Marijuana's effects on the body, brain, heart and sperm: All your weed questions answered

By Anna Swartz

With five more states voting on whether or not to legalize recreational marijuana come November, millions more Americans are closer than ever to being able to smoke pot freely and legally. This makes it a perfect time to take another look about some of the facts about marijuana’s effects.

Mic has done extensive reporting on the positive and negative effects of weed. For those interested in marijuana’s effects on the body — from your brain to your heart to your uterus — here are all the facts you need.

What are marijuana's effects on the body?

What are marijuana's effects on the lungs? Marijuana is often smoked, but its effects on the lungs aren’t as well understood as, say, smoking cigarettes, which has been indisputably linked to lung cancer. Mic’s Kathleen Wong explored the complicated answer of how marijuana affects lung function back in February. Here it is in full:

Smoking from bongs, joints and hand pipes are some of the most common methods that people use to consume marijuana. As it’s common knowledge that cigarette smoking is a life-damaging addiction, it’s unclear if marijuana smoking is equally damaging to our precious (and just about only) set of lungs.

A 2012 study observed over 5,000 smokers over a 20-year span, and reported that its participants who smoked marijuana did it on average two to three times per month, while tobacco smokers lit up on average about eight times a day, according to Time.

For the most part, since marijuana is habitually smoked less frequently than cigarettes and marijuana smokers tend to inhale deeper and for longer compared to cigarette smokers, smoking marijuana becomes a sort of pulmonary function test and may improve lung capacity, Time reported. The study’s findings may also be attributed to the anti-inflammatory properties of the THC in marijuana.

Granted, smoking is smoking, and marijuana smoking can lead to more coughing, shortness of breath and sore throats.

Cigarette smokers have higher instances of lung cancer, according to the Centers for Disease Control and Prevention, but there has been conflicting information regarding the lung cancer rates of marijuana smokers.

”The THC in marijuana has well-defined antitumoral effects that have been shown to inhibit the growth of a variety of
cancers in animal models and tissue culture systems, thus counteracting the potentially tumorigenic effects of the procarcinogens in marijuana smoke,” said Dr. Donald Tashkin — professor of medicine at the University of California, Los Angeles — according to Time.

However a 2008 New Zealand study linked heavy cannabis smoking with a higher likelihood of lung cancer. The 2012 study also noted that those who smoke marijuana frequently will probably experience considerable lung damage.

One study found that marijuana smoke contained up to “20-fold” more ammonia compared to tobacco smoke.

Smoking marijuana could also lead to chronic obstructive pulmonary disease, a lung disease gained from smoking that is bronchitis-like, according to CBS News.

If you’re worried about smoking marijuana, you could always try a vaporizer — though the jury’s still out on how safe those are.

**Weed and sleep:** Some marijuana users swear by smoking before bed, while some avoid it. There’s no one answer about how marijuana affects sleep, but Mic’s Max Plenke investigated the truth about weed and sleep. Here is his piece in full:

Some project has been stressing you out at work. You’re on hour three of unsuccessfully trying to fall asleep. Another episode of Breaking Bad just gets you even more wired, so you pull out a bong that looks like a dragon and get a little stoned. Boom. You pass out.

But when you wake up, how do you feel? Groggy? Refreshed? Was your weed-induced sleep better or worse than it would have been if you’d just fallen asleep naturally, using this breathing trick, for example?

*Mic* spoke with a number of medical marijuana advocates and addiction experts about the benefits and drawbacks of getting high before bed, and the conclusion is... there isn’t one. Researchers say it all depends on what you want out of sleep.

**Experts agreed on a few things:** Marijuana probably helps you fall asleep, as long as it’s a type of marijuana plant categorized as indica, rather than sativa. Indica is known the relaxing type of marijuana; sativa is thought to be energizing.

Cannabinoid receptors, which are mechanisms you already have in your brain that receive cannabis, play an important role in regulating your anxiety and keeping those lizard-brain "fight-or-flight" responses to a minimum. That's why weed makes you calm down enough to fall asleep.

But after that, its impact on your sleep is uncertain. The most important question here: Which stage of sleep is more important, stage 3 or stage 4?

"The key sleep state is the REM sleep," or stage 4, Dr. Kevin Hill — director of the Substance Abuse Consultation Service, Division of Alcohol and Drug Abuse at McLean Hospital, a Harvard Medical School affiliate — told *Mic."That's the restorative stage for your sleep. Evidence suggests that's lowered by marijuana."

Dr. Perry Solomon, chief medical officer at HelloMD, a digital health care platform for medical marijuana, says it’s the third stage of sleep — deep sleep or slow-wave sleep — that seems to let your body "renew and repair itself," as an adaptation of a health report from Harvard Medical School stated. Stage 3 is "the most sensitive to cannabis," Solomon told *Mic."Marijuana seems to make that stage longer, and people get a more restful sleep when [slow-wave sleep] is longer."
While Solomon (and the adaptation of the health report) says that stage 3 sleep is probably what repairs your body the best, Hill says stage 4, or REM sleep, is what refreshes your brain. Weed makes that brain-refreshment stage less effective.

"You need it all," Hill told Mic. "But if you’re using cannabis to help you sleep, your sleep architecture is not optimal. You might optimize stages prior to REM, but if you cut into REM, you’re hampering your efforts."

**The possible risks:** Dr. Harold Urschel, chief medical strategist at Enterhealth, a drug and alcohol addiction rehab center in Texas, thinks using cannabis to get to sleep is more of a slippery slope than you might expect.

For one, he says, if marijuana has been cutting into your REM sleep and reducing dreams, cutting it out of your night routine could mean those dreams could return in unsettling ways. If you’ve been using cannabis to fall asleep every night for weeks, trying to phase it out can result in withdrawal that often includes insomnia.

**There's a problem with this whole story:** The science is inconclusive because marijuana research is barely crawling. As much as anecdotal evidence stands to at least pave the way, our physiological understanding of the substance as a whole is barely more than personal experience.

That's because, according to the Drug Enforcement Administration, weed is a Schedule 1 drug, the same category as heroin, peyote and Ecstasy. Schedule 1 means the drug has no medicinal value — and running trials is the only way to prove it can have value. So in order to better understand the effects of marijuana on a physiological level, the DEA needs to reschedule marijuana to reflect its potential for medical use.

That is, if we’re ever going to fully understand the pros and cons of weed once and for all.

"I wish we could have a less theoretical conversation about this," Hill said. "If you’re treating people with cannabis and say it works for certain things, it would be great to have scientific evidence to back it up. Rescheduling marijuana would definitely help that."

**The bottom line:** From what experts deduce, you have to choose what kind of sleep is important to you. If you smoke weed, you’ll probably be more physically restored. But you could become mentally foggy and dream less, if you dream at all.

**What are marijuana's effects on the brain?**

**Marijuana and mental health:** Some people use marijuana to treat anxiety, but for some, the drug feels like it causes anxiety. But, as Mic’s Jordyn Taylor reported in February, the latest science indicates that marijuana does not cause clinical anxiety. Here is that report in full:

Marijuana doesn’t get the best rap when it comes to mental health. Past research has shown it causes short-term paranoia. Another study found that high-potency cannabis — or "skunk" — could be directly responsible for one in four new cases of psychotic disorders, such as schizophrenia.

But the results of a new, widespread study offer some slightly more chill news: Despite what you may have read, cannabis does not increase your risk of developing mood or anxiety disorders.

To conduct their study, published in JAMA Psychiatry, researchers surveyed a nationally representative sample of approximately 35,000 U.S. adults. They started by gauging the group’s marijuana habits; three years later, they analyzed the group's mental health status.
Countless people report feeling anxious when they use marijuana. "Does anyone else get really bad anxiety when smoking weed?" one marijuana user asked Reddit. "It sort of seems like my anxiety started to come out much more after smoking weed for a while."

"During prom I ate an edible, had a panic attack and hid in the bathroom for three hours," another user responded.

And yet, when the researchers adjusted their findings for several covariates, they found "cannabis use was not associated with increased risk for developing mood or anxiety disorders," according to the study. **But the findings weren't all positive.** Weed may not increase your likelihood of developing an anxiety disorder, but it was linked to a "significantly increased risk for developing alcohol, cannabis and other drug use disorders," according to the study. That included nicotine dependence, too.

Folks who reported using cannabis were nearly three times more likely to have an alcohol use disorder or other drug use disorder, and nearly two times more likely to have nicotine dependence, according to the study.

When it comes to the gradual legalization of marijuana across the U.S., the researchers suggested that policymakers should take their findings into account.

"Our findings suggest caution in the implementation of policies related to legalization of cannabis for recreational use," the researchers wrote, "as it may lead to greater availability and acceptance of cannabis, reduced perception of risk of use and increased risk of adverse mental health outcomes, such as substance use disorders."

**Marijuana and brain health:** It turns out that one of the possible benefits that marijuana may have on the brain is as a potential guard against Alzheimer's disease. Mic's Jordyn Taylor investigated the latest research in July. Here is that report in full:

Scientists are searching for ways to prevent Alzheimer's disease, a form of dementia that affects more than 5 million Americans and is the sixth-leading cause of death among U.S. adults.

It turns out weed may help.

**The latest research:** According to new findings out of the Salk Institute, tetrahydrocannabinol and other compounds found in marijuana may help remove amyloid beta — a toxic protein associated with Alzheimer's disease — from nerve cells in the brain.

"Although other studies have offered evidence that cannabinoids might be neuroprotective against the symptoms of Alzheimer's, we believe our study is the first to demonstrate that cannabinoids affect both inflammation and amyloid beta accumulation in nerve cells," the paper's senior author, Salk professor David Schubert, said in a statement.

**How it works**

**Let's start with those "toxic proteins."** Though scientists don't have a definitive cause of Alzheimer's disease, they suspect it's partly to do with plaques: clumps of a "sticky" protein — amyloid beta — that develop between neurons in the brain, according to the Alzheimer's Association.

Using lab-grown tissue, the Salk Institute researchers found that higher levels of amyloid beta led to increased inflammation — and, in turn, cell death.
Here's where the weed comes in: Our bodies naturally produce compounds called endocannabinoids, which facilitate signaling in the brain. According to the new study, endocannabinoids also protect nerve cells from amyloid beta and inflammation.

THC and other cannabinoids were found to have the same effect.

"When we were able to identify the molecular basis of the inflammatory response to amyloid beta, it became clear that THC-like compounds that the nerve cells make themselves may be involved in protecting the cells from dying," the paper's first author, Antonio Currais, said in a statement.

"I think it is exciting, to tell you the truth," Keith Fargo, director of scientific programs and outreach at the Alzheimer's Association — which funded research that informed this study — said in a phone call Wednesday.

Currently, there are five drugs approved by the Food and Drug Administration to treat the symptoms of Alzheimer's disease. But "they don't actually do anything to slow down the disease's process," Fargo said. "They help with the condition for a little while, but the disease progresses unabated."

"Really, the holy grail is to find something that would stop the progress of the disease, or at least slow it down," he continued. The Salk Institute's research is a step in that direction.

Weed and Alzheimer's disease

A number of other studies have explored marijuana's potential role in fighting Alzheimer's disease. Research like this 2014 study and this 2006 study found THC inhibited amyloid beta aggregation.

Still, it'll be some time before America's Alzheimer's patients can put the Salk Institute's findings to the test. As the press release points out, the research team used "exploratory laboratory models" — and "the use of THC-like compounds as a therapy would need to be tested in clinical trials."

If the therapy works in humans, "it probably won't be the whole plant marijuana that's recommended," Fargo cautioned. "Not everybody wants to have that psychoactive experience you have with marijuana use."

Instead, pharmaceutical companies could create treatments that target the brain's cannabinoid system — and don't get patients stoned.

It may be a far off goal — but it's still an important one, Fargo said.

"There are 5 million Americans today that have dementia from Alzheimer's disease," he said. "That's just going to increase unless we find something that can slow down the progress of the disease."

What are marijuana's effects on the heart?

Marijuana and exercise: Marijuana can raise heart rates, which for some people may feel uncomfortable, even frightening. Yet some athletes swear by getting high before a workout. Mic's Jordyn Taylor investigated the link between weed and working out in May. Here's that piece in full:

Some people drink overpriced kale juice before hitting the gym. A growing body of athletes is fueling up on a different green treat: weed.

Coming soon to San Francisco is a gym that'll let clients consume marijuana while working out, according to Tech Insider.
The gym, Power Plant Fitness, will reportedly allow edibles and vaping on-site and plans to add an "outdoor smoking deck" in the future.

The gym sees cannabis as "a tool for focus and recovery," according to Tech Insider, which spoke to founder Jim McAlpine via email:

*New members will take a "cannabis performance assessment" under the supervision of staff to determine the "most optimal ways to consume." Some might find a bite out a pot brownie gives them the push they need to complete a circuit training workout, while others find it knocks them on the floor.*

"It won't be a place to get high and just screw around," McAlpine said in a blog post. "We are focused on the athletic side, not the cannabis side."

**So! Can weed actually help you work out?**

**Plenty of athletes claim weed ups their game.** One of them is Seibo Shen, a jiujitsu enthusiast and founder of the vaping company VapeXhale. The 39-year-old recently starting vaping before entering jiujitsu matches, and says it's helped him achieve the perfect mental state for fighting.

"When I consume cannabis, I'm just in a state of — I don't want to call it 'oneness' — but I'm very calm," Shen said Thursday in a phone interview. "I just go in super loose."

In intense, competitive sports like jiujitsu, mixed martial arts or football, so much of athletes' success depends on "getting in the zone," Shen said — and marijuana stands to help them get there.

"When you can get your mind out of the way and let your body do what it's supposed to do based on muscle memory and repetition, you have athletes performing at a higher level," he said.

**There's also Ross Rebagliati,** the Canadian snowboarder who tested positive for THC after winning a gold medal at the 1998 Olympic Games. Rebagliati — who ultimately got to keep his medal — has said cannabis helps him train.

Cannabidiol, a nonpsychoactive compound in cannabis, "is excellent for athletes who are recovering, in particular because it's such a big anti-inflammatory," Rebagliati said, according to Vocativ.

"It's excellent for those guys and girls who are out there training hard every day and needing to recover muscles that would naturally be inflamed or after any injuries they may incur on a regular basis," he said. "Pain through inflammation is a big deal."

Of all the ways people incorporate cannabis into their fitness routines, "the most popular way right now is on the recovery side," Shen said.

**Does science back any of it up?** Because the Drug Enforcement Agency still classifies weed as a Schedule 1 drug, it's hard for researchers to run studies on it, according to Business Insider.

Past studies have suggested weed could have a negative impact on fitness — but they're not the most compelling, thorough or up-to-date.

A 1975 study involving just eight people — all of whom had asthma — found a 25% "decrease in power output among study subjects after smoking marijuana," Business Insider reported. A 1977 study — this one involving just six people —
found "some decreased motor control" among "experienced pot smokers when they got high, though they didn't show significant changes in reaction time."

**Yes, there are risks.** Smoking marijuana can irritate your lungs and make you cough, according to the National Institute on Drug Abuse — which is not ideal if you’re heading outside for a 5-mile run. It also raises your heart rate for "up to three hours after smoking," which "may increase the chance of heart attack."

Learning how to incorporate weed into a workout takes time, Shen cautioned. "Using cannabis in fighting is like surfing for the first time," he said. "It just feels really unsteady. You’re off balance, you fall a lot — it's not a really good time."

But with regular use, Shen has been able to use it to his advantage. "Once you understand how to surf, there's this oneness, this connectedness, this effortless movement you have with the board along with the water," he said.

**What are marijuana's effects on sex?**

**Does marijuana improve sex?** Marijuana has been known to increase libido and even improve orgasms in some users, although there’s not much research to suggest what, if any, science backs up those anecdotal claims. And marijuana use has been linked to a lower sperm count in men. *Mic’s* Max Plenke reported on the combination of marijuana and sex back in 2015. Here is that story in full:

Having sex and getting high are two fun things to do separately — but they're even more fun to do at the same time. There are real-deal psychological and physiological benefits of a quick toke — or nibble, or spray — before climbing into bed.

If you're in the right headspace for it, sex with a head full of cannabis is great. It's been shown that cannabis can act as an aphrodisiac, strengthening orgasms in women and boosting libido. "Sometimes when couples smoke marijuana, they take more time to have a fuller sensual experience and slow down, which would allow more time for vasocongestion (blood flow to genitals) and myotonia (muscular tension)," sex therapist Ian Kerner previously told *Mic*. He said weed can cause couples to feel "relaxed, comfortable and sexy, [which may] lead to a higher quality of orgasm."

**It's all in your head:** When it comes to sex and biology, men tend to obsess over erectile dysfunction. Drugs like Viagra and Cialis can fix the physiological symptoms, but the root problem is often psychological: stress and anxiety. "The mentality for men is that they just need a pill and that will solve all the psychological issues, but that doesn't work," Dr. Jordan Tishler, a cannabis therapeutics physician for Inhale MD, told *Mic*. "Whatever the psychological causes of the dysfunction or inability to make intimate contact, women are more willing to discuss above-the-neck issues than men."

Cannabis, unless taken in excessive doses, is known to help curb stress and anxiety. Why and how it affects the brain isn’t talked about as much.

Your body actually makes cannabinoids in a part of your brain and nervous system called the endocannabinoid system, which helps regulate our stress and anxiety levels. THC, marijuana’s champion psychoactive ingredient, is chemically similar to a brain chemical called anandamide — better known as our body’s natural marijuana — that makes us less anxious.

Marijuana’s impact on sex looks a lot like the way it impacts everything else: It helps shelf stress and anxiety in order to make users more present. Not only does it help you feel more comfortable in your skin, but with the release of oxytocin, the hormone responsible for the feeling of bonding, cannabis can help you feel more connected to your partner.
"The endocannabinoid system does help restore a healthy neurological firing pattern of existing oxytocin already in an individual's body," Stephanie Viskovich, a medical marijuana advocate in Washington, told Mic. "Cannabis won't deplete what is there to increase sensation in one giant shot." She said it helps your body "naturally restore a healthy firing of neurological pistons directly correlated to balancing the oxytocin, which is naturally produced by your own body."

**Research needs to aim higher:** Overall, marijuana is the ingestible equivalent of meditation when it comes to getting stress levels in check. But there aren't a lot of studies to prove the impact. According to Nicole Prause, founder of Liberos, a company that uses brain stimulation to impact sex drive issues, the problem comes from the lack of funding and support for sex-related research.

"No one will apply to study THC and sexual arousal," Prause told Mic. "You need a lot of money to run fMRI studies, usually $600 an hour, just for scanner time. Congressional aids scan NIH funding for the word 'sexual' and have brought five grants up for defunding. One was successful — the only time in the history of NIH it has ever happened."

Until then, we'll just have to go on largely anecdotal evidence, which is why it's all the more important for couples to experiment, communicate and find what works for them.

"Everyone reacts differently to strains, and there is a lot of misconception about sativas being good for energy and 'daytime use," Viskovich told Mic. "Depending on your body's physiological makeup, a sativa could help you focus and give you energy, or it could induce anxiety and paranoia." She compared it to how Ritalin affects people with and without ADD.

Viskovich recommends running the stoner gamut: Try a pure indica strain, a pure sativa strain and a hybrid mix of the two. Plenty of home research needs to be done on your own to see what works in your bedroom — so have fun.