Road Safety: Increase in Blood Concentrations of Cannabinoids between 2010 and 2013 – Assessment of Confirmation Tests

O. Roussel1; D. Coste1; X. Bouvot1; S. Sabin1; F. Bévalot2; Y. Gaillard2; M. Carlin1

1 Forensic Toxicology Unit, Forensic Sciences Institute of the French Gendarmerie (FSIGF), Rosny-sous-Bois, France. 2 LAT LUMTOX, Lyon-La Voulte sur Rhône, France. 3 Faculty of Health & Life Sciences, Northumbria University, Newcastle upon Tyne, United Kingdom

ABSTRACT

In 2008, the French government decided to set up oral-fluid drug screening in drivers. This new practice modified the customs of police officers and the number of screenings and confirming tests increased dramatically. Since this change, we have consequently observed an increase in blood concentrations of cannabinoids without any modifications in our lab procedures.

In trying to understand this rise and to confirm this observation, we extended our study to include another lab. Results were reviewed by both LAT LUMTOX lab and FSIGF’s forensic toxicology unit and data was obtained between 2010 and 2013 for the following substances: Δ9-tetrahydrocannabinol (THC), 11-nor-9-carboxy-THC (THCCOOH) and 11-hydroxy-THC (11-OHTHC). Results were classified as “non-detected” (ND), “detected” (D) and “quantified” (Q) and if no substance was detected, results were considered negative (NEG).

Parametric statistics were carried out using "t" tests and ANOVA-1 performed with GraphPad Prism 5.08 software. Since 2010, the number of NEG has still been stable (ns) whereas the proportions of D and Q changed significantly. Significant increases in blood concentration of all cannabinoids were also observed (e.g. LAT LUMTOX for THC from μD=3.40±0.14 ng/mL to μD=5.26±0.10 ng/mL, p<0.001).

The results from LAT LUMTOX confirmed the increase in blood concentrations of cannabinoids in drivers.

RESULTS

11OHTHC: from 73.15% to 82.93%, p < 0.001.

THCCOOH calculations were impossible because we could not detect THC in all cases.

AIMS

Confirm our past observations by:

The analysis of our results from 2013
The analysis of the results from another lab: LAT LUMTOX

MATERIALS AND METHODS

Data analysis:

• Retrospective analysis of GC-MS confirmation analysis results for cannabinoids (THC, THCCOOH and 11-OHTHC) obtained by FSIGF and LAT LUMTOX after urinary or oral fluid screening.

• Distribution of the results in 3 categories:
  – "not detected" (ND) when not identified by comparison of retention time and spectrum (LLL at 0.1 or 1mg/mL),
  – detected (D) when identified but under the LLOD. The mean of LLOD and LLL was allocated to those results for the parametric statistics, and
  – "quantified" (Q) when upper to LLOQ (0.5 or 3mg/mL). When all the 3 cannabinoids were not detected, results were categorized “negative” (NEG).

• "t" tests and 1 way ANOVA with Bonferroni's post-tests were performed with GraphPad Prism 5.08 software.

DISCUSSION + CONCLUSIONS

• Even though the results obtained by the LAT LUMTOX were slightly different (absence of negative results) and obtained with another analytical method than FSIGF's, they confirmed our past observations of an increase in blood concentrations of cannabinoids in drivers.

• Several hypotheses could explain this observation:
  – an evolution of the practices of police officers. They now work closer to the drivers and participate more in the intervention.
  – Consequently, they might reduce the wait between screening and sampling. Since the introduction of oral fluid screening tests, the only stop requiring an health practitioner has been for blood sampling when positive.
  – the change of oral fluid screening test during the last four years (from Rapidstar® to Drugwipe®), the increase in THC content of consumed products, especially cannabis resins (INPS, 2013; OFDT, 2013).

• This final observation was established when the lab environments were stable (methods, equipment, team and customers) which ruled out laboratory influence. This is therefore the external reason. Our observations are also reinforced by the similar results of a Norwegian study (Vindenes, 2013).

• A field study of police-officer’s practices could confirm or refute our first hypothesis; the others will be more difficult to investigate.

Bibliography: