Dr Green

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THE HEALTH PROBLEM AND OBJECTIVES IN RESEARCH ON CIGARETTE DESIGN.

By CHARLES ELLIS.

1. I have for some time been trying to get clear in my own mind what are our objectives, and on happening to discuss this recently with I. W. Hughes I found that he and I were thinking along similar lines except that he had experimental data which took him beyond the point I had reached. The object of the present note is not to propose any new experiments, or changes of programme, but to suggest some points of view which seem worth examining. Since Hughes had quite independently started along the same lines of thought it is possible that others have also done so.

2. It is a tenable assumption that if smoke aerosol were not inhaled into the lungs there would be a marked reduction of damage to the lung, and of lung cancer. A problem that is therefore worth considering is how to provide the smoker with his customary amount of nicotine, and with his accustomed psychological satisfaction from the social gesture, without making it necessary for those who currently inhale to continue to do so to the same extent.

I do not regard it as a practical solution to hope that many people will go over to pipes or cigars, the cigarette has an appeal all its own, and our object must be to improve the safety of cigarette smoking.

I presume that inhalers do so because thereby they absorb more of the nicotine and more quickly. One partial solution would be to increase the nicotine/tar ratio so that the inhaler can get the nicotine he craves for with less smoke aerosol in his lungs. It is difficult to achieve much by choosing a high nicotine tobacco and filtering heavily since usually such tobaccos are copious tar producers. However, supposing an ordinary cigarette had its nicotine content doubled by straightforward addition of a nicotine salt to the rag, and then the filtration was also doubled, we should arrive at a cigarette which for the same quantity of nicotine only delivered half the quantity of tar. It would obviously be safer to inhale.

Unfortunately this solution, which is simple and technically feasible, is inadmissible on current policy, and need not be given further consideration.

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But to experiment

3. I understand from I. W. Hughes that there may be a possibility of modifying the design of the cigarette, or pre-treating the rag, so as to increase the nicotine/tar ratio in the smoke, when again it would be possible to employ extra heavy filtration but yet give the smoker adequate nicotine to satisfy him and maintain him in his habits. This appeals to me as a very interesting line of progress.

4. A smoker gradually develops the habit of inhaling because thereby he achieves a larger and quicker uptake of nicotine. Thus, if we could speed up the absorption of nicotine in the mouth the smoker would find it unnecessary to inhale and many would in due course cease to do so.

Nicotine has to get into the blood stream to give its various physiological reactions, and it is plausible that this can happen more quickly from an aerosol droplet deposited in the lungs as opposed to deposition in the mouth or throat. But absorption can take place in the mouth since many smokers do not inhale but yet demonstrably absorb nicotine because the characteristic reactions occur and nicotine is found in the urine.

An aerosol droplet has a watery phase on the outside and the nicotine will be here partly as esters, or as salts of various organic acids. The absorption of nicotine in the mouth does depend on its state, the free base for example being taken up very quickly, and thus even a slight shift of the nicotine in the direction of physiologically more active salts might have the effect we are looking for. For example, if a small amount of free ammonia could be released in the puff some of it would certainly be picked up by the aerosol droplets, and when the droplet was caught on the wet surface of the mouth presumably the nicotine would be in a slightly more basic state than without the ammonia.

5. The attitude which emerges from all this is to regard the absorption of nicotine by the smoker as good and the basis of our industry, and to regard the smoke aerosol, which arises from an ingenious and convenient way of releasing this nicotine, as relatively harmless except when it is inhaled. Our problem is to enable the smoker to absorb the nicotine he wants without the necessity of taking as much smoke into his lungs. Two lines of investigation seem possible, either to increase the release of nicotine into the main stream permitting heavier filtration, or to increase the take-up of nicotine in the mouth making inhalation less necessary.