Issues Related to the Study of Cannabinoids in Exhaled Breath

To the Editor:

In the December 2013 issue of Clinical Chemistry, Huestis and colleagues published an article on cannabinoids in exhaled breath following smoked cannabis (1). This intriguing study prompted a valuable conversation regarding current legislation and future possibilities for detecting cannabis-induced impairment. We therefore commend the authors for their initial efforts to assess a breath test for cannabinoid detection. There are, however, several aspects of this study that deserve further discussion.

First, the possibility of laboratory interference must be considered. Although all study participants tested negative 1 h before smoking, there were positive tests that were not well explained. Two participants (I and K) had a detectable Δ⁹-tetrahydrocannabinol (THC) concentration on admission. In this scenario, the positivity of THC can be explained by 2 possibilities: those participants smoked marijuana after admission, which is unlikely, or the assay also detected 11-nor-9-carboxy-THC (THCCOOH), which is often increased in chronic users. Subsequently, by the 1-h assessment, the THCCOOH concentration may have fallen below the detection limit of 50 pg/pad, which could possibly be translated to a moderately high concentration in serum. This also may explain why the chronic smokers showed higher concentrations of THC in the breath compared to occasional smokers despite a fixed dose. However, this needs further validation, since the authors state that the samples were negative for TCHCOOH. A control group made up of nonsmokers or recently abstinent smokers would have helped to elucidate the positive predictive value of this test.

Second, although we recognize that this test is in its infancy, collection of additional data may have improved the applicability of the test results to the assessment of functional impairment as underscored by the authors: at the workplace and behind the wheel. A protocol for testing functional impairment (reaction time, coordination) may have been beneficial to delineate how breath concentrations relate to actual changes in participant impairment. Most importantly, this would help to determine the degree to which impairment persists even after the participant is out of the detection window. Functional testing may also have illuminated variations in the degree of impairment between chronic and occasional smokers and how this correlated with the statistical differences in median breath THC concentration reported.

These issues will be essential as we legally and chemically define functional impairment for marijuana use. As real-time testing for alcohol intoxication took time to mature, so too will the development of tools to assess cannabinoid intoxication.

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