



Properties of “light” cigarettes sold in New Zealand

“Light” or “mild” cigarettes have historically been marketed to appeal to health concerned smokers, and positioned as an alternative to quitting.¹ But despite this marketing strategy, there is evidence that “light” cigarettes often deliver as much tar as regular cigarettes.² Furthermore, there is epidemiological evidence that suggests no significant health benefit in terms of lung cancer, heart disease or chronic lung disease for smoking “light” versus other cigarettes.^{2,3}

Even more concerning is that the marketing appears to work in that there is evidence that smokers do indeed use “lights” as an alternative to quitting.⁴ In New Zealand, there is also some local survey evidence that smokers believe that “light” cigarettes do less harm than regular cigarettes.⁵ In response to misleading marketing around “lights”, the Framework Convention on Tobacco Control (FCTC)⁶ requires ratifying countries to enact laws that prohibit misleading descriptors and specifically mentions the terms: “light”, “mild”, “ultra-light”, and “low tar”.

As part of the New Zealand arm of the International Tobacco Control Policy Evaluation Survey (ITC Project), we purchased factory-made cigarettes of the 11 leading cigarette varieties in New Zealand (based on sales figures⁷).

Purchases were made in August 2007 at two urban supermarkets (suburban and central Wellington) and a store in a rural town (in the Wairarapa) with six packs of each variety per location. One pack of each variety was used for physical property testing (at Roswell Park Cancer Institute) and four packs of each variety were used in the emissions testing using both the ISO and Canadian Intense conditions testing regimens at an independent contract laboratory (Labstat International, Kitchener, Ontario, Canada).

The Canadian regime more closely mimics real-life smoking, as it involves blocking cigarette vent holes to enhance nicotine delivery. Five cigarettes per pack were tested and the product testing followed methods previously reported.^{8,9} A full description of the methods and results are available in an online report.¹⁰ We undertook comparisons between brands marked “light” or “mild” (n=4) and other cigarettes (n=7), and these are reported herein.

For most characteristics, the “lights” were fairly similar to regular cigarettes (e.g. for: cigarette length, filter length, wet weight, dry weight, tipping paper length, vacuum porosity, pressure porosity etc). All variants tested had vent holes except for one regular brand variant. However, “lights” were significantly more ventilated (34% vs 8% on average) and this was associated with a lower pressure drop or “draw resistance” (see Table 1).

At first glance at the table, “lights” might appear less health damaging than regular cigarettes due to lower levels of tar and carbon monoxide (CO) inhaled per cigarette (Table). However, the differences between regular brands and “lights” for tar and nicotine yields were less (and some differences were not statistically significant e.g. for CO) for the Canadian test that is thought to better approximate actual smoker

behaviour than with the ISO test. Importantly though, studies of smokers' behaviour show that they generally smoke to achieve specific levels of nicotine delivery, and will inhale deeper and take more puffs when smoking lower nicotine content cigarettes (as reviewed by Hammond et al¹¹). In doing so they will also inhale more tar, CO and other toxic constituents. Therefore, other relevant measures are the ratios of tar to nicotine and CO to nicotine (last four rows in the Table), as this gives an indication of the amount of tar and CO that will be inhaled to receive a given dose of nicotine.

Table 1. Test results for brand variants of “lights” and regular factory-made cigarettes which are popular in the New Zealand market

Property*	Regular brand variants (average results – 7 variants)**	“Light” brand variants (average results – 4 variants)**	Test for difference (ANOVA unless indicated otherwise)
<i>Physical properties (showing those with significant differences)</i>			
Pressure drop (mm water)	110.21	101.63	p < 0.001
Ventilation (%)	7.58	33.91	p < 0.001 (NP)
Filter weight (g)	0.11	0.13	p < 0.001 (NP)
<i>Tar levels</i>			
ISO tar average inhaled per cigarette (mg)	12.64	8.47	p < 0.001 (NP)
Canadian tar average inhaled per cigarette (mg)	31.87	28.38	p < 0.001
ISO tar per puff (mg)	1.61	1.09	p < 0.001 (NP)
Canadian tar per puff (mg)	3.10	2.96	p = 0.020
<i>Nicotine levels</i>			
ISO nicotine average inhaled per cigarette (mg)	1.10	0.76	p < 0.001 (NP)
Canadian nicotine average inhaled per cigarette (mg)	2.46	2.09	p < 0.001 (NP)
ISO nicotine per puff (mg)	0.14	0.10	p < 0.001 (NP)
Canadian nicotine per puff (mg)	0.24	0.22	p < 0.002 (NP)
<i>Carbon monoxide levels</i>			
ISO carbon monoxide average inhaled per cigarette (mg)	10.99	7.60	p < 0.001
Canadian carbon monoxide average inhaled per cigarette (mg)	24.52	23.81	p = 0.11

Property*	Regular brand variants (average results – 7 variants)**	“Light” brand variants (average results – 4 variants)**	Test for difference (ANOVA unless indicated otherwise)
ISO carbon monoxide per puff (mg)	1.40	0.98	p < 0.001
Canadian carbon monoxide per puff (mg)	2.39	2.50	p = 0.97 (NP)
<i>Ratios of tar/CO to nicotine</i>			
ISO tar ratio (mg tar per mg nicotine)	11.51	11.34	p = 0.011 (NP)
Canadian tar ratio (mg tar per mg nicotine)	12.95	13.79	p = 0.20 (NP)
ISO carbon monoxide ratio (mg CO per mg nicotine)	10.03	10.48	p = 0.64 (NP)
Canadian carbon monoxide ratio (mg CO per mg nicotine)	9.98	11.68	p = 0.004 (NP)

* For full definitions and details of the brands, see the full online report.¹⁰

** In each of these categories there were two of the same brands which had both “regular” and “light” variants that were tested.

NP – Non-parametric test (Kruskal Wallis test for two groups) comparing medians was used where variances were not homogeneous and analysis of variance (ANOVA) was not appropriate.

These results indicate that the “lights” smokers who block vent holes with their fingers (as to some extent mimicked by the Canadian test method), would potentially obtain higher doses of tar and CO per dose of nicotine inhaled (with the latter being statistically significant). Higher tar to nicotine ratios for a “light” versus a regular brand have been described previously for New Zealand cigarettes, but only two brands were tested.¹²

In conclusion the results show that the amount of tar, CO and nicotine per cigarette were fairly similar (especially when considering the Canadian test results). Also the yield of CO per dose of nicotine was significantly higher for the “lights” compared to regular brands when using the test method where vent holes were blocked. Therefore for smokers who block vent holes with their fingers (as they can do unknowingly, or as a compensatory behaviour) to achieve delivery of a specified level of nicotine (as most do), “lights” may result in as great or greater exposure to toxic constituents. Hence smoking “lights” will probably be at least as hazardous as smoking regular cigarettes, despite the impression given by the marketing of “lights” being a less toxic alternative. This provides a plausible mechanism for the epidemiological observations of no difference in risk of adverse health effects between smokers of “light” and regular cigarettes.

These findings should strengthen the hands of authorities in New Zealand such as the Commerce Commission which is currently investigating misleading tobacco product marketing. Other jurisdictions (eg, the European Union, Australia, and Canada) have all banned misleading descriptors from cigarette packs, and there are calls for plain

packaging for tobacco products so as to eliminate the potential for all misleading marketing (eg, via colours, wording and imagery).¹³

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