

The Hemp Loophole: A Need to Clarify the Legality of Delta-8-THC and Other Hemp-Derived Tetrahydrocannabinol Compounds

Eric C. Leas, PhD, MPH

ABOUT THE AUTHOR

The author is with the Herbert Wertheim School of Public Health and Human Longevity Science, University of California, San Diego, La Jolla.

On June 22, 2021, Connecticut became the newest state to legalize recreational cannabis, raising the total number of US states allowing recreational cannabis to 18. One of the promissory notes of state-led legalization is that it will bring cannabis out of an illicit market and into a more transparent one with better safety standards. Meeting this challenge will require properly defining a group of compounds that fall into the category of tetrahydrocannabinol (THC) but can have different structures and origins. Here I discuss loopholes that allow for legal hemp production to yield a THC compound that has escaped state and federal regulation because of its hemp, rather than cannabis, origins. I make the case that the loopholes that allow THC compounds to be sold as hemp ought to be closed and provide a brief case study of one state that has done an exceptional job in closing such loopholes.

WHERE DO THC COMPOUNDS COME FROM?

The label THC refers to a group of compounds that in chemistry are called isomers. THC isomers have the same formula and structure but a different arrangement of atoms and potentially different pharmacological properties. The most abundant naturally occurring THC isomer is Δ^9 -tetrahydrocannabinol (delta-9-THC). Delta-9-THC is the main cannabis-specific compound (called a cannabinoid) responsible for mediating the psychotropic effects of cannabis. Because of delta-9-THC's ubiquity in most cannabis strains, it is often referred to universally as "THC," but other THC isomers can also naturally occur, just usually in smaller amounts.

One other THC isomer that naturally occurs in cannabis plants is Δ^8 -tetrahydrocannabinol (delta-8-THC). Delta-8-THC is nearly identical in chemical structure to delta-9-THC, differing

only by the location of a carbon-carbon double bond.¹ Because the structure of delta-8-THC is slightly different from that of delta-9-THC, it interacts with the human body in ways that can differ from delta-9-THC. For example, at the same dose, delta-8-THC produces a psychotropic effect that is similar to but slightly reduced from delta-9-THC. The pharmacological profile of delta-8-THC also suggests it has antiemetic, anxiolytic, appetite-stimulating, analgesic, and neuroprotective properties, indicating that it may have therapeutic applications and that some of these applications may differ from delta-9-THC.

Both delta-8-THC and delta-9-THC naturally occur in cannabis, but they can also be synthesized. One means of synthesis is conversion from another group of naturally occurring cannabis isomers called cannabidiol (CBD). Because CBD isomers are similar in structure to THC isomers, they can be converted to THC isomers through a relatively simple series of chemical reactions. The main method of converting CBD to delta-8-THC yields a solution containing delta-8-THC and delta-9-THC as well as other byproducts from the associated reactions. This solution can be further processed to remove delta-9-THC and then added to various consumer goods for consumption or application.

LOOPHOLES ALLOW SOME THC COMPOUNDS TO BE SOLD NATIONWIDE

Many manufacturers in the United States have made the argument that delta-8-THC products are "hemp products" and not "cannabis products," which, if true, affords them legal rights and privileges. Hemp is a variety of the

cannabis plant species in which 0.3% or less of its mass contains delta-9-THC when measured after it is dried. In the past three years, hemp and derivatives extracted from hemp have become widely available in the United States after a US congressional law called the 2018 Farm Bill removed hemp from the definition of marijuana in the Controlled Substances Act.² This has allowed hemp to be legally cultivated for its commercial and industrial purposes (e.g., to make paper, rope, and clothing) while retaining the schedule I classification of cannabis strains containing concentrations of delta-9-THC above 0.3%.

Because hemp contains very little delta-9-THC, it is not generally considered psychotropic; however, because it contains an abundance of CBD, it is possible to synthesize THC isomers from hemp. The processes used to convert CBD or other cannabinoids found in hemp to THC isomers were not explicitly prohibited in the 2018 Farm Bill or in most state laws governing hemp. One interpretation of the omissions of a broader definition of THC and the processes of synthesizing THC isomers from hemp laws is that this implies that THC isomers can be produced and sold legally under hemp laws so long as hemp and hemp derivatives are legally obtained and the final products contain 0.3% or less delta-9-THC.

These “hemp loopholes” have created a new marketplace for delta-8-THC products that uses sophisticated sourcing and distribution strategies designed to evade cannabis and hemp laws and appeal to consumers but also resemble a legitimate business. For example, one of the largest delta-8-THC manufacturers is based in Indiana, where both medicinal and recreational

cannabis products containing delta-9-THC remain prohibited.³ The manufacturer claims to obtain hemp and hemp extracts that are legally sourced from California, Colorado, and Oregon and then convert the extracts to other cannabinoids including delta-8-THC. The manufacturer sells bulk quantities of delta-8-THC solutions and an array of premixed delta-8-THC products that resemble traditional cannabis products (e.g., brownies, cookies, dabbing concentrates, gummies, vape cartridges) through its Web site and claims to have had these products featured in major news outlets such as ESPN, ABC News, and *Rolling Stone*.

The manufacturer also has a program to ship its products wholesale to retailers that resell them, as well as individually to consumers across the United States. To help guide purchasing decisions, the manufacturer provides a tool on its Web site to educate retailers and consumers on how it interprets federal cannabis and hemp laws and comparable laws in the 50 US states (Table 1). Nowhere on this manufacturer’s Web site does it suggest that it restricts shipments to specific places; on its “shipping” page, however, the manufacturer claims that “if, after ordering, we discover an item is illegal in your state we reserve the right to cancel and refund the order.”

CANNABIS CONTROL SYSTEMS PROMISE A SAFER MARKETPLACE

Hemp loopholes have created a marketplace in which delta-8-THC products are being widely sold outside of most of the cannabis control systems developed by states that have legalized recreational cannabis products. Although the marketplaces regulated by state-

run cannabis control systems remain unambiguously illegal at the federal level and have faced many challenges from the still-thriving illicit cannabis market, in theory they are designed to bring cannabis out of an illicit marketplace and into ones with more effective means for oversight and better safeguards that ensure consumer safety. Examples of some of the requirements in these systems provide a perspective on how they are intended to protect the public’s health in ways that the current marketplace for delta-8-THC does not.

First, most cannabis control systems have established a minimum purchasing age and require age verification to purchase cannabis products. Age requirements are designed to limit youth access to cannabis given that developing brains are more susceptible to addiction, exposure among youths potentially results in a greater number of heavy users, and heavy cannabis use among young people may have distinct health effects (e.g., cognitive impairments).⁴ For now, delta-8-THC retailers are setting their own minimum purchasing age (if any) and creating their own method of verifying the ages of their consumers.

Second, most cannabis control systems require cannabis products to be submitted to a certifying agency that tests them for potency, consistency, and a wide range of potential contaminants that are known to be used in illicit cannabis cultivation and processing. Without such requirements, adulterated products can enter the supply chain and harm consumers. For example, illicit cannabis vaping products containing the cutting agent vitamin E acetate were determined to be the primary cause of the 2019 outbreak of lung injury known as EVALI that led to

TABLE 1— Recreational Cannabis Laws and the Legal Status of Delta-8-THC Claimed by One Delta-8-THC Manufacturer as of July 22, 2021: United States

State	Recreational Cannabis Permitted	Delta-8-THC Permitted ^a
Alabama		Yes
Alaska	Yes	
Arizona	Yes	
Arkansas		
California	Yes	Yes
Colorado	Yes	
Connecticut	Yes	Yes
Delaware		
Florida		Yes
Georgia		Yes
Hawaii		Yes
Idaho		
Illinois	Yes	Yes
Indiana		Yes
Iowa		
Kansas		Yes
Kentucky		Yes
Louisiana		Yes
Maine	Yes	Yes
Maryland		Yes
Massachusetts	Yes	Yes
Michigan	Yes	Yes
Minnesota		Yes
Mississippi		Yes
Missouri		Yes
Montana	Yes	
Nebraska		Yes
Nevada	Yes	Yes
New Hampshire		Yes
New Jersey	Yes	Yes
New Mexico	Yes	Yes
New York	Yes	Yes
North Carolina		Yes
North Dakota		
Ohio		Yes
Oklahoma		Yes
Oregon	Yes	Yes
Pennsylvania		Yes
Rhode Island		
South Carolina		Yes
South Dakota		Yes
Tennessee		Yes

(continued)

2668 hospitalizations and 68 deaths.⁵ Delta-8-THC products have not been linked to EVALI, but such events expose the potential dangers of certain manufacturing processes that, if left unchecked, could harm consumers. Although some delta-8-THC manufacturers claim to test their products, the methods used to convert CBD to delta-8-THC have not been well studied with respect to quality assurance, and there are currently no established standards for testing delta-8-THC products for potentially toxic or otherwise harmful substances that could be byproducts of these processes.

Finally, most cannabis control systems have established detailed packaging and labeling standards including requirements for legible supplement information, warnings regarding the presence of psychotropic compounds, and restrictions on design features that could be attractive to youths (e.g., cartoons and names such as “kandyz”). Delta-8-THC products do not have such packaging and labeling requirements, and this could increase the risk of unintended use or overdose. The West Virginia Poison Center has already issued a warning after adults mistakenly consumed delta-8-THC products believing them to be CBD products and youths were hospitalized after consuming delta-8-THC gummies believing them to be candy.⁶

CLOSING HEMP LOOPHOLES

Precedent exists to incorporate delta-8-THC into federal regulations governing cannabis. According to the 1986 amendment to the Controlled Substances Act,⁷ a controlled substance analogue is a substance where “the chemical structure of which is substantially

TABLE 1— CONTINUED

State	Recreational Cannabis Permitted	Delta-8-THC Permitted ^a
Texas		Yes
Utah		
Vermont	Yes	
Virginia	Yes	Yes
Washington	Yes	Yes
West Virginia		Yes
Wisconsin		Yes
Wyoming		Yes

Note. Blank spaces indicate that recreational cannabis or delta-8-THC is not permitted.

^aLegal status of delta-8-THC claimed by one delta-8-THC manufacturer.³

similar to the chemical structure of a controlled substance in schedule I or II.” The act also states that “a controlled substance analogue shall, to the extent intended for human consumption, be treated, for the purposes of any Federal law, as a controlled substance in schedule I.” Given that the chemical structure of delta-8-THC is nearly identical to that of delta-9-THC, it could certainly be considered a controlled substance analogue of delta-9-THC and enforced as such. The Drug Enforcement Agency has also promulgated that the use of any process that creates delta-9-THC as a byproduct at any point—as is the case during the conversion of CBD to delta-8-THC—is in violation of federal law.⁸ Although these rulings have been made, it is unclear whether the Drug Enforcement Agency has acted or will act on them.

In the current political landscape, federal enforcement of cannabis laws rarely occurs and will likely be inadequate to have any meaningful public health impact. Thus, state-by-state amendments to cannabis control laws are probably the best course of action to close hemp loopholes in a meaningful manner. Few states have anticipated

the potential for psychotropic compounds to be produced under hemp laws, but some have already taken actions to close their hemp loopholes in ways that put the public’s health first and serve as an example for other states.

The actions taken by Colorado represent an excellent model for closing a hemp loophole. First, Colorado’s controlled substance laws⁹ provide a clear definition of THC that broadly applies to isomers other than delta-9-THC, eliminating any ambiguity about whether delta-8-THC is considered an analogue to delta-9-THC. Second, the Colorado Department of Public Health¹⁰ and the Marijuana Enforcement Division¹¹ have made it clear to their stakeholders that the state considers the process of chemically modifying or converting naturally occurring cannabinoids from industrial hemp as noncompliant with the statutory definition of an “industrial hemp product,” clarifying that industrial hemp and hemp derivatives should not be used as precursors.

Third, the Marijuana Enforcement Division has also clarified the specific solvent and extract methods it allows and specified that the current

methods of converting cannabinoids do not fall in this category.¹¹ Finally, the Colorado Department of Public Health has explained that it is disallowing THC isomers produced by methods of converting cannabidiol or other cannabinoids from being added to food, dietary supplements, or cosmetics because there is insufficient evidence to determine whether any toxic or otherwise harmful substances are produced during the process of creating or converting THC isomers and may remain in the products ingested, applied, or used by consumers.

At present, these actions essentially ban manufacturers from producing or selling delta-8-THC or other THC isomers if they are converted from other cannabinoids in hemp or cannabis. However, Colorado’s Marijuana Enforcement Division has left open the possibility for stakeholders to work with regulators to examine potentially compliant methods to produce THC’s by converting cannabis-derived cannabinoids.¹¹ Colorado’s policies also do not appear to prohibit strains of cannabis that contain THC’s other than delta-9-THC or any compliant methods of extracting those compounds. This suggests that compliant delta-8-THC products could be sold within Colorado’s cannabis control system and that methods of converting cannabinoids could be used once their safety can be assured.

The actions taken by Colorado are commendable because they prioritize the public’s health while also acknowledging a potentially legitimate consumer demand for delta-8-THC and the potential value of safe methods of converting naturally occurring cannabinoids. For this reason, I believe that more states should follow in Colorado’s

footsteps and close their own hemp loopholes. *AJPH*

CORRESPONDENCE

Correspondence should be sent to Eric C. Leas, PhD, MPH, University of California, San Diego, 9500 Gilman Dr, Mail Code 0725, La Jolla, CA 94304-1334 (e-mail: ecleas@ucsd.edu). Reprints can be ordered at <http://www.ajph.org> by clicking the "Reprints" link.

PUBLICATION INFORMATION

Full Citation: Leas E. The hemp loophole: a need to clarify the legality of delta-8-THC and other hemp-derived tetrahydrocannabinol compounds. *Am J Public Health*. Published online ahead of print October 7, 2021:e1–e5.

Acceptance Date: July 26, 2021.

DOI: <https://doi.org/10.2105/AJPH.2021.306499>

ACKNOWLEDGMENTS

I thank John Ayers and Erik Hendrickson, University of California, San Diego School of Medicine; Keith Humphreys, Stanford Medical School; Annelise Jolley, a freelance writer and journalist; and the anonymous reviewers for their helpful comments on previous versions of this article.

CONFLICTS OF INTEREST

The author declares no conflicts of interest.

REFERENCES

1. National Center for Biotechnology Information. PubChem compound summary for CID 638026, delta8-tetrahydrocannabinol. Available at: <https://pubchem.ncbi.nlm.nih.gov/compound/638026>. Accessed June 19, 2021.
2. US Senate Committee on Agriculture. 2018 Farm Bill. Available at: <https://www.agriculture.senate.gov/2018-farm-bill>. Accessed March 11, 2021.
3. 3Chi Hemp. Delta 8 THC blends. Available at: <https://www.3chi.com>. Accessed June 19, 2021.
4. Volkow ND, Baler RD, Compton WM, Weiss SRB. Adverse health effects of marijuana use. *N Engl J Med*. 2014;370(23):2219–2227. <https://doi.org/10.1056/NEJMra1402309>
5. Centers for Disease Control and Prevention, Office on Smoking and Health. Outbreak of lung injury associated with the use of e-cigarette, or vaping, products. Available at: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html. Accessed May 22, 2020.
6. WSJ News. West Virginia Poison Center warns about dangers of delta-8-THC. Available at: <https://www.wsj.com/2021/03/10/poison-center-warns-about-dangers-of-delta-8-thc>. Accessed April 27, 2021.
7. US Congress. Controlled Substance Analogue Enforcement Act, 1986, 21 USC §§ 802(32) and 813. Available at: <https://www.congress.gov/bills/99th/congress/house-bill/5484>. Accessed April 27, 2021.
8. National Archives and Records Administration Office. Implementation of the Agriculture Improvement Act of 2018. Available at: <https://www.govinfo.gov/app/details/FR-2020-08-21/https%3A%2F%2Fwww.govinfo.gov%2Fapp%2Fdetails%2FFR-2020-08-21%2F2020-17356>. Accessed July 22, 2021.
9. State of Colorado. Criminal code § 18-18-102. Available at: <https://www.colorado.gov/pacific/sites/default/files/atoms/files/Uniform%20Controlled%20Substances%20Act%20of%202013.pdf>. Accessed July 22, 2021.
10. Colorado Department of Public Health & Environment. Re: production and/or use of chemically modified or converted industrial hemp cannabinoids. Available at: <https://drive.google.com/file/d/1KQflLbG46j3iDZ5kc1k1Kcng2-IFZCIG/view>. Accessed July 22, 2021.
11. Colorado Department of Revenue. Re: industry-wide bulletin 21-07: industrial hemp product (production/use of chemically modified or synthetically derived THC isomers from industrial hemp precursors). Available at: <https://sbg.colorado.gov/sites/sbg/files/documents/210514%20Industry-Wide%20Bulletin%2021-07%20-%20Industrial%20Hemp%20Product.pdf>. Accessed July 22, 2021.