OSAC RESEARCH NEEDS ASSESSMENT FORM

Title of research need: Cannabinoids

Keyword(s): Cannabis, Marijuana, Cannabinoids, Hemp

Submitting subcommittee(s): Toxicology **Date Approved:** 5/22/20

(If SAC review identifies additional subcommittees, add them to the box above.)

Background Information:

1. Description of research need:

There are many new issues that raise concern since states legalized/decriminalized cannabis and since the 2018 Farm Bill, which defines the standards for industrial hemp production. Cannabis has changed over the years with increasing concentrations of Δ9-THC, as well as Δ8-THC. There is growing anecdotal evidence that Δ8-THC is deliberately sought to increase the likelihood of beating drug tests and to achieve a different type of "high." Further, there is evidence that Δ8-THC may be produced (converted) as a consequence of hemp processing and as edibles age. Additionally, there are few data to determine whether products that fall within the legal definition of hemp would also produce positive drug tests or whether repeated/long-term exposure to hemp-derived CBD products would increase one's chances of testing positive for THC. Further, there are few data to suggest that products currently on the market comply with the Farm Bill standards.

Research is needed in the development of analytical methods for the identification and quantification of emerging cannabinoids to enhance the scope of capability and knowledge of the forensic toxicology community. Evaluation of existing and novel sample preparation techniques for the recovery of these analytes is also warranted while chromatographic separation from Δ9 -THC and its metabolites remains problematic for cannabinoid isomers. Research should also include epidemiological studies, metabolite identification, matrices studies, and pharmacodynamics/pharmacokinetics studies. Reference materials are needed for emerging cannabinoids as well as their metabolites.

2. Key bibliographic references relating to this research need:

Bonn-Miller, M.O., Loflin, M.J.E., Thomas, B.F., Marcu, J.P., Hyke, T. and Vandrey, R. (2017) Labeling Accuracy of Cannabidiol Extracts Sold Online. *JAMA*, **318**, 1708–1709.

Morales, P., Reggio, P.H. and Jagerovic, N. (2017) An Overview on Medicinal Chemistry of Synthetic and Natural Derivatives of Cannabidiol. *Frontiers in Pharmacology*, **8**, 422.

Citti, C., Linciano, P., Russo, F., Luongo, L., Iannotta, M., Maione, S., et al. (2019) A novel phytocannabinoid isolated from Cannabis sativa L. with an in vivo cannabimimetic activity higher than Δ9-tetrahydrocannabinol: Δ9-Tetrahydrocannabiphorol. *Scientific Reports*, **9**, 20335.

Spindle, T.R., Cone, E.J., Kuntz, D., Mitchell, J.M., Bigelow, G.E., Flegel, R., et al. (2019) Urinary Pharmacokinetic Profile of Cannabinoids Following Administration of Vaporized and Oral Cannabidiol

and Vaporized CBD-Dominant Cannabis. *Journal of Analytical Toxicology*, November 4, 2019: 10.1093/jat/bkz080.

Huestis, M.A., Solimini, R., Pichini, S., Pacifici, R., Carlier, J. and Busardò, F.P. (2019) Cannabidiol Adverse Effects and Toxicity. *Current Neuropharmacology*, **17**, 974–989.

Hollister, L.E. and Gillespie, H.K. (1973) Delta-8- and delta-9-tetrahydrocannabinol comparison in man by oral and intravenous administration. *Clinical Pharmacology and Therapeutics*, **14**, 353–357.

Mead, A. (2019) Legal and Regulatory Issues Governing Cannabis and Cannabis-Derived Products in the United States. *Frontiers in Plant Science*, **10**, 697.

3a. In what ways would the research results improve current laboratory capabilities?

Current analytical methodologies and instrumentation capabilities may not detect or chromatographically separate cannabinoids such as Δ8- and Δ9-THC isomers. Reporting of cannabinoids can be problematic when interferences or unresolved peaks are present. Additionally, in vitro conversion should be evaluated to support data interpretation.

3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

Results of research studies will improve understanding of the cannabinoid scientific knowledge for the forensic toxicology community. The following are how each of the subcategories would impact the community: Identify cannabinoids that are not currently included in testing panels. Develop and optimize chromatographic techniques that could be used by the forensic toxicology community. Identify metabolites or biomarkers indicative of recent use or those that correlate with impairment. Analyze different matrices in the subcategories of forensic toxicological testing. Understand the importance of result variability and how their impact is interpreted. Pharmacodynamics/pharmacokinetic information is lacking for THC isomers and emerging cannabinoids and epidemiological studies should be conducted.

3c. In what ways would the research results improve services to the criminal justice system?

This research would have a direct impact on the criminal justice system involving cases of driving while impaired or under the influence, drug facilitated crimes, and probation/parole violations.

4. Status assessment (I, II, III, or IV):   I

	Major gap in current knowledge	Minor gap in current knowledge
No or limited current research is being conducted	I	III
Existing current research is being conducted	II	IV

This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.

Approvals:

Subcommittee   Approval date: 04/30/2020

(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)

SAC

1. Does the SAC agree with the research need?   Yes X   No ☐

2. Does the SAC agree with the status assessment?   Yes X   No ☐

    If no, what is the status assessment of the SAC: ☐

Approval date: 5/22/20

(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)