.austlii.edu.au/cgi-bin/sinodisp/au/legis/vic/consol_act/ta198773/s1.html?stem=0&synonyms=0&query=Tobacco%20Act.

46. *Tobacco and Other Smoking Products Act 1927* (ACT), s 21. See notice contained in Tobacco (Prohibited Smoking Products) Declaration 2011 (No 1) (Notifiable instrument NI2011-584).
47. *Tobacco Control Act* (NT), section 30.
48. *Tobacco and other Smoking Products Act 1998* (QLD), s 26ZT.
49. *Public Health (Tobacco) Act 2008* (NSW), s 29. See notice contained in New South Wales Government Gazette dated 15 January 2010, at 136.
50. *Public Health Act 1997* (TAS), s 68A(c)-(e). 1997.
51. *Tobacco Products Regulation Act 1997* (SA), s 34A. See notice contained in South Australian Government Gazette dated 10 August 2006, at 2640.
52. National Cancer Institute. Risks associated with smoking cigarettes with low machine-measured yields of tar and nicotine. Bethesda, MA: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; 2001.
53. Hukkanen J, Jacob P, 3rd, Benowitz NL. Metabolism and disposition kinetics of nicotine. *Pharmacological reviews* 2005;57(1):79-115.
54. Benowitz NL, Hukkanen J, Jacob P, 3rd. Nicotine chemistry, metabolism, kinetics and biomarkers. *Handbook of Experimental Pharmacology* 2009;(192):29-60.
55. King B, Miller C, Scollo M. Tobacco in Australia: Facts and Issues. Chapter 12. The construction and labelling of Australian cigarettes. In: Scollo MM, Winstanley MH, eds. Tobacco in Australia: Facts and Issues. 4th ed. Melbourne: Cancer Council Victoria; 2012. Available from: <http://www.tobaccoinaustralia.org.au/chapter-12-tobacco-products>.
56. Kozlowski LT, Mehta NY, Sweeney CT, Schwartz SS, Vogler GP, Jarvis MJ, et al. Filter ventilation and nicotine content of tobacco in cigarettes from Canada, the United Kingdom, and the United States. *Tobacco Control* 1998;7(4):369-75.
57. Banks E, Joshy G, Weber MF, Liu B, Grenfell R, Egger S, et al. Tobacco smoking and all-cause mortality in a large Australian cohort study: findings from a mature epidemic with current low smoking prevalence. *BMC Medicine* 2015;13:38.
58. Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 years' observations on male British doctors. *British Medical Journal* 2004;328(7455):1519-1528.
59. Jha P, Ramasundarahettige C, Landsman V, Rostron B, Thun M, Anderson RN, et al. 21st-century hazards of smoking and benefits of cessation in the United States. *New England Journal of Medicine* 2013;368(4):341-50.
60. Pirie K, Peto R, Reeves GK, Green J, Beral V. The 21st century hazards of smoking and benefits of stopping: a prospective study of one million women in the UK. *Lancet* 2013;381(9861):133-41.
61. Greenhalgh EM, Grace C, Haslam I, Scollo M, Tumini V, Freeman B, et al. Chapter 11. Tobacco advertising and promotion. In: Scollo M, Winstanley M, eds. Tobacco in Australia: Facts and Issues. Melbourne: Cancer Council Victoria; 2016. Available from: <http://www.tobaccoinaustralia.org.au/chapter-11-advertising>.
62. NSW Australian Retail Tobacco Traders' Association. Cigarettes. Australian Retail Tobacconist 2016:16.