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Would alternate tobacco products use be better than smoking?☆

Yves Martinet^{a,b,*}, Abraham Bohadana^{a,c}, Karl Fagerström^d

^a *Unité de Tabacologie, Service de Pneumologie, Centre Hospitalier Universitaire, Nancy, France*

^b *INSERM U724, Université Henri Poincaré, Nancy, France*

^c *INSERM ERI 11, Vandoeuvre-lès-Nancy, France*

^d *Smokers Information Centre, Helsingborg, Sweden*

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Summary Tobacco use is dominated by cigarette smoking. Most toxicity due to cigarette smoking is related to the burning process. Several observations suggest that unburned or oral tobacco is less harmful than cigarette smoking. Up to now, physicians have advised a policy based on two ideas: (i) young people should not start smoking and (ii) the only choice for smokers is to quit.

However, numerous smokers cannot or do not want to give up; eventually, one out of two lifelong smokers will die from smoke-related diseases. Thus, it is legitimate to ask if alternate nicotine containing product use would be better than cigarette smoking and limit the tobacco death toll. However, the logic leading to the concept of tobacco harm reduction (THR) turns out to be much more complex than it looks at a first glance.

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1. Introduction

The health hazards of cigarette smoking are well known [1]. To fight smoking-related diseases most doctors support the “quit smoking or die” dogma. However, even if 50% of

lifelong smokers are expected to die from smoking-related diseases many smokers are not willing or cannot give up their habit [2].

With the above fact in mind it is legitimate to ask whether alternate, less toxic, nicotine containing products would be better than cigarettes [3]. This question triggers passionate statements, while scientific and experimental observations are still very tenuous.

2. Reducing smoking-related health hazards

Cigarette smoke toxicity is primarily related to non-nicotine components resulting from the combustion of both tobacco and the additives added during cigarette manufacturing. To

☆ This paper addresses the main questions related to the potential use of alternate, less toxic, nicotine products rather than cigarettes, a matter that the scientific community should tackle in a prospective and specific research-oriented approach.

* Correspondence to: Service de Pneumologie, Hôpital de Brabois, rue du Morvan, 54511 Vandoeuvre-lès-Nancy, France.

Tel.: +33 3 83 15 34 00; fax: +33 3 83 15 35 41.

E-mail address: y.martinet@chu-nancy.fr (Y. Martinet).

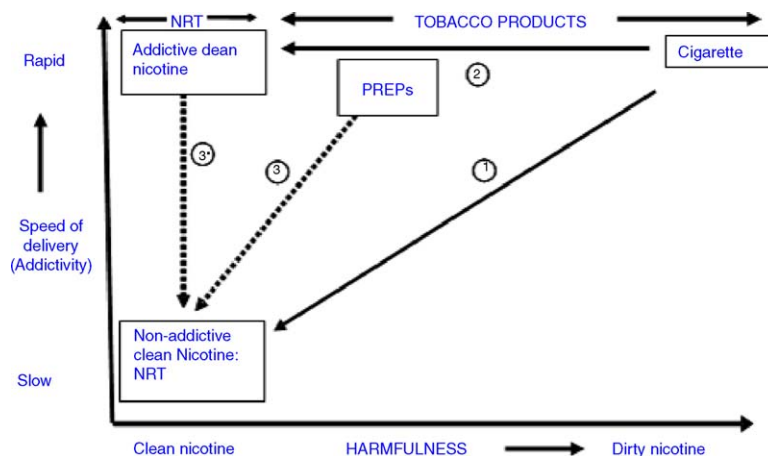


Fig. 1 Characterization of different nicotine delivery systems.

reduce smoking-related health hazards one could suggest the possible intake of “cleaner” nicotine, obtained by lowering the level of all nicotine-associated toxic products, thus increasing the nicotine over toxic products ratio. The rationale behind this idea is the belief that nicotine use is “here to stay” and attempts to wipe it off from the face of the earth does not seem feasible. In our view, a more realistic approach would be exploring safer nicotine delivery systems [4] which could contribute to tobacco harm reduction.

Tobacco harm reduction (THR) is the “lessening of the net damage to health associated with the use of tobacco products, products including constituents of tobacco, and other substitutes for tobacco products” [5]. Smoking is usually started in adolescence. Most smokers start to be interested in giving up in middle age, typically at 40–50 years of age. It can result in a successful quit attempt where harm can be reduced to that of a never-smoker depending on the age at which it occurs. Continued cigarette smoking will cause the maximum harm, and a reduction in harm is any action that decreases the risk from continuing smoking the same product at the same rate. The sooner the action starts and the safer the product is, the greater the harm reduction.

Any nicotine delivery system can be defined by its: (i) nature (non-tobacco products versus tobacco products); (ii) harmfulness (clean versus dirty nicotine); and (iii) addictivity power (largely determined by a slow versus rapid delivery) (Fig. 1). Current guidelines about tobacco smoking advise smokers to switch from cigarettes to nicotine replacement therapy (NRT) (arrow 1) and eventually, to no nicotine. Alternatively, the subject could switch from cigarettes to a potential reduced-exposure product (PREP) (arrow 2) or a not-yet-manufactured “clean addictive nicotine delivery system” [4] and in a second step (arrows 3 and 3’) switch to nicotine products and, eventually, to no nicotine. The reduction in harm from moving to cleaner nicotine delivery systems is gaining support. For example, it has been calculated that the use of a clean nicotine inhaler by every person in the US would be less harmful than today’s smoking. Also, within the tobacco products there is evidence of THR. If the harm of a low nitrosamine smokeless tobacco product is less than 10% of smoking (The Royal College of Physicians estimated snus to be 10–1000 times less harmful than cigarettes [6]), its prevalence of use must be more than 10 times that

of smoking to offset the beneficial effects [7]. Thus, with a smoking prevalence higher than 10%, a product with such a risk would never increase the population risk.

3. Potential reduced-exposure products (PREPs)

Theoretically, PREPs fall into two main categories: tobacco-based products and non-tobacco nicotine containing products. They include: (i) cigarettes with modified tobacco (e.g. low nitrosamine, Advance™, OMNI™, lower levels of additives); (ii) cigarette-like products with less combustion [e.g. Premier™ (off market), Eclipse™, Accord™]; and (iii) low nitrosamine smokeless tobacco (e.g. snuff, snus, and Ariva cigarettes).

Non-tobacco nicotine containing products are those recommended for smoking cessation such as the patch, gum, tablet, lozenge, and spray. Although their health hazards are extremely low [8] none can yield a “high” effect similar or close to that of cigarette. Thus, for the sake of acceptability, a device capable of delivering “clean addictive nicotine” closer to the cigarette “high” than the current non-tobacco nicotine containing products seems to be appealing [4].

4. PREPs’ efficiency and safety

To be a valid alternative to cigarette smoking, PREPs should be safer and incite the smoker to stop or reduce smoking. This raises many questions: what are the PREPs’ relative health hazards versus cigarette smoking? Will smoking reduction or smoking cessation while using PREPs be sustainable? Will it result in THR for both the smoker and population as a whole?

Insight concerning the safety of new PREPs can be gained from what is already known about smokeless tobacco in general, and its particular form snus. However, it needs to be pointed out that although smokeless tobacco in general is less harmful than smoking, it is linked to lesions of the oral cavity ranging from simple thickening of the mucosa to cancer, increased risk of high blood pressure, and possibly, cardiovascular diseases [9]. Importantly, the current knowledge about the limited health effects of snuff relies

on the follow-up of users who started using it at quite an older age than today's users.

Snus, an oral moist tobacco, is very popular in Sweden, the only European Union country where it can be found because of an EU ban. It releases a free-base form of nicotine (pH 7.8–8.5) with low concentrations of harmful chemicals such as tobacco specific nitrosamines (TSNAs) [10]. Current evidence indicates that snus is at least partly responsible for the so-called "Swedish experience", that is the low rate of male lung and oral cancer in Sweden, in comparison to all comparable nations in the world (half of tobacco-related mortality compared with in the rest of EU) [11]. Indeed, in Sweden, smoking prevalence rates are 15% for men and 18% for women, while, for snus use, the rates are 22% and 3%, respectively. The pro-snus advocates suggest that Swedish males smoke less because they use snus. They say lifting the ban on snus sales in Europe could lead smokers to abandon cigarettes for snus and, subsequently, decrease the incidence of lung cancer and chronic obstructive pulmonary disease (COPD). However, there is no evidence that promoting snus use in a naive population will, globally, result in a large-scale reduction of cigarette smoking.

The health hazards of cigarettes and oral tobacco are relatively well known. In turn, public information about new PREPs must consider their potential health hazards in terms of evidence-based Public Health information. To achieve this goal funds must be made available – preferably from the industry marketing the products – and mechanisms created which will allow the use of such funds by the scientific community.

5. Target population(s) for PREPs

If we consider PREPs as the lesser of two evils, any measure implementing their use should be strictly limited to smokers who cannot and/or do not want to give up smoking but are willing to try to switch to a less harmful tobacco product. Such a population would probably be formed by hardcore smokers who "resist" the current advice for the prevention and treatment of nicotine addiction. These smokers "indomitable" to the "quit or die" advice include underprivileged and undereducated people, psychiatric patients, heavily tobacco/nicotine addicted smokers, and obese smokers. Obviously, the reasons for their refractoriness to all current actions need to be better understood so as to increase the efficiency of specific THR messages targeted at them.

6. Issues related to smoking-related health hazard control

Using PREPs to control smoking-related health hazards raises several questions [12,13]. For instance, will a new PREP promote a gateway effect by encouraging teenagers to start using nicotine then switching to cigarettes? If the Swedish experience with snus is acceptable, the answer is probably no. In fact, while roughly 40% of snus users were smokers, only 5% of Swedish boys smoke—the lowest rate in Europe [14].

Another question is: will PREPs promote a cutback effect, making smokers eventually give up their habit? Some exper-

imental evidences suggest this is possible. However, we acknowledge that because of the lower toxicity of smokeless tobacco it could prevent cigarette smokers from totally give up tobacco. However from a recent study, the net effect of introducing low nitrosamine smokeless products in the US, under a regulatory framework allowing health related information to smokers about such products, would decrease smoking [15].

From the public health point of view one can ask whether the use of PREPs would lead to a better control of environmental tobacco smoke. Although the answer is probably yes, one should also question to what extent a public health message about PREPs, issued by the public health community (under the responsibility of a specific health authority) is likely to be clear, simple, honest and ethical [16], and yet efficient.

Another question is whether research on THR should focus more on individuals or collectivities. Indeed, a measure potentially beneficial for individual smokers may not be as good for the general population. In this respect, it would be interesting to investigate whether observations made from THR in patients (with COPD for example) [17] apply to populations. Finally, it would be only natural to ask how cynical would companies be in producing and marketing new PREPs.

7. Temporary conclusion

There is no straightforward response to our question "would alternate tobacco products use be better than smoking?" Yet, it is our belief that it would be unethical not to work on it. To implement an efficient health policy about tobacco use, including THR, a Tobacco and Nicotine Regulatory Authority is needed preferably at national and international levels. However, one pitfall of such an authority, with respect to THR, would be to assume a labeling responsibility of new PREPs which, to some degree, would free tobacco companies from their responsibilities.

As a starting point, a hierarchy of goals should be clearly established. Although complete smoking cessation must clearly remain the final objective, smoking reduction should be given consideration as it may act as a gateway to complete cessation [18]. For the smokers unable to comply with these strategies, a series of new products could be considered including: cigarettes with lower level and/or number of toxins; heating, rather than burning cigarettes; smokeless tobacco, including the Swedish snus; and preferentially medicinal nicotine products if they could be accepted by smokers.

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