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AUGUST 2019 DIGEST

How New Zealand is
Prepping for its Upcoming
Cannabis Referendum

Brazilian Regulators Could
Soon Approve Cannabis
Cultivation

Luxembourg to Legalize
Cannabis, But Not for
Tourists

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Notes from the Editor Jack Rudd

Welcome to the eleventh issue of the Analytical Cannabis Digest, a free monthly resource covering the latest developments in cannabis extraction, science and testing. In a month that saw Luxembourg make major steps towards a national legal cannabis market we review what this could mean for Europe as a whole. We also take a look at how accidental cannabis consumption incidents are on the rise, why combining cannabis and alcohol puts users at risk and much more.

If you have an idea for a cannabis science related story or would like to contribute to our coverage of the industry, please feel free to email me at any time - jack@analyticalcannabis.com



Brazilian Regulators Could Soon Approve Cannabis Cultivation

by Alexander Beadle

A health regulatory agency in Brazil could soon permit the country's first domestic cultivation of cannabis for medicinal use.

It's hoped the move that could reduce the country's [heavy reliance](#) on internationally imported medical cannabis and open up the Brazilian market to cannabis companies worldwide.

But since its initial unveiling, the new plan has attracted stiff opposition from a number of top-level sources, including psychiatrists and a top government minister.

Brazilian regulatory agency seeks reform

In June, a public meeting of the National Sanitary Surveillance Agency (Anvisa), the body responsible for cannabis regulation in Brazil, saw the agency's collegiate directors [vote unanimously in favor](#) of approving [two draft resolutions](#) that would reform its current approach to cannabis.

The first of these would see the agency regulate the domestic cultivation of cannabis for the first time. The cultivation would exclusively be for medical and scientific purposes, and would be carried out in compliance with the international [1961 Single Convention on Narcotic Drugs](#) treaty.

The second would have Anvisa review the current registration procedures for medical cannabis products, including synthetic cannabinoids and cannabis derivatives. It was proposed that Anvisa could begin allowing the commercialization of cannabis products that have completed only the second phase of clinical trials.

Anvisa authorities say that enacting these new rules would be enough to begin regulating cannabis cultivation and the review of the product registration system; no additional legislative change from parliament would be needed for the resolutions to take effect.

The change is needed, Anvisa authorities say, because many Brazilian patients have [had trouble accessing "safe" cannabis products](#), and they would like to see local production and regulation become part of the solution to this problem.

A 60-day [public comment period](#) on the proposed resolutions is now underway, with Anvisa seeking feedback from relevant companies, universities, government agencies, health professionals, and the general public on the proposals.

As of July 30, Anvisa has received 590 official comments on the new rules, with only eight of those responses being negative toward the draft resolutions, according to [Estadão](#).

Select government ministers condemn the plan

Anvisa says that as it [has a mandate](#) to make regulatory changes to already-existing laws without the approval of parliament, this would also give the agency the power to decide to regulate cannabis without parliamentary approval.

This existing mandate may come as a relief to cannabis reform advocates in Brazil, as some members of the current government have been very vocal in their disapproval of the plans since they were announced.

Leading the opposition is Osmar Terra, the minister of citizenship. Terra sent out a [tweet](#) shortly after the unveiling of the draft proposals which branded the planned reforms “against the law, against scientific evidence, against Congress and against the Brazilian government.”

“[Anvisa] is a government agency against the government” said Terra, in an interview with the Brazilian news website [Jota](#). “It doesn’t make sense.”

Terra went on to call Anvisa’s proposals “very dangerous” and “irresponsible.” Terra also suggested that Anvisa could be [shut down by the government](#) if it continues with the proposals.

But, a source from within the Ministry of Health appears to contradict this threat. The anonymous source, speaking in a separate interview with [Jota](#), confirmed that the government generally does disagree with Anvisa’s proposals, but views any direct intervention as being too politically risky to carry out.

In the rest of his interview, Terra did say that the government would support the use and manufacture of synthetic cannabidiol (CBD) products, so long as they contained no traces of tetrahydrocannabinol (THC). He stated that President Bolsonaro agreed with this assessment.

“Tem de estar puro o canabidiol. Quando estiver com THC, é a droga que causa dependência,” said

Terra, meaning, “Cannabidiol must be pure. When with THC, it is the drug that causes addiction”.

Not all ministers are in opposition to the plans. Congresswoman Carla Zambelli, of President Bolsonaro’s PSL party, told newspaper [Folha](#) that discussion of cannabis reform should be indeed be facilitated in Brazil, just as it’s in other parts of the world.

Public hearing goes ahead despite calls to cancel

Voices outside of politics have also cautioned against the new Anvisa proposals.

The Brazilian Federal Council of Medicine (CFM) and the Brazilian Psychiatric Association (ABP) [jointly published a document](#) in June that dubbed the proposals “high risk” and urged Anvisa to cancel the public comment period.

The organizations noted that only pure CBD is currently authorized for use in the country, and even this is under “compassionate use” rules. They also contend that the CFM prohibits doctors from prescribing cannabis in its “natural form,” as well as any prohibiting any products that are not pure CBD.

Anvisa responded, saying that its proposals do not advocate for the use of cannabis in its “natural” plant form. Anvisa also argued that the new regulations aim to serve exactly those doctors who are seeking cannabis products for their patients as a last resort under the compassionate care rules; repeating that they want to improve access to medicines for doctors, not simply inflate the number of medical cannabis patients.

Despite the requests of the CFM and ABP, a [public meeting](#) was held last week to further discuss the proposals, ahead of the closing of the public comment period in mid-August.

Speaking at the hearing, Anvisa’s president William Dib defended once again Anvisa’s plan, saying that it’s “robust, good, coherent, safe, effective and that it will provide peace of mind for the citizen to be able to consume a product of better origin than what we are seeing today.”





DEA Announces It Will Expand Cannabis Research

by Leo Bear-McGuinness

The US federal government has announced its intention to improve the quantity, quality, and accessibility of cannabis for scientific researchers.

The statement came on Monday from the Drug Enforcement Administration (DEA), which was ordered earlier this month by the US Court of Appeals to explain its inaction on a cannabis cultivation license application it had received nearly three years ago.

Federal disapproval

Despite receiving 33 applications since 2016 to [“provide researchers with a more varied and robust supply of marijuana,”](#) only one cultivation facility – a research department [at the University of Mississippi](#) – is authorized by the DEA to provide cannabis material to scientific researchers.

[Defending the administration’s inaction in 2017](#), a DEA spokesperson stated that it didn’t have a timeline to approve or deny the submissions.

But now, days before it was [required under a federal court order to respond to a lawsuit](#) from one of the original applicants, the administration has said it plans to propose new regulations for cultivators before reviewing pending applications.

“Prior to making decisions on these pending applications, DEA intends to promulgate regulations that govern the program of growing

marihuana for scientific and medical research under DEA registration,” [the notice states](#).

Any member of the public is also free to add their thoughts on this regulatory process by contacting the DEA directly.

“I am pleased that DEA is moving forward with its review of applications for those who seek to grow marijuana legally to support research,” said Attorney General William Barr [in a press statement](#). “The Department of Justice will continue to work with our colleagues at the Department of Health and Human Services and across the Administration to improve research opportunities wherever we can.”

Research needs high-grade cannabis

High quality cannabis is sorely needed for scientific research. One recent study carried out on cannabis from the University of Mississippi found the crop [genetically closer to hemp](#) than most market-sold cannabis.

Scientists have also complained that the federal grade cannabis is generally of poor quality and tainted by impurities.

“SRI used [cannabis from the University of Mississippi] for its Phase II trials,” wrote the Scottsdale Research Institute (SRI) [in its DEA](#)



lawsuit. "It arrived in powdered form, tainted with extraneous material like sticks and seeds, and many samples were moldy."

"Whatever reasons the government may have for sanctioning this cannabis and no other, considerations of quality are not among them. It is not suited for any clinical trials, let alone the ones SRI is doing. Simply put, this cannabis is sub-par."



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How New Zealand is Prepping for its Upcoming Cannabis Referendum

by Alexander Beadle

Next year, New Zealand will hold the world's first national referendum on cannabis legalization.

Dubbed, the "reefer-endum," a pro-cannabis outcome could see the country become the third nation in the world to fully legalize and regulate marijuana.

With such an advent at stake, many in the international cannabis industry are keeping a close eye on each new referendum development. So, how are preparations going?

Setting up the referendum

During the country's 2017 general election, a three-way coalition between Ardern's Labour Party, the Greens, and the nationalist party New Zealand First, beat out the incumbent prime minister Bill English and his National Party to form the country's new government.

As a part of the confidence and supply agreement between the Labour Party and the Green Party, the new government was obligated to undertake a referendum on whether to legalize recreational cannabis use.

While the requirement for a referendum had been known since the acceptance of the confidence and supply agreement, the [formal announcement of the cannabis referendum](#) came in December

2018, just one week after New Zealand's law makers gave medical cannabis the green light. The announcement revealed that the recreational cannabis vote would take place during [the country's 2020 general election](#), which, at the latest, will fall on November 21, 2020.

But, just as hemp hype was building in the country, the referendum's great potential was soured in May by the announcement that its results [would not be legally binding](#) and [would instead be up to the next administration](#) to enact.

Constitutional law expert Graeme Edgeler [told Newsroom](#) at the time that this essentially made the referendum "exactly as binding as any other political party promise prior to an election."

Separate from this controversy, the May announcement also brought [a first look](#) at exactly what was being proposed by the draft legislation, which included:

- A minimum age of 20 to purchase and use recreational cannabis legally
- Regulations that limit cannabis use and sales to license premises
- Limited home cultivation options
- A public cannabis education program

Further research and public education efforts are ramping up

Earlier this week, an official bill [was introduced](#) into the country's parliament, which – if it passes – will hold the referendum to many of the same rules as the concurrent general election, such as restricted advertising, which should ensure “a balance between freedom of expression and transparency” in the referendum.

So, with the countdown to the referendum now on, the Government is knuckling down to produce more quality research and policy work ahead of the vote.

Chief science advisor Juliet Gerrard has reportedly [been tasked with producing](#) a “short, authoritative, accessible and unbiased summary of the evidence for the harms and benefits of legalized cannabis.”

The summary is intended to better inform the general public in the run up to the referendum and will include an assessment of the impacts of legal recreational cannabis. The final summary will then be peer-reviewed by the chief science advisor forum and several international experts.

Independent researcher and medical anthropologist Dr Geoff Noller [told Newsroom](#) that this type of research was going to be extremely important in the referendum. While New Zealand's residents had a general idea about cannabis and its potential harms, Noller said, these ideas were often based on inaccurate stereotypes and generalizations.

“There's no such thing as a typical cannabis user,” Noller cautioned.

The exact makeup of the panel of experts who will be assisting in the research and its review is due to be announced next month, but Noller advised that it should include scientists, doctors, legal

experts, educators, and anthropologists in order to deliver the sort of broad and informed report that would be the most beneficial to the public.

Māori voices should also be an integral part of the analysis, he says, as the indigenous population has been harmed disproportionately by New Zealand's current policy of prohibition.

Medical cannabis education classes already underway

Parallel to these public efforts, cannabis education programs for doctors and medical professionals are also in full swing as the country prepares for the opening of its medical cannabis program.

Professor Mike Barnes, director of education at the London-based Academy of Medical Cannabis, was recently in New Zealand [running cannabis education classes](#) for doctors.

“There's about 350 doctors, generally, [who we saw] across the board over the three days,” said Professor Barnes, in an interview with [NewstalkZB](#), “Which is a really good turnout actually, really shows a lot of enthusiasm for the subject.”

“Doctors have never been trained in cannabis medicine, for obvious reasons, it's been an illegal product, they haven't been able to prescribe it until very recently. So I think it's good that the people are [here] to learn, they're keen, and they're enthusiastic. Fundamentally, they didn't have much prior knowledge, but it's good that they're there to learn and empower themselves to get the knowledge to be able to prescribe [more knowledgeably].”





“Cannabis Poisoning” Calls for Children Have Doubled in Massachusetts

by Leo Bear-McGuinness

The number of cannabis-related calls to a poison control room have doubled in Massachusetts since the state legalized medical marijuana, according to a new study.

Calls for single-substance cannabis exposure increased from 0.4 to 1.1 per 100,000 population between 2009 and 2016, a jump of 140 percent.

The study didn't include data from 2017 – the year Massachusetts legalized recreational cannabis – but the authors believe that current cannabis-related poison calls are likely higher.

Cannabis calls

All 218 calls involving cannabis exposure in children and teenagers were made to the Regional Center for Poison Control and Prevention, a not-for-profit that assists in diagnosing poisonings within Massachusetts and Rhode Island.

Most of these exposures resulted in “moderate and minor effects,” while four cases were said to have major effects. The majority of incidents were intentional and 19.4 percent involved infant children. No deaths were reported.

“While we're pleased to see that the incidence is relatively low, we feel these cases are preventable,” said Jennifer Whitehill, an assistant professor at

the University of Massachusetts Amherst and lead author of the study, [in a press statement](#).

[Under current state regulations](#), all packaging for cannabis products in Massachusetts must be child-resistant and should be unappealing to minors. Bright colors, cartoons, and images of minors are all prohibited, and every piece of packaging must include the warning: “keep out of the reach of children.”

But in addition to these measures, Whitehill's study, published in *JAMA Network Open*, calls on any state considering a liberal cannabis policy to strengthen its regulations “with particular attention to edible cannabis products and concentrated extracts” or risk unintentional exposure among young children.

“As states across the country enact more permissive marijuana policies, we need to do more to promote safe storage in households with children,” said Whitehill.

A minor case

While the increase in “cannabis-related poisoning” in children was significant, the calls still only represented 0.15 percent of all calls to the Massachusetts poison center during the seven-year study period for the 0-19 age group.



Rather than cannabis, the top three non-pharmaceutical causes of poisoning last year were cosmetics, household cleaners, and toys, according to [the center's own 2018 report](#).

Recent research has also indicated that localized cannabis legalization could actually be reducing the number of teenage consumers. One study found that states which legalized recreational cannabis were associated with an 8 percent fall in the

number of high school-age teenagers who claimed they used cannabis in the last 30 days.

"I think the big takeaway is that we find no evidence that teen marijuana use goes up after legalization for medicinal or recreational purposes," Mark Anderson, an associate professor at Montana State University and lead author of that study, [told Analytical Cannabis in July](#).



Creating Consistency within Cannabis Extracts

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Combining Cannabis and Alcohol More Dangerous Than People Realize - Study

by Leo Bear-McGuinness

Revellers who consume alcohol and marijuana simultaneously are more likely to experience alcohol-related problems, according to new research.

Published in the journal [Substance Use and Misuse](#), the new survey asked 1,017 young adults from 49 US states how often they used alcohol and cannabis, and how they perceived the drinking habits of themselves and their friends.

Consumers who regularly took cannabis and alcohol together were more likely to drink more often and for longer periods of time; 70 percent claimed to use cannabis and alcohol together at least weekly. These simultaneous consumers were associated with alcohol use disorder.

Cannabis and alcohol, an intoxicating relationship

“The results suggest that individuals who simultaneously use alcohol and marijuana are at a disproportionately higher risk for heavy, frequent, and problematic substance use,” said Ashley Linden-Carmichael, an assistant

research professor at the Edna Bennett Pierce Prevention Research Center at Penn State University, in a press statement.

Linden-Carmichael and the study’s other authors have recommended that alcohol intervention programs consider cannabis and any other substance the patient is using before progressing with treatment.

“Right now, a lot of campus programs focus on whether students are drinking, and while sometimes they are asked about other substances, it’s not necessarily whether they’re using these substances simultaneously,” she continued. “I think we do need to be asking about whether they’re drinking in combination with other drugs and educating students about how that exacerbates their risk.”

Simultaneous users also reported higher levels of sensation seeking and greater perceptions of their close friends’ drinking behavior in comparison to alcohol-only users.

“Even after controlling for the number of drinks a person typically consumed, people who used alcohol and marijuana at the same time were at a greater risk for problems like blacking out, getting in an argument, or other concerns,” Linden-Carmichael said.

Heavy drinking is [associated with many health risks](#), including heart disease, liver disease, and brain damage.

Over the limitations

But while comprehensive, the results were drawn from a selective group. All participants were aged between 18 and 25 years and most were male (67.8 percent), Caucasian (71.5 percent), and had attended at least some college (74.8 percent). This skewed sample set could prevent the study's conclusions from applying to any other group of people.

And despite measuring the rate of cannabis use, the study neglected to differentiate data

from states with legal, recreational access and those without.

Recent research has also shown that localized cannabis legalization could be linked to a decreased interest in alcohol. [In a marketing study](#) published in July, researchers found that online searches for alcohol fell by 11 percent once recreational cannabis was legalized in individual US states.

"It appears the alcohol industry has valid reason to be concerned about legal marijuana and may need creative strategies to avoid market decline if it passes," Pengyuan Wang, an assistant professor at the University of Georgia and lead author of the study, said in a press statement.



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Creating Custom Terpene Profiles

by Alexander Beadle

If you've ever watched a professional wine taster or sommelier at work you may have noticed that before they take a sip of whatever vintage they've selected, they smell it. That's because they know there's more to a good wine than simply how strong it is, or how old it is. The aroma is quite simply an essential part of the wine tasting experience.

And it's similar for cannabis. Different strains of cannabis have different smells and different flavors, and users will naturally have certain preferences for each based on the kind of experience they want to have.

Tetrahydrocannabinol (THC) and cannabidiol (CBD) are the two most prominent cannabinoids in cannabis, responsible for the majority of both the intoxicating and the medicinal effects of the plant respectively. However, both of these compounds are [near-flavorless when isolated](#). The odors and flavors that cannabis users experience when they smoke the drug are almost entirely the result of the cannabis terpenes present. Terpenes are [aromatic oils](#) that are produced by the cannabis plant alongside THC and CBD, and can vary dramatically between different strains. Differing terpene profiles between strains can result in dramatic differences in aroma, flavor, and even the feeling of the high or the type of medicinal benefits that are experienced as a result of using that strain.

The importance of terpenes in the cannabis industry

The sensory effects of terpenes are particularly important to note for those in the industry who deal with cannabis extracts, and products that are infused with some form of cannabis extract. Some of the most commonly used cannabis extraction processes concentrate on extracting THC, CBD, or a combination of the two from plant material – usually with little attention paid to what terpenes, if any, are also extracted in the process.

When these extracts are being produced for use in other strongly flavored products, such as [cannabis-infused chocolate or gummy sweets](#), the absence of terpenes may not be an issue for the consumer. But in products such as cannabis vape e-liquids, where the cannabis extract cannot so easily hide behind other ingredients, there is significant interest in developing ways of synthetically recreating terpene profiles that can be added back into the extracts. This would satisfy consumers who want the same cannabis-like flavors, aromas, and whole-plant-like effects that they can get from cannabis flower, but in a different product form.

Creating a custom terpene profile

But where do these terpene isolates come from? Some firms offer [cannabis-derived terpenes](#), where the terpenes are [extracted from the cannabis plant mechanically](#), without the use of solvents, leaving the cannabinoids intact for further processing. These methods produce a “full spectrum” terpene extract, and so the flavors, aromas, and effects of the extract will be a very close match to the original strain.

Alternatively, it's common practice to isolate terpenes [from other botanical sources](#). For example, pinene, one of the most common terpenes found in cannabis, can also be found in abundance in pine needles, basil, parsley, and orange peel. Myrcene, a terpene with known anti-inflammatory and sedative properties, can also be easily isolated from mangoes, hops, and lemongrass.

Numerous firms produce individual terpenes isolated from botanical sources, and a growing number of firms, such as [Eybna Technologies](#) and [True Terpenes](#), offer formulations of these botanical terpenes that are mixed to mimic the terpene profiles of popular cannabis strains.

If a firm wants to produce one of these botanical mixes, the first step in [the process](#) is to study the target cannabis strain that the terpene mix will want to mimic. Using [a technique for terpene analysis](#), commonly some form of gas chromatography, the terpene profile of the strain can be elucidated. Once these terpenes are identified, building a botanical terpene blend becomes a case of extracting the relevant terpenes from readily available botanical sources and mixing them to the desired ratios to match the target strain.

“The process of developing a botanically re-assembled profile of a specific cannabis strain is not as easy as it sounds,” shares Nadav Eyal, CEO and co-founder of the Israeli R&D company [Eybna Technologies](#). “It all starts with tracing a good phenotype, then running the sample through different analytical instruments and methods that we were able to develop only from experience. But when it comes to aroma and flavor, it's not only about the analysis, as our clients need the smell and taste of their phenotype to be on point.

Therefore, our final stage, which is fine-tuning, is done by the human nose as well as very unique analytical equipment, mostly used in food-tech.”

Each of these terpene mixes, both cannabis-derived and botanically derived, have their advantages and disadvantages. Cannabis-derived terpene mixes have the benefit of including more minor terpenes, creating a more accurate match to the original plant strains in terms of flavor. This more diverse terpene profile can also be beneficial if the terpene extract is intended to provide some sort of medicinal effect as opposed to just adding to the flavor. However, these cannabis-derived terpenes can often be prohibitively expensive – the cheaper botanical feedstocks allow those terpene mixes to be sold at a much more attractive price point. Prices for cannabis-derived terpene profiles can be as much as [\\$45 USD per milliliter](#) from a high-quality retailer, compared to botanical extract mixes which retail for [between \\$6 and \\$10 USD](#) per milliliter from similarly high-quality botanical-only brands.

Applications of terpene master mixes

Is it really worth this expense to add in some extra flavor to your extracts? For many companies, yes. The oil profile of a cannabis strain is quite fickle, with the level of terpenes present in a certain crop being [heavily influenced by environmental factors](#) such as the climate, weather, and soil type depending on where the crop was grown. But when it comes to building a recognizable brand, one of the key things you want in a product is consistency. So while these terpene mixes are indeed useful as a simple flavoring, the important thing is that they are able to [consistently create the same flavors and aromas](#) every time, as they are expertly mixed to have the same profile every time.

This consistency is also important for people who wish to use terpene-containing cannabis products for medicinal purposes. By having a consistent terpene profile in the cannabis oil or extract, there should be a reliable and reproducible medicinal effect each time the product is used, even if using different batches of the product. This means that when a product does elicit a positive health response, it's likely to be easily reproducible – likewise, if a product fails to provide any medicinal

relief then the consumer can be confident that this is down to the selected product being unsuitable for their needs, not due to the natural variation of the cannabis oil profile.

As well as being beneficial to company branding and to customers, there is an additional, more direct, way in which producers of cannabis extracts can benefit from using terpene mixes in the final product. Typically, for companies that use them, terpene mixes will make up around 3 percent to 10 percent of the final product, so

using these terpene mixes can help make the raw product go further. Depending on the [costs associated with the extraction technique](#), and how much product is produced in the typical extraction run, adding terpenes in this way could potentially be saving companies money, while still providing the additional benefits of a reliable terpene profile to consumers.

This article originally appeared in Analytical Cannabis' [Trends in Cannabis Extraction ebook](#) in March 2019.



Luxembourg to Legalize Cannabis, But Not for Tourists

by Leo Bear-McGuinness

Luxembourg ministers have cemented their commitment to legalizing cannabis consumption, but only for citizens.

[Speaking to Politico](#), the country's health minister announced that the country's legislation will likely ban non-residents from buying cannabis in order to prevent a drug-tourism surge seen in cities like Amsterdam.

However, he also called on European neighbors to follow in the country's wake and legalize cannabis for their own citizens.

"This drug policy we had over the last 50 years did not work," said Etienne Schneider. "Forbidding everything made it just more interesting to young people... I'm hoping all of us will get a more open-minded attitude toward drugs."

[Luxembourg officials revealed their preliminary plans for recreational legalization back in November 2018](#) during a press conference held by the three coalition parties. But the recent comments from Schneider have added clarity to the kind of recreational market Luxembourg will develop.

While draft legislation isn't expected to be seen until later in the year, home growing is expected to be prohibited, as the state intends to regulate production and distribution entirely through a new cannabis agency.

Residents over the age of 18 will be allowed to buy up to 30 grams of cannabis, but minors aged between 12 and 17 won't be criminalized for possessing five grams or less of the drug.

Schneider claims that legalization could enter Luxembourg law within two years, which would make the country the third in the world (after Uruguay and Canada), and the first in Europe, to violate the three United Nations (UN) treaties that set the world's robust drug control program. [This planned defiance was recently questioned in the Luxembourg parliament](#), but Schneider claimed the government was in discussion with the UN over the issue.

If successful in enacting such a stark change in European drug policy, many believe a domino effect is likely to follow.

"The social pressure will be so high that if you have legalization in one of the EU member states, soon that will be discussed seriously in the other ones," Malte Goetz, a lawyer specializing in the German medical cannabis market, told *Politico*.

Germany legalized medical cannabis in March 2017, but its program has been stymied by supply shortages. Other European countries like [the UK, France, and Ireland](#) have all recently announced medical cannabis efforts, but none have progressed with recreational policies.

Luxembourg [legalized medical cannabis in June 2018](#) and now has at least 250 doctors trained to prescribe the medication.

[Following a research trip to Canada in May](#) to discuss legalization with government officials, Schneider and justice minister Félix Braz said that Luxembourg will have a similar public health-led model for recreational cannabis.

This public health approach will likely involve a cap on the potency of any cannabis products. Though

this limit has yet to be announced, according to *the Luxembourg Times* cannabis sold on the country's black market can sometimes reach up to [60 percent THC content](#) by weight.

"We can learn from other countries' experiences and avoid mistakes [in Luxembourg] from the outset," explained the ministers [in their official report](#) following their trip to Canada.



Medical Marijuana for Epilepsy: What Does the Research Say?

by Alexander Beadle

According to [statistics released](#) by the US Centers for Disease Control and Prevention, there are currently around three million adults and nearly half a million children living with some form of active epilepsy in the United States.

[Around 1 in 26 people](#) will develop the condition at some point in their lives, making epilepsy the fourth most common neurological condition in the world, behind only migraine, stroke, and Alzheimer's disease. Globally, there is estimated to be around [50 million people](#) living with an active epilepsy diagnosis.

People with epilepsy suffer from episodes of [abnormal brain activity](#) which disrupt the usual function of the brain, resulting in seizures. The exact nature and frequency of these seizures can vary hugely between different forms of epilepsy, as can the success rate of treatment for these seizures.

While epilepsy is a lifelong condition, for most people the symptoms of epilepsy can be easily controlled through anti-epileptic medications, meaning that the majority of sufferers can go on to lead a relatively normal life. In fact, it is even possible for epilepsy to [naturally go into remission](#); in children with absence epilepsy it is relatively common for the child to "grow out of it" as they reach puberty.

But for up to a third of epilepsy patients, anti-epileptic medication fails to bring their seizures

under control. This is known as [refractory epilepsy](#), or intractable epilepsy.

Medical cannabis has been floated as a potential treatment for people with refractory epilepsy. Indeed, [a cannabis-derived medicine](#) is approved by the US Food and Drug Administration for the treatment of two types of refractory epilepsy, Dravet syndrome and Lennox-Gastaut syndrome. Refractory epilepsy is also one of the conditions for which specialists in the United Kingdom [are allowed to prescribe medical cannabis](#), though this is still rare in practice.

But is cannabis really an effective treatment for epileptic seizures? The scientific evidence is perhaps a little murkier than you might expect.

Major review concludes "insufficient evidence" cannabis is effective

In 2017, the National Academies of Sciences, Engineering, and Medicine released [a comprehensive report](#) on the health effects of cannabis and cannabinoids, which sought to evaluate the current state of medical cannabis research with respect to a range of different medical conditions.

The reviewers identified two systematic reviews of randomized trials and two case studies

dealing with the effect of cannabinoids on epilepsy symptomology. Contrary to what we hear today, the reviewers concluded that there was “insufficient evidence to support or refute the conclusion that cannabinoids are an effective treatment for epilepsy.”

In fact, across the more than one hundred conclusions that the report authors investigated, only three were deemed to conclusively have enough evidence to support the therapeutic use of cannabis: in reducing nausea in chemotherapy patients, treating chronic pain, and reducing muscle spasms in people with multiple sclerosis.

The report’s conclusion on epilepsy was criticized at the time. Orrin Devinsky, director of the epilepsy center at the New York University Langone Medical Center told [the Guardian](#) that the conclusions of the entire report were broadly “conservative” and that the conclusions on epilepsy were “wrong.”

“I think when they do a scientific review they should incorporate all the evidence that is out there for that disorder, and I don’t think they did that for epilepsy,” said Devinsky. Though he did also say that the report was still “very valuable” despite its supposed conservative nature.

More recent cannabis and epilepsy studies show promise

Since the publishing of the 2017 review, research into cannabis and its effectiveness in treating epilepsy has continued.

One recent study found that the cannabinoid cannabidiol (CBD) appears to be [helpful in treating epileptic seizures in children](#). The researchers observed that for children with Lennox-Gastaut syndrome and dissociative seizures, those given a treatment of oral CBD experienced a significant reduction in the frequency of their seizures compared to those taking a placebo; nearly 40 percent of those taking CBD had their seizure frequency reduced by 50 percent or more.

However, alongside this observation, the researchers also noted that the children taking oral doses of CBD began to experience negative side effects; 8.9 percent of the CBD patients

withdrew from the study because of these effects, most commonly diarrhea. Although adverse events were experienced in 87.9 percent of those treated with CBD, importantly, 72.2 percent of those taking a placebo also reported similar symptoms, raising doubts as to whether the CBD was the cause of these side effects.

Separately, a recent evaluation of combination CBD and tetrahydrocannabinol (THC) cannabis oil also [saw a significant drop in seizure frequency](#) among children with Dravet syndrome, with seizure frequency reduced by an average of 70 percent over the course of the 20-week study period. Once again, there were some negative adverse effects observed, most commonly fatigue, anorexia, and diarrhea, but this time no participants chose to withdraw from the study. The researchers believe that this study could form the basis of safe dosage guidelines should cannabis oil continue to become a common treatment for epilepsy.

Cannabis and epilepsy treatment, in the patients’ own words

Cannabis’ potential as a treatment for epilepsy became [central to the medical cannabis legalization movement](#) in the United Kingdom, with the high-profile cases of two young boys, Alfie Dingley and Billy Caldwell, capturing the attention and sympathies of the British public. When the UK did eventually move to legalize the medicinal use of cannabis, the Home Secretary at the time, Sajid David, referenced the struggle of the boys [in his public statement](#) on the matter, saying that “the recent cases involving sick children made it clear to me that our position on cannabis-related medicinal products was not satisfactory.”

Hannah Deacon, the mother of Alfie Dingley, has become one of Britain’s most prominent medical cannabis campaigners following her fight to secure her son a prescription for medical cannabis. She has seen first-hand the effectiveness of cannabis oil in treating her son’s severe refractory epilepsy.

“At five, when his condition was at its worse, he was having intravenous steroids up to 25 times a month. So that’s very, very dangerous,” Deacon [explained to Analytical Cannabis in June](#).

“And our doctors were saying to us that he was so seriously ill that the seizures may kill him. But if the seizures didn’t, it was likely the steroids would because they can cause organ failure.”

“So we then went to Holland in 2017, where we worked with a pediatric neurologist to use medical cannabis. And we saw [Alfie’s] seizures drop to once every 17 days, and then one seizure every 40 days. So, for us, it was like a miracle.”

Deacon has argued that patient stories like Alfie’s should be considered as viable pieces of evidence by UK regulators, which still restrict wider access to medical cannabis. It’s a sentiment shared by Peter Carroll, a medical cannabis campaign founder, [who confronted a UK parliamentary panel earlier this year](#) on the issue.

“I think that we have to take a broader view of the evidence here because there is a point where multiple anecdotal stories do actually build on to a pattern of evidence,” he stated. “And it seems absurd to me that we have to wait three, four or five years on these trials to be produced when there are actually real-life cases now.”

[A recent report from a UK health body](#) stated that the research supporting cannabis as an epilepsy treatment is “limited and of low quality,” and so it “did not warrant a practice recommendation.”

However, [a separate review from NHS England](#), which said children’s experiences on medicinal cannabis should be considered as evidence of how well the drug works.



Chocolate is Really Confusing Cannabis Testers

by Leo Bear-McGuinness

The combination of chocolate and cannabis, which has forever dazed marijuana users, is now confusing the cannabis professionals who analyze the infused edibles.

Researchers in California claim that components in chocolate could be interfering with cannabis potency tests, which could mean thousands of cannabis-chocolate products across the US are inaccurately labelled.

Weighing in

The research, which was presented at a meeting of the American Chemical Society, found that one gram of cannabis-infused chocolate showed higher levels of THC than two grams of material. The analysts say this error indicates that the chocolate is disrupting the cannabis testing equipment.

“One gram gave higher values than two grams across the board,” David Dawson, a researcher at CW Analytical Laboratories, told Analytical Cannabis. “That is not what you expect. And that was with a commercially available chocolate bar. I got it off the shelf.”

After follow-up experiments, Dawson induced that the disruptive elements in the chocolate were likely its fats rather than any unique cocoa chemical, such as theobromine.

“I bought commercially available cocoa powder, baking chocolate, and white chocolate, all of which have different levels of chocolate components. The cocoa powder has minimal fats, the baking chocolate has natural cocoa fats but no added milk fats, and then the white chocolate has a lot of added dairy fats and sugars.”

“I ran an experiment with a THC solution and the cocoa powder had the least issues... so that points me away from the organic cocktail [of chocolate] and more to the fats.”

It’s currently unclear whether Dawson’s discovery is an isolated incident or reflective of a wider testing issue.

“I cannot really speak to how widespread this is because I have no idea how other labs are testing,” he said. “There is not a lot of collaborative communication between testing labs, but I am hoping that we eventually do come to the table.”

In California, where the finding was made, [inaccurate label claims are the leading reason](#) for denied licensing applications by the state regulator.

But if the testing error is common, Dawson warns that it won’t just be chocolate bars being mislabelled.

“If it’s [the] fats then that is not just an issue that pertains to chocolates,” he continued, “that is an

issue that pertains to baked goods, brownies, topicals – any product with fat content.”

A fat load of cannabis

Most cannabis edibles rely on [fats to bind with THC and carry the cannabinoid](#) through the body's epithelial layers to create the desired intoxication. When this is achieved, the edible's psychotropic effect can last much longer than inhalable products.

Because of this potent reputation, many US states and countries have placed cannabis edibles under stricter regulations; the products will only be [legal to buy in Canada this October](#), despite the country legalizing cannabis in October 2018.

Regardless of impediments, the edibles market is set to grow from [\\$1 billion to \\$4.1 billion in Canada and the US](#) between 2017 and 2022.

But in light of his findings, Dawson says that cannabis edibles still need higher testing standards before this consumer boom hits.

“I think this should be a microcosm of why we need to be investigating in the commercial

sphere,” he said. “It’s really shocking for an industry to come from decades of black-market obscurity and then, in the period of two years essentially, have FDA-pharmaceutical-level testing requirements on products.”

It’s not the first time cannabis analysts have called for more reform in edibles testing. Kim Rael, CEO of the cannabis edibles company Azuca, [told Analytical Cannabis last year](#) that inaccuracies are best addressed when the testing community acts together.

“My intent in discussing this challenge is not to accuse the labs of foul play, it’s quite the opposite,” he said. “Working within an industry where the scientific community is still fighting the technical and legal battles necessary to even establish reliable reference-standards for testing means that reduction in variability is something we as an industry must work together on, for the ultimate benefit of our patients.”

Dawson’s team now aim to test the levels of other cannabinoids, such as CBD, in more edible products, in the hopes of developing such standard methods for cannabis edibles potency testing.



Not Enough Evidence to Prescribe Medical Cannabis, Says UK Health Body

by Leo Bear-McGuinness

UK patients are being denied access to cannabis-based treatments because there is a “lack of evidence about the long term safety and effectiveness of medicinal cannabis,” [according to an official report](#).

Despite [becoming legal to do so in November last year](#), very few cannabis medicines have been prescribed in the UK, as doctors and health bodies remain concerned over their effects.

This reticence from the National Health Service (NHS) has led some parents of children with epilepsies to source medications from other countries, [which are then seized at UK airports](#).

But in its new report, the National Institute for Health and Care Excellence (NICE, an advisory health body to the NHS) stated that the research supporting cannabis as an epilepsy treatment is “limited and of low quality,” and so it “did not warrant a practice recommendation.”

The draft guidance also considered whether to recommend cannabis medications for patients living with nausea from chemotherapy, chronic pain, and spasticity. And while the authority approved of the cannabis-based drug nabilone for nausea treatment if conventional medicines had no effect, it rejected all cannabis medications used to treat chronic pain and spasticity.

However, one [of the most comprehensive scientific reviews](#) ever undertaken into medical cannabis concluded in 2017 that there was enough evidence to support treatment in all three areas: to reduce nausea from chemotherapy, to treat chronic pain, and to reduce spasms from multiple sclerosis.

And while that same review found the evidence for epilepsy treatment lacking, [recent studies](#) have added scientific weight to cannabis’ efficacy as an epileptic medication, and [high-profile media cases of children with epilepsy](#) have highlighted cannabis’ medical effect in certain cases.

“At five, when his condition was at its worse, he was having intravenous steroids up to 25 times a month; that’s very, very dangerous,” said Hannah Deacon, a medical cannabis campaigner and mother of Alfie Dingley, a young British boy with severe epilepsy. [Speaking to Analytical Cannabis in June](#), Deacon described the remarkable effect medical cannabis had on her son. “So we then went to Holland in 2017, where we worked with a pediatric neurologist to use medical cannabis, and we saw [Alfie’s] seizures drop to once every 17 days. So, for us, it was like a miracle.”

[Speaking to ITV News](#) on NICE’s ruling, Deacon said that the NHS authority was “showing a complete lack of understanding of cannabis-based medicine, a complete lack of knowledge of how the cannabis plant works, and no empathy to the families... who

are funding private prescriptions because the NHS doctors will not prescribe.”

But Deacon did praise [a separate review from NHS England](#), which said children’s experiences on medicinal cannabis should be considered as evidence of how well the drug works.

Both the NICE and NHS England reports claim that more randomized, controlled clinical trials need to be carried out in the UK before cannabis can be regularly prescribed, but campaigners say such medical models aren’t fit to test cannabis’ effects.

“[NICE] relies solely on the pharmaceutical model of the randomised controlled trials (RCTs), which is not an appropriate methodology for the assessment of cannabis efficacy,” said Professor Mike Barnes, chair of the Medical Cannabis Clinicians Society, in a press statement.

Some medical professionals feel that RCTs are best suited to test single pharmaceutical ingredients, and not cannabis extracts, which can contain over 100 naturally occurring cannabinoids. This view seems to be supported by the current UK health secretary, Matt Hancock, [who told MPs in July that medical cannabis will not need to be tested through RCTs](#) in order to be licensed because “the licensing process takes into account global evidence. You don’t have to have trials in this country.”

Given the conflicting conclusions from the health secretary and the two reports from NICE and NHS England, it remains uncertain whether medical cannabis policy in the UK will change.

The NICE draft guidance is open for public consultation until 5th September 2019.