DOCUMENT SUMMARY

This document is a transcript of an in-depth, informal research discussion between Liz and Justin about the neuroscience of cannabis. They explore how compounds like THC and specific terpenes (**limonene**, **myrcene**, **pinene**) interact with the brain's neurochemical systems (**GABA**, **serotonin**, **dopamine**) to affect intrusive thoughts and mania. The conversation captures their real-time learning and brainstorming, culminating in the conceptual idea of creating therapeutic cannabis "cocktails" or a "weed EpiPen" for acute mental health challenges.

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- clinical_guide_anxiety_coping_skills_v1
- clinical_guide_bipolar_disorder_v1

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FORMATTED CONTENT

Part 1: Understanding the Brain's "Hardware"

Justin: ...What are receptors? Receptors are protein structures on brain cells that catch and respond to **neurotransmitters**. Think of them like electrical outlets. Each outlet receptor is shaped to accept only specific plugs—neurotransmitters. When the right chemical plug fits into the right receptor outlet, it triggers a response in that brain cell. Why this matters: **THC** works by plugging into specific receptors that weren't originally designed for it. The cannabinoid system... how THC works in your brain. The brain has natural communication networks called the endocannabinoid system, the ECS. Think of it like your brain's internal Wi-Fi network that helps regulate mood, memory, pain, and appetite. This system has two main parts: **CB1 receptors**, located mainly in the brain, like Wi-Fi routers in different rooms, and **CB2 receptors**, located

mainly in the immune system, like security system sensors. How does THC hijack this system? Well, THC is shaped almost exactly like your brain's natural endocannabinoids. Think of THC as a master key that can unlock receptors it wasn't originally designed for. That's fantastic.

Liz: So this is just Liam's visual that he did with the caffeine of how caffeine works?

Justin: Essentially, yeah.

Liz: Which makes sense because caffeine's a neurotransmitter. So he just found a way that he explained it to us in a way that made sense in a YouTube video about fitness.

Justin: So THC molecules travel to your brain through your bloodstream. They bind to **CB1 receptors**, like plugging a universal adapter into various outlets. This triggers responses your brain wasn't expecting from its natural system. Why this matters: this hijacking explains both therapeutic and recreational effects of cannabis.

Part 2: Terpenes and Intrusive Thoughts

Justin: The terpene layer... What are **terpenes**? Terpenes are aromatic compounds found in many plants, not just cannabis. Think of them like spice blends in cooking. They provide flavor and aroma, but they also change how the main ingredients work together... Terpenes don't just add smell and taste; they can modify how THC affects your brain. The major players you mentioned: **Limonene**. The same terpene found in citrus peel. May increase **serotonin** and **dopamine** activity... **Myrcene**, found in mangoes and lemongrass. May enhance THC's ability to cross the blood-brain barrier... **Pinene**, found in pine trees and rosemary. May improve memory and alertness by affecting acetylcholine...

Justin: Intrusive thoughts are unwanted, distressing thoughts that pop into your mind without invitation. Think of them like spam emails that bypass your mental spam filter... Understanding which brain circuits control these thoughts helps us see how cannabis might influence them. What brain systems control intrusive thoughts? The **prefrontal cortex**. What it is: the executive control center behind your forehead. Functions and acts like a security guard that filters and controls what thoughts get your attention... The **anterior cingulate cortex**. What it is: your brain region that monitors for conflicts and errors. It works like a smoke detector that alerts when something seems wrong. Overactivity here can make normal thoughts feel threatening.

Liz: This makes *Inside Out* a very different style of story.

Justin: What do you mean?

Liz: Oh, it's just like you can kind of see how the way that they've got the, like, emotions established is like, they all sit at a control panel at the top of the head behind the forehead. And they, like, yeah, keep what is gonna be there and not. Like, they're just starting to explain neuroscience in a way that's approachable for kids to understand.

Justin: Why are we not teaching this to therapists? Why is Disney teaching it to kids, and why can't schools teach it to therapists?

Liz: Because the problem is that so many people get to this point that we're at and then they say, "Oh, but we can teach it to therapists." And instead of the schools making money off of it, we could make money off of it. So we're going to start a continuing education program or certification program or whatever the fuck. And it's like... I think that's the answer as to why Disney is teaching how the neuroscience works instead of the schools, is because of gatekeeping that happens at a lot of levels.

Justin: So the **default mode network**. What it is: a network of brain regions active when you're not focused on tasks. Functions like your brain's screensaver mode... Problem: when this network becomes overactive, it can generate repetitive, unwanted thoughts. Okay, so this is where it sounds like our unwanted thoughts are really coming from, this default mode network.

Liz: I explained this without the neuroscience to one of my kids this week because he was freaking out because he was having thoughts about being trans. And I was like, "Bro, it's just because you're being influenced with it because your dad is trans and you're watching him go through this transition." So, like, you're like, "Oh, if my dad is in his 40s becoming my mom, like, what the fuck is my life gonna be like?". And it's like, yeah, of course you're thinking about that because your little, like, AuDHD-ass brain is like going a billion miles a minute and it's gonna run out of things to think about, so it's gonna make up things to think about.

> They're just AI hallucinations... ever since I've started looking at it as like, "Oh, that's just like an AI hallucination. That's just your brain's making up information because it doesn't... it's just making it up."

Justin: I told you a long time ago. That was the thing I tell myself: "Stop." That's it. That triggered a, "Hey, let me snap me out of screensaver mode." That's shaking the mouse.

Liz: Mm. It fits with the analogy.

Justin: Okay, so the chemical controllers. **GABA**. What it is: your brain's primary brake pedal neurotransmitter. Functions like a volume control that turns down brain activity. Why it matters: low GABA activity can lead to racing, intrusive thoughts.

Liz: Okay, so you decrease your GABA, you're... you're taking your foot off the brakes, you're letting that thing go. And if you give it an overactive thing with the THC, put it on the gas pedal.

Justin: My thought raced from one, boom, boom, boom. And I said, "Stop." And I knew what the next one was going to be, and I stopped it right before we got there. And so, like, that makes total sense. So, **serotonin**. It's the mood stabilizer neurotransmitter... Low serotonin can make the brain's alarm system too sensitive.

Part 3: How Cannabis Compounds Interact with These Systems

Justin: So when people experience psychosis while on cannabis, what they're experiencing is a rush and an overproduction or underproduction by blocking different things. It's just like caffeine. It blocks receptors by binding into places it's not supposed to because it's just the lock and key thing. So we're back to the Liam thing. Dope.

Justin: So **myrcene** may enhance **GABA** activity, which is your brain's brake pedal.

Liz: So the higher the myrcene, the slower the racing thoughts go.

Justin: Can help slow down racing thoughts... **Pinene's** double-edged effect. Memory enhancement might improve working memory and focus. Potential problem: can also make intrusive thoughts more vivid or memorable. Like installing brighter lights. Helpful for seeing clearly but might make you notice things you'd rather ignore. Pinene's a bitch, bro.

Liz: We've always said that. We've always been like, we don't really like pinene. Like, it's not one that we like to find in the tops... I'm pretty sure that you're like, you don't like pinene because it makes you feel... like, that's the one that we kind of determined was like the one that was making you have some of these thoughts the most. Like, you were like, "I just don't like it. I get really focused on really negative things and get, like, locked into that thought spiral."

Justin: So intrusive thoughts come from overactive alarm systems and weakened security guards. THC affects the brain's executive control center and background thought patterns. Different terpenes can either calm or intensify these systems. This is wild. What if I present this to Proper? I'm like, "Dude, you want to change the way you, like, change the game on everything? We can connect cannabis to positive mental health outcomes."

Part 4: The "Entourage Effect" and Mania

Justin: The **entourage effect** is when multiple cannabis compounds work together to create effects different from what each would do alone... Your concentrate's terpene profile can either amplify or counteract THC's effects on intrusive thoughts... What if we can look at if there's an ideal combination of terpenes and THC for specific current mental health challenges based on science?

Liz: It's what we did with, like, physical medicine. Because it went from having, like, a medicine man who would be like, "Oh, what ails you? Great. Here, eat four limes and eat some ginger." And that's because you were getting the terpenes from that. They'd put the, like, teas together from the different terps and the leaves, and it was just healing the body by opening the different cannabinoid systems. Like, it's just essentially a more natural medication route.

Justin: If I went to Proper with a book of recipes, essentially... terpene profiles clustered by mental health buzzword they can positively impact, do you think they could turn the whole world upside down and just create a mega-juggernaut of a cannabis industry? Because all they got to do is just start saying the word **ADHD** and sell the science behind it. Bro, they get dirt filthy rich. I want in on the money... 'Cause like, what we're learning right now is so goddamn wildly advanced for just two goddamn dinks.

Liz: God, we sat and struggled our ass off to understand this much neuroscience.

Justin: And now it just makes sense. It all just clicks.

Part 5: A "Cannabis EpiPen" for Mania

Justin: So **mania**, neurochemically, is a state where multiple brain systems become hyperactive simultaneously... **Dopamine** and hyperactivity... it's like having the accelerator pedal stuck down... **Norepinephrine** overload... like having all of the building's lights blazing at maximum brightness... **GABA** system breakdown... like a runaway truck with failing brakes going downhill.

Justin: So by reducing the inflammation in your neural path... reducing that inflammation, you can reduce the mania. Reducing neuroinflammation could bring someone out of mania.

Liz: Potentially.

Justin: Potentially. It's unproven until it's been done, but it can be done with a combination of **myrcene**, **linalool**, and **beta-caryophyllene**...

Liz: Do we maybe, like, take this to Proper as, like, a, "Hey, we want to, like, partner with you guys..."?

Justin: ...to build a guide, an educational guide around the neuroscience of cannabis and mental health... and then we have them curate some strains, try to see if we can get community volunteers to participate in...

Liz: Yeah, like a study of, like, how do these impact where we create...

Justin: A system of assessments that they fill out at different points in the cannabis high.

Liz: We would work with Proper and I would be like, "I will develop this study if you fund it and, like, whatever we find, I have, like, some sort of rights over it."

Justin: ...could we in the moment have an actual impact in someone with, like... kind of like to think of like an EpiPen? If everyone kind of had a bag of edibles that were specifically tailored for, like, that moment when, like, they needed to reset themselves back to a place of more normal function... Could that be something that's created? Like, almost like a cannabis EpiPen... So this would be like an intervention. We could create moderate THC, around 40 to 50%, enough to activate **CB1** without overwhelming it. High **linalool**, which maximizes **GABA** activation. Moderate **myrcene**... **beta-caryophyllene**... and lower **limonene**.

Liz: But that makes sense though, because if we think of, like, how it impacts us, it gives us a lot of focus and a lot of the attention kind of being taken away from the guards a little bit. So that would make mania a little bit worse.

Justin: We could make a weed EpiPen. Can you imagine? Partner with Proper on that.

Liz: Be sick.

Part 6: Final Thoughts and Next Steps

Justin: ...I had no sound whatsoever and I couldn't figure it out at all to save my life. Turns out there's a little button I missed...

Liz: Probably exactly where cats like to put their booty boots.

Justin: It was at least an hour. And then I went and made dinner at like 6:30 and I was still able to learn all that extra tonight. And come up with the idea of, whatchamacallit, a weed EpiPen, bro. That's something we could do. Like, think about it. No, seriously.

Liz: So I think the thing that I think about the most with that is, like, how to get over the imposter syndrome. Where I feel like, "Why are they gonna believe me when I say that?"

Justin: Because we're gonna have neuroscience studies that legitimately are evidence of our theories. We're just saying we think this is an opportunity to really fine-tune cocktails for specific challenges within the mental health community... Can you imagine if, like, cops just rode around with weed EpiPens? Like, they're just like, "Yo, bro, you're crazy."

Liz: As, like, if instead of Narcan, you just got...

Justin: Bro, who's not gonna want to smoke some weed in front of the cops while the cops give it to you to smoke? ...you train the social workers in use of it and the administration of it. And so it's a controlled dose specifically designed to be administered by a social worker.