Amy Turncliff, PhD
Neuroscientist & Public Health Advocate
Written Testimony Supporting H152; and
More Public Health Protections Needed
12/14/21

To: Chairpersons and Members of the Joint Committee on Cannabis Policy,

24 Beacon St.
Rooms 111 & 544
Boston, MA 02133

Dear Chairpersons and Members of the Joint Committee on Cannabis Policy,

I am a PhD level neuroscientist and public health advocate with expertise in the areas of mental health and substance use disorders. My passion is translating scientific knowledge for the public and policy makers to help PREVENT mental illness and addiction.

I am grateful for the opportunity to provide both verbal and written comments in support of H152, *An Act relative to preventing the health harms of marijuana products*. H152 includes necessary components to reduce the serious health harms being seen across MA, associated with the use of high THC products. All pieces of legislation outlined in H152 work together and should be passed as a comprehensive package to protect public health. While my testimony is focused on educating about, and preventing, serious mental health harms caused by THC, I am requesting an amendment to include the very serious health condition known as cannabinoid hyperemesis syndrome (CHS), that is increasingly being seen across the country and MA.

Please note that the National Institute on Drug Abuse (NIDA) has recently set a “standard dose unit of 5mg of THC to be used for human research.” Leaders in the field of cannabis-psychosis research have defined high THC products, with greater risk of inducing psychosis, as those containing >10% THC. The Netherlands has deemed products with >15% THC, a “hard drug”. It is clear from the scientific literature that some people may experience cannabis-induced psychosis at lower THC amounts, and others require higher amounts of THC to accumulate before experiencing signs and symptoms of overdose (yes, cannabis-induced psychosis, suicidal ideation, THC-induced catatonia, and cannabinoid hyperemesis syndrome [CHS] are manifestations of THC OVERDOSE, and yes, these are being seen in MA and can be life-threatening).

Based on purchase and possession limits in Massachusetts, I am sure you know that consumers may purchase products ranging from 0mg THC (e.g., CBD-only products) to concentrated products containing more than 90% THC. With a 5g purchase limit, 5g of 90% THC concentrate contains 4,500mg THC. This is equivalent to 900 x 5mg THC NIDA-defined dose units. Further, “looping” and “smurfing” are also happening; all together it isn’t hard to see how young people are gaining access to dispensary products through the diversion of these products, also known as the “grey market”. Of course, this is in addition to underage access to products from the thriving “illegal” market, that hides in plain sight among the “legal” commercial market. The last page of this testimony includes a careful breakdown of the calculations showing exactly how much THC can be purchased and what adverse events have been seen in “gold standard” clinical studies at different dose levels of pure THC. I ask that you please take

the time to review this information, as it is incredibly important to your role on the Joint Committee on Cannabis Policy.

I am aware that the MA Cannabis Control Commission recently released a report titled: High Tetrahydrocannabinol (THC) Cannabis and Effects on the Human Body, finding that "Evidence is insufficient to recommend a THC potency limitation ("cap") at this time." Please know that this report was inadequate. While it is important to quantify the growing use of high THC vapes and concentrates, now at approximately 30-35% of sales in MA, the report omitted key pieces of credible science highlighting serious public health risks that increase at higher THC levels. The cursory nature and scientific omissions were shocking coming from a state that consistently cites **MENTAL HEALTH as a top priority**.

This report omitted clear evidence from gold standard clinical studies of FDA approved THC formulations, showing higher risk of significant adverse events at or above doses of 0.4mg/kg per day which is equivalent to 28mg per day for a 154lb person. These severe adverse reactions include warning of: Neuropsychiatric Adverse Reactions (cannabis-induced psychosis including paranoia); Hemodynamic Instability (cardiovascular effects); Seizures and Seizure-like Activity; Multiple Substance Abuse; and Paradoxical Nausea, Vomiting, and/or Abdominal Pain (cannabinoid hyperemesis syndrome). One package insert warns of cases of "suicidal thoughts" and "toxic psychosis" at doses approaching 100mg/day of a 1:1 preparation of THC:CBD). To put this in perspective: before commercialization, an average joint (with ~0.333g flower containing 3% THC) contained approximately 10mg THC and this was often shared among several people. People were typically consuming 1 to 3mg THC. With commercialization of cannabis/THC products, selective breeding has resulted in flower with THC content upwards of 30%, delivering 100mg THC in a standard joint. The purchase limit of 5g of concentrate can allow folks to purchase nearly 5,000mg THC and 1oz of flower containing 30% THC delivers 8,400mg THC or an average of 84 joints at 100mg THC each. See Supplemental Material for Additional Information.

This report omitted centuries of evidence, and dozens of scientific publications, showing THC can induce acute episodes of psychosis in a dose-dependent manner, and newer studies showing that the conversion rate from cannabis-induced psychosis to schizophrenia or bipolar disorder is higher than for any other drug-induced psychosis, at nearly 50%.[i] In human laboratory studies, concerning healthy individuals being administered THC at high doses, it has been approximated that 35–50% will experience psychotic symptoms.[ii] Another significant omission was a recent analysis by leaders in the cannabis-psychosis field, which found that if high-potency cannabis, defined as >10% THC, were no longer available, 50% of cases of first-episode psychosis could be **prevented** in Amsterdam.[iii] Additionally, as reviewed by Sideli et al (2021): "Further, independent evidence comes from Portugal that has registered a steady increase in the rate of hospital admissions for psychotic disorders with comorbid CUD.[iv] Similar data were reported in Denmark.[v] Both countries have seen a rise in the potency of available cannabis over the same period."[vi,vii] The authors of the Denmark study concluded: "**The increase in cannabis-induced psychosis follows both the increase in the level of THC in cannabis, and the increase in cannabis use. The change in diagnostic practice does not appear to explain the increase in incidence of cannabis-induced psychosis.**" These are

just a few examples from a ROBUST body of scientific literature showing a causal link between cannabis use and psychosis.

RECENT QUOTES FROM MA CLINICIANS HIGHLIGHT THIS SCIENCE:

In written testimony to the Joint Committee on Cannabis Policy, submitted in advance of the 12/1/21 Hearing in support of H.152, a MA clinician who treats patients with psychosis provided important testimony. In this testimony she stated: "I treat many patients who have developed psychosis after using high potency THC products… Earlier age of first use, frequent use, and higher THC concentration are well known risk factors for developing psychosis. While some of my patients are "lucky" in that they are able to stop using THC and eventually recover from their psychotic episode, most are not so lucky. For some, the psychosis does not go away even though they stop using marijuana (i.e. the harm to their brain is irreversible). For others, they are addicted to THC and cannot abstain from using, and thus cannot recover from their psychosis. **Such histories are typical of a larger and larger proportion of our schizophrenia patients.** A growing body of research demonstrates that these individuals are NOT necessarily people who would have developed schizophrenia without using marijuana." **To be clear, she is talking about PREVENTABLE cases of schizophrenia!**

Another MA clinician stated, in her written testimony: "**Marijuana use is associated with and *causes* the development of psychotic disorders as determined by the Bradford Hill criteria for causation."** (Note: I have attached this analysis to my email). She also stated: "Decisions about which products, concentrations, formulations and delivery devices cannot be left up to the market because features that make products stronger, more addictive and more attractive to younger people also make products more profitable. External limits via government regulation are crucial for public health."

Industry advocates often try to cast doubt on this science, personal testimony, and clinician testimony. I have seen it at legislative and CCC hearings over the past 5 years. This is a well-known industry tactic, utilized for decades by the tobacco industry, that has been clearly described in books like "Doubt is Their Product" and "Merchants of Doubt". Industry advocates often try to deflect and cast doubt by saying: "there is not enough evidence" and "more research is needed" and "correlation does not equal causation". Science is always evolving, more research will always be needed; however, just as cigarette smoking *can cause* lung cancer in a dose-dependent manner, the collective body of current science shows that THC ***can cause cases of*** acute and chronic psychosis, in a dose-dependent manner, that would not have otherwise occurred.

It is unconscionable that the public, let alone consumers, are not being warned about the very serious risks of using marijuana, with higher risk from using high THC products containing >10% THC (which now make up the majority of the commercial market).

On the contrary, people of all ages have been seeing billboards stating: "Cannabis for Everyone", "Life is Better with Cannabis", and "Tis the Season to Buy Weed. Shop Now", not to mention the social media advertising young people are seeing every day!

Data from the 2018 MetroWest Adolescent Health Survey, of nearly 25,000 Massachusetts high school students, is alarming.[viii] Marijuana use among teens increased from 2016 to 2018 (the

most recent year the survey was conducted due to COVID). Two thirds of high school students said marijuana is “fairly easy” or “very easy” to obtain. Nearly half of youth (44%) reported there is either “no risk” or “slight risk” of using marijuana once or twice a week. **One in four high school youth (26%) had vaped a marijuana product in their lifetime. Among youth who have used a vape device, three out of five (60%) had used them to vape marijuana.** This is alarming given that a 2018 study showed significantly greater blood levels of THC, and impairment, via vaped as compared to smoked THC.[ix] The 2019 Massachusetts Youth Risk Behavior Survey results showed that 4% of our children have tried marijuana before the age of 13, and by the time they are in 12th grade, nearly 65% had tried it.

As I have said in testimony before, the “illegal” market does not magically go away with a “legal”, commercial, market. The illegal market thrives, hiding in plain sight. The legal market comes with advertising, marketing, and high THC products appealing to young people. From prevention science, we know that this serves to decrease perception of harm and decrease perception of disapproval, increasing social normalization of use. This grows both the “legal” and “illegal” markets (including the “grey market” via diversion to those underage). The “illegal” market will always undercut the prices set by the “legal” market; however, it is well-established that higher price is important to help reduce use-related harm from substances with addiction potential.

We desperately need commonsense regulation including limiting THC content and products appealing to young people; improving required warning labels on marijuana/THC packaging to warn about the risk of psychosis and other serious health risks (e.g, suicidal thoughts, severe abdominal pain, nausea and vomiting); prohibiting advertising and marketing in public spaces accessible to those under 21; improving data collection of adult and youth marijuana/THC use and related harms; and funding a comprehensive public awareness campaign to educate the public about the serious health and safety risks that come with the use of high THC products, especially for (but not exclusive to) young people under age 25.

This is Massachusetts, a leader in public health; it is time to take action to implement more public health protections, now, before more young people who are unaware of the serious health risks are harmed. **Moving H152 forward would be a significant first step!** Thank you!

Kindly,

Amy Turncliff, PhD
Neuroscientist & Public Health Advocate
Massachusetts

Support/Oppose Recommendations Based on a Public Health Regulatory Framework

Bill	Bill Title	Sponsor	Recommended Position
H.145	An Act dedicating one-percent of the recreational marijuana excise tax to youth substance use prevention	Bruce J. Ayers	Support
H.148	An Act relative to allowing a local sales tax on medical marijuana	Shawn Dooley	Support
H.149	An Act to create an open-container law for marijuana	Shawn Dooley	Support
H.152	An Act relative to preventing the health harms of marijuana products	Bradford Hill	**SUPPORT**
H.153	An Act relative to the prevention of health harms of marijuana products	Bradford Hill	SUPPORT
H.154	An Act relative to THC potency limits for types of marijuana	Bradford Hill	SUPPORT
H.155	An Act relative to the labeling of marijuana	Bradford Hill	SUPPORT
H.157	An Act to protect children from the use of alcohol and marijuana	Daniel J. Hunt	Support
H.159	An Act further regulating the promotion of marijuana and marijuana products	Hannah Kane	Support
H.160	An Act to further continue the special commission on operating under the influence	Hannah Kane	Support
H.161	An Act relative to possession and consumption of marijuana or marijuana accessories	Hannah Kane	Support
H.162	An Act relative to siting a marijuana establishment	Hannah Kane	Support
H.163	An Act relative to establishing a minimum age of entry for cannabis-related events, conferences, forums and exhibitions	Hannah Kane	**SUPPORT**
H.165	An Act to enhance enforcement against unlicensed marijuana operators	Hannah Kane	Support

Bill	Bill Title	Sponsor	Recommended Position
H.167	An Act relative to community outreach procedure for retail marijuana establishment license applicants	Hannah Kane	Support
H.170	An Act increasing the legal age for marijuana consumption and purchase from 21 to 25	James J. O'Day	Support
H.172	An Act relative to research by independent testing laboratories	David M. Rogers	Neutral
H.175	An Act relative to employment discrimination protections for legal cannabis	David M. Rogers	Neutral
H.180	An Act to grant co-op's equal business opportunity	Erika Uyterhoeven	Neutral
H.3710	An Act to facilitate the unionization of the cannabis workforce	Steven C. Owens	Neutral
H.4026	An Act requiring informed consent for marijuana testing	Russell E. Holmes	Neutral
H.4133	An Act relative to social consumption sites	Patricia A. Duffy	**OPPOSE**
S.65	An Act relative to social consumption sites	Julian Cyr	**OPPOSE**
S.66	An Act relative to equal opportunity for craft cooperatives	Julian Cyr	Neutral
S.69	An Act to facilitate the unionization of the cannabis workforce	James B. Eldridge	Neutral
S.74	An Act relative to marijuana potency	Jason M. Lewis	Oppose
S.75	An Act relative to establishing a minimum age of entry for cannabis-related events, conferences, forums and exhibitions	Jason M. Lewis	**SUPPORT**
S.76	An Act to enhance enforcement against unlicensed marijuana operators	Michael O. Moore	Support
S.78	An Act dedicating one-percent of the recreational marijuana excise tax to youth substance use prevention	Patrick M. O'Connor	Support

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SUPPLEMENTAL MATERIALS

Do you know how many NIDA-defined dose units of THC consumers can legally purchase and possess in Massachusetts?

Edibles: Massachusetts has set the "serving size" for an edible at 5mg/demarcated serving with a maximum of 20 servings per container for a total of 100mg THC/package. There are no transaction limits on the number of packages a person can buy at one time, in one day, one week, etc.

From Revolutionary Clinics Dispensary Website (accessed 12/8/21): **Is it true that edibles at recreational marijuana shops aren't as strong as edibles at medical marijuana dispensaries?**
"It sure is. According to current Massachusetts state law, recreational edibles can only have up to five milligrams of tetrahydrocannabinol, or THC, per single serving. If multiple servings are sold together, the total package can't have more than 20 single servings, or 100 milligrams of THC. Medical marijuana dispensaries like Revolutionary Clinics are not subject to these same restrictions which is why we can offer patients products like Watermelon Fruit Chews that contain 105mg of THC…PER CHEW.

Limits on the potency of recreational edibles is one of the most important reasons why a Massachusetts medical marijuana card is still a great thing to have."

Flower: The average THC content of marijuana products has increased significantly over the past 50 years. The marijuana of the 1960s and 1970s was approximately 2-3% THC. **This means that an average joint (with ~0.333g flower) contained approximately 10mg THC and this was often shared among several people.** With commercialization of marijuana/THC products, selective breeding has resulted in flower with THC content upwards of 30%, delivering 100mg THC. In Massachusetts people may possess up to 1oz of flower material in public, this is equivalent to 60-100 joints, but on average approximately 84x 0.333g joints. This means that 1oz of 3% flower would have contained 840mg THC while 1oz of 30% flower contains 8,400mg THC. Note: pre-rolled joints in MA are generally being sold in 0.5g to 1g sizes. A 0.5g pre-roll with 3% THC = 15mg THC; a 1g pre-roll with 3% THC = 30mg THC; a 0.5g pre-roll with 15% THC = 75mg THC; a 1g pre-roll with 15% THC = 150mg THC; a 0.5g pre-roll with 30% THC = 150mg THC; a 1g pre-roll with 30% THC = 300mg THC. [There are approx. 28g in 1oz]

Note: People can possess 10oz of flower in their home, and medical marijuana card holders can purchase 10oz of flower. This is equivalent to approximately 840x 0.333g joints containing approximately 84,000mg THC if that flower is 30% THC or 8,400mg THC if the flower is 3% THC. Further, "looping" and "smurfing" are happening in MA, to get around purchase limits. 84,000mg THC is equivalent to 16,800 NIDA-defined 5mg THC dose units.

Concentrates: In Massachusetts people may possess up to 5g concentrate material in public. 5g of concentrate that is 50% THC contains 2,500mg THC, while 5g of concentrate that is 95% THC contains 4,750mg THC. About the smallest "dab" (solid concentrate) that can be portioned is approximately the size of a peppercorn (~25mg THC, if the concentrate is 80% THC). Additionally, these products are often advertised to be used with other marijuana/THC products (e.g., Nova Farms Framingham menu [accessed online 3/26/21, Lemon Grapeade - Crystals 1g [89.9% THC=900mg THC; $80.91] "This collaboration between our Extraction Team yields a

highly potent concentrate that can be crushed up and added to your joint, used as a bowl topper, decarbed and used to bake with or enjoyed via your chosen concentrate compatible piece.")

Note: Medical marijuana card holders can purchase concentrate that is equivalent to 10oz of flower, where 1gram of concentrate is equivalent to 5.3g of flower. Thus, medical marijuana card holders can purchase and possess approximately 52grams of concentrate. As discussed above, if this concentrate is 50% THC, it contains a total of 26,000mg THC. 52grams of concentrate that is 95% THC contains 49,400mg THC or nearly 10,000 NIDA-defined THC dose units. This is meant to be a 60-day supply. If so, even 52 grams (equivalent to 10oz flower) of 50% THC concentrate, would provide approximately 433mg THC/day for 60 days. This is more than 15x the max daily dose recommended for FDA-approved THC (dronabinol) of 28mg for a 70kg (154lb) person and more than 10x the max daily dose of THC recommended for the FDA-approved THC/CBD combo (Sativex) of 32.4mg THC/day, to avoid severe adverse reactions that included **"neuropsychiatric effects" and "toxic psychosis"**.

Dronabinol: (Marinol—FDA approved oral delta9-THC enantiomer= delta9-THC structure): comes in 2.5mg, 5mg, and 10mg dosing strengths. Recommended dosing: Anorexia Associated with Weight Loss in Adult Patients with AIDS= 2.5mg 2x/day = 5mg/day (20mg/day maximum); The submission to the FDA for this product included controlled studies to show efficacy for the approved indications and outlined the toxicology/pharmacokinetic/safety parameters for dosing. The prescribing insert for dronabinol states that severe adverse reactions are more common at or above 0.4mg/kg = 28mg for 70kg (154lb) person. These severe adverse reactions include: Neuropsychiatric Adverse Reactions; Hemodynamic Instability; Seizures and Seizure-like Activity; Multiple Substance Abuse; Paradoxical Nausea, Vomiting, or Abdominal Pain
Sativex: not yet FDA-approved (currently in Phase 3 trials); is approved in EU and Canada as an add-on therapy for MS patients with moderate-to-severe spasticity who fail to respond to other anti-spastic treatments. Each single 100 microlitre spray contains: 2.7 mg delta-9-tetrahydrocannabinol (THC) and 2.5 mg cannabidiol (CBD) from Cannabis sativa L. According to prescribing insert: The patient may continue to gradually increase the dose by 1 spray per day, up to a maximum of 12 sprays per day (32.4mg/day THC + 30mg/day CBD), until they achieve optimum symptom relief. Product insert states: Psychiatric symptoms such as anxiety, illusions, changes in mood, and paranoid ideas have been reported during treatment with Sativex. Disorientation (or confusion), hallucinations and delusional beliefs or transient psychotic reactions have also been reported and in a few cases a causal association between Sativex administration and suicidal ideation could not be ruled out. In any of these circumstances, Sativex should be stopped immediately, and the patient monitored until the symptom has completely resolved. In a thorough QT study of Sativex in 257 subjects, with 18 sprays taken over a 20-minute period twice daily, **signs and symptoms of overdose/poisoning were observed**. These consisted of acute intoxication produced CB1 agonism type reactions including dizziness, hallucinations, delusions, paranoia, tachycardia or bradycardia with hypotension. In three of 41 subjects dosed at 18 sprays twice a day (18 sprays taken over 20min period 2x per day = 48.6mg THC/45mg CBD 2x/day = 97.2mg THC/90mg CBD), this presented as a transient **toxic psychosis** which resolved upon cessation of treatment. Twenty-two subjects who received this substantial multiple of the recommended dose successfully completed the 5-day study period. [approx. 50% were able to tolerate 18 sprays taken over 20min period 2x per day = 48.6mg THC/45mg CBD 2x/day = 97.2mg THC/90mg CBD daily; in 3/41 subjects this dose caused transient toxic psychosis].

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