

## Smoking—Good or Bad for Semen?

### To the Editor:

We were interested to read the recent article of Vine et al. (1) concerning cigarette smoking and semen quality, especially as we were completing a similar study ourselves. We are in full agreement with their statement concerning the inadequate consideration of smoking dose in previous studies into the association between cigarette smoking and sperm density, motility, and morphology. Self-reported smoking, often the only source of information about smoking habit in the majority of studies, is unreliable. Ignoring the elements of bias, self-report does not consider the type of cigarettes smoked, methods of smoking, depth of inhalation, and lung absorption. Biochemical assessment of tobacco smoke intake is therefore more desirable for current determinations of the effects of smoking.

Whereas Vine et al. used radioimmunoassay to measure cotinine levels in semen, urine, and serum as a means of assessing smoking habit, we used a newly developed kit that measures nicotine and all its metabolites in urine (2). The kit utilizes a colorimetric assay to measure nicotine and eight or more derivatives, including cotinine, 3-hydroxycotinine, and nor-cotinine. This approach overcomes problems associated with inter-individual variations in nicotine metabolism.

In our study, the smoking test result, which is fully quantitative, correlated with smoking category (yes/no) ( $n = 55$ ,  $r = 0.74$ ,  $P < 0.001$ ) and reported daily cigarette consumption ( $r = 0.80$ ,  $P < 0.001$ ). Ours was a cross-sectional study of 111 men attending an infertility clinic and 20 healthy sperm donors. Semen samples were routinely assessed for sperm density, motility, and morphology using World Health Organization guidelines. Urine samples obtained at the same time as the semen samples were assessed "blind" for nicotine metabolites, and the two sets of results compared.

Unfortunately, our findings of the effects of smoking on semen quality do not dispel the equivocal findings of previous studies and do not support the findings of Vine et al. We found that urinary nicotine metabolite excretion was positively related to the percentage of normal sperm ( $r = 0.25$ ,  $P < 0.01$ ),

and removal of zero nicotine values (equivalent to no exposure to tobacco smoke) further improved the association ( $r = 0.43$ ,  $P < 0.005$ ). Using the same parameters, smokers were found to have fewer abnormal sperm heads ( $r = -0.27$ ,  $P < 0.05$ ). There was also a positive relationship with nicotine metabolite excretion and progressively motile normal sperm, but the association was only approaching statistical significance ( $P < 0.1$ ).

Our study examining the biochemical measurement of smoking habit has indicated that smoking in an abnormal group (unlike the Vine et al. study group that was highly selected for an elevated standard of health and education) appeared to have some protective effects, i.e., improving the percentage of normal sperm, the degree of head defects, and motility.

Clearly, our study was not as well controlled as that of Vine et al., but these contradictory findings probably lend weight to the argument that sperm morphology and motility are not adequate parameters to assess semen fertility.

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### REFERENCES

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2. Cope G, Nayyar P, Holder R, Gibbons J, Bunce R. A simple near-patient test for nicotine and its metabolites in urine to assess smoking habit. *Clin Chim Acta* 1996;256:135-49.

### Reply of the Author:

Cope et al. report that results of a study relating an improved biochemical measure of smoke exposure to effects on semen quality do not support the findings of Vine et al. (1). Without understanding more about their methods, it is difficult to completely