

Nicotine metabolite ratio (NMR) prospectively predicts smoking relapse: longitudinal findings from ITC Surveys in five countries

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Abstract

Introduction: The ratio of trans 3'-hydroxycotinine (3HC) to cotinine (nicotine metabolite ratio, NMR) is a biomarker of the rate of nicotine metabolism, with higher NMR indicating faster metabolism. Higher NMR has been found to be associated with higher daily cigarette consumption and less success stopping smoking in cessation trials. This study examines differences in NMR among population-based samples of smokers in the 5 countries and explores the relationship between NMR and smoking abstinence.

Methods: Participants (N=874) provided saliva samples during International Tobacco Control (ITC) surveys in the US, UK, Mauritius, Mexico, and Thailand conducted in 2010/2011 with follow-up surveys in 2012/2013. When all samples were received, they were sent to a common laboratory for analysis using liquid chromatography and tandem mass spectroscopy.

Results: There was significant variation in NMR across countries ($F=15.49$, $p<.001$). Those who reported smoking at follow-up had a mean NMR of 0.32, compared to a mean NMR of 0.42 in participants who reported that they had stopped ($F=8.93$; $p=0.003$). Higher mean NMR values were also associated with longer quit duration ($p=0.007$). There was no substantial difference in NMR between current smokers who made a failed quit attempt and those who made no attempt – both had significantly lower NMR compared to those who quit and remained abstinent. Smokers with a higher NMR were more likely to report that they stopped smoking compared to those with a lower NMR ($OR=2.67$; 95%CI: 1.25-5.68).

Conclusions: These results suggest faster nicotine metabolizers may be less likely to relapse following a quit attempt. This finding differs from results of clinical trials testing stop smoking medications, where slower metabolizers have been found to be more likely to maintain abstinence from smoking.

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