

Higher Nicotine Levels in Cigarettes May Be Beneficial

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BUFFALO, N.Y., Sept. 11 /PRNewswire/-- A recent press release from The Massachusetts Department of Public Health (“MDPH”), [“NICOTINE IN CIGARETTES INCREASES SIGNIFICANTLY SINCE 1998: DPH Report”](#) (“MDPH Release”), highlights findings from its report titled, [“CHANGE IN NICOTINE YIELDS 1998–2004”](#) (“MDPH Report”). The following is analysis of the above documents by 22nd Century Limited, LLC.

Despite an attempt to provide pivotal information to benefit public health, the MDPH Release and MDPH Report focus attention on nicotine, while totally disregarding “tar” and carbon monoxide (CO). It is widely accepted that exposure to “tar” and CO are much more harmful to smokers than nicotine.¹⁻⁴ Although nicotine is the “addictive” substance in cigarette smoke, it is relatively benign to existing smokers compared to other smoke components, such as “tar” and CO. The MDPH Release fails to even mention “tar” or CO.

One finding of the MDPH Report is, “Overall, nicotine yields increased ten percent from 1998 – 2004.” Although it appears paradoxical to the MDPH’s purported implications for public health, these increases in nicotine yields may have been beneficial to smokers of the subject brands, since they may have inhaled less smoke from their cigarettes produced in 2004 compared to 1998. Published research studies and analyses of smoking behavior have indicated an inverse relationship between nicotine concentration in cigarette smoke and the amount of smoke that smokers actually inhale.²⁻⁶

From a public health perspective, the MDPH Report would have been much more meaningful if “tar” and carbon monoxide yields were also measured in relation to nicotine yields. A 656-page report titled, *Clearing the Smoke, Assessing the Science Base for Tobacco Harm Reduction* (“IOM Report”), by the Institute of Medicine of the National Academy of Sciences,¹ affirms, “Retaining nicotine at pleasurable or addictive levels while reducing the more toxic components of tobacco is another general strategy for harm reduction.”

Although the MDPH Release states, “Increased levels of nicotine may make it more difficult for the average smoker to quit,” there is no scientific evidence to support this. Within the nicotine range of popular cigarette brands, no scientific evidence suggests that cigarettes with higher nicotine levels are associated with smoking being more addictive. A paper by Harvard Health Publications titled, *Nicotine: It may have a good side*, states, “nicotine, unlike many other addictive drugs, doesn’t behave in a simple additive manner as the dose increases.”⁷ Smokers desire certain amounts of nicotine at different times, no more or less.⁸ Too much nicotine at once becomes unpleasant to the smoker.

Regrettably, the MDPH Release does not mention the phenomena of compensatory smoking, also known as compensation,^{9,10} despite the fact that the nicotine yields in the MDPH report are based on its own smoking-machine method “developed to reflect compensation techniques.” Human smoking behavior is primarily driven by nicotine seeking. Compensatory smoking essentially means over smoking (smoking more intensely) to obtain the desired nicotine impact or under smoking (smoking less intensely) due to the increased presence of nicotine. The manner in which a smoker may compensate includes the frequency of puffs per cigarette, volume of smoke inhalation of these puffs, time the inhaled smoke is held before exhaling, and the number of cigarettes smoked per day. Some smokers engage in compensatory smoking of low-yield cigarettes, namely with “lights” and “ultra lights.” This mainly occurs due to the reduced presence of nicotine in smoke.

The conclusions presented in the MDPH Release and MDPH Report were based solely on results obtained from smoking-machine data, and therefore do not necessarily predict nicotine intake by smokers. Results from smoking behavioral studies on individual smokers are far more conclusive in evaluating the impact of varying nicotine levels on public health.

The IOM Report¹ on page 533 specifically recommends using a low-tar/moderate-nicotine (nicotine-enriched) cigarette for evaluation in human clinical trials. It states, “Potential advantages of this trial are that the low-tar/moderate-nicotine product, if it reduces harm, could be used as a reference product for future regulation of marketed products.”

As announced in October of 2005, 22nd Century Limited, LLC is genetically modifying tobacco cultivars for increased nicotine content for use in less hazardous cigarettes. After field trials in the spring of 2007, 22nd Century is planning rigorous, short-term, human-exposure studies to measure differences in exposure levels to tobacco toxins from cigarettes with varying nicotine levels.

22nd Century believes that these studies will substantiate that a higher nicotine concentration in cigarette smoke will effectively reduce compensatory smoking of low-yield cigarettes, thereby substantially reducing exposure to most harmful tobacco smoke components, including “tar” and CO. Joseph Pandolfino, the company’s president states, “The expected result is that smokers will inhale less daily average tobacco smoke by smoking fewer cigarettes per day and/or smoking less of each cigarette.

It is imperative that public policy decision makers, including the U.S. Congress, only consider scientific facts when legislating tobacco policy.

About 22nd Century Limited, LLC

22nd Century, founded in 1999, is a plant biotechnology company focused on the development of relevant and differentiated products produced from genetically-engineered (GE) *Nicotiana* plants. The company develops innovative plant lines with combinations of new and/or enhanced traits. 22nd Century's two main business areas which utilize GE tobacco leaf are potential reduced-exposure products (PREPs) and novel biomass crops for sources of renewable energy and other products. Pertaining to PREPs, the company is developing nicotine-free tobacco lines that may be used as a bridge to smoking cessation and nicotine-enriched tobacco lines to be used for less hazardous cigarettes for smokers who will not or cannot quit.

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