# TTURC
## TRANSDISCIPLINARY TOBACCO USE RESEARCH CENTER
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## UNIVERSITY OF MINNESOTA
*Cancer Center*

# umn**tturc**researchbrief
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**t**ransdisciplinary **t**obacco **u**se **r**esearch **c**enter

**Research summary**
To assess the degree of compensatory smoking in those who reduce their cigarette intake, researchers at the University of Minnesota Transdisciplinary Tobacco Use Research Center (UMN TTURC) measured levels of total 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (total NNAL) in the urine of light smokers and of heavy smokers who reduced their cigarette use by at least 40%.

**Results and policy implications**
The average level of NNAL for the reducers was more than twice that of light smokers. Amidst the reality of compensatory smoking, the only known way to reduce disease risk associated with cigarette use is to stop smoking completely.

**About** umn**tturc**researchbrief
The UMN TTURC Research Brief presents timely information on emerging tobacco research from the University of Minnesota. The aims of UMN TTURC are to examine strategies for reducing tobacco toxin exposure, determine the most effective methods for treating smokers who are unable or unwilling to quit smoking, and outline public policy implications for interventions that reduce exposure to tobacco toxins.

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## Cigarette reduction: Can it reduce exposure to toxins?

In 2004, researchers at the University of Minnesota Transdisciplinary Tobacco Use Research Center published findings demonstrating what many had speculated but had not yet demonstrated: Reducing cigarettes per day did not necessarily translate into reduced exposure to carcinogens. Interestingly, the investigators found that even when smokers could reduce their cigarette intake by 73%, they reduced their tobacco-specific toxin exposure by only 30%. (1)

To explore further the effects of cigarette reduction on toxicant exposure, TTURC researchers measured levels of total 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (total NNAL) in participants who reduced their cigarette exposure compared with those who were light smokers. (Total NNAL, a biological marker, indicates the amount of exposure to the known tobacco-specific lung carcinogen NNK.) The main objective was to assess reducers' degree of compensatory smoking—changes in smoking behavior that may occur in order to make up for lower smoking levels and/or to maintain a specific level of nicotine in the body. (2-6)

**M**ethods
Researchers selected 62 participants in two smoking reduction interventions and compared their urinary NNAL levels with 62 light smokers who smoked the same as the reducers. Using these measurements, the investigators created a mathematical formula to calculate the degree of smoking compensation in the study participants.

**S**tudy population
Light smokers averaged age 48, were 53% female and smoked an average of 5.6 cigarettes a day. The reducers averaged age 51, were 39% female and smoked an average of 26 cigarettes per day before they reduced their cigarette intake. All of those in the cigarette reduction group decreased their smoking by at least 40% and smoked 5 cigarettes per day within 6 months of enrollment in the study.

**F**indings
Results showed that the average level of NNAL for the reducers was more than twice that of light smokers, even when the two groups smoked about the same number of cigarettes. (See table 1.) In addition, the greater the reduction in smoking, the greater the

amount of compensatory smoking that occurred. Smokers who reduced their smoking to one to three cigarettes per day, for instance, experienced a 4- to 8-fold increased exposure to NNK per cigarette.

### Table 1. Total NNAL in light smokers and reducers

|  | Mean | SD | 95% CI |
|---|---|---|---|
| **Light smokers** (N=62) | 0.85 | 0.80 | 0.65-1.05 |
| **Reducers** (N=64) | 2.07 | 1.25 | 1.76-2.38 |

## Policy and health care implications

As a result of their findings, TTURC investigators have concluded that compensatory smoking limits the harm reduction value of reducing cigarettes per day. To date, researchers do not know what level of reduction in tobacco toxicant exposure is necessary to create a significant reduction in disease risk. The only known way to lower the risk involved in smoking is to stop smoking completely.

## References

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*For more information, please see Hatsukami DK, Le CT, Shang Y, Joseph AM, Mooney ME, Carmella SG, and Hecht SS. Toxicant exposure in cigarette reducers versus light smokers.* Cancer Epidemiol Biomarkers Prev *2006;15(12):2355-8.*