

MY WEIRD PROMPTS

Podcast Transcript

EPISODE #400

Rebooting the Brain: The Science of ECT and TMS

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EPISODE SYNOPSIS

When standard antidepressants like SSRIs aren't enough, where does psychiatry turn? In this episode, Herman and Corn Poppleberry tackle the heavy but fascinating world of treatment-resistant depression (TRD). They trace the history of electroconvulsive therapy from its dark origins in 1930s slaughterhouses to its modern-day application as a refined, life-saving clinical procedure. By exploring the mechanisms of "controlled reboots," Brain-Derived Neurotrophic Factor (BDNF), and the "snow globe" effect on the brain's Default Mode Network, the duo explains why inducing a seizure can sometimes be the most effective medicine. They also compare the "heavy artillery" of ECT with the "precision laser" of Transcranial Magnetic Stimulation (TMS) and look ahead to the potential of psilocybin and next-gen neurotechnology. It's an essential deep dive for anyone looking to understand the cutting edge of mental health interventions beyond the pharmacy counter.

DANIEL'S PROMPT

Daniel

Hi Herman and Coran. I thought I'd ask another question about psychiatry and the brain. We previously discussed SSRIs, which are the mainstays of modern treatment for depression and anxiety. While these work well for many, some people are severely depressed and don't respond to first-line treatments or even older medications like MAOIs and amitriptyline. In these cases, electroconvulsive therapy (ECT) is sometimes used. For those who reach this stage, what percentage of people with depression are we talking about who are at the severe end of the spectrum and don't get an adequate response to multiple drugs? The mechanism of ECT is intriguing. What is it about the idea of electrocuting the brain that has a therapeutic effect, and why does it do things that drugs seemingly can't touch? I'm also interested in transcranial magnetic stimulation (TMS). Beyond current medications, what is the future of treatment? Will it be psychedelics or more refined, less invasive forms of brain stimulation? What has been the evolution of ECT from the first attempts to how it's administered today, and why does giving electrical shocks often yield responses for patients who otherwise couldn't get better?

TRANSCRIPT

Corn

Hey everyone, welcome back to My Weird Prompts. I am Corn, and I am sitting here in our living room in Jerusalem with my brother, the one and only Herman Poppleberry.

Herman

Herman Poppleberry, present and accounted for. Corn, I have to say, the weather outside is beautiful today, but we are diving into a topic that is, well, a bit heavier than the sunshine. Our housemate Daniel sent us a voice note that really gets into the weeds of the human brain.

Corn

He really did. Daniel was thinking about psychiatry again, specifically what happens when the first-line treatments do not work. We have talked about selective serotonin reuptake inhibitors before, those common antidepressants like Prozac or Lexapro, but Daniel is asking about the deep end of the pool. He is asking about treatment-resistant depression and the intervention that still carries a huge amount of stigma, despite being one of the most effective tools we have, which is electroconvulsive therapy, or E-C-T.

Herman

It is such a fascinating and, frankly, misunderstood area of medicine. There is this huge gap between the cultural image of shock therapy, you know, the screaming patients in movies like *One Flew Over the Cuckoo's Nest*, and the reality of a modern clinical suite where this is happening every day. Daniel specifically wanted to know how many people are in this severe category, why we are still using electricity in twenty twenty-six, and what the mechanism actually is.

Corn

And he made a great point about the older drugs too. He mentioned monoamine oxidase inhibitors and that whole blue cheese problem. For those who do not know, if you are on those older antidepressants, you actually have to avoid foods high in tyramine, like aged cheeses, soy sauce, or red wine, or you could have a literal hypertensive crisis. It shows you how far we have come, but also how stuck we still are for a large portion of the population.

Herman

Exactly. So let us start with that first question from Daniel. What percentage of people are we actually talking about when we say treatment-resistant? The numbers are actually quite sobering. Most clinical definitions of treatment-resistant depression, or T-R-D, kick in after a patient has failed two or more adequate trials of different antidepressant classes. Research suggests that a significant percentage of people with major depressive disorder experience treatment-resistant depression, with estimates ranging from roughly thirty percent to nearly fifty percent depending on how strictly you define treatment failure.

Corn

That is a massive number of people. If we are looking at global statistics, we are talking about millions of individuals for whom the standard pills just are not doing the job.

Herman

It really is. The reality is that the brain is incredibly redundant and complex. Sometimes, simply nudging the levels of serotonin or norepinephrine in the synaptic cleft just is not enough to break a deep, biological depression.

Corn

So that brings us to the big one. Electroconvulsive therapy. Daniel asked about the evolution of this. How did we go from the first attempts to where we are today? It is a bit of a grizzly story, isn't it?

Herman

It is definitely a story of high-stakes experimentation. The core idea actually predates electricity. In the early nineteen thirties, a Hungarian pathologist named Ladislas Meduna noticed that people with epilepsy rarely seemed to have schizophrenia, and vice versa. He had this theory, which turned out to be wrong, that seizures and schizophrenia were biologically antagonistic. So he started inducing seizures in patients using a chemical called metrazol.

Corn

I remember reading about metrazol. It was terrifying because it caused this intense feeling of impending doom before the seizure actually hit.

Herman

Precisely. It was a chemical shock, and it was brutal. Then you had insulin coma therapy, where they would drop a patient's blood sugar so low they would fall into a coma and seize. But the real shift happened in Rome in nineteen thirty-eight. Two researchers, Ugo Cerletti and Lucio Bini, were looking for a cleaner way to induce a seizure. Legend has it that Cerletti got the idea after visiting an abattoir, a slaughterhouse, where he saw pigs being stunned with electric shocks to the head before they were killed. He realized the electricity caused an immediate, painless loss of consciousness and a convulsion.

Corn

It is such a dark origin story for a medical treatment. Using slaughterhouse technology on humans.

Herman

It sounds barbaric, but their first human subject was a man found wandering a train station in Rome, completely delusional and non-verbal. After a series of electric shocks that induced seizures, he actually recovered his speech and his sanity. That was the birth of E-C-T. But back then, they did it without anesthesia and without muscle relaxants. That is where the horror stories come from, the broken bones and the physical trauma of the convulsion itself.

Corn

Right, and that is what Daniel was asking about. Why is it different today? Because if you go into a hospital for E-C-T in twenty twenty-six, you are not being strapped down while awake.

Herman

Not at all. Modern E-C-T is a highly refined surgical procedure. The patient is given a general anesthetic, so they are completely unconscious. Then they are given a powerful muscle relaxant, usually something like succinylcholine. This is the crucial part. The muscle relaxant prevents the body from actually convulsing. If you were watching the procedure, you would only see a tiny flicker in the patient's toes or a slight tensing of the jaw. The seizure is happening entirely within the brain.

Corn

So the electricity is just the trigger. The seizure is the medicine.

Herman

That is the perfect way to put it. The electricity itself is not what cures the depression. It is the generalized, synchronous firing of neurons across the entire brain. We are basically forcing the brain to undergo a massive, controlled reboot.

Corn

Okay, so let us talk about that reboot. This was Daniel's core question. What is it about inducing that seizure that has a therapeutic effect? Why does it work when the drugs fail?

Herman

This is where the science gets really cool. One of the leading theories involves something called Brain-Derived Neurotrophic Factor, or B-D-N-F. Think of B-D-N-F as fertilizer for the brain. When you have a massive seizure, the brain responds by flooding itself with this protein. It promotes neuroplasticity, it helps repair damaged neurons, and it actually stimulates neurogenesis, the birth of new neurons, especially in the hippocampus.

Corn

And the hippocampus is that area deeply involved in mood and memory that often shrinks in people with chronic, severe depression.

Herman

Exactly. We see measurable increases in hippocampal volume after a course of E-C-T. But it is more than just growth. It is also about connectivity. There is a concept called the Default Mode Network, which is the part of your brain that is active when you are ruminating or thinking about yourself. In severely depressed people, this network is often hyper-connected. They are stuck in a loop of negative self-thought. E-C-T seems to temporarily disrupt these rigid circuits. It is like shaking a snow globe. When the flakes settle, they do not always fall back into the same broken patterns.

Corn

That shaking the snow globe analogy is great. It explains why it works for the un-touchable cases. If a drug is like trying to change the color of one specific flake in the snow globe, E-C-T is picking up the whole thing and giving it a vigorous rattle.

Herman

Right. And there is also a massive neurotransmitter reset. We talk about serotonin all the time, but E-C-T affects the whole cocktail. It increases G-A-B-A, which is the brain's primary inhibitory neurotransmitter. It modulates dopamine and norepinephrine. It basically forces a level of neurochemical rebalancing that a pill, which has to be absorbed through the gut and cross the blood-brain barrier in small amounts, just cannot achieve.

Corn

But it is not without a catch. Daniel mentioned the side effects, and that is usually what people are most afraid of. Memory loss is the big one.

Herman

It is the primary trade-off. Because you are inducing a generalized seizure, you can have what we call retrograde amnesia, where you lose memories of events leading up to the treatment, or anterograde amnesia, where you have trouble forming new memories for a few weeks. However, we have gotten much better at minimizing this. We now use ultra-brief pulse stimulation, where the electricity is delivered in tiny fractions of a second. We also use unilateral placement, where the electrodes are only on one side of the head, usually the non-dominant hemisphere. This preserves memory much better than the old bilateral approach.

Corn

So if E-C-T is the gold standard for efficacy, where does T-M-S fit in? Daniel asked about transcranial magnetic stimulation. I know we have friends who have tried this, and it seems much less intense.

Herman

T-M-S is a completely different beast. Instead of electricity, it uses a powerful, focused magnetic field. If you remember your high school physics, Faraday's Law of Induction says that a changing magnetic field will induce an electrical current in a nearby conductor. In this case, the conductor is your brain's neurons.

Corn

So it is like an invisible probe reaching into the brain.

Herman

Exactly. And unlike E-C-T, T-M-S does not induce a seizure. It is non-convulsive. You sit in a chair, fully awake, and this coil clicks against your head. It is targeting one specific area, usually the left dorsolateral prefrontal cortex, which is often under-active in depression. It is much more like a gentle, repetitive tapping that encourages those neurons to start firing properly again.

Corn

And Daniel also mentioned i-T-B-S, or intermittent theta burst stimulation. That is the newer, faster version, right?

Herman

Yes. Standard T-M-S used to take forty minutes per session. i-T-B-S mimics the natural firing rhythms of the brain and can do the same job in about three minutes. There are promising newer protocols like Stanford Neuromodulation Therapy that use high-dose i-T-B-S over short treatment courses with encouraging early trial results. But, to answer Daniel's question about efficacy, T-M-S is generally considered less powerful than E-C-T for the most severe cases. If E-C-T is the heavy artillery, T-M-S is more like a precision laser.

Corn

So let us look toward the future, which was the final part of Daniel's prompt. He asked if the future is psychedelics or more refined brain stimulation. Where are we standing here in early twenty twenty-six?

Herman

It is a bit of a crossroads. If we look back at twenty twenty-four and twenty twenty-five, the psychedelic movement hit some real speed bumps. Everyone thought M-D-M-A for post-traumatic stress disorder would be approved by the F-D-A in late twenty twenty-four, but they actually rejected it. They cited concerns about trial design and something they called functional unblinding.

Corn

Functional unblinding. That is basically when the patient knows they got the drug because, well, they are tripping. It makes it hard to compare it to a placebo fairly.

Herman

Exactly. It is a huge hurdle for psychedelic research. However, psilocybin is still moving forward. We are expecting a major filing for treatment-resistant depression later this year or in early twenty twenty-seven. The results for psilocybin are very promising because it seems to have a similar reset effect to E-C-T, but without the seizure and with potentially fewer cognitive side effects. It promotes that same neuroplasticity we were talking about.

Corn

But what about the stimulation side? Is there a middle ground between the gentle tapping of T-M-S and the grand mal seizure of E-C-T?

Herman

There is! And it is called Magnetic Seizure Therapy, or M-S-T. This is one of the most exciting things on the horizon. It uses the same massive magnets as T-M-S but turns the power up high enough to actually induce a seizure. Because magnetic fields pass through the skull and scalp without resistance, unlike electricity, you can target the seizure much more precisely to the frontal lobes and avoid the areas responsible for memory.

Corn

So you get the therapeutic seizure of E-C-T, but without the memory loss of the electricity passing through the whole head.

Herman

That is the hope. Early trials have shown it is just as effective as E-C-T but with significantly less cognitive impact. Then you have Deep Brain Stimulation, where they actually implant electrodes into the brain, like a pacemaker for the mind. That is usually reserved for the most extreme, life-threatening cases, but the technology is getting more sophisticated every year.

Corn

It feels like we are moving toward a world where psychiatry is becoming much more of a circuitry science. Instead of just bathing the whole brain in a chemical, we are looking at specific loops and saying, this loop is stuck, how do we un-stick it?

Herman

That is exactly the shift. We are moving from the chemical imbalance era into the connectome era. We are looking at the brain as a complex electrical network. And honestly, if you have a software bug that is causing the whole system to crash, sometimes you need to do more than just update one driver. Sometimes you need a hard reset.

Corn

It is a powerful way to think about it. And for the listeners out there who might be struggling, or who have family members who have tried every pill in the book and feel hopeless, I think the takeaway here is that treatment-resistant does not mean untreatable. It just means you have reached the point where the standard tools are too small for the job.

Herman

Well said, Corn. The stigma around E-C-T is one of the most damaging things in modern mental health. I have seen people who were literally unable to get out of bed for years, people who had lost the ability to speak or eat, who were brought back to their families by a course of E-C-T. It is not a punishment, and it is not a horror movie. It is a profound biological intervention.

Corn

I think it is important to mention, for anyone listening in our area or elsewhere, that these treatments are becoming more accessible and integrated. If you are in a position where the first-line treatments are failing, it is worth having a serious, non-stigmatized conversation with a psychiatrist about neuromodulation. Whether it is T-M-S, or ketamine, which we didn't even get into today but is another huge player, or E-C-T, the options are expanding.

Herman

They really are. And Daniel, thank you for sending this in. It is a topic that affects so many people but is often whispered about in the shadows. Bringing it into the light is how we change the conversation.

Corn

Absolutely. And hey, if you are finding these deep dives into the brain and technology helpful, we would really appreciate it if you could leave us a review on your podcast app or on Spotify. Those reviews really do help new people find the show.

Herman

They really do. It makes a huge difference for our visibility. You can also head over to [myweirdprompts dot com](https://myweirdprompts.com) to check out our archive. We have a large collection of episodes covering everything from artificial intelligence to ancient history. There is a contact form there too if you want to send us a prompt like Daniel did.

Corn

We love hearing from you. Whether it is a question about the brain, or something completely out of left field, we are here for it.

Herman

We certainly are. Well, Corn, I think my brain has had enough stimulation for one afternoon. Should we head out and get some of that Jerusalem sunshine?

Corn

I think that is a fantastic idea. No electricity required for that.

Herman

Just some good old-fashioned photons.

Corn

Alright everyone, thanks for listening to My Weird Prompts. We will be back next week with another exploration into the weird, the technical, and the deeply human.

Herman

Until then, take care of your brains. They are the only ones you have got.

Corn

See you next time.

Herman

Bye everyone!