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LETTER

A new point of care cotinine test for saliva to identify and monitor smoking habit

To *the Editors*:

We welcome the paper by CAPONNETTO *et al.* [1], in which they evaluated a nicotine-free inhalator as part of a smoking cessation programme. In the randomised controlled trial, they found no significant improvement with the inhalator, but further analysis of the data showed a significant increase in cessation rate among those with strong and very strong behavioural dependence as measured by questionnaire. While this was a good attempt to find inexpensive means to improve smoking cessation, we question their methodology to assess smoking dependency and abstinence.

Questionnaires such as those used for the Fagerström Dependence Score and the Glover–Nilsson Smoking Behavioural Questionnaire are subject to bias and intentional and unintentional under-reporting. Also, smoke topography, the way a smokers uses a cigarette, depth of inhalation and nicotine metabolism are extremely variable. The best way of assessing smoking behaviour and nicotine intake is by biochemical analysis. This paper did utilise expired-air carbon monoxide (CO) monitoring, but this has significant drawbacks; it is not specific to tobacco intake (being influenced by atmospheric CO) and it has a short half-life of 3 h, so assessing smoking behaviour over a 6- to 8-h period. Nicotine metabolites, such as cotinine, are judged to be the best biochemical test for smoking behaviour [2]. Cotinine is specific to nicotine intake and has a half-life of 18 h, meaning results are indicative of smoking over a number of days. However, cotinine measurements are largely confined to sophisticated laboratory tests, which are expensive and time consuming. We would like to take this opportunity to describe a new point of care saliva test, which measures cotinine and the other nicotine metabolites.

A previous colorimetric urine test [3] called SmokeScreen was modified. The same testing device was used, but the reagents were changed to improve sensitivity to detect the lower levels of cotinine found in saliva. The new, more sensitive assay based on the König reaction has been developed and evaluated in the laboratory and then using a group of healthy volunteers (n=124, age range 21–67 yrs), including 61 smokers with a cigarette consumption of four or more cigarettes per day, (mean 16.6 cigarettes per day), 25% of whom smoked hand rolled cigarettes.

Each provided a saliva sample using a manufactured collecting sponge and collecting bottle. 1 mL of saliva was eluted using the test's fixed-volume syringe. The sample was introduced onto freeze-dried reagents and quickly shaken. A sample positive for nicotine metabolites would be expected to turn pink within 1 min, but up to 10 min was allowed for full colour development. The resultant colour was compared with a four-point colour chart (*i.e.* 1–4 point to represent weak to very intense colour) and the level of smoking recorded. Samples from nonsmokers remained unchanged. A positive colour change was obtained from 55 of the 61 smokers and a negative result from 62 of the 63 nonsmokers, giving a sensitivity of 90%, specificity of 98% and accuracy of 94% ($p<0.05$). There is a significant difference in saliva test results between the smoking and nonsmoking groups (Chi-squared test, $p<0.01$), indicating that the test is specific for screening smokers with a cigarette consumption of four or more cigarettes a day.

The new test was found to have a sensitivity and specificity comparable with the other commercial point of care saliva cotinine test available [4], but was quicker and is less expensive. A dedicated colorimeter to quantify the result is under development. This test could be an important adjunct for identifying smokers and treating smoking-related diseases by providing instantaneous results at a fraction of the cost of laboratory cotinine analysis. [1]

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Statement of Interest: A statement of interest for G.F. Cope can be found at www.erj.ersjournals.com/site/misc/statements.xhtml

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