

NEBRASKA MEDICAL CANNABIS COMMISSION MEETING

August 4, 2025

1:00 p.m. – 3:00 p.m.

301 Centennial Mall South, Lower Level, Meadowlark Conference Room
Lincoln, Nebraska 68508

Notice of this meeting was posted on the Nebraska Medical Cannabis Commission landing page on the Nebraska Liquor Control Commission's website on July 22, 2025, as well as the Nebraska.gov Public Meetings Calendar.

DRAFT MINUTES

1. **Call to Order / Open Meetings Act Notification.** The meeting was called to order by the acting Commission Chair, Lorelle Muetting, on August 4, 2025, at 1:08 PM. Present were Commission members Bruce Bailey, Kim Lowe, and Lorelle Muetting, establishing a quorum. Commission member J. Michael Coffey arrived after roll call. Commission Chair Dr. Monica Oldenburg was not present. A copy of the Open Meetings Act was posted in the meeting room next to the entrance.
2. **Record Roll.**
 - Bruce Bailey - present
 - Kim Lowe – present
 - Lorelle Muetting – present

(Note: J. Michael Coffey arrived at 1:13 PM. after roll call.)
3. **Approval of Meeting Minutes from June 26.** A Motion to approve the Minutes of June 26, 2025, meeting was made by Commissioner Bailey and seconded by Commissioner Lowe. The motion was adopted with Commissioners Bailey, Lowe, and Muetting voting in favor.
4. **Public Comment Period.** Comments were received from nine individuals. Several speakers described the efficacy of cannabis in treating medical symptoms. Some reported that cannabis did not have the negative side effects that they had experienced with prescription medications. A number of speakers opposed prohibitions on smoking or inhaling as a delivery method for medical cannabis, with several saying that smoking provided faster relief of symptoms and that decisions on the delivery method are best left to the patient and the patient's doctor. Others opposed prohibitions on flavoring medical cannabis, noting that it was common for over-the-counter and prescription medications to be flavored. Some speakers thought that the Commission was contravening to the will of people by proposing restrictions on medical cannabis that were not listed in the approved ballot measure. A number of speakers mentioned that they would prefer to have the public comment period at the end of the meeting so that they could address issues brought up during the meeting.

- 5. Discussion of Statutes: Nebraska Medical Cannabis Patient Protection Act and Nebraska Medical Cannabis Regulation Act.** Commissioner Muetting noted that the Commission does not have authority to regulate patients, but it does have authority to regulate the transportation of cannabis. She also noted that the Commission does not have authority to collect fees.

Commissioner Bailey reported that the Commission is actively working on regulations to implement the Nebraska Medical Cannabis Regulation Act. He hopes the public will continue to give constructive feedback throughout the process. He said he was a strong supporter of both vertical and horizontal regulations. One potential idea for ensuring access to medical cannabis throughout the state would be to require an entity that opens a dispensary in a high-population area, such as Omaha, to also open a dispensary in a less densely populated area of the state. Commissioner Bailey expressed interest in ensuring that licensed dispensaries are economically feasible. He also suggested that a lottery system might be implemented for applicants who meet the minimum licensure requirements.

Muetting said that the Commission is reading and reviewing public comments as they work on developing regulations. She expressed understanding that the public might be frustrated with the pace of implementation, but she noted the challenges that the Commission faces given their lack of staff and minimal funding.

- 6. Commission Website and Email Address, and Submission of Applications.** Commissioner Muetting announced that the public can contact the Nebraska Medical Cannabis Commission by emailing mcc.contact@nebraska.gov. The Commission's website address is <https://lcc.nebraska.gov/medical-cannabis>. Agendas for the Commission's meetings will be posted to this website.

Commissioner Muetting reported that the Commission is actively working on developing application forms for persons who wish to apply for licenses. Once the applications are finalized, they will be posted to the Commission's website. Prior to publication of the application forms, persons can begin the application process by submitting an email to mcc.contact@nebraska.gov. The email should include the information required for the particular license type. Application requirements can be found in the emergency regulations posted at <https://lcc.nebraska.gov/medical-cannabis>.

- 7. Invoices for Public Meeting Notices.** Commissioner Muetting reported that the Commission has received two invoices from the Omaha World Herald, one for \$43.20 and the other for \$31.00, for publication of public meeting notices on June 9th and June 26th. The Commission has also received two invoices from the Lincoln Journal Star, one for \$16.96 and the other for \$17.52, for publication of public meeting notices on June 9th and June 26th. Commissioner Lowe asked who would pay for the invoices. Bo Botelho, Chief Legal Officer for the Nebraska Department of Health and Human Services, said it would depend on the Commission's agreement with the Nebraska Liquor Control Commission. Commissioner Bailey said that the Liquor Control Commission would need to vote on the issue. A motion to approve requesting that the Liquor Control Commission pay invoices received from the Omaha World Herald and the Lincoln Journal Star was made by Commissioner Coffey and seconded by Commissioner Bailey. The motion was adopted with Commissioners Bailey, Coffey, Lowe, and Muetting voting in favor.

- 8. Operating Budget and Staffing.** The Commission has received an allocation of \$60,000. The Liquor Control Commission has received \$30,000 to provide administrative support to the Medical Cannabis Commission. Commissioner Muetting suggested that a staff member from the Liquor Control Commission might be contracted to work on applications for cannabis licensure. A motion to approve asking the Liquor Control Commission to utilize funds for staffing the Nebraska Medical Cannabis Commission was made by Commissioner Bailey and seconded by Commissioner Coffey. The motion was adopted with Commissioners Bailey, Coffey, Lowe, and Muetting voting in favor
- 9. Interlocal Operation Agreement with the Liquor Control Commission.** Mr. Botelho, Chief Legal Officer for the Nebraska Department of Health and Human Services, described an Interlocal Operation Agreement as a formal agreement between two or more state agencies on the use of funds and staff to pursue a cooperative action. The proposal on the agenda, if adopted, would involve appointing one or two Commission members to enter negotiations with the Liquor Control Commission to draft specific terms and conditions on how the two Commissions would work together. Commissioner Coffey noted that three members of the Medical Cannabis Commission also serve on the Liquor Control Commission. He asked if it would be a conflict of interest for these three members to negotiate an agreement. Mr. Botelho said that it was at the Commissioner's discretion, but he also noted that it would be awkward in the sense that a Commissioner would be negotiating with him- or herself. Commissioner Bailey, noting that the Liquor Control Commission already has a software system and other resources, said that having a majority of the Medical Cannabis Commission's functions handled through the Liquor Control Commission might be the best decision in terms of being good stewards of public funds. Coffey and Muetting questioned if the Medical Cannabis Commission has full authority to make payments through the Liquor Control Commission prior to approval of an Interlocal Operation Agreement.
- A motion to approve entering negotiations to pursue an Interlocal Operation Agreement with the Liquor Control Commission was made by Commissioner Bailey and seconded by Commissioner Coffey. The motion was adopted with Commissioners Bailey, Coffey, Lowe, and Muetting voting in favor.
- A motion to approve having Commissioner Muetting serve as the Commission's contact person for negotiating an Interlocal Operation Agreement with the Liquor Control Commission was made by Commissioner Coffey and seconded by Commissioner Bailey. The motion was adopted with Commissioners Bailey, Coffey, and Lowe voting in favor of the motion and Commissioner Muetting abstaining.
- 10. Discussion of Research on Flavorings, Effects of Cannabis Use During Pregnancy, and Smoking.** Commissioner Muetting read the following statement from Commissioner Dr. Oldenburg regarding flavorings in cannabis:

Every public health decision has to be made by weighing the risk and benefits to the entire population. In the state of Nebraska approximately 25% of the population is pediatric. Across the United States most states have between 1-3% of the state population with medical cannabis cards. When medical literature is reviewed it is very clear that with increasing availability there are increases in pediatric exposure and toxicity. The Journal Pediatrics reported in Aug of 2023 that "Common findings in pediatric marijuana exposures include drowsiness, tachycardia, ataxia, and vomiting.

More concerning findings are hypotension, coma, respiratory depression, and seizure,”

As a state, no one wishes to see harm comes to our most vulnerable population. To attempt to mitigate these adverse events, we are having the packaging be plain with no appealing pictures. It will be in childproof packaging. If a child were to inadvertently gain access to medical cannabis, it will not taste good due to lack of flavoring, so they hopefully will consume less, as toxicity increases with increasing doses.

Commissioner Mueting read the following statement from Commissioner Dr. Oldenburg regarding the smoking of cannabis:

This commission has been tasked with regulating medical cannabis. Because of this designation we must look for research to see how to best provide this medicine. Currently there are no FDA regulated medications that are smoked. Per the FDA, smoking is an unsafe and ineffectual way to deliver medicine. As a society we have spent the last 45 years educating the public about the dangers of tobacco smoke inhalation. As more research is done on cannabis, it is clear the dangers are similar for cannabis smoking. These include irritation of the respiratory tract, chronic cough, bronchitis, long-term lung tissue damage and increased lung infections in vulnerable populations. In addition, it can increase heart rate and blood pressure and reduce blood vessel function thereby increasing risk of heart attack, hypertension and peripheral vascular disease. The American Lung association states, “We caution the public against smoking marijuana because of the risk of damage to the lungs.... [T]oxins and carcinogens are released from the combustion of materials. Smoke from marijuana has been shown to contain many of the same toxins, irritants, and carcinogens as tobacco smoke.” Additionally, there is concern about the harmful effects of second-hand smoke especially among young children. UCLA Health states “Particulate matter in secondhand marijuana smoke includes ammonia, cadmium, chromium, hydrogen cyanide, lead, mercury, and nickel. Because cannabis is a plant, it might also be contaminated with mold, insecticides or pesticides that get released when smoked.” When weighing the risk to benefit of smoke inhalation, it is clear that the harm outweighs the potential benefits.

Commissioner Mueting also read comments from Commissioner Dr. Oldenburg regarding cannabis use during pregnancy. Because marijuana crosses the placenta, Dr. Oldenburg recommended guidelines for physicians who prescribe cannabis to women of childbearing age, such as asking or determining if patient is pregnant.

Commissioner Bailey requested that links to the articles cited by Dr. Oldenburg be included in the minutes. [See Attachments 1 and 2.]

- 11. Rules Updates.** Mueting reported that she and other Commissioners are reaching out to other states to learn more about those states’ experiences with regulating cannabis. Mueting talked with the Executive Director of the Cannabis Regulators Association (CANNRA), whose members include governmental entities from throughout the United States and Canada. She also talked with a representative from Metrc, a software company whose products include seed-to-sale tracking systems for cannabis. Mueting hopes that a representative from Metrc will be able to address the Commission at a future meeting either

in-person or virtually. Mueting reached out to Nebraska's Chief Procurement Officer to learn about the process of getting bids for a tracking system. Mueting noted that although building a tracking system takes time, those states that did not include seed-to-sale tracking when they implemented medical cannabis are now backtracking to incorporate the technology. Mueting did not know if the Metrc product was compatible with the software currently used by the Liquor Control Commission. The Metrc system does not include a patient registry or a provider registry, two components that Mueting would like to be included in Nebraska's system. Mueting noted that the system used in Iowa, which includes seed-to-sale tracking, a patient registry, and a provider registry, took six years to build.

Commissioner Bailey described seed-to-sale tracking as a necessity. One benefit of seed-to-sale tracking is that it helps ensure that product from cannabis plants that fails quality standards do not get dispensed to patients. Licensing fees could help pay for the cost of a tracking system, but the Legislature would first need to give the Commission the authority to charge fees.

Commissioner Bailey said that it was his understanding that the emergency regulations expired at the end of September and could be renewed for an additional ninety days. In terms of getting permanent regulations in place within a reasonable timeframe, he suggested breaking the process down into phases, starting with regulations for planting seeds, and then proceeding in phases to the end phase of dispensing product to patients. Mr. Botelho noted that the emergency regulations expire at the end of December, 2025 if extended.

12. Mueting thanked the public for the constructive comments that were received on the emergency regulations.
13. **Date for Next Meeting.** The Commission announced that its next meeting will be held September 2, 2025, at 1:00 PM.
14. **Closed Executive Session.** A motion to go into Closed Session to discuss pending litigation and for the protection of the public interest was made by Commissioner Coffey and seconded by Commissioner Lowe. The motion was adopted with Commissioners Bailey, Coffey, Lowe, and Mueting voting in favor. Commissioner Mueting announced that the Commission was moving into closed session at 2:28 PM for the limited purpose of discussing pending litigation, and that the Commission will return as soon as the closed session is concluded. The Commission went into Closed Session at approximately 2:28 PM.

The Commission returned to Open Session at approximately 3:04 PM. Motion to come back from (closed) executive session made by Commissioner Bailey and seconded by Commissioner Lowe. The motion was adopted with Commissioners Bailey, Coffey, Lowe, and Mueting voting in favor.
15. **Adjournment.** With no further business to be taken, a motion to adjourn was made by Commissioner Bailey and seconded by Commissioner Lowe. The motion was adopted with Commissioners Bailey, Coffey, Lowe, and Mueting voting in favor. The meeting adjourned at approximately 3:05 PM.

ATTACHMENT 1

Pediatrics

Leubitz, Andrew et al. (2021). Prevalence and clinical characteristics of unintentional ingestion of marijuana in children younger than 6 years in states with and without legalized marijuana laws. *Pediatric Emergency Care*, 37(12), e969-e973. https://journals.lww.com/pec-online/abstract/2021/12000/prevalence_and_clinical_characteristics_of.49.aspx

Pepin, Lesley et al. (2023). Toxic tetrahydrocannabinol (THC) dose in pediatric cannabis edible ingestions. *Pediatrics*, 152(3). <https://doi.org/10.1542/peds.2023-061374>

Tweet, Marit et al. (2021). Pediatric edible cannabis exposures and acute toxicity: 2017-2021. *Pediatrics*, 151(2). <https://doi.org/10.1542/peds.2022-057761>

Whitehill, Jennifer et al. (2019). Incidence of pediatric cannabis exposure among children and teenagers aged 0 to 19 years before and after medical marijuana legalization in Massachusetts. *JAMA Network*. <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2748051>

Smoking

American Lung Association. Marijuana and Lung Health. <https://www.lung.org/quit-smoking/smoking-facts/health-effects/marijuana-and-lung-health>

UCLA Health. (2020). Secondhand marijuana smoke: What are the risks to your health? <https://www.uclahealth.org/news/article/secondhand-marijuana-smoke-what-are-the-risks-to-your-health>

Wang, Xiaoyin, et al. (2016). One minute of marijuana secondhand smoke exposure substantially impairs vascular endothelial function. *Journal of the American Heart Association*, 5(8). <https://doi.org/10.1161/JAHA.116.003858>

OBSTETRICS

Medical marijuana laws and pregnancy: implications for public health policy

Ira J. Chasnoff, MD

An increasing number of states are passing or considering medical marijuana laws. The goal of this paper is to address the public health system's responsibility to educate physicians and the public about the impact of marijuana on pregnancy and to establish guidelines that discourage the use of medical marijuana by pregnant women or women considering pregnancy.

Patterns of marijuana use in pregnancy

The prevalence of marijuana use during pregnancy ranges from 2% to 5% in most studies but is reported as high as 15–28% among young, urban, socioeconomically disadvantaged women.¹ Importantly, the mean potency of marijuana in terms of its content of 9-carboxy- Δ^9 -tetrahydrocannabinol, the psychoactive ingredient in marijuana, has increased steadily over the past 30 years.²

Although no epidemiological studies of the use of marijuana during pregnancy provide information as to the source of the women's access to marijuana, a recent report from the US Drug Testing Laboratories (Chicago, IL), examined Colorado's 2012 ballot initiative allowing large-scale marijuana production and statewide distribution and studied its impact on patterns of maternal marijuana use.³ The ballot

Although there is much to learn yet about the effects of prenatal marijuana use on pregnancy and child outcome, there is enough evidence to suggest that marijuana, contrary to popular perception, is not a harmless drug, especially when used during pregnancy. Consequently, the public health system has a responsibility to educate physicians and the public about the impact of marijuana on pregnancy and to discourage the use of medical marijuana by pregnant women or women considering pregnancy.

Key words: marijuana, medical marijuana, pregnancy

initiative was passed in November 2012 and went into effect January 2014.

Based on local hospital protocols, meconium specimens from newborns across the nation that were determined to be at high risk of prenatal drug or alcohol exposure were collected and forwarded to the US Drug Testing Laboratories for analysis. Data were analyzed for the presence of marijuana in specimens originating from hospitals within the state of Colorado vs specimens sent from the rest of the United States during the first 9 months of the years 2012 and 2014. Positive samples were confirmed for 9-carboxy- Δ^9 -tetrahydrocannabinol using gas chromatography–mass spectrometry.

The rates of positive meconium samples for marijuana were similar at each of the time points in the 2 populations, with an approximately 10% increase in the rate of positive marijuana samples in Colorado and in the rest of the country. More importantly, however, although the concentration of marijuana in exposed neonates' meconium for the US-wide population demonstrated little change across the 2 time periods, the exposed neonates in Colorado experienced substantially more exposure to marijuana in the postlegalization period as indicated by a significant increase (Mann-Whitney, $P = .013$) in the concentrations of 9-carboxy- Δ^9 -tetrahydrocannabinol, from a mean concentration of $213 \text{ ng/g} \pm 230.9 \text{ ng/g}$

(median, 142 ng/g) in 2012 to $361 \text{ ng/g} \pm 420.3 \text{ ng/g}$ (median, 212 ng/g) in 2014.³

Consequences of marijuana use in pregnancy

Although increased rates of stillbirths⁴ and low-birthweight neonates^{5–8} have been documented in pregnancies complicated by prenatal marijuana use, these findings are partially confounded by tobacco use, which is relatively common among women who use marijuana during pregnancy. However, the known action of exogenous cannabinoids could explain the consistent neurological and neurodevelopmental outcomes that have been documented in infants and children prenatally exposed to marijuana.⁹

Marijuana is highly lipid soluble and crosses the placenta and the blood-brain barrier with ease, accumulating in fetal tissues, particularly the brain.^{10,11} In the adult central nervous system, 9-carboxy- Δ^9 -tetrahydrocannabinol interferes with the endocannabinoid signaling system, responsible for modulating synaptic neurotransmitter release to regulate motor control, memory, and other brain functions.¹²

Components of the endocannabinoid system are present during embryonic central nervous system development as early as 16–22 days' gestation in humans.¹³ It is at this time that the neural plate and neural tube, the basic scaffold for the forebrain, midbrain, and hindbrain, are established. A large study

From the Department of Clinical Pediatrics, University of Illinois College of Medicine, and NTI Upstream, Chicago, IL.

Received April 4, 2016; revised June 22, 2016; accepted July 5, 2016.

The author reports no conflict of interest.

Corresponding author: Ira J. Chasnoff, MD. irachasnoff@gmail.com

0002-9378/\$36.00

© 2016 Elsevier Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.ajog.2016.07.010>

conducted by the US National Birth Defects Prevention Center documented a significantly increased risk for anencephaly when the fetus is exposed to marijuana during the first month of gestation.¹⁴ This risk was isolated to the period when the neural tube is closing, 1–4 weeks after conception.

The function of the endocannabinoid system during the preneuronal phase in humans has not been well delineated. However, a long line of research has demonstrated its important role in

shaping neuronal circuitry in the developing fetus as well as modulating development of various neurotransmitter systems, primarily the catecholaminergic and opioidergic systems.^{15–17} Gestational exposure to exogenous cannabinoids, as found in marijuana, may target the cannabinoid receptor CB₁, disrupting migration, differentiation, and synaptic communication in the developing neurotransmitter system.^{18–21}

There also is evidence that intrauterine exposure to marijuana impairs dopamine D2 mRNA expression in the amygdala and in the nucleus accumbens at around 18–22 weeks' gestation.²² The resulting defective dopamine D2 signaling in these centers, which play a role in cognitive and emotional functioning, is consistent with the neurobehavioral deficiencies that have been observed in newborns exposed to marijuana.

These deficits primarily reflect impaired regulatory control: irritability, tremors, and poor habituation²³; difficulty with arousal and state regulation^{24,25}; and sleep disturbance.²⁶ Although 2 studies^{27,28} found no neurobehavioral differences between marijuana-exposed and nonexposed infants in the early neonatal period, it has been postulated that these 2 studies differed from the others because of sociocultural differences as well as the varying statistical treatments of the different confounding factors.²⁵

Numerous studies have documented neurodevelopmental deficits in older children, adolescents, and young adults who were prenatally exposed to marijuana.^{29–36} These studies once again are consistent with 9-carboxy- Δ^9 -tetrahydrocannabinol's action on the developing fetal central nervous system. Longitudinal follow-up of children in a large prospective study found a consistent pattern of deficits in cognitive functioning. At 6 years of age, prenatal marijuana exposure was linked to lower verbal reasoning scores and deficits in composite, short-term memory, and quantitative intelligence scores.²⁹

In this same cohort at 10 years of age, negative effects of prenatal marijuana

exposure had a significant impact on design memory and screening index scores of the Wide Range Assessment of Memory and Learning,³⁰ and the exposed children had lower test scores on school achievement.³¹ In addition, by age 10 years, prenatal marijuana exposure was significantly related to increased hyperactivity, impulsivity, and inattention problems as well as significantly increased rates of child depressive symptoms.^{32,33}

Child depressive symptoms and attention problems in these children at age 10 significantly predicted delinquency at 14 years.³⁴ Fried and Smith,³⁵ in a review of several well-controlled longitudinal studies, showed that prenatal marijuana exposure was related to a significantly increased rate of difficulties with executive functioning, an aspect of regulatory control that is key to learning and to managing behavior.

A study of functional MRIs in a group of 18–22 year old young adults who had been prenatally exposed to marijuana revealed altered neural functioning that impacted short-term memory.³⁶ Further animal and human studies are needed, especially studies that can overcome the common limitations found in the majority of studies that investigate teratogenic agents in humans, specifically the inability to conduct randomized, controlled, prospective studies and the reliance on retrospective self-report regarding amounts and patterns of marijuana use.

Policy implications

Although there is much to learn yet about the effects of prenatal marijuana use on pregnancy and child outcome, there is enough evidence to suggest that marijuana, contrary to popular perception, is not a harmless drug, especially during pregnancy. Twenty-four states and Washington, DC, have passed medical marijuana legislation³⁷ (Table).

In general, the legislation in all states removes state-level criminal penalties on the use, possession, and cultivation of marijuana by patients who possess written documentation from their physician advising that they would derive benefit from the medical use of marijuana. Only Oregon has legislation

TABLE
States with medical marijuana laws³⁷

State	Date of passage of original legislation
Alaska	November 1998
Arizona	November 2010
California	November 1996
Colorado	November 2000
Connecticut	May 2012
District of Columbia	May 2010
Delaware	May 2011
Hawaii	June 2000
Illinois	May 2013
Maine	November 1999
Maryland	April 2014
Massachusetts	November 2012
Michigan	November 2008
Minnesota	May 2014
Montana	November 2004
Nevada	November 2000
New Hampshire	May 2013
New Jersey	January 2010
New Mexico	March 2007
New York	June 2014
Oregon	November 1998
Pennsylvania	April 2016
Rhode Island	January 2006
Vermont	May 2004
Washington	November 1998

Chasnoff. Medical marijuana laws and pregnancy. Am J Obstet Gynecol 2016.

that requires a point-of-sale warning at dispensaries regarding cannabis use in pregnant or breast-feeding women.³⁸ The Colorado Department of Health has posted recommended screening questions for women who are pregnant and recommends discussing the importance of the cessation of marijuana during pregnancy or, at a well-woman visit, if a woman desires to become pregnant.³⁹

The number of physicians who are prescribing marijuana to pregnant women across the various states is unknown, but professional organizations have recognized the need to address the issue. The American Medical Association announced in 2015 that it would advocate for regulations and pregnancy warning labels on medical and recreational marijuana,⁴⁰ and in July 2015 the Committee on Obstetric Practice of the American College of Obstetricians and Gynecologists published a policy statement that discouraged obstetricians and gynecologists from "prescribing or suggesting the use of marijuana for medicinal purposes during preconception, pregnancy, and lactation."¹

From a public health perspective, state departments of health, in collaboration with state licensing boards, should take several steps to educate and inform the public and professionals on the possible impact of marijuana's use during pregnancy and to discourage such use including the following:

- Medical marijuana legislation should include public, professional, and legislative education about the impact of marijuana on pregnancy and child outcome.
- Informational materials should be available at all sites that prescribe or sell marijuana, and a government warning label, similar to alcohol, regarding marijuana use and pregnancy should be posted.
- Physicians who plan to write marijuana prescriptions should be required to obtain continuing medical education credits that address marijuana and pregnancy.
- Guidelines for physicians writing marijuana prescriptions should be

developed, including asking all women of child-bearing age about the possibility of a current pregnancy and offering a pregnancy test to all women of child-bearing age prior to giving a prescription for marijuana.

From a research perspective, randomized controlled studies of the effectiveness of marijuana as a medication need to include women, and rates of marijuana use in pregnancy before and after new medical marijuana legislation need to be assessed further. It appears that in the short term, legalization of marijuana use did not significantly increase the rate of marijuana use among pregnant women in Colorado.³ However, those women who were using marijuana were either using greater quantities of marijuana or marijuana with higher concentrations of 9-carboxy- Δ^9 -tetrahydrocannabinol.

Importantly, prospective, longitudinal studies of child cognitive and neurocognitive development need to be undertaken to further assess the impact of prenatal marijuana exposure, and studies of family functioning and child safety are necessary to understand environmental factors that may affect the child if a family member is using or abusing marijuana.

As states continue to legalize marijuana, making it more accessible, increased use across the general population could lead to increased rates of prenatal marijuana exposure, especially because most women do not realize they are pregnant during the first weeks after conception.

From a public health perspective, at the very least, we must acknowledge that marijuana's use during pregnancy has potential risks, and we need to incorporate guidelines into the new and emerging marijuana laws that recognize and communicate that risk. Marijuana use is fast fading from the legal agenda, but its use, especially during pregnancy, remains a public health issue. ■

REFERENCES

1. American College of Obstetricians and Gynecologists. Marijuana use during pregnancy

and lactation. ACOG Committee Opinion no. 637. *Obstet Gynecol* 2015;126:234-8.

2. Mehmedic Z, Chandra S, Slade D, et al. Potency trends of Δ^9 -THC and other cannabinoids in confiscated cannabis preparations from 1993 to 2008. *J Forens Sci* 2010;55:1209-17.

3. Jones JT, Baldwin A, Shu L. A comparison of meconium screening outcomes as an indicator of the impact of state-level relaxation of marijuana policy. *Drug Alcohol Depend* 2015;156:e104-5.

4. Varner MW, Silver RM, Hogue CJR. Association between stillbirth and illicit drug use and smoking during pregnancy. *Obstet Gynecol* 2014;123:113-25.

5. Hayatbakhsh MR, Renady VJ, Gibbons KS, et al. Birth outcomes associated with cannabis use before and during pregnancy. *Pediatr Res* 2012;71:215-9.

6. Hurda YL, Wang X, Anderson V, Beck O, Minkoff H, Dow-Edwards DY. Marijuana impairs growth in mid-gestation fetuses. *Neurotoxicol Teratol* 2005;27:221-9.

7. El Marroun H, Tiemeier H, Steegers EAP, et al. Intrauterine cannabis exposure affects fetal growth trajectories: the Generation R study. *J Am Acad Child Adolesc Psychiatry* 2009;48:1173-81.

8. English DR, Hulse GK, Milne E, Holman CD, Bower CI. Maternal cannabis use and birth weight: a meta-analysis. *Addiction* 1997;92:1553-60.

9. Tiezza V, Quomo V, Louk J, Vanderschuren MJ. Cannabis and the developing brain: insights from behavior. *Eur J Pharmacol* 2008;585:441-52.

10. Haibison RD, Mantilla-Plata B. Prenatal toxicity, maternal distribution and placental transfer of tetrahydrocannabinol. *J Pharmacol Exp Ther* 1972;180:446-53.

11. Hutchings DE, Martin BR, Gamagari Z, Miller N, Roco T. Plasma concentrations of delta-9-tetrahydrocannabinol in dams and fetuses following acute or multiple prenatal dosing in rats. *Life Sci* 1989;44:697-701.

12. Pertwee RG. Ligands that target cannabinoid receptors in the brain: from THC to anandamide and beyond. *Addict Biol* 2008;13:147-59.

13. Psychoyos D, Vinod KY. Marijuana, Spice "herbal high," and early neural development: implications for rescheduling and legalization. *Drug Test Anal* 2013;5:27-45.

14. vanGelder MM, Reefhuis J, Caton AR, Weiter MM, Druschel CM, Roeleveld N. Maternal periconceptional illicit drug use and the risk of congenital malformations. *Epidemiology* 2008;20:60-6.

15. Mulder J, Aguado T, Keimpema E, et al. Endocannabinoid signaling controls pyramidal cell specification and long range axon patterning. *Proc Natl Acad Sci USA* 2008;105:8760-5.

16. Hernandez M, Berruendo F, Suarez I, et al. Cannabinoid CB(1) receptors colocalize with tyrosin hydroxylase in cultured fetal mesencephalic neurons and the action increases the

- levels of this enzyme. *Brain Res* 2000;857: 56-65.
17. Harkany T, Keimpema E, Barabas K, Mulder J. Endocannabinoid functions controlling neuronal specification during brain development. *Mol Cell Endocrinol* 286: S84-90.
 18. Harkany T, Guzman M, Galve-Ropeth I, Beighuis P, Devi LA, Mackie K. The emerging functions of endocannabinoid signaling during CNS development. *Trends Pharmacol Sci* 2007;28:83-92.
 19. Galve-Ropeth I, Aguado T, Rueda D, Velasco G, Guzman M. Endocannabinoids: a new family of lipid mediators involved in the regulation of neural cell development. *Curr Pharm Des* 2006;12:2319-25.
 20. Guzman M, Sanchez C, Galve-Ropeth I. Control of the cell survival/death decision by cannabinoids. *J Mol Med* 2001;78: 613-25.
 21. Barnard C, Milh M, Morozov YM, Ben-Ari Y, Freund TF, Gozlan H. Altering cannabinoid signaling during development disrupts neuronal activity. *Proc Natl Acad Sci USA* 2005;102: 9388-93.
 22. Wang X, Dow-Edwards D, Anderson V, Minkoff H, Hurd YL. In utero marijuana exposure associated with abnormal amygdala dopamine D2 gene expression in the human fetus. *Biol Psychiatry* 2004;56:909-15.
 23. Fried PA, Makin JE. Neonatal behavioral correlates of prenatal exposure to marijuana, cigarettes, and alcohol in a low risk population. *Neurotoxicol Teratol* 1987;9:1-7.
 24. Coles CD, Platzman KA, Smith I, James ME, Falck A. Effects of cocaine and alcohol use in pregnancy on neonatal growth and neurobehavioral status. *Neurotoxicol Teratol* 1992;14:23-33.
 25. Maraes Barros MC, Guinsburg R, Araujo Peres C. Exposure to marijuana during pregnancy alters neurobehavior in the early neonatal period. *J Pediatr* 2006;149: 781-7.
 26. Scher MS, Richardson GA, Coble PA, Day NL, Stoffer DS. The effects of prenatal alcohol and marijuana exposure: disturbances in neonatal sleep cycling and arousal. *Pediatr Res* 1988;24:101-5.
 27. Richardson GA, Day NL, Goldschmidt L. Prenatal alcohol, marijuana and tobacco use: infant mental and motor development. *Neurotoxicol Teratol* 1995;17:479-89.
 28. Dreher MC, Nugent K, Hudgins R. Prenatal marijuana exposure and neonatal outcomes in Jamaica: an ethnographic study. *Pediatrics* 1994;93:254-60.
 29. Goldschmidt L, Richardson GA, Wilford J, Day NL. Prenatal marijuana exposure and intelligence test performance at age 6. *J Am Acad Child Adolesc Psychiatry* 2008;47: 254-63.
 30. Jastak S, Wilkinson GS. Manual for the Wide Range Achievement Test, revised. Wilmington (DE): Jastak Associates; 1984.
 31. Goldschmidt L, Richardson GA, Cornelius MD, Day NL. Prenatal marijuana and alcohol exposure and academic achievement at age 10. *Neurotoxicol Teratol* 2004;26: 521-32.
 32. Richardson GA, Ryan C, Wilford J, Day NL, Goldschmidt L. Prenatal alcohol and marijuana exposure: effects on neuropsychological outcomes at ten years. *Neurotoxicol Teratol* 2002;24:309-20.
 33. Goldschmidt L, Day NL, Richardson GA. Effects of prenatal marijuana exposure on child behavior problems at age 10. *Neurotoxicol Teratol* 2000;22:325-36.
 34. Day NL, Leech SL, Goldschmidt L. The effects of prenatal marijuana exposure on delinquent behaviors are mediated by measures of neurocognitive functioning. *Neurotoxicol Teratol* 2011;33:129-36.
 35. Fried PA, Smith AM. A literature review of the consequences of prenatal marijuana exposure: an emerging theme of a deficiency in aspects of executive function. *Neurotoxicol Teratol* 2001;23:1-11.
 36. Smith AM, Longo CA, Fried PA, Hogan MJ, Cameron I. Effects of prenatal marijuana on visuospatial working memory: an fMRI study in young adults. *Neurotoxicol Teratol* 2006;28: 286-95.
 37. ProCon.org. (March 14, 2016). 24 legal medical marijuana states and DC. Available at: <http://medicalmarijuana.procon.org/view.resource.php?resourceID=000881>. Accessed June 4, 2016.
 38. Oregon Health Authority. Public Health Division, Medical Marijuana Dispensary Program. Information bulletin 2015-04. Sept. 10, 2015, page 3. Available at: www.oregon.gov/oha/mmj/Bulletins/Informational%20Bulletin%202015-04%20Early%20Retail%20Sales.pdf.
 39. Colorado Department of Health. Available at: www.colorado.gov/pacific/sites/default/files/MJ_RMEP_Pregnancy-Breastfeeding-Clinical-Guidelines.pdf. Accessed June 4, 2016.
 40. American Medical Association. Marijuana use in pregnancy. Policy Statement, Nov. 16, 2015. Available at: www.ama-assn.org. Accessed June 18, 2016.