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Reference No. B2.1

Research Conference, Canada - August, 1982

UNDERSTANDING THE SMOKING PROCESS -  
THE WAY FORWARD FOR LOW DELIVERY PRODUCTS

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In response to consumer demand, we have been engaged for some considerable time in the development and marketing of cigarettes with reduced smoke deliveries. Products have been designed for those of our consumers who, whilst wishing to remain cigarette smokers, perceive some personal benefit from smoking cigarettes yielding less tar and nicotine than is obtained from the more traditional product. The transition to the new cigarettes is accompanied by the need for the smoker to adjust his expectations, particularly in respect of the "satisfaction" or taste level which he will obtain from lower delivery products. For those who are able to accommodate the reduction in sensory and pharmacological stimulation, it is assumed that the implied reassurance which they obtain from smoking lower delivery products enables them to remain members of the smoking population.

However, we have clear indications that most smokers who attempt to switch permanently into the low delivery sector, fail to do so, often despite numerous attempts with a variety of milder products. That they are attempting to switch surely indicates a significant health concern motivation; that they fail, identifies some significant product weaknesses. Given the apparently high level of unsuccessful long-term switchers, it is reasonable to conclude that the health concerned (but as yet unsatisfied) smoker characterises a market sector with significant growth potential.

The first generation of low delivery cigarettes were almost universally relatively bland products. Indeed, for some smokers, their very blandness itself will have provided repeated reassurance that an appropriate change in product choice had been undertaken. The residual would be low delivery smokers, however, require something different, a product which retains as many of the traditional values associated with full flavour cigarette smoking as possible, whilst at the same time, is genuinely regarded as a low delivery product. This emergent product class we have previously described as "low tar plus", where the "plus" may be variously expressed, for example, as "a low delivery cigarette with middle tar (full flavour) taste". Or, we might regard the "plus" pharmacologically in our development of cigarettes with lower than usual tar:nicotine ratios. In our view, the "low tar plus" proposition provides us with the greatest technical challenge, but also with the greatest potential market opportunities and rewards.

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In order to provide products in this important category, it will be necessary to devote considerable research resources to significantly extend our understanding of the various sensations associated with smoking. In view of the multi-faceted nature of the phenomena to be studied, it is appropriate that we conceive of an holistic approach to research in this area, drawing upon resources from a range of research groups with GR&DC. Such a co-ordinated research programme is being constructed from ongoing projects, each of which is likely to provide significant contributions to our understanding of the sensory, chemical, physiological and pharmacological requirements for advanced low delivery products.

In order to establish the benefits of any new concepts or designs, refinement and extension of our consumer testing and smoking behaviour methods will also be required.

In essence, we are confronted by the need to obtain from small amounts of smoke, the maximum sensory and pharmacological sensations. We are seeking to achieve enhanced efficiency of stimulation, on a per cigarette or per puff basis, in order that the maximum sensation can be achieved at the lowest delivery level - "making the smoke work harder". At the same time, the smoker must be able to obtain his satisfaction without "working harder" - by "oversmoking" or "attempting" "compensation". In order to achieve this, we need to more fully understand

- (a) the mechanisms through which sensory and pharmacological signals are received, transmitted and translated,
- (b) the components of smoke which yield these sensations and which of these are amenable to amplification or supplementation,
- (c) the influence of particle dynamics and chemistry, particularly in the mouth, on qualitative judgements of the product, and
- (d) the interaction between product characteristics, smoking behaviour (especially puff taking) and product acceptability.

All these factors will have to be reconciled with the smoker's inherent dispositions to smoke in a particular way - largely determined by his experience of traditional, full-flavoured products which define, at least in part, his expectations of a desirable and acceptable smoking experience.

Our further understanding of the smoking process will require a much closer examination of the smoking act. In particular, the role of the early sensations in the mouth, which contribute to the smoker's impression of satisfaction. We believe that good smoking mechanics are a prerequisite of an acceptable smoking experience; we do not yet know whether the important sensation of "mouthfullness" conferred by features of the smoke bolus or is inferred through mediating sensations. We believe that the "body" of the smoke may be chemically enhanced using, for example, fatty acid ester additives; we do not know how these chemicals achieve this effect. We believe that the smoker expects a certain sensory and pharmacological reward for a given puffing effort, but we do not know the elastic limit of this correlation.

More specifically, we need to know much more about the relationships between smoking behaviour (especially puff taking) and the sensory evaluation of the same cigarette, in order that we may identify the behavioural and perceptual consequences of particular design changes. At the same time, we need to investigate the relationship between puff taking and inhalation, in order to identify genuine mouth-only effects which may be separated from sensations only inferred from the later pharmacological response to inhalation. We need to know much more about the influence of particle size and aerodynamic effects of smoke in the mouth, in order to determine the spatial and temporal components of buccal stimulation and their contribution to sensory satisfaction. We should have regard not only to direct enhancement of desirable sensations, but also to the minimization of undesirable sensations. In this connection, cyclohexyl alcohols are claimed to inhibit malodour perception. At the same time, we should explore the possible exploitation of mechanisms which might potentiate desirable responses to smoke constituents; for example, the role of salivating agents, like sucrose octa-acetate, should be further investigated.

In summary, our future research projects in this area will reflect our commitment to better understand the smoking process in the belief that this will provide us with the means to design and sell low delivery products to a market waiting to be convinced that it is possible to smoke "mild" cigarettes without sacrificing satisfaction and enjoyment. This research will not only extend current product development principles, but is expected to provide some entirely new dimensions to our thinking about cigarette design.

In pursuing these goals, we need to know which activities in other CAC research laboratories have a direct bearing on this programme and on which aspects some direct collaboration might be arranged. Also, we should ask which other laboratories/operating companies are able to offer facilities to field test significant developments arising from this research.