Welcome to the Huberman Lab podcast where we discuss science and science-based tools for everyday life. I'm Andrew Huberman, an Omer Professor of Neurobiology and Optomology at Stanford School of Medicine. Today we are talking about obsessive-compulsive disorder, or OCD. We are also going to talk about obsessive-compulsive personality disorder, which, as you will soon learn, is distinct from obsessive-compulsive disorder. In fact, many people that refer to themselves or others as obsessive or compulsive, or, quote unquote, having OCD, or OCD about this, or OCD about that, do not have clinically diagnosable OCD. Rather, many people have obsessive-compulsive personality disorder. However, there are many people in the world that have actual OCD. And for those people, there is a tremendous amount of suffering. In fact, OCD turns out to be number seven on the list of most debilitating illnesses, not just psychiatric illnesses, but of all illnesses, which is remarkable and somewhat frightening. The good news is, thanks to the fields of psychiatry, psychology, and science in general, there are now excellent treatments for OCD. We're going to talk about those treatments today. Those treatments range from behavioral therapies to drug therapies and brain stimulation and even some of the more holistic or natural therapies. As you'll soon learn for certain people, they may want to focus more on the behavioral therapies, whereas for others, more on the drug-based therapies and so on and so forth. One extremely interesting and important thing I learned from this episode is that the particular sequence that behavioral, end-or-drug, end-or-holistic therapies are applied is extremely important. In fact, the outcomes of studies often depend on whether or not people start on drug treatment and then follow with cognitive behavioral treatment or vice versa. We're going to go into all those details and how they relate to different types of OCD, because it turns out there are indeed different types of obsessions and compulsions, and the age of onset for OCD and so on and so forth. What I can assure you is, by the end of this episode, you'll have a much greater understanding of what OCD is and what it isn't, and what obsessive-compulsive personality disorder is and what it is not, and you'll have a rich array of different therapy options to explore in yourself or in others that are suffering from OCD. And if neither you or others that you know suffer from OCD or obsessive-compulsive personality disorder, the information covered in today's episode will also provide insight into how the brain and nervous system translate thought into action generally. And also, you're going to learn a lot about goal-directed behavior generally. My hope is that by the end of the episode, you will both understand a lot about this disease state that we call OCD. You will have access to information that will allow you to direct treatments to yourself or others in better ways, and that you will gain greater insight into how you function and how human beings function in general. The Uberman Lab podcast is proud to announce that we've partnered with Momentus Supplements. We've done that for several reasons. First of all, the quality of their supplements is exceedingly high. Second of all, we wanted to have a location where you could find all of the supplements discussed on the Uberman Lab podcast in one easy-defined place. You can now find that place at livemomentus.com slash Uberman. In addition, Momentus Supplements ship internationally, something that a lot of other supplement companies simply do not do. So that's terrific whether or not you live in the U.S. or you live abroad. Right now, not all of the supplements that we discussed on the Uberman Lab podcast are listed, but that catalog of supplements is being expanded very rapidly, and a good number of them that we've talked about, some of the more prominent ones for sleep and focus, and other aspects of mental and physical health are already there. Again, you can find them at livemomentus.com slash Uberman. Before we begin, I'd like to emphasize that this podcast is separate from my teaching and research roles at Stanford. It is, however, part of my desire and effort to bring zero cost to consumer information about science and science-related tools to the general public.. Let's talk about OCD or obsessive compulsive disorder. First of all, as the name suggests, OCD includes thoughts or obsessions and compulsions, which are actions. The obsessions and the compulsions are often linked. In fact, most of the time, the obsessions and the compulsions are linked such that the compulsion, the behavior, is designed to relieve the obsession. However, one of the hallmark themes of obsessive compulsive disorder is that the obsessions are intrusive. People don't want to have them. They don't enjoy having them. They just seem to pop into people's minds and they seem to pop into their mind recurrently. And the compulsions, unlike other sorts of behaviors, provide brief relief to the obsession, but then very quickly reinforce or strengthen the obsession. This is a very key theme to realize about obsessive compulsive disorder. So I'm just going to repeat it again. These two features. First, the fact that the obsessions are intrusive and recurrent, as well as the fact that the compulsions, the behaviors, provide if anything only brief relief for the obsessions, but in most cases, simply serve to make the obsession stronger, or the hallmark features of obsessive compulsive disorder. It turns out to be very important to keep these in mind as we go forward, not just because they define obsessive compulsive disorder, but they also define the sorts of treatments that will and will not work for obsessive compulsive disorder. And then once you understand a little bit about the neural circuitry underlying obsessive compulsive disorder, which we'll talk about in a few moments, then you will clearly understand why being a quote-unquote obsessive person or having obsessive compulsive personality is not the same as OCD. In fact, we can leap ahead a little bit and compare and contrast OCD with obsessive compulsive personality disorder along one very particular set of features. Again, I'll go into this in more detail later, but it's fair to say that OCD is characterized by these recurrent and intrusive obsessions. And as I mentioned before, the fact that those obsessions get stronger as a function of people performing certain behaviors. Like an itch that you feel and then you scratch it and it feels better, OCD is more like an itch that you feel you scratch it and the itch intensifies. That contour or that pattern of behaviors and thoughts interacting is very different than obsessive compulsive personality disorder, which mainly involves a sense of delayed gratification that people want and somewhat enjoy because it allows them to function better or more in line with how they would like to show up in the world. So again, OCD has mainly to do with obsessions that are intrusive and recurrent whereas obsessive compulsive personality disorder does not have that intrusive feature to it. People do not mind or in fact often invite or like the particular patterns of thought that lead them to be compulsive along certain dimensions. So leaving aside obsessive compulsive personality disorder for the moment, let's focus a bit more on OCD and define how it tends to show up in the world. First of all, OCD is extremely common. In fact, current estimates are that anywhere from 2.5% to as high as 3 or even 4% of people suffer from true OCD. That is an astonishingly high number. Now the reason the range is so big, 2.5% all the way up to 3 or maybe even 4% is that a lot of the features of OCD go unnoticed both in the clinicians office. The clinicians office and simply because people don't report it and don't talk about it. In fact, it is possible to have recurrent and intrusive obsessions and not engage in the sorts of behaviors that would ever allow people to notice that somebody has OCD. That can be because some of the intrusive thoughts don't actually lead to overt behaviors like handwashing or checking that other people would notice. It can also be because people learn to disguise or hide their obsessions and their compulsions out of shame or fear of looking strange or whatever it might be such that they have these obsessive and intrusive thoughts and they do little micro behaviors like they might tap their fingers on their fly as a way to avoid at least in their own mind, something catastrophic happening. That might seem crazy to you, it might seem bizarre but this is the sort of thing that operates in a lot of people and I really want to emphasize this because the clinical literature that are out there really point to the fact that many people have OCD, full blown OCD and never report it because of the kind of shame and hiding associated with it. Another thing to point out is that OCD is extremely debilitating. I mentioned this a few minutes ago but OCD is currently listed as a number seven in terms of the most debilitating illnesses, not just mental illnesses or disorders but all types of illnesses including things like asthma and cancer etc. You can imagine with that standing at number seven that it is both extremely common and extremely debilitating and as a consequence it's now realized that many hours, days, weeks, months or even years of work performance or showing up at work of relational interactions really suffer as a consequence of people having OCD. This is a vital problem that the scientific and psychiatric and psychological communities understand and it's one of the reasons that I'm doing this podcast and of course I received a ton of interest in OCD because of this incredibly high incidence of OCD and how debilitating it is. We could go really deep into why it's so debilitating. I don't want to spend too much time on that because I think most of that is pretty obvious but some of it is not. For instance, one of the things that makes OCD so debilitating is of course the shame that we talked about before but it's also the fact that when people are focusing on their obsessions and their compulsions they're not able to focus on other things. That's simply the way that the brain works. We're not able to focus on too many things at once. The other thing is that OCD takes a lot of time out of people's lives with recurrent intrusive thoughts happening at very high frequency or even at moderate frequency. People are spending a lot of time thinking about this stuff and they're thinking about the behaviors they need to engage in and then engaging in the behaviors which as I mentioned before just serve to strengthen the compulsions and so they're not actually doing the other things that make us functional human beings like commuting to work or doing homework or doing work or listening when people are talking or interacting or sports or working out all the things that make for a rich quality life are taken over by OCD in many cases. So well that might be obvious to some I'm not sure that it's obvious to everybody just how much time OCD can occupy. Another thing you'll soon learn is that sadly a lot of the obsessions and compulsions in OCD often relate to taboo topics and that's because the general categories of OCD fall into three different bins. Checking obsessions and compulsions, repetition obsessions and compulsions and order obsessions and compulsions. The checking ones are somewhat obvious, checking the stove or checking the locks which I think we all tend to do. I'm somebody typically I'll head off to the car to commute to work and I'll think I'll lock the front door and I'll go back once. But I won't go back twice or 50 times people with OCD will often go back 20 or 30 times before they'll actually allow themselves to drive off and then it's a real challenge for them to continue to drive off and discard with the idea that they didn't check the stove or they didn't check the locks or they didn't check something else critical. Repetition obsessions and compulsions obviously can dovetail with the checking ones but those tend to be things like counting off of a certain number of numbers like one to three four five six seven. 7654321 people will perform that repeatedly repeatedly repeatedly or feel that they have to remember years ago watching a documentary about the band the Ramones. Most people heard of the Ramones right jeans t-shirts aviator glasses everyone had to change their last name to Ramone they weren't actually all related to one another by the way. You had to change your last name to Ramones the Ramones had one band member who was admittedly and known to others as having OCD and during that documentary which I forget the name I think it was called can't remember anyway can't remember hippocampal laps there but in this documentary the band members describe Joey Ramone as leaving hotels walking down the stairs to the parking lot but then having to walk up and down them seven or eight times and sometimes getting out of the van again and walking up down them seven or eight times. And it always had to be a certain number of times given a certain number of stairs this appears quote unquote crazy but of course we don't want to think of this as crazy this is somebody who very likely had full blown OCD now that particular example believe it or not is not all that uncommon. It just so happens that that example entailed certain compulsions and behaviors that were overt and that other people could see and you can imagine how that would prevent somebody from moving about their daily life easily a lot of people as I mentioned before have obsessions and compulsions that they hide and they do these little micro behaviors or they'll just count off in their head as opposed to generating some sort of walking up and down stairs or tapping or things of that sort. So we have checking we have repetition and then there's order order oftentimes is thought of as putting cleanliness or making sure everything is aligned and perfect and orderly and oftentimes that is the case but there are other forms of order that people with OCD can focus on in a obsessive way. Things like incompleteness the idea that one can't walk away from something or stop doing something because something is not right or complete in that picture it could be the way that table is set it could be the way that something is written on a page it could be an email again now we're still talking about OCD the disorder we're not talking about obsessive compulsive personality disorder. I'm aware of well I'll just be direct several colleagues of mine is just remarkable the order in their emails every email is perfect punctuated perfect grammar perfect everything space perfect or do they have OCD well they might they might not how would I know unless they disclose that to me but they might have obsessive compulsive personality disorder or they just might be able to generate a lot of order and they have a lot of discipline around the way they write in the way they present any communication. So if somebody has a OCD that's in the domain of order it could be incompleteness and the constant feeling of something not being completed and a need to complete it it can also be in terms of symmetry that everything be aligned in symmetric in some way this could be seen perhaps in young kids this is one example that I read in the literature of children that need to arrange their stuffed animals in exact same order every day and in a particular order to the point where if you were to move the little stuffed frog over next to the stuffed rabbit that the child will have an anxiety reaction to that and feel literally compelled driven to fix that maybe even multiple times over and over again. We'll talk about OCD and children versus adults in a little bit and then the other aspect of order which is a little bit less than intuitive is this notion of disgust this idea that something is contaminated so we often think about that. We often think about OCD and hand washing behavior in response to people feeling that something is contaminated a space a towel etc or even simply somebody else's hand and so they're unwilling to shake somebody's hand. You can imagine how these different bins of obsessions and compulsions checking repetition and order be extremely debilitating depending on how severe they are and how many different domains of life they show up in. It's often times in movies and even the way I'm describing it now it sounds as if okay well somebody has to check the locks but they don't have to also check the stove or somebody has the need to count to seven back and forth up to seven and down to seven seven times seven times a day or something of that sort where they need symmetry in very specific domains of life but it turns out that this recurrent and intrusive aspect of obsessions leads people with OCD to have checking repetition and order. And or order compulsions everywhere so whether or not somebody is at work or in school or trying to engage in sport or trying to engage in relationship or just something simple like walking down the street. The obsessions are so intrusive that they show up and they compel people to do things in that domain independent of whether or not they happen to be one location or another in other words the thought patterns and the behaviors take over the environment as opposed to the environment driving the thought patterns and behaviors. So it therefore becomes impossible to ever find a room that's clean enough to find a bed that's made well enough to find anything that's done well enough to remove the obsession and I know I said it multiple times now but I'm going to say it many times throughout this episode in a somewhat obsessive but I believe justified way that every time that one engages in the compulsion related to the obsession the obsession simply becomes stronger. So you can imagine what a what a powerful and debilitating loop that really is so let's drill a little bit deeper into how the obsessions and compulsions relate to one another if we were to draw a line between the obsessions and the compulsions that line could be described as anxiety. Now we need to define what anxiety is and to be quite honest most of psychology and science can't agree on exactly what anxiety is typically the way we think about fear is that it's a heightened state of autonomic arousal so increase heart rate increase breathing sweating etc in response to an immediate and present threat or perceived threat whereas anxiety generally speaking in the scientific literature relates to the same sorts of thought patterns and the same sort of the way that we think about the most important things that we can do is to think about what we can do. The same sorts of thought patterns and somatic bodily responses heart rate breathing etc but without a clear and present danger being in the environment or right there so that's the way that we're going to talk about anxiety now and anxiety is really what binds the obsessions and compulsion such that someone will have an intrusive thought so for instance someone will have the thought that if they turn left on any street that something bad will happen. That's an obsession is actually not all that uncommon now how bad and what the specificity of that bad thing really is will vary some people will think if I turn left something generally bad will happen it just makes me feel anxious so they always insist on going right whereas other people think if I turn left so and so will die or I will die or something terrible will happen I'll get a disease or someone else will get a disease or I'll be cursing myself or somebody else in some very specific way. Unfortunately quite common in people with OCD so they have this feeling and the feeling can be generally or specifically related to a particular outcome but beneath that is a feeling of anxiety a quickening of the heartbeat a quickening of breathing a narrowing of one's visual focus I've talked about this before another podcast the master stress and other podcast but if you haven't heard those let me just briefly describe that when we are in a state of increased so called autonomic arousal alertness stress it's not going to be a good thing. So you're going to be able to see the visual alertness stress etc our visual field literally narrows the aperture of our visual field gets smaller and that's because of the relationship between the autonomic nervous system and your visual system so you start seeing the world through sort of so distra view or through you as opposed to seeing the big picture why is that important well it literally sharpens and narrows your focus toward the very thing that the obsessions and the compulsions are focused on so the person walking down the street who sees the opportunity to go left or right will only see the bad decision their visual field and they're also very tightly along that possibility of taking a left turn and I know as I describe this seems totally irrational but I want to emphasize that the person with OCD knows it's irrational they might feel crazy because they're having these thoughts but they know it makes no sense whatsoever that left somehow would be different than right in terms of outcomes in this particular case and yet it feels as if it would in fact in some cases it feels as if they went left they would have a full blown panic attack. So the idea here is that the obsessions and compulsions are bound by anxiety but then by taking a right hand turn again in this one particular example by taking a right hand turn there's a very brief I should mention very brief relief of that anxiety at the time of the decision to go right not left and there's an additional drop in anxiety while one takes the right hand turn as opposed to the left hand turn and then as I alluded to before there's a reinforcement of the compulsion in other words by going right it doesn't create a situation in the brain and psychology of the person that you know what I'm not anxious anymore left would probably been OK it reinforces the idea that right made me feel better or turning right made me feel better and going left would have been that much worse again it reinforces the obsession even further and again we could swap out right turns and left turns with something like hand washing the feeling that something is contaminated and the need to wash one's hands even though one already washed their hands 20 30 50 times prior we're actually going to go back to that example later when we talk about one particular category of therapies that are very effective in many people for OCD which are the cognitive behavioral and exposure therapies is that I think some of you have heard of cognitive behavioral and exposure therapies but the way they are used to treat OCD is very much different than the way they are used to treat other sorts of anxiety disorders and other sorts of disorders generally so it's fair to say that up to 70% of people with OCD have some sort of anxiety or elevated anxiety either directly related to the OCD or indirectly related to the OCD and it's really hard to tease those apart because OCD can create its own anxiety as I mentioned before it can even increase its own anxiety and there's also an issue of depression having OCD can be very depressing right especially if some of these OCD thoughts and behaviors start to really impede people's ability to function in life at work and school and relationship they can start feeling less optimistic about life and in fact some people can become suicidally depressed that's how bad OCD can be for us so we have to be careful when saying that 70% of people with OCD also have anxiety or X number of people with OCD are also depressed because we don't know whether or not the depression led the OCD or the other way around or whether or not they're operating as we say in science in parallel some of the drug treatments for OCD and depression and anxiety can tease some of that apart and we'll talk about that but I think it's fair to say that what binds the obsessions and compulsions is anxiety that there's a feeling of it or I should say an urgent feeling of a need to get rid of the obsession and the person feels as if the only way they can do that is to engage in a particular compulsive behavior some people are probably wondering if there's a genetic component to OCD and indeed there is although the nature of it isn't exactly clear and oftentimes when people hear that something has a genetic component they think it's always directly inherited from a parent and that's not always the case there can be genes that surface in siblings or genes that surface in children that are not readily apparent in terms of what we call a phenotype so you have a genotype the gene and then you have a phenotype the way it shows up as a body form or like eye color or how it shows up in terms of a behavior or behavioral pattern based on twin studies where researchers have examined identical twins for eternal twins even identical twins that share the same sac in utero that what we call monocorionic so sitting in the same little bag during pregnancy or in different little bags you can see different levels of what's called genetic concordance but if we are just sort of cut a broad swath through all of the genetic data it's fair to say that about 40 to 50% of OCD cases have some genetic component some mutation or some inherited aspect that's genetic and that one could point to if they got their genome mapped now while that's interesting I don't think it's terribly useful for most people first of all you can't really control your genes at least at this point in history even though there are things like epigenetic control and people are very excited about technologies like CRISPR for modifying the genome in humans at some point most people can't control their genetics right you can't pick who your parents were as they say so just know that there is a genetic component in about half of people with OCD but not always now as is typical for this podcast I want to focus on some of the neural mechanisms and chemical systems in the brain and body that generate obsessive compulsive disorder in fact if you've watched this podcast before listen to this podcast before this is always how I structure things first we introduce a topic and we explore that topic in detail really define what it is and what it isn't and then it's very important that we focus on what is known and what is not known about the biological mechanisms that generate whatever that thing happens to be in this case OCD and obsessive compulsive personality disorder now I want to emphasize that even if you don't have a background in biology I will make this information accessible to you and I also want to emphasize that for those of you that are interested in treatments and are anxiously awaiting the description of things that can help with OCD I encourage you if you will to please try and digest some of the material about the underlying mechanisms because understanding even just a little bit of those biological mechanisms can really help shed light on why particular drug and behavioral treatments and other sorts of treatments work and don't work this is especially important in the case of OCD where it turns out that the order and type of treatment can really vary according to individual and that's something really special and important about OCD that we really can't say for a number of the other sorts of disorders that we've described on previous podcasts so let's take a step back and look at the neural circuitry what's going on in the brain and body of people with OCD why the intrusive recurrent thoughts why the compulsions why is that whole system bound by anxiety and in some ways in thinking about that I want you to keep in mind that the brain has two main functions the brains main functions are to take care of all the housekeeping stuff make sure digestion works make sure the heart beats make sure you keep breathing no matter what make sure that you can see you can hear you can smell etc the basic stuff and then there's an enormous amount of brain real estate that's designed to allow you to predict what's going to happen next either in the immediate future in the long term future and largely that's done based on your knowledge of the past so you also have memory systems you have systems in the brain and body that are designed to bind what's happening at the housekeeping level like your heart rate to your anticipation of what's going to happen next so if you're thinking about something very fearful your body will have one type of reaction if you're thinking about something very pleasant and relaxing your body will have another type of reaction so whenever I hear about the brain body distinction I have to just remind everybody that there really is no distinction between brain and body when you think about it through the nervous system the nervous system is the brain the eyes the spinal cord but of course all their connections with all the organs of the body and the connections of all the organs of the body with the brain the spinal cord etc so as I describe these neural circuits I don't want you to think of them as just things happening in the head they are certainly happening in the head in fact the circuits all describe most in detail do exist within the confines of your cranial vault that's nerd speak for skull but those circuits are driving particular predictions and therefore particular biases towards particular actions in your body they're creating a state of readiness or a state of desire to check or desire to count or desire to avoid etc etc so what are these circuits well there's been a lot of wonderful research exploring the neural circuits underlying obsessive compulsive disorder and that's mainly been accomplished through a couple of methods most of those methods when applied in humans involve getting some look into which brain areas are active when people are having obsessions and when people are engaging in compulsions now that might seem simple to do but of course your brain is housed inside the cranial vault in order to look inside it you have to use things like magnetic resonance imaging which is just fancy technology for looking at blood flow which relates to activation of neurons nerve cells or things like pet PET imaging which has nothing to do with the verb pet and has nothing to do with your house pet has everything to do with positron emission tomography which is another way of seeing which brain areas are active and you can also use pet to figure out what sorts of neurochemicals are active like dopamine etc many studies we can fairly say dozens if not hundreds of studies have now identified a particular circuit or loop of brain areas that are interconnected and very active in obsessive compulsive disorder that loop includes the cortex which is kind of the outer shell of the human brain the lumpy stuff as it sometimes appears if the skull is removed and it involves an area called the striatum which is involved in action selection and holding back action the striatum is involved in what's commonly called go and no co types of behaviors so every type of behavior like picking up a pen or a mug of coffee involves a go type function involves generating an action but every time I resist an action my nervous system is also doing that using this brain structure the striatum which includes among the other things the basal ganglia talked about that before I'm not trying to overload you with terminology here but I know some people are interested in terminology so we have go behaviors and you have no go resisting of behaviors not going toward behavior the cortex and the striatum are in this intricate back and forth talk it's really loops of connections the cortex doesn't tell the striatum what to do the striatum doesn't tell the cortex what to do they're in a cross talk like any good relationship there's a lot of back and forth communication there's a third element in this cortico stride loop as it's called and that's the thalamus now the thalamus is not a structure I've talked a lot about before on this podcast but it's one of my favorite structures to think about and teach about in neuroanatomy which I teach back at Stanford and have taught for many years elsewhere because the thalamus is this incredible egg like structure in the center of your brain that has different channels through it channels for relaying visual information or auditory information or touch information from your environment up into your cortex and as a consequence making certain things that are happening to you and around you apparent to you making you aware of them making you perceive them and suppressing others so for instance right now if you're hearing me say this your thalamus has what are called auditory nuclei there's collections of neurons that respond to sound waves that are of course coming in through your ears and your thalamus is not a problem your thalamus is active in a way that those particular regions of your thalamus are allowed literally permitted to pass the information coming from your ears through some other steps but then to your thalamus your auditory thalamus then up to your cortex and you can hear what I'm saying right now at the same time your thalamus is surrounded by a kind of a shell something called the thalamic particular nucleus again you don't have to remember the names but this thalamic particular nucleus also sometimes called the particular thalamic nucleus this is believe it or not a subject of debate in the world a subject of debate in science are people that literally hated each other probably still hate each other even though one of them is dead for decades because they would argue with the thalamic particular nucleus the other was retic reticulate the lamb nucleus anyway these are scientists their people they tend to debate but the the lambic particular nucleus is I'm going to call it serves as a sort of gate as to which information is allowed to pass through up to your conscious experience and which is not and that gating mechanism is strongly regulated by the chemical GABA GABA is a neurotransmitter that is inhibitory as we say it serves to shut down or suppress the activity of other neurons so the thalamic particular nucleus is really saying no touch information cannot come in right now you should not be thinking about the contact of the back of your legs with the chair that you're sitting on Andrew you should be thinking about what you're trying to say and what you're hearing and how your voice sounds and what you see in front of you etc whereas if I'm about to get an injection from a doctor or I'm in pain or I'm in pleasure I'm going to think about my somatic sensation at the level of touch and I'm probably going to think less about smells in the remote although I might also think about smells in the room or what I'm seeing and what I'm hearing we can combine all these different sensory modalities but that the lamic particular nucleus really allows us to funnel to direct particular categories of sensory experience into our conscious awareness and suppress other categories of sensory experience in addition the thalamic particular nucleus plays a critical role in which thoughts are allowed to pass up to our conscious perception and which ones are not so much so that some neuroscientists and indeed some neuro philosophers if you want to call them that have theorized or philosophized that the thalamic particular nucleus is actually involved in our consciousness now consciousness is in a topic that I really want to talk about this episode and it's a very kind of mushy murky as we say in science it's a schmooey term because it doesn't really have clear definition so arguments about it often get lost in the fact that people are arguing about different things but when I say consciousness what I mean is conscious awareness so let's zoom out and take a look at the circuit that we've got and that we now know based on neuroimaging studies is intimately involved in generating obsessions and compulsions in OCD we have a cortex or neocortex which is involved in perception and understanding of what's happening we have the striatum and basal ganglia which are involved in generating behaviors go and suppressing behaviors no go and we have the thalamus which collects all of our sensory experience in parallel hearing touch smell etc not so much smell through the thalamus I should mention but the other sensor senses that is and then that thalamus is encased by the thalamic particular nucleus which serves as a kind of a guard saying you can pass through and you can pass through but you you you can't pass through up to conscious understanding and perception so that loop this corticostriatol thalamic loop corticostriatol thalamic loop is the circuit thought to underlie OCD and dysfunction in that circuit is what's thought to underlie OCD now again this circuit exists in all of us and it can operate in healthy ways or it can operate in ways that make us feel unhealthy or even suffer from full bone OCD how do we know that this circuit is involved in OCD well there we can look to some really interesting studies that involve bringing human subjects into the laboratory and generating their obsessions and compulsions and then imaging their brain using any variety of techniques that we talked about before what would such an experiment look like well in order to do that sort of experiment first of all you need people who have OCD and of course you need control subjects that don't and you need to be able to reliably evoke the obsessions and the compulsions now turns out this is most easily or I should say most simply done because it can't be easy for the people with OCD but this is most straightforward that's the word I was looking for most straightforward when looking at the category of obsessions and compulsions that relate to order and cleanliness so what they do typically is bring subjects into the laboratory who have a obsession about germs and contamination and a compulsion to hand wash and they give these people believe it or not a sweaty towel that contains the sweat and the odor and the liquid basically from somebody else's hands in fact they'll sometimes have someone wipe their own sweat off the back of their neck and put it on the towel and then they'll put it in front of the person which as you can imagine for someone with OCD is incredibly anxiety provoking and almost always evokes these obsessions about oh this is really this is really bad this is really bad I need to I need to clean I need to clean I need to clean now they're doing all this while someone is in a brain scanner or while they're being imaged for positron emission tomography and then they can also look at the patterns of activation in the brain while the person is doing hand washing although sometimes the apparatus associate with these imaging studies make it hard to do a lot of movement they can do these sorts of studies they have done these sorts of studies in many subjects using different variations of what I just described and lo and behold what lights up when I say lights up what what sorts of brain regions are more metabolically active more blood flow more neural activity well it's this particular cortical stride or philamic loop in addition to that some of the drug treatments that are effective in some and I want to emphasize some individuals at suppressing obsessions and or compulsions such as the selective serotonin reuptake inhibitors or SSRIs which we'll talk about in a little bit when people take those drugs they see not just a suppression of the obsession and compulsion but also a suppression of these particular neural circuits they become less active now I want to emphasize and telegraph a little bit of what's coming later these drugs like SSRIs do not work for everybody with OCD and as many of you know they carry other certain problems inside effects for many but not all individuals but nonetheless what we have now is an observation that this circuit the cortical stride or philamic loop is active in OCD we have a manipulation that when people take a drug that at least in those individuals is effective in suppressing or eliminating the obsessions and compulsions there's less activity in the loop and thanks to some very good animal model studies that at least at this point in time you really couldn't do in humans although soon that may change we now know in a causal way that the equivalent circuitry A exists in other animals such as mice such as cats such as monkeys and that activation of those particular cortical stride or philamic circuits in animal models can indeed evoke OCD in an individual that prior to that did not have OCD so I'm just going to briefly describe one study this is a now classic study published in the journal science one of the three apex journals in 2013 the first author on this paper is Susanna Maari AHM AI I will provide a link to this in the show notes as a truly landmark paper done in Renee Hens lab at Columbia University and the title of the paper is repeated cortical stride stimulation generates that's the keyword here generates persistent OCD like behavior what they did is they took mice mice do mouse things they move around they play toys they eat they pee they mate they do various things in their cage but they also groom humans groom animals with fur groom well you hope most people groom some people over groom some people under groom most people groom they'll comb their hair they'll clean et cetera those are normal behaviors that humans engage in I'm not aware that mice comb their hair but mice adjust their hair so they'll kind of pet their hair and they'll do this will sometimes even do it to each other we used to have mice in the lab now we only do human studies but the mice will groom themselves and typical what we call wild type mice not because they're wild but because they're typical will groom themselves at a particular frequency but not to the point where their hair is falling out not constantly they are grooming some of the time and they're doing other mouse things other mouse times so in this particular study what they did is they used some technology which it actually was discussed on a previous episode of the human lab podcast this is technology that was developed by a psychiatrist and bioengineer by the name of Carl Diceroth one of my colleagues at Stanford School of Medicine this is technology that allows researchers to use the presentation of light to control neural activity in particular brain areas in a very high fidelity way you control the activity in the cortex of the striatum or the thalmas when you want and how you want it's really a beautiful technology in any event what they did in this study is or I should say what Susan Amari and colleagues did in this study was to stimulate the corticosterietal circuitry in animals that did not have any OCD like behavior and when they did that those animals started grooming incessantly to the point where their hair was falling out or they even you know they didn't take the experiments this far fortunately but the animals would have a tendency to almost rub themselves raw in the same way that somebody who has a compulsion to hand wash would sadly people will hand wash to the point where their hands are actually bleeding and raw it's really that bad I know that's tough imagery to imagine you can't even imagine why someone would self harm in that way but again that's that incredible anxiety relationship between the compulsion excuse me the obsession and the compulsion and the fact that engaging in the compulsion simply strengthens the obsession and therefore the anxiety anxiety so that collection of studies of data F MRI pet scanning in humans the treatment with SSRIs and these experiments where researchers have actively triggered these particular circuits in animal models that previously did not have too much activity in the circuits and then they observe OCD emerging really points squarely to the fact that the corticosterietal philamic loop is likely to be the basis of OCD now of course other circuits could also be involved but the corticosterietal philamic circuit seems to be the main circuit generating OCD like behavior that's a lot of mechanism hopefully it was described in a way that you can digest and understand and some of you might be thinking well so what why why does that help me I mean I can't reach into my brain and turn off my cortex I can't reach into my brain and turn off my thalamus and indeed on the one hand that's true but as you'll next learn when thinking about the various behavioral treatments and drug treatments and holistic treatments for OCD what you'll notice is that each one taps into a different component of this corticosterietal philamic loop and by understanding that you can start to see why certain treatments might work at one stage of the process versus others you will also start to understand why obsessive compulsive personality disorder does not have the same sorts of engagements of these neural loops and yet relies on other aspects of brain and body and therefore responds best to other sorts of treatments or in some cases people with obsessive compulsive personality disorder are not even seeking treatment as I alluded to before the point here is that by understanding the underlying mechanism why certain drugs and behavioral treatments work and don't work will become immediately apparent and in thinking about that in knowing that you'll be able to make excellent choices I believe in terms of what sorts of treatments you pursue what sorts of treatments you abandon and most importantly the order the sequence that you pursue and apply those treatments before we go any further I'd like to give people a little bit of a window into what a diagnosis for OCD would look like to be a sense of the sorts of questions that a clinician would ask to determine whether or not somebody has OCD or not now I want to be clear I'm not going to do this in an exhaustive way I wouldn't want anyone to self diagnose although I'm hoping that by sharing some of this that some of you might get inside into whether or not you do have obsessions and compulsions that might qualify for OCD and perhaps even to seek out help the most commonly used test of OCD or for OCD I should say is called the Yale Brown Obsessive Compulsive Scale and this is you know scientists love acronyms as do the military and it's the Y box the Y dash B O C S the Y box so typically someone will go into the clinic either because a family member encouraged them to or because they feel that they're suffering from obsessions and compulsions and before the clinician would proceed with any kind of direct questions they would very clearly define what obsessions and compulsions are and here I'm actually reading from the Y box so quote obsessions are unwelcome and distressing ideas thoughts images or impulses that repeatedly enter your mind they may seem to occur against your will they may be repugnant to you you may recognize them as senseless and they may not fit your personality and there are compulsions quote compulsions on the other hand or behaviors or acts that you feel driven to perform although you may recognize them as senseless or excessive at times you may try to resist doing them but this may prove difficult you may experience anxiety that does not diminish until the behavior is completed and as I mentioned before in many cases immediately after the behavior is completed the anxiety doesn't just return it indeed can strengthen there are tremendous number of questions on the Y box so I'm just going to highlight a few of the general categories typically the person will fill out a checklist so they will designate whether or not currently or in the past they have for instance aggressive obsessions fear that one might harm themselves fear that one might harm others fear that they'll steal things fear that they will act on unwanted impulses currently or in the past or both that's one category the other one our contamination of sessions so concerned with dirt or germs bothered by sticky substances or residues etc etc so a bunch of different categories that include for instance sexual obsessions what are called saving obsessions even moral obsessions access concern with right or wrong or morality concerned with sacrilege and blasphemy obsession with need for symmetry and exactness again all these questions being answered as either present in the past we're not present in the past present currently we're not present currently and then the test generally transitions over to questions about target symptoms they really try to get people to identify if they have obsessions what are their exact obsessions now this turns out to be really important because as we talk about some of the therapies that really work I'll just give away a little bit of why they work best in certain cases and why they don't work as well in other cases it turns out that it becomes very important for the clinician and the patient to not just identify the obsessions and the compulsions generally and kind of a generic or top contour way but to really encourage or even force the patient to define very precisely what the biggest most catastrophic fear is what the obsession really relates to that turns out to be very important in disrupting this corticosteroidal philamic loop and getting relief from symptoms one way or the other so the Yale Brown Obsessive Compulsive Scale this Y-Box again is very extensive it goes on for dozens of pages actually and has all these different categories not so much designed to just pinpoint what people obsess about or what they feel compelled to do but to also try and identify what is the fear that's driving all this right in the way that we've set this up thus far we've been talking about obsessions and compulsions is kind of existing in a vacuum you're obsessed about germs and you're compelled to wash your hands obsessed about germs compelled to wash your hands or obsessed about symmetry compelled to put right angles on everything or obsessed about counting and therefore counting etc but beneath that is a cognitive component that is not at all apparent from someone describing their obsession and from someone describing or displaying their compulsion the deeper layer to all that is what is the fear exactly if one were to not perform the compulsion meaning what is the fear that's driving the obsession so that brings us to a very powerful category of treatments that I should say does not work in everybody with OCD but works in many people with OCD and really speaks to the underlying neural circuitry that generates OCD and how to interrupt it and that is the treatment of cognitive behavioral therapy and in particular exposure based cognitive behavioral therapy so we're going to talk about cognitive behavioral therapy and exposure therapy now but right at the outset I wanted to distinguish the kinds of cognitive behavioral therapy and exposure therapies that are done for obsessive compulsive disorder the sorts of cognitive behavioral therapies that are done for other types of mental challenges and disorders because cognitive behavioral therapy for OCD really has everything to do with identifying the utmost fear in some sense we can think of fears is kind of along a hierarchy right in the example earlier of somebody being afraid to turn left and therefore feeling compelled to turn right you would want to take that person and really understand what do they fear most about turning left now they might not be aware of it they might not be conscious to what that really is but if you were to probe them in a clinical setting you would eventually get to an answer that answer could be at first I don't know just it's just bad I don't know why it's bad it makes no sense but it's just bad I do not want to go left I don't know why I don't know why but if you were to push that person a little bit in a respectful and kind and carrying way aimed at there's a lot of things that are going to happen in a very caring way aimed at their treatment if you were to push them and say well what do you mean my bad if you turn left you think the world would end they might say no the world's not going to end but you know someone is going to die suddenly I know that sounds crazy but somebody's going to die suddenly it almost this almost sounds like superstition talk about superstitions later but indeed it is somewhat superstitious so for instance you would say who's going to die and they'd say I don't know and you'd say no really who's going to die if you think about this are you going to die and so going to die and very often very often what you find is that people will start to reveal the underlying obsession at a level of detail that both to the clinician and to them can be somewhat astonishing even though they've been living with that detail in their mind for a very long time now how could somebody start to reveal detail about something that's existed in their mind for a very long time but not known about it right not been aware of it now some of you might think oh it's repressed or something that's not at all what's happening if you think about the architecture of OCD typically people will have an obsession and then they'll engage in the compulsion as quickly as they can to relieve that obsession so in many ways the disease itself prevents people from ever getting to the bottom of that trough ever getting to the point where they really clearly articulate to themselves exactly what it is that they fear but it becomes so essential to articulate exactly what it is that they fear for a somewhat counter intuitive reason you might think oh the moment they realize exactly what they fear everything lifts the circuit turns off and they just feel better because they realized it I wish I could tell you that's the case but it turns out it's the opposite what the clinician is actually trying to do is get people to feel more anxiety not less what they're trying to get them to do is to short circuit no pun intended to intervene in their own neural circuit I should say with that relief of anxiety however brief brought on by engaging in the compulsion related to the obsession so whereas typically someone would feel the obsession with oh I don't want to turn left because something bad is going to happen someone's going to die and then they turn right they never get the option or the opportunity to really explore what would happen where they to turn left or to not be able to turn right by forcing them down the path of inquiry that leads them to the place where they very clearly identify the fear the anxiety it raises the anxiety in them and that's actually what the clinician is after cognitive behavioral therapy and exposure therapy in the context of OCD most often involves trying to get people to tolerate not relieve their anxiety this is extremely important and I realize there's variation to this depending on the style of cognitive behavioral therapy the style of exposure therapy but almost across the board the goal again is to get people to feel the anxiety that normally they are able to at least partially relieve however briefly by engaging in the compulsion so if we think back to that circuit of cortical strato philamic what's going on here where is CBT intervening what part of the circuit is getting interrupted as you recall the cortex is involved in conscious perception the thalamus and that the particular nucleus are involved in the passage of certain types of experience up to our conscious perception not others and the strutum is involved in this go no go type behavior when OCD is really expressing itself in its fullness people feel an anxiety around a particular thought and they either have a go for instance wash hands or a no go do not turn left type reaction by having people progressively in a kind of hierarchical way reveal their precise source of anxiety their utmost fear in this context what happens is they feel enormous amounts of autonomic arousal now in the context of anxiety treatment or other types of treatments the goal would be to teach people to dampen to lessen their anxiety through breathing techniques or through visualization techniques or through self talk or through social support any of the number of things that are well known to help people self regulate the own anxiety here it's the opposite what they're trying to get the patient to do is to really feel the anxiety at its maximum but then do the exact opposite of whatever the normal compulsion is so if normally the compulsion is to wash one's hands then the idea is to suppress hand washing while being in the experience of the utmost anxiety or in the case of not turning left the person is expected to or would hopefully be able to actually turn left and as you can imagine that would evoke tremendous anxiety and yet to tolerate that anxiety now I want to be very clear this is not the sort of thing you want to do on your own this is not the sort of thing you want to do for a friend this is done by trained licensed psychologist and psychiatrist but nonetheless it really points to the fact that as a anxiety related disorder OCD is distinct from other types of anxiety and anxiety related disorders things like PTSD and panic disorder etc because the goal again is to bring the person right up close to the thing that they fear the most and then to interrupt the circuit and now you should be able to know just intuitively because you understand the mechanisms that the circuit you're trying to disrupt is the pattern of information flow from the thinking part of the brain the perception part of the brain which is the cortex to the striatum right the striatum has these neurons which are active that essentially are know it sounds a little bit like a discussion about free will but they're trying to get some the person to generate a certain behavior suppress a certain behavior and as anxiety ramps up it's sort of a hydraulic pressure to do that very thing that they've done for so long and they suffer from so much we talked about hydraulic pressure in the context of aggression in the aggression episode this is very similar right there's a kind of a now when I say hydraulic pressure it's not actual hydraulic pressure it's the confluence of a lot of different systems it's neochemical as we'll soon learn it's hormonal it's electrical it's it's a lot of different things operating in parallel so we can't point to one chemical or transmitter what's happening is the person is feeling compelled to act act to relieve the anxiety and through a progressive type of exposure right you don't throw people in the deep end in this kind of therapy right off the bat you gradually ratchet them toward or move them toward the discussion of exactly what they fear the most and then eventually move them toward the interruption of the compulsion as they're feeling this extremely elevated anxiety of course within the context of a supportive clinical setting but in doing that what you are teaching people is that the anxiety can exist without the need to engage in the compulsion now some of this might sound to people like this is a lot of fancy psychological neuroscience speak around something that's kind of intuitive but I think for most people this is not intuitive and for people with OCD the there's no really other way to put it the impulse the the compulsion to avoid anxiety is such a powerful driving force that it should now make sense to you as to why being able to tolerate anxiety and really sit with it and do the exact opposite of what you're trying to do is normally compelled to do is going to be the path treatment and indeed CBT has been shown to be enormously effective again for a large number of people with OCD but not all of them and oftentimes it requires that it also be used in concert with certain drug treatments which we're going to talk about in a moment next let's talk about some of the really unique features of cognitive behavioral therapy and exposure therapy in the context of OCD that you often don't see in the use of CBT or the behavioral therapy for other types of psychiatric challenges and disorders the first element is one of stair casing and I already mentioned this before but this gradual and progressive increase in the anxiety that you're trying to evoke from the patient from the person suffering from OCD in the context of the office or the laboratory again by a trained in licensed clinician but then the person leaves right they leave the office they leave the laboratory and a very vital component of CBT and exposure therapy for people with OCD is that they have and perform what's called homework is literally what they call this might be seen in other sorts of treatments but for OCD homework is extremely important because within the context of a laboratory experiment or the clinic patients often feel so much support that they can tolerate those heightened levels of anxiety and interrupt their compulsions whereas when they get home oftentimes the familiarity of the environment brings them to a place where all of a sudden those obsessions and compulsions start interacting the same way and they have a very hard time suppressing the behaviors why would that be well in neuroscience we have a phrase it's called condition place preference and condition place avoidance there's some other phrases to but basically it all has to do with a simple thing which is when you feel something repeatedly in a given environment sometimes even once within a given environment you tend to feel that same thing again when you return to that or similar environments condition place blank or condition place that is simply fancy nerd speak for the fact that when you're in a place and something good happens you tend to feel good if you return to that place or replace like it or if something bad happens in a given place you tend to feel bad when you return to that place or a place like it I think that most saline example that leaps to mind is an unfortunate category of bad but I had some friends years ago visit San Francisco there's been an ongoing it seems like it's been happening forever but this is really in the last decade of daytime break ins and nighttime break ins into cars to steal anything from computers to what seems to be like a box of tissues and the numerous reasons for this I don't want to get into it's not the topic of today's podcast but I will use this the opportunity to say if you're visiting anywhere in the Bay Area do not leave anything in your car because the window will get broken into sometimes in broad daylight some good friends of mine were visiting the Bay Area and I texted them and said hey by the way when you're headed to dinner guys make sure you bring in all your luggage and computers or ever convenient inconvenient that might be they wrote back too late everything got stolen so some years ago now I think five six years ago this happened sadly all everything got stolen most of it could be replaced but some of it was very sentimental to them every time we talk every time we consider having a meeting in a particular city this comes up as I don't I don't want to be there I don't like that city anymore etc and of course San Francisco has some wonderful redeeming features but it only takes one bad incident in one location to kind of color the whole picture dark so to speak the brain works that way the brain generalize is it it's not a very specific organ again it's a prediction machine and addition to other things so in the case of CBT therapy the reason there's homework is that when people go home oftentimes that's when they relapse if you want to call it that back into their obsessions and compulsions and then we're going to do that. That's when you're going to have a lot of problems and compulsions and that location that condition place is where it becomes most important to challenge the anxiety into deal with anxiety did not try and suppress the anxiety through compulsions or other means and when I say other means I want to highlight something will come up again a little bit later in the podcast that substance abuse is very common in people with OCD because of the anxiety component and also because of people's feelings that they just can't escape from the thoughts or behavioral patterns that are so characteristic of OCD so alcohol abuse or cannabis abuse or other forms of narcotics abuse are very common in OCD later we'll talk about whether or not cannabis can or cannot help with OCD but needless to say suppressing anxiety is exactly the wrong direction that one should take if the goal is to ultimately relieve or eliminate the OCD. So we now have two characteristics of CBT exposure therapy that are extremely important for OCD and somewhat unique to the treatment of OCD and that's the stair casing up towards the really bad fear the really severe and specific articulation and understanding and feeling of how bad things really would be if someone engage in a particular behavior or avoided a particular behavior then there's the component of homework given by the clinician for the person to be able to create a broader set of context in which they can deal with the anxiety not engage in the compulsions and then a very unique feature of treatment of OCD that you don't see in many other psychiatric disorders are home visits I find this is fascinating I think that the field of psychiatry and psychology traditionally doesn't allow for or invite home visits but this component of context location and context being so vital to the treatment and relief of OCD has inspired many psychiatrists and psychologists to get permission to do home visits where they actually go visit their patients in their native setting in their home cages right they're not mice but in their home home cages right I'm being facetious here but people mice living cages at least in the laboratory and humans generally even houses or elsewhere so they visit them in their home in order to see how they're interacting and the particular locations that evoke the most anxiety and the least anxiety some of the and want to call them crutches but some of the tools that that people are using to confront and deal with the obsessions and compulsions and in particular to try and identify some of the tools and tricks that people are using to try and avoid that heightened anxiety because once again and I know I'm repeating myself but I think this is just so vital and so unique about OCD and the treatment of OCD the critical need for the patient to be able to tolerate extremely elevated levels of anxiety is so crucial so if people are avoiding certain rooms in the house or if people are avoiding certain foods or certain locations in the kitchen the clinician can start to identify that by mere observation and I should mention here that patients are not always aware of how they are interacting with their home environment some of these patterns are so deeply ingrained in people that they don't even realize that they're constantly turning to the left or they don't even realize that they're only washing their hands on one side of the sink and so the clinician by visiting the home can start to interrogate a bit in a polite way and a friendly and a supportive way as to do you ever think about why you always you know flip the faucet to the left or flip the faucet to the right etc. Now we all do a lot of things that are habitual we all do things that are somewhat regular from day to day in fact I would invite you to ask yourself do you always put your toothbrush in the same location do you always cap the toothbrush before after you use it what sorts of things you do wipe the little threading on the toothpaste or not I'm somebody I confess that I have well I have about 3500 pet peeves but one of my pet peeves is toothpaste kind of on the thread of the toothpaste it really bothers me I don't know why almost as much as trying to wipe it off bothers me which creates a certain challenge and if I talk about this any further then I think I would qualify for obsessive compulsive personality disorder but I have to say I don't experience a ton of anxiety about it it doesn't govern my life in fact I realize that right now there are tubes of toothpaste that have toothpaste along the thread everywhere in the world it doesn't really bother me I can still sit here and provide some information about OCD to use it. It's not intrusive at least not to my awareness so by the home visit the therapist can really start to explore through direct questioning and can allow the patient to explore through direct questioning of themselves the things that it might be conscious of and the things that they might not be conscious of that would qualify for OCD so I'd like to just briefly summarize the key elements of cognitive behavioral therapy and exposure therapy and how they can be combined with drug treatments that are very effective. Much of what I'm going to talk about next relates to the data and indeed the practice of an incredible research scientist and clinician so this is Helen Blair Simpson or I should say doctor Helen Blair Simpson because she is indeed an MD medical doctor NAPHD research scientist at Columbia University school of medicine and one of the world's foremost experts if not the expert I would put her in a category of maybe just one to three people who is most knowledgeable about the mechanisms of OCD is actively researching OCD in humans trying to find new treatments trying to unveil new mechanisms and expand on our current understanding and who also treats OCD quite actively in her own clinic. Dr. Simpson gave a beautiful presentation which she summarized some of the core elements of CBT and exposure therapy for the treatment of obsessive compulsive disorders. She describes that the key procedures are exposures of course done in person and with the actual thing that evokes the obsessions and compulsions so this could be the sweaty towel as described earlier or could be any number of different triggers done with the patient in real time. So in vivo as we say and it could also be things that are imaginal sitting somebody down in a chair in an office and saying okay I want you to imagine the thing that triggers the intrusive thought or let's just focus on the intrusive thought as it arises and then to explore and expose the patient to their obsessions and compulsions that way so it can be real or can be imaginal and the goal of course then is to gradually and progressively increase the level of anxiety but then to intervene and so called rich. And so called ritual prevention to prevent the person from engaging in the compulsion the goals again on paraphrasing here are to as she stays disconfirmed fears and challenge the beliefs about the obsessions and compulsions the interbeing and the thoughts and the behaviors and to break the habit of ritualizing and avoiding now how is this typically done what what are the nuts and bolts of this procedure typically this is done through two planning sessions with the patient. So describing to the patient what will happen and when it will happen and how long it will happen so they're not just thrown into this out of the blue and then 15 exposure sessions done twice a week or more so the one thing to really understand about cognitive behavioral therapy is that it can take some period of time several or more weeks as many as 10 or 12 weeks. However, as you'll soon learn many of the drug treatments that are effective in treating OCD either alone or in combination with behavioral therapies also can take 8 10 12 weeks or longer and many of those never work at all so even though 10 to 12 weeks seems like a long period of time it's actually pretty standard if you'd like to see more complete description of the protocols for cognitive behavioral therapy and exposure therapy for OCD. I'll provide links to two papers, Kozak and F O A which is published in 1997 which might seem like a long time ago but nonetheless the protocols are still very useful and then the second paper is by that last author foe at all in 2012 will provide links to both of those in addition. Dr. Blair Simpson and others have explored what are the best treatments for patients with OCD by comparing cognitive behavioral therapy alone placebo so essentially no intervention or something that takes an equivalent amount of time but is not thought to be effective in treatment as well as selective serotonin reuptake inhibitors so what is an SSRI and SSRI is a drug that prevents the reuptake of serotonin at the sin apps what are synapses they're the little spaces between neurons where neurons communicate with one another by vomiting little bits of chemical into the space the synapse and then those chemicals either evoker suppress the electrical activity of the next neuron across the synapse. And this case the neurotransmitter the chemical that we're referring to is serotonin SSRI selective serotonin reuptake inhibitors prevent the reuptake of the chemical that's left in this case the serotonin that's left in the synapse after that I call it vomiting to be dramatic but it's not actually a vomiting the extrusion of the chemical into the synapse and as a consequence there's more serotonin around to have more of an effect over time the net effect being more serotonergic transmission. More serotonin overall so not more serotonin being made more serotonin being available for use that's what an SSRI does so they compared cognitive behavioral therapy SSRI they also the placebo group and they had cognitive behavioral therapy plus the selective serotonin reuptake inhibitor this was a 12 week study done as described before two times a week over the course of 12 weeks first of all the most important thing of course placebo did nothing. It did not relieve the OCD to any significant degree right how did they know that they gave them the Y box test that we talked about before the with the Yale Brown test with all those questions of which I read a few so the OCD severity that one has to have on the Y box is measured in terms of an index that goes from any here from eight all the way up to 28 that shouldn't mean anything so that number eight is kind of meaningless here it's in terms of an index that's only only a little bit more. So that's the only index that's only only meaningful for the Y box but if somebody has a threshold of 16 or higher it means that they're still having somewhat debilitating symptoms are very debilitating symptoms placebo did not reduce the obsessions or compulsions to any significant degree. However and I think quite excitingly cognitive behavioral therapy had a dramatic effect in reducing the obsessions and compulsions such that by four weeks that score that in this case range from eight to 28 dropped all the way from 25 down to about 11 so is a huge drop in the severity of the symptoms now what's really interesting is that when you look at the effects of SSRIs in the treatment of OCD symptoms. They had a significant effect in reducing the symptoms of OCD that showed up first at four weeks and then continued to eight weeks in fact there was a progressive and further reduction in OCD symptoms from the four to eight week period again these are the people just taking the SSRI and then it sort of flattened out a little bit such that like 12 weeks there was still a significant reduction in OCD symptoms for people taking SSRIs as compared to placebo but the severity there's symptoms it was a huge risk. The severity there symptoms it was still much greater than those receiving cognitive behavioral therapy alone so at least in this study and I should tell you which study it is this is foleyboets at all 2005 in the American journal psychiatry will also provide a link to this so you can peruse the data if you like but at least in this study cognitive behavioral therapy was the most effective selective serotonin reuptake inhibitors less effective. So what happens when you combine them well they explore that as well and the combination of cognitive behavioral therapy and the SSRIs together did not lead to any further decrease in OCD symptoms. This points to the idea that cognitive behavioral therapy is the most effective treatment and again when I say cognitive behavioral therapy now I'm still referring to cognitive behavioral slash exposure therapy done in the way that I detailed before twice a week for 12 weeks or more. So the data at least in this study points to the fact that cognitive behavioral therapy is really effective and the most effective does it alleviate OCD symptoms for everybody. No is it very time consuming yes twice a week for you know two sessions or more of 15 minutes sometimes in the office plus there's homework plus there can in an ideal case there's also home visits from the psychiatrist or psychologist that's a lot of investment a lot of time investment to say nothing of the potential financial investment. Now Dr Blair Simpson has given some beautiful talks where she describes these data and also emphasizes the fact that despite the demonstrated power of cognitive behavioral therapy for the treatment of OCD most people are given drug treatments simply because of the availability of those drug treatments. Now when I say most people want to emphasize that I'm referring to most people who actually go seek treatment because a really important thing to realize is that most people with OCD do not actually go seek evidence based treatment. I want to repeat that most people with OCD do not seek evidence based treatment which is a tragic thing one of the motivations for doing this podcast episode is to try and encourage people who think they may have persistent obsessions and compulsions to seek treatment. But most people don't for a variety of reasons we spelled out earlier shame etc of those that do the first line of attack is typically a prescription most often an SSRI although not always just SSRI because soon we'll talk about the somewhat common use of also prescribing a low dose of a neuroleptic or an anti-psychotic not always but often. So the important things to understand here is that excellent researchers like Dr. Simpson understand that while there are treatments that we could say are best or are ideal based on the data that doesn't necessarily mean that's what's being deployed most often in the general public as a consequence Dr. Simpson and others have explored in a very practical way whether or not it matters if somebody is getting SSRI treatment and is experiencing that. Reduction in OCD symptoms that as you may recall is more than what they would experience with placebo alone but not as dramatic a reduction in OCD symptoms as they would get with cognitive behavioral therapy. And as I mentioned before there was this exploration of combining drug treatment cognitive behavioral therapy from the outset but they also quite impressively explored what happens when people who are already taking SSRI's initiate cognitive behavioral therapy. This is a really wonderful thing that they've done this because in doing that first of all they're acknowledging that there are many people out there who have sought treatment and are getting some relief from those SSRI's but it perhaps is not as much relief as they could get and they are actively acknowledging that many people are getting these drug treatments first in fact most often people are getting these drug treatments first. So what happens when you add in cognitive behavioral therapy well the good news is when you add cognitive behavioral therapy to someone who's already taking SSRI's that further improves their symptoms. Now that's different than the results that I described before from the same laboratory in fact that if you combine cognitive behavioral therapy with SSRI's from the outset there's no additional benefit of SSRI. However as I just described if someone is already taking an SSRI and they're experiencing a reduction in their OCD symptoms by adding in cognitive behavioral therapy there's a further reduction in the symptoms of OCD. So it's very important so for those of you that have sought treatment and you're taking a SSRI or if you're thinking about treatment and you're prescribed an SSRI the ideal scenario really would be to combine the drug treatment with cognitive behavioral therapy or in some cases maybe cognitive behavioral therapy alone although that's a decision that you really have to make with the close advice and oversight of a licensed physician because of course these are prescription drugs and anytime you're going to add or remove a prescription drug or change dose that you really want to do that in the end of the day. So I want to do that in close discussion with and on the advice of your physician I want to say that to protect me I say that to protect you and because it's just the right thing to do. So again, cognitive behavioral therapy is extremely powerful drug treatments seem less powerful though if you're already on a drug treatment adding cognitive behavioral therapy can really help. So I've been talking about SSRI's and I described a little bit about how they work at a kind of superficial level of keeping more serotonin in the synapse so that more serotonin can be in action as opposed to gobbled back up by those neurons. I should just mention what some of the selective serotonin reuptic inhibitors are so things like clumipramine which is not entirely selective I should say that that one generally falls into a category of less selective so it can impair or I or can enhance some of the other neurotransmitter and neuromodulator systems like epinephrine etc. The selective serotonin reuptic inhibitors are at least the classic ones are fluoxetine, prozac, fluvoxamine, fluvox, peroxetine, sertraline, satalapram etc. There are about six or classic SSRI's some of them like sertralapram are used in children and are available in pediatric doses some like prozac may or may not be used in children the details of which SSRI's etc. is a very extensive literature and discussion and I think it's safe to say that which drugs to use and which dosage and whether or not to continue excuse me the same dosage over time depends a lot on the individual variation. The individual variation that people express and the responses that they have all of these drugs in fact I think we can say all drugs have side effects these the question is how detrimental those side effects are to daily life the SSRI's are well known to have effects on appetite in some cases they abolish appetite in some cases they just reduce a little bit in some cases they increase appetite at least highly individual they can have effects on libido for instance they can reduce sex drive sometimes in the dose dependent ways sometimes in a way that's more like a step function where people are fine at say five or 10 milligrams but then they get to 15 milligrams and there's a cliff for their libido that can happen it really depends I please don't take those dosages as exact values because this is going to depend on the what they're being used for depression or anxiety or OCD and it's also going to depend on the drug etc. So I just throughout those numbers as a way to illustrate what a kind of a step function would look like it's not gradual it's immediate at a given dose is what that means the other thing is that some of these drugs will have transient effects so side effects that show up and then disappear or sadly people will sometimes take these drugs for a while and then side effects will surface later that weren't there previously depending on life factors nutrition factor so it's a very complicated landscape overall so it's important to explore any kind of drug treatment SSRI or otherwise really in close communication with a psychiatrist who really understands the pharmaconetics and has a lot of patient history and experience with them so what I'm about to tell you next is most certainly going to come as a big surprise which is that despite the fact that the selective serotonin reuptake inhibitors can be effective in reducing the symptoms of OCD at least somewhat and certainly more than placebo there is very little if any evidence that the serotonin system is disrupted in OCD and I have to point out that this is a somewhat consistent theme in the field of psychiatry that is a given drug can be very effective or even partially effective in reducing symptoms or in changing the overall landscape of a psychiatric disorder or illness and yet there is very little if any evidence that that particular system is what's causal for OCD or anxiety or depression etc. This is just the landscape that we're living in in terms of our understanding of the brain and psychiatry in the ways of treating brain disorders so as a consequence there are a huge number of academic reviews that clinicians and research scientists have generated and read and share one of the more I think thorough ones in recent years was published in 2021 I'll provide a link to this this is by an excellent truly excellent researcher from Yale University School University of Medicine I should say not just a researcher but a clinician scientist again an MD PhD this is Christopher Pitinger and the title of the review is Farmo go to pharmacotherapeutic strategies and new targets in OCD and again we'll provide a link to it as this is a just gorgeous review describing as I just told you that the serotonin system isn't really disrupted in OCD and yet assessor eyes can be very effective the review goes on to to explore even what sorts of resources even what sorts of receptors for serotonin might be involved if it's in fact the case that serotonin is a culprit in the creation of OCD symptoms talk about the serotonin 2A receptor and the serotonin 1A receptor why am I mentioning all that detail if in fact it's not clear serotonin is involved because I'll just tell you right now there is currently a lot of interest in whether or not some of the psychedelics in particular psilocybin can be effective in the treatment of OCD psilocybin has been shown in various clinical trials in particular clinical trials done at Johns Hopkins School of Medicine by Matthew Johnson and others Matthew was on the Huberman lab podcast he's been on the Tim Ferriss podcast he's been on the Lex Friedman podcast is a world class researcher on the use of psychedelics for depression and other psychiatric challenges and there psilocybin treatment has been seen at least in those trials to be very effective in the treatment of certain parts of the treatment of certain kinds of major depression currently the exploration of psilocybin for the treatment of OCD has not yielded similar results although the studies are ongoing again has not yielded similar effectiveness but the studies are ongoing and the serotonin 2A receptor and the serotonin 1A receptor are primary targets for the drug psilocybin so I figured there were going to be some questions about whether or not psychedelics help with OCD thus far it's inconclusive if any of you have been part of clinical trials or have knowledge or intuition about this relationship or potential relationship I should say between psilocybin or other psychedelics in OCD please put them in the comment section we'd love to love to hear from you one thing I should point out is that even though serotonin has not been directly implicated in OCD serotonin and the general systems of serotonin the circuits in the brain that carry serotonin and depend on it have been shown to impact cognitive flexibility and inflexibility which are kind of hallmarked themes of OCD so in animals that have their serotonin depleted or in humans that have very low levels of serotonin you can see evidence of cognitive inflexibility challenges in tasks switching challenges and switching the rules by which one performs a game challenges in any kind of cognitive domain switching and so that does indirectly implicate serotonin in some of the aspects of OCD again when one starts to explore the different transmitter systems that have been explored in animal models and in humans it's a vast vast landscape but serotonergic drugs do seem to be the most effective drugs in treating OCD despite the fact that there's no direct evidence that serotonin systems are the problem in OCD if you recall the corticostrietyl thalamic loop that is so central to the ideology the presence and the patterns of symptoms in OCD of course serotonin is impacting that system serotonin is impacting just about every system in the brain but there's no evidence that tinkering with serotonin level specifically in that network is what's leading to the improvements in OCD however if people go into a FMRI scanner and those people have OCD and they evoke the obsessions and compulsions you see activity in that corticostrietyl thalamic loop treatments like SSRIs that reduce the symptoms of OCD equate to a situation where there is less activity in that loop and I should point out cognitive behavioral therapy which we have no reason to believe only taps into the serotonin system I think it would be an extreme stretch it would be false actually to say that cognitive behavioral therapy taps only into the serotonin system clearly it's going to affect a huge number of circuits in the narochemical systems well people do cognitive behavioral therapy and find some relief for OCD they also show reductions in those corticostrietyl thalamic loops so basically we have a situation where we have a behavioral therapy that works in many people not all and we have a pretty good understanding of about why it works it increases anxiety tolerance and interference with pattern execution getting people to not engage in the same sorts of behaviors that are detrimental to them and we have drug treatments that work at least to some degree but we don't know how they work or where they work in the brain one of the things that really unifies the behavioral treatments and the drug treatments is that they take some period of time some relief from symptoms seems to show up around four weeks and certainly by eight weeks for both cognitive behavioral therapy and the SSRIs but it's really at the 10 to 12 week stage when someone's been doing these twice a week cognitive behavioral sessions where they've been taking a SSRI for 10 to 12 weeks that the really significant reduction in OCD symptoms starts to really show up now until now I've been talking about the fact that people are getting relief from these treatments but sadly in the case of OCD there is a significant population that simply does not respond to CBT or to SSRIs or to their combination which is why psychiatrist also explore the combination of SSRIs and Neuroleptics or drugs that tap into the so called dopamine system or the gluteus system or the glutamate system these are other neurotransmitters and neuromodulators that impact different circuits in the brain and just to really remind you what neurotransmitters and neuromodulators do because this is important to contextualize all this neurotransmitters are typically involved in the rapid communication between neurons and the two most common neurotransmitters for that are the neurotransmitter glutamate which we say is excitatory meaning when it's released into the synapse it causes the next neuron to be more active or active and GABA which is a neurotransmitter that is inhibitory meaning when it's released into the synapse typically not always but typically that GABA is going to encourage the next neuron to be less electrically active or even silence its activity. The neuromodulators by contrast so not neurotransmitters but neuromodulators like dopamine serotonin epinephrine and acetylcholine and others operate a little bit differently then tend to act a little bit more broadly they can act within the synapse but they can also change the general patterns of activity in the brain making certain circuits more likely to be active and other circuits less likely to be active. So when we say dopamine does x or dopamine does y or serotonin does x or serotonin does y they don't really do one thing they change the sort of overall tonality they make it more likely or less likely that certain circuits will be active. You can think of them as kind of activating playlists or genres of activity in the brain rather than being involved in the specific communication or specific songs if you will in this analogy or discussions between particular neurons. So when we hear that SSRIs increase serotonin and reduce the symptoms of OCD or a neuroleptic reduces the amount of dopamine and makes people feel calmer for instance or can remove some stereotype repetitive motor behavior which they can either generate or reduce motor behavior turns out. So when I say that what I'm referring to is the fact that these neuromodulators are turning up the volume on certain circuits and turning down the volume on other circuits. I say that because if you are going to explore drug treatments again with a licensed physician if you're going to explore drug treatments for OCD and in particular if you are not getting results from SSRIs or you're not getting results from cognitive behavioral therapy or the side effect profiles of the drugs that you're taking for OCD. Are causing problems that you don't want to take them. Well then it's important to understand that anytime you take one of these drugs they're not acting specifically on the corticosterietal philamic circuit that would be wonderful. That's the future of psychiatry but as now when you take a drug it acts systemically so it's impacting serotonin in your gut. Serotonin in your gut is also impacting serotonin in other areas of the brain hence the effects on things like digestion or libido or any number of different things that serotonin is involved in. Likewise if you take a neuroleptic like halopyridol or something that reduces dopamine transmission well then it's going to have some motor effects because dopamine is involved in the generation of motor sequences and smooth limb movement. That's why people with Parkinson's who don't have much dopamine will get a resting tremor of a hard time generating smooth movement and so that the side effects start to make sense given the huge number of different neural circuits that these different norm modulators are involved in. I don't say that to be discouraging I say that to encourage patients and careful systematic exploration of different drug treatments for OCD always again with the careful and close guidance and oversight of a psychiatrist because say a psychiatrist really understand which side effect profiles make it likely that you can or cannot or will never or maybe someday will be able to take a given drug at a given dose they are the ones that really have that knowledge this is not the sort of thing that you want a cowboy and go try and figure out yourself. Now I also want to acknowledge that there are other forms of drug treatments we touched on psilocybin briefly but there are other forms of drug treatments that have been explored for OCD earlier we talked a little bit about cannabis why would cannabis be a place of exploration at all well first of all a number of people try and self medicate for OCD there is some clinical evidence I'm not talking about recreational use something about clinical evidence that cannabis can reduce anxiety earlier we were talking about not reducing anxiety but learning anxiety. Tolerance in order to deal with and treat OCD in the context of cognitive behavioral therapies. That doesn't necessarily rule out cannabis as a candidate for the treatment of OCD and in fact this has been explored a study from Dr Blair Simpson herself looked at this this was a fairly small scale study so first of all give you the title and again we'll provide a link this is entitled acute effects of cannabinoids on symptoms of obsessive compulsive disorder human laboratory study. Very briefly this was 14 adults with OCD they had prior experience with cannabis this was randomized placebo controlled the cannabis was smoked they had different varietals as they're called they had a placebo so this is basically a condition in which certain subjects consumed a cigarette that had 0% THC others had 7% THC other groups that is or some had 0.4% CBD and T. So they looked at CBD I know a lot of people out there interested in CBD is one of the few studies I could find where they explored different percentages of THC and CBD in these cannabis or marijuana cigarettes basically the total amount that they consumed I believe was 800 milligrams these again are not suggestions these are just simply reporting what's in this study you can again I'll provide a link. They looked at OCD symptoms ratings they looked at cardiovascular effects they had a large number of different things that they explored and I should say this study was done in 2020 and it was the first placebo controlled investigation of cannabis and adults with obsessive compulsive disorder pretty interesting and I'm just reading from their conclusions here the data suggests that smoked cannabis whether containing primarily THC or CBD remember they looked at different concentrations of those has little acute impact meaning immediate impact on OCD symptoms and yield smaller reductions in anxiety complied to placebo so they did not see a when I say a positive effect I mean a amelitive effect an effect in reducing symptoms of OCD from cannabis or CBD which you know it's unfortunate it's unfortunate any time a treatment doesn't work but nonetheless those are the data I'm sure they're going to be other studies I'm sure they're also going to be people in the YouTube comments section saying that cannabis and CBD helps them to get a better look at the data CBD helps their OCD symptoms at least I anticipate they're probably will almost everything I say here somebody will contradict it with something from their experience which I encourage by the way I want to hear about your experience with certain things even if it's not from randomized placebo controlled studies I still find it very interesting to know what people are doing and what they're experiencing I think that's one of the better uses of social media comments sections is to be able to share some of that not in an advice giving way or prescriptive way but simply as a way to share an encourage different types of exploration there are other sorts of drug treatments that are gaining popularity for OCD at least in the research realm one treatment that is a legal ledgl right sometimes when I say legal sometimes people think I say illegal but that is legal at least by prescription in the United States is ketamine the actions of ketamine are somewhat complex although we know for instance that ketamine acts on the glutamate system it tends to disrupt the transmission or the real life of the treatment where the relationship I should say between glutamate right not glutamine not the amino acid but glutamate the neurotransmitter and the so called NMDA the N-methodespartate receptor which is a receptor that's very special in the nervous system because when glutamate binds to the NMDA receptor it tends to offer the opportunity for that particular synapse to get stronger so called neuroplasticity and ketamine is a essentially an antagonist although it works through a complicated mechanism it tends to block that binding of glutamate to the NMDA receptor or the effectiveness of that ketamine therapy is now being used quite extensively for the treatment of trauma and for depression at least to a dissociative state it's a so called dissociative analgesic and the variety of ways in which that happens we did an episode on depression we're going to do another entire episode all about ketamine describing the networks that ketamine impacts et cetera ketamine therapies are being explored for OCD as of now the data look somewhat promising but there's still a lot more work that needs to be done my read of the data are that the more extensive clinical trials have not happened yet the smaller studies that have happened reveal that some patients do get some relief from ketamine therapy for OCD but there was nothing overwhelmingly pointing to the fact that ketamine is a magic bullet for OCD treatment so cannabis CBD at least now even though it's one smaller study there's no real evidence that it can alleviate OCD symptoms if there are new studies published soon I'll be sure to update you and if you see those studies please send them to me ketamine therapy the jury is still out psilocybin the jury is still out these are early days another treatment that's becoming somewhat common or at least people are commonly excited about is transcranial magnetic stimulation so this is the use of a magnetic coil this is completely non invasive placed on one portion of the skull and one can direct magnetic energy toward particular areas of the brain to either suppress or now days you can also activate particular brain regions there are some interesting data showing that if TMS is applied to areas of the brain involved in the generation of motor action so the so called motor areas are supplementary motor areas as they're called while people think about or have intrusive thoughts we know that the TMS coil can interrupt the motor behaviors the compulsive behaviors and at least in a small cohort of studies on a small number of patients within those studies this has been shown to be effective not just while the coil is on the head of course but act after the study has been performed the treatment has been performed in reducing OCD symptoms by disrupting the tendency for the compulsive behavior to be so automatic one of the key features of obsessed and compulsive disorder is that you know especially if it's been around for a while the person's been dealing with it for a while there isn't a pattern in which the person thinks oh I have this contamination fear or I need symmetry or I'm kind of obsessed to count to the number seven and then they pause and they go and then they do it no typically there's a very close pairing of the obsession and the compulsion in time so that somebody's walking down the street thinking one two three four five six seven one and then they're doing this in such rapid succession because the obsessions are coming up so quickly right thoughts can be generated very quickly and then they're generating the compulsion to the way to beat down or to try and suppress that anxiety and then it comes right back up again at even stronger as I described earlier so trans cranial magnetic stimulation seems to intervene in these various fast processes right now I don't think it's fair to say that TMS is a magic bullet either I think there's a lot of excitement about TMS and in particular I really want to nail this point home in particular there's excitement about the combination of TMS with drug treatments or the combination of TMS with cognitive behavioral therapy and this is a really important point not just for sake of discussion about obsessive compulsive disorder but also depression ADHD schizophrenia any number of different psychiatric challenges and disorders in most cases are going to respond best to a combination of behavioral treatment that's ongoing that occurs in the laboratory and clinical setting but also in the home setting where there's homework maybe in home visits drug treatments often not always are a terrific augment to those cognitive behavioral therapies or other behavioral therapies and then now we are living in the age of brain machine interface you have companies like neural length that I think it's fair to say are going to enter the brain machine interface world first through the treatment of certain syndromes right movement syndromes or psychiatric syndromes probably before they start putting it up and then we're going to see that before they start putting electrodes into the brain to stimulate enhanced memory or enhance cognition who knows I don't know exactly what they're doing behind the walls of neural link but I have to imagine in fact I would wager maybe not both arms but I'll wager my left arm that the first set of FDA approved technologies to come out of companies like neural link are going to be those for the treatment of things like Parkinson's and movement disorders and cognitive disorders rather than so we say kind of recreational cognitive enhancement or things of that sort so transcranio magnetic stimulation is non invasive it doesn't involve going down but below the skull can have some effect but most laboratories that I'm aware of at Stanford and elsewhere are come that are exploring TMS for things like OCD and other types of psychiatric challenges are using TMS in combination with drug therapies are using in some cases for instance laboratory at Stanford hope to get them on the podcast psychiatrist Nolan Williams is exploring TMS in combination with psychedelic therapies not necessarily the same time but nonetheless combining them or exploring how they impact brain circuitry so if you have OCD should you run out and get TMS or should you try ketamine therapy of course with a licensed physician I think it's too early to say yes I think the answer is you we need to wait and see I think cognitive behavioral therapy the SSRI's and some other drug treatments like neural optics combined with SSRI's and cognitive behavioral therapy are where the real bulk of the data are I want to make one additional point about cannabis CBD as it relates to obsessive compulsive disorder to me it's not at all surprising that cannabis CBD did not improve symptoms of OCD because in my discussion with Dr Paul Conti a few weeks ago and I should mention Dr Conti is indeed a medical doctor psychiatrist we were talking about cannabis and its various uses because it does have some clinical applications and he mentioned that one of the main effects of cannabis is to tighten focus and to enhance concentration on and thoughts about one particular thing and in some cases that can be clinically beneficial and in other cases that can be clinically detrimental if you accept the idea that cannabis increases focus and you think about OCD and the networks involved and you think about the anxiety and the relationship between the obsession and compulsion well then it shouldn't come as any surprise that cannabis did not improve the symptoms of OCD because if anything it would increase focus on the obsessions and the compulsions now that's not what they observe they did not see an exacerbation or a worsening of the symptoms of OCD with cannabis at least that's not my read of the data but they did not see an improvement in OCD symptoms with cannabis or CBD and to me that's not surprising given that cannabis CBD seems to increase focus next I'd like to talk about some of the research on and the rules of hormones in OCD because it turns out to be a very interesting relationship there but before I do I want to point out something that I realize I probably should have said earlier which is one of the key things for someone with OCD to come to understand if they're going to experience any relief of their symptoms whether or not they're doing drug treatments or behavioral treatments or otherwise is that thoughts are not as bad as actions right thoughts are not as bad as actions one of the rules that people with OCD seem to adopt for themselves is that thoughts are really truly the equivalent of actions so they'll have an intrusive thought and we haven't spent too much time on this today but earlier I touched on the fact that some of the intrusive thoughts that people have in OCD are really disturbing they can be really gross or at least gross to that person they can evoke imagery that is toxic or infectious or highly sexualized in a way that is disturbing to them can be very taboo this is not uncommon when you start talking to people with OCD and you start pulling on the thread again this would be a psychiatrist who was trained to ask the right questions and gain the comfort and trust of a patient they start to reveal that these these thoughts are really intrusive and kind of disturbing which is why they feel so compelled to try and suppress them with behaviors one of the powerful elements of treatment for OCD is to really support the patient and make them realize that thoughts are just thoughts and that everyone has disturbing thoughts and that oftentimes those disturbing thoughts arise at the most inconvenient and sometimes what seems like the most inappropriate circumstances and this relates to a whole larger discussion that we could have about what are thoughts and why do they surface and how come when you stand at the edge of a bridge even if you do not want to jump off you think about jumping off and you know this has to do with the fact that your nervous system as a prediction machine is oftentimes testing possibilities and sometimes that testing goes way off into the Netherlands of the thought patterns and emotional patterns that we all have inside of us the big difference between a thought and an action is that of course the nervous system is one case not translating those patterns of thinking into motor sequences that nerdy way of saying thoughts aren't actions believe it or not can be helpful for people if they really think about that and use it as an opportunity to realize that first of all they're not crazy they're not thinking and feeling this stuff because they're bad or evil and of course sometimes this can cross over with other other elements of life where we place moral judgment on people for certain behaviors I think that's part of a healthy society of course that's where we have laws and punishments and and rewards for that matter for certain types of behaviors but this idea that thoughts are not as bad as actions and that thoughts can be tolerated and the anxiety around thoughts can be tolerated and over time can diminish that's a very powerful hallmark theme of the treatment of OCD so I'd be remiss if I didn't mention it thoughts are not actions actions can harm us they can harm other people they can soak up enormous amounts of time thoughts can soak up enormous amounts of time they can be very troubling they can be very detrimental we of course want to be sensitive to that but when it really comes down to it the first step in treatment for OCD is this realization where the approach to the realization that thoughts are not as bad as that so what about hormones in OCD well this has been explored albeit not as extensively as I would have liked to find but when I went into the literature I found one particularly interesting study entitled neuro steroid levels in patients with obsessive compulsive disorder for softer air bay and as always will provide a link to the study the objective of the study was to explore serum within blood neuro steroid levels in people with OCD why well because of the relationship between OCD and anxiety and the fact that in stress related disorders such as anxiety and depression the hormones have been extensively explored but not so much in OCD at least until the study so they compared serum levels of a number of different hormones progesterone pregnant alone DHEA cortisol and testosterone this was done in 30 patients with OCD and 30 healthy controls so it's not a huge study but it's enough to draw some pretty nice conclusions these subjects were 18 to 49 years old and the controls were agents sex matched healthy volunteers again no OCD what was the basic takeaway from the study the basic takeaway from the study was that in females with OCD there was evidence for significantly elevated cortisol and DHEA now that's interesting because cortisol is well known to be associated with the stress system although every day should mention we all male or female everybody experiences an increase in cortisol shortly after awakening that's a healthy increase in cortisol late shifted I mean late late in the day peaks in cortisol where a shift in that cortisol peak to later in the day is a known correlates of depression and anxiety disorders so the fact that cortisol is elevated in DHEA are elevated in female patients with OCD suggests that the cortisol is either reflective of or causal for the increase in anxiety we don't know the direction of that effect now in male patients with OCD there was evidence for increased cortisol again not surprising given the role of anxiety and cortisol or I should say given the role of cortisol in anxiety and the increasing anxiety seen in OCD but there are also significant reductions in testosterone which should also not surprise us because cortisol and testosterone more or less compete in some fashion for their own production both are derived from the molecule cholesterol and there are certain biochemical pathways that can either direct that cholesterol molecule toward cortisol synthesis or testosterone synthesis but not both so they compete so when cortisol goes up in general not always but in general testosterone goes down and vice versa if you want to learn more about the relationship between cortisol and testosterone and there are even some tools to try and optimize those ratios in both males and females you can find that in our episode on optimizing testosterone and estrogen that's at HubermanLab.com Now I would say the most interesting aspect of this study is not that DHEA and cortisol are elevated in females with OCD or that cortisol and testosterone have this opposite effect cortisol up and testosterone down in males with OCD but rather the relationship between all of those DHEA cortisol and testosterone in terms of GABA GABA again being this inhibitory neurotransmitter that tends to quiet certain neuronal pathways it does different things at different synapses but in general the more GABA that's present the more inhibition that's present and therefore the more suppression of neural activity and DHEA is known to be a potent antagonist of the GABA system. So here we have elevated DHEA in females and I should also mention that testosterone is also known to tap into the GABA system typically when testosterone is elevated GABA transmission at least is slightly elevated so here we have a situation in which the pattern of hormones in females and males with OCD are different from those in people without OCD such that GABA transmission is altered and the net effect would be an overall reduction in GABA GABA as an inhibitory neurotransmitter and broadly speaking is associated with lower levels of anxiety and it tends to create balance within various neural circuits. Now that's a very broad statement but we know for instance in epilepsy that GABA levels are reduced and therefore you get runaway excitation of certain circuits in the brain and therefore seizures either petite mall mini seizures or grand mall massive seizures or even drop seizures where people completely collapse to the floor in seizure you may have seen this before I certainly have it's very dramatic and it actually is quite debilitating for people because obviously they don't know when these seizures are coming on most often and then they you know they can fall into a stove or while driving etc. So the situation with OCD is one in which for whatever reason we don't know the direction of effect certain hormones are elevated in females and certain hormones are elevated in males and those hormones differ between males and females and yet they both funnel into a system where GABA or GABA transmission in the brain is reduced because of this ability for those particular hormones to be antagonist to GABA and as a consequence there's likely to be overall levels of increased excitation in certain networks in the brain and that brings us back to this corticosteratol philamic loop this repetitive loop that seems to reinforce we can say reinforce is obsession leads to anxiety leads to compulsion leads to transient relief of anxiety but then increase in anxiety increased obsession anxiety compulsion anxiety compulsion anxiety compulsion and so on and so forth so I have not found studies that have explored adjusting testosterone levels through exogenous administration cream or injection or otherwise or that have focused on reducing DHA in females if anyone is aware of such studies please put them in the comment section on YouTube or send them to the community or send them to us we have a contact site on the website at hubermanlab.com but the comment section on YouTube would be best but because we know that hormones impact neuromodulators and neurotransmitters as I just described and that those neuromodulators and neurotransmitters play an intimate role in the generation and the treatment of things like OCD it stands to reason that manipulations of those hormone systems however subtle or dramatic might highlight might prove useful in adjusting the symptoms of OCD and I hope that this is an area that researchers are going to pursue in the very near future because many of the treatments for reducing DHA or increasing testosterone or reducing cortisol have already made it through FDA approval they're out there they're readily prescribed many of them are already in generic form which means that the patents have already lapsed on the on the first versions of those drugs so when they're available generic drugs very often they're available at significantly lower cost there's a whole discussion we had there about patent laws and prescription drugs but because these drugs are largely available in prescription yet generic form I think there's a great opportunity to explore how hormones not just cortisol testosterone and DHA but the or a huge category of hormones might impact the symptoms of OCD especially since many of the symptoms of OCD show up right around the time of puberty we haven't talked a lot about childhood OCD because we're going to do an entire series on childhood psychiatric disorders and challenges but many children develop OCD early as young as you know three or four believe it or not or even six or seven and 10 and in adolescence and certainly around puberty and in young adulthood it is rare although it does happen that people will develop OCD very late in life around 40 or older just kind of spontaneously most often when you look at their clinical history you find that either they were hiding it or as being suppressed in some way or if it does spontaneously show up late in life like mid 30s or in 40s typically there's a traumatic brain injury could be due to stroke or physical injury to the head or something of that sort nonetheless there is a interesting correlation between the onset of puberty in certain forms of OCD there's certain forms of or I should say there's certain aspects of menopause that can relate to OCD you can find all these things in the literature all this to say that hormones impact neurotransmitters and remodulators which clearly impact the kinds of circuits that are involved in OCD and it makes sense that and I would hope that there would be an exploration of how these hormones impact OCD in the not too distant future now there is an extensive literature exploring how testosterone therapy both in males and females can be effective in some cases in the treatment of anxiety related disorders but not at least a my knowledge in OCD in particular so this whole area of the use of testosterone and estrogen therapies DHA cortisol suppression or maybe even enhancement for the treatment of OCD is essentially a big black box that very soon I believe will be lit I realize that a number of listeners of this podcast are probably interested in the non-typical or holistic treatments for OCD Dr. Blair Simpson's lab has at least one study exploring the role of mindfulness meditation for the treatment of OCD there the data are a little bit complicated and I should mention that good things are happening at least in the United States probably elsewhere as well but good things are happening in terms of the exploration of things like meditation and other what's called a nontraditional or holistic forms of treatment for psychiatric disorders because of the division of complementary health that's now been launched by the National Institutes of Health so whereas before people would think about meditation or yoga Nidra or even CBD supplementation for that matter as kind of fringe maybe or kind of woo or nontraditional at the very least the National Institutes of Health in the United States has now devoted an entire division entire institute purely for the exploration of things like breathing practices meditation etc so there's a cancer institute there's a hearing and deafness institute there's a vision institute and now there's this complementary health institute which I think is a wonderful addition to the more traditional aspects of medicine I think no possible useful treatment should be overlooked or unresearched in my opinion provided that can be done safely and as I mentioned Dr. Blair Simpson's lab has looked at the role of mindfulness meditation in the treatment of OCD now we should all keep in mind no pun intended that most of the data on mindfulness meditation shows that it increases the ability to focus now this brings us back to a kind of repeating theme today which is that increased focus may not be the best thing for somebody with OCD because it might increase focus on the obsession and or compulsion turns out that mindfulness meditation can be useful in the treatment of OCD but mainly by way of how it impacts the focus on and the ability to engage in cognitive behavioral therapies so it's very unlikely at least by my read of the data to be a direct effect of meditation on relieving the symptoms rather it seems that meditation is increasing focus on things like cognitive behavioral therapy homework and to not focus on other things and therefore indirectly improving the symptoms of OCD now somewhat surprisingly at least to me there have also been a fairly large number of studies exploring how nutraceuticals as they're sometimes called supplements that are available over the counter can impact the treatment of obsessive compulsive disorder now there's such an extensive number of different compounds and supplements that fall under the category of nutraceuticals and that have been explored in the treatment of OCD that I'd like to point you to a review that is entitled Nutriaceuticals in the treatment of obsessive compulsive disorder a review excuse me of mechanistic and clinical evidence so it's published in 2011 so it's over 10 years old and so by now I have to imagine that there are an enormous number of additional substances that could be explored but they're just one or two here that I want to focus on here in this review they describe effects of 5-HTP and tryptophan so things are in the serotonin pathway which would make sense given what we know about the SSRIs that people would explore how different supplements that increase serotonin ergic transmission might impact OCD what you find is that they do have significant effects in improving or reducing the symptoms of OCD in somewhat similar way to some of the SSRIs but you of course have to be careful anything that's going to tap into a given neurochemical system to the same degree may very likely have the same sorts of side effects that a prescription drug would one compound that I like to focus on a little more depth however because it's exciting and interesting to me is inocital inocital is a compound that we are going to talk about in several future of podcasts because well first of all it seems that can have impressive effects on reducing anxiety it also can have pretty impressive effects in improving fertility in particular in women with polycystic ovarian syndrome and here I'm referring specifically to myocinocital because it comes in several forms and it does appear that 900 milligrams of inocital can improve sleep and can reduce anxiety perhaps when taken at that dosage or higher dosages I will just confess first of all I don't have OCD although I will also confess that when I was a child I had a transient tick I've talked about this on podcast before it was a grunting tick so when I was about six or seven I recall a trip to Washington DC with my family where I was feeling a strong desire or need even as I recall to grunt in order to clear something in my throat but I didn't have anything in my throat it was I didn't have a cold or any post nasal drip it was really just the feeling that I needed to do that to release some sort of tension and I remember my dad at the time telling me don't do that you know don't do that it's not good to grunt or something like that I think he saw that it was kind of compulsive behavior and so I would actually hide in the back seat of the rental car and do it or hide in my room fortunately for me it was transient I think about six months or a year later it disappeared although I did notice actually an ex-girlfriend of mine point out that when I get very tired and I've been working very long hours sometimes that grunting tick will reappear what does that mean do I have Tourette I don't know maybe I was never diagnosed with Tourette do I have OCD maybe I certainly could be accused of having obsessive compulsive personality disorder which will talk about still in a few minutes but the point here is that many children transiently express ticks or low level Tourette or OCD and again transiently and it disappears over time so inocital has been explored in a bunch of different contexts including for ticks and OCD etc going back to inocital and its current use or I should say my current use I've been taking 900 milligrams of inocital as an addition to my existing toolkit for sleep which I've talked about many times on this podcast and other podcasts consists of magnesium 3 and 8 Appa Jenin and Thienine if you want to know more about that kit you can go to our newsletter neural network newsletter at Hubermanlab.com the toolkit for sleep is there you don't even have to sign up for the newsletter but it'll give you a flavor of the sorts of things that are in the newsletter in any case I've been experimenting a bit with taking 900 milligrams of myo inocital either alone or combination with that sleep kit and I must say the sleep I've been getting on inocital is extremely deep and does seem too lead to enhanced levels of focus and alertness during the day and perhaps you're noticing that because I'm talking more quickly on this podcast and then previous podcast no I'm just kidding I don't think the two things related in any kind of causal way the point here is that inocital is known to be pretty effective in reducing anxiety but when taking it very high dosages can it do the same at low dosages we don't know I would consider 900 milligrams a low dose most of this given the fact that most of the studies of inocital have explored very high dosages like even 10 or 12 grams per day which I must say seems exceedingly high and they do report that some of the subjects in those experiments actually stop taking the inocital because of gastric discomfort or gastric distress as it's called so I've reported my results with sleep in a kind of anecdotal way they certainly aren't peer reviewed studies that I described about my own experience in an anecdotal way but nonetheless it's been explored that things like glycine which is another which is an amino acid which also acts as an inhibitory neurotransmitter in the brain taking it very high dosages 60 grams per day that is a absolutely astonishingly high amount of glycine I would not recommend taking that much glycine unless you're part of a study where they tell you to and you know it's safe 18 grams excuse me of inocital these are very very high dosages used in these studies nonetheless there's some interesting data about inocital leading to some alleviation of OCD symptoms or partial alleviation of OCD symptoms in as little as two weeks after initiating the supplement protocol so I think there's a great future for these new tressutacles meaning I think more systematic exploration in particular lower dosages in the context of of OCD treatment and as we saw before for the SSRIs and other prescription drug treatments I think there really needs to be an exploration of these new tressutacles in combination with behavioral therapies and who knows maybe with brain machine interface like training on magnetic stimulation as well now way back at the beginning of the episode I alluded to the fact that OCD is one thing obsessive compulsive disorder and it's truly a disorder and it's truly debilitating and it's extremely common. And then there's this other thing called obsessive compulsive personality disorder which is distinct from that does not have the intrusive component so people don't feel overwhelmed or overtaken by these thoughts rather they find that the obsessions can be a lot of the other things that the obsessions can sometimes serve them or they even welcome them. And I think many of us know people like this I perhaps even could be accused or who knows maybe have been accused of having an obsessive compulsive personality at times why do I draw this distinction well first of all we've come to a point in human history I think in large part because of social media but also in large part because there are a number of discussions being held about mental health that have brought terms like trauma depression OCD etc into the common vernacular so that people will say you're so OCD or someone will say I was traumatized by that or I was traumatized by this we should be very careful right I'm certainly not the word police but we should be very careful in the use of certain types of language especially language that has real psychiatric and psychological definitions because it can really draw us off course in providing relief for some of these syndromes for instance the word trauma is thrown around left and right nowadays I was traumatized by this or that caused trauma you're giving me trauma listen I realize that many people are traumatized by certain events including things that are said to them I absolutely acknowledge that hence our episodes on trauma and trauma treatment several of them in fact Dr. David Spiegel and then dedicated solo episodes with just me blabbing about trauma and trauma treatment but as Dr. Conti so appropriately pointed out trauma is really something that changes our neural circuitry and therefore our thoughts and our behaviors in a very persistent way that is detrimental to us not every bad event is traumatizing not everything that we dislike or even that we hate or that feels terrible to us is traumatizing for something to reach the level of trauma it really needs to change our neural circuitry and therefore our thoughts and our behaviors in a persistent way that is maladaptive for us similarly just calling someone obsessive is one thing saying that someone has OCD or assuming one has OCD simply because they have a personality or a phenotype as we say where they need things in perfect order like I find myself correcting these pens making sure that the caps are facing in the same direction for instance right now that is not the same as OCD for instance I can tolerate these pens being at different orientation or even throw the cap on the floor something it doesn't create a lot of anxiety for me I confess it creates a little bit in the moment then I can forget about and move on that's one of the key distinctions between obsessive compulsive personality disorder and obsessive compulsive disorder in its strictest form now once one hears that OCD is different than obsessive compulsive personality disorder because of this difference in how intrusive the thoughts are or not then that's useful but it really doesn't tell us anything about what is happening mechanistically in one situation or another fortunately there are beautiful data again from Dr Blair Simpson's lab and you can tell based on the number of studies that I've referred to from her laboratory there's truly one of the luminaries in this field that there really are some fundamental wiring differences and behavioral differences and psychological differences between people who have obsessive compulsive disorder and those who have obsessive compulsive personality disorder this is a study first author Pinto Pinto in title capacity to delay reward differentiates obsessive compulsive disorder and a obsessive compulsive personality disorder and the methods in this study were to take 25 people with OCD and 25 people with obsessive compulsive personality disorder and 25 people who have both because it is possible to have both and that's important to point out and 25 so called healthy controls people that don't have obsessive compulsive personality disorder or obsessive compulsive disorder they take clinical assessments and then they took a number of tests that probed their ability to defer gratification something called in the laboratory we call the delayed discounting so their ability to defer gratification through a task where they can either accept reward right away or accept a word later some of you may have heard of the two marshmallow task this is a based on a study that was performed years ago on young children at Stanford and elsewhere where they take care of the test where they take young children into a room they offer them a marshmallow kids like marshmallows generally and you say you can eat the marshmallow right now or you can wait some period of time and if you are able to wait and not eat the marshmallow you can have two marshmallows and in general children want marshmallows more than they want one marshmallow so really what you're probing is their ability to access delayed gratification and they're very entertaining even truly amusing videos of this on the internet so if you just do two marshmallow task video and you go into YouTube what you'll find is that the children will use all sorts of strategies to delay gratification some of the kids will cover the marshmallow others will talk to the marshmallow and say I know you're not that delicious you look delicious but no you're not delicious they'll engage with the marshmallow and all sorts of cute ways they'll turn around and trying to avoidance which actually speaks to a whole category of behaviors that people with OCD also use I'm not saying these kids at OCD but avoidance behaviors are very much a component of OCD people really trying to avoid the thing that evokes the obsession well some kids are able to delay gratification some aren't and it's debatable as to whether or not the kids that are able to delay gratification go on to have more successful lives or not initially that was the conclusion of those studies there's still a lot of debate about it we'll bring an expert on to give us the final conclusion on this because there is one and it's very interesting and not intuitive nonetheless adults are also faced with decisions every day all day as to whether or not they can delay gratification and this study used a not a too much millotask but a game that involved rewards where people could delay in order to get greater rewards later what is the conclusion well first of all obsessive compulsive and obsessive compulsive personality disorder subjects both showed impairments in their psychosocial functioning and quality of life they had compulsive behavior so these are people that are suffering in their life because their compulsions are really strong so it's not just being really nitpicky or really orderly in one case and having full blown OCD and the other both sets of subjects are challenged in life because they're having relationship issues or job related issues because they are that compulsive however the individuals with obsessive compulsive personality disorder they discounted the value delayed gratification significantly less than those with obsessive compulsive disorder what do I mean they are both impairing disorders that are marked by compulsive behaviors here I'm paraphrasing but they can be differentiated by the presence of obsessions in OCD people with OCD are absolutely fixated on certain ideas and those ideas are intrusive again that's the hallmark theme and by an excessive capacity to delay reward in obsessive compulsive personality disorder that is people who have obsessive compulsive personality disorder are really good at delaying gratification so they are able to concentrate very intensely and perform very intensely in ways that allow them to instill order such that they can delay reward now you can see why this contour of symptoms meaning that the people with OCD are experienced intrusive thoughts whereas the people with obsessive compulsive personality disorder show an enhanced ability to defer gratification you could see how that would lead to very different outcomes people with obsessive compulsive personality disorder can actually leverage that personality disorder to perform better in certain domains of life not all domains of life because remember again these people are in this study and they are showing up as experiencing challenges in life because of their obsessive compulsive personality disorder nonetheless people with obsessive compulsive personality disorder you can imagine would be very good at say architecture or anything that involves instilling a ton of order maybe sushi chef for instance maybe a chef in general I know chefs that just kind of throw things around like the chef on the muppets and just like throwing things everywhere and still produce amazing food and then there's some people are there incredibly exacting they're just incredibly precise I think that movie what is a hero dreams of sushi that movie is incredible I certainly not saying he has obsessive compulsive personality disorder but I think it's fair to say that he is obsessive or extremely meticulous and orderly about everything from start to finish you can imagine a huge array of different occupations and life endeavors where this would be beneficial science being one of them where data collection and analysis is exceedingly important that one be precise or mathematics or physics or engineering anything where precision has a payoff and gaining precision takes time and delay of immediate gratification you can imagine that obsessive compulsive personality disorder would synergize well with those sorts of activities and professions whereas obsessive compulsive disorder is really intrusive it's preventing functionality in many different domains of life so the key takeaway here is that when we use the words obsessive compulsive or we call someone obsessive compulsive or we are trying to evaluate whether or not we are obsessive compulsive it's very important that we highlight that obsessive compulsive disorder is very intrusive it involves intrusive thoughts and it interrupts with normal functioning in life whereas obsessive compulsive personality disorder while it can interrupt normal functioning in life it also can be productive it can enhance functioning in life not just in work but perhaps at home as well if you are somebody and you have family members that really place enormous value on having a beautiful and highly organized home well then it could lend itself well to that it's going to be a matter of degrees of course none of these things is an absolute it's going to be on a continuum but I think it is fair to say that obsessive compulsive disorder whether or not in mild moderate or severe form is impairing normal functioning whereas obsessive compulsive personality disorder there's a range of expressions of that some of which can be adaptive some of which can be maladaptive and again it's all going to depend on context before we conclude I do want to touch on something that I think a lot of people experience and that's superstitions superstitions are fascinating and there's some fascinating research on superstitions one particular study that I'm a big fan of is the work of Benzo Alevsky at Harvard he studies motor sequences and motor learning and he has beautiful data on how people learn for instance a tennis swing and the patterns that they engage in early on and then the patterns of swinging that they swinging the racket that is that they engage in later as they acquire more skill and basically the takeaway is that the amount of error or variation from swing to swing is dramatically reduced as they acquire skill that's all finding good and there's some beautiful mechanistic data that he and others have discovered to support how that comes to be but they also explore animal models in particular rats pressing sequences of buttons and levers to obtain a reward believe it or not rats are pretty smart I've seen this with my own eyes you can teach a rat to press a lever for a pellet of food rats can also learn to press levers in a particular sequence in order to gain a piece of food and they can actually learn to press an enormous number of levers in very particular sequences in order to obtain pellets of food you can also give them little buttons to press or even a paddle to or I should say a pedal excuse me to stomp on with their foot in order to obtain a pedal of food basically rats can learn exactly what they need to do in order to obtain a piece of food especially if they're made a little bit hungry first Benz's lab has published beautiful data showing that as animals and humans come to learn a particular motor sequence very often they will introduce motor patterns in that sequence that are irrelevant to the outcome and yet that persist if you've ever watched a game of baseball you've seen this before often times the picture up on the mound will bring the ball to their chin they'll look over their shoulder look back over the other shoulder and then they will of course reel back and pitch the ball but if you watch closely often times there are components in the motor sequence which are completely unrelated to the pitch they're not looking necessarily to see if someone's stealing a base they're not necessarily looking down at home plate where the batter is they're also doing things like touching the back of their ear before they bring the ball to their chin or adjusting their hat and if you watch individual pictures what you'll find is that they'll do the same sequence of completely irrelevant motor patterns before each and every single pitch similarly rats that have been trained to for instance hit two levers and step on a pedal with their left hind foot and then tap a button up above that is the red button will do that to gain a piece of food but sometimes they'll also introduce a pattern into that motor sequence where they will shake their tail a little bit or they'll turn their head a little bit or they'll move their ears a little bit etc. Motor patterns that have nothing to do with obtaining the particular outcome in mind in other words you could eliminate certain components of the motor sequence and it would not matter the rat would still get the pellet the pitcher would still be able to pitch and yet that can introduce because somehow because they were performed again and again prior to successful trials the rat or the human baseball pitcher comes to believe in some way that it was involved in generating the outcome hence superstition I have a few superstitions I occasionally will knock on wood I'll say something that I want to happen and I'll say I'll knock on wood and I'll just do it and occasionally I'll challenge myself and I don't want to knock on wood and I don't do that I don't think anyone wants to be superstitious I certainly don't and so every once in a while I'll just challenge it and I won't actually knock on wood I'm admitting this to you to kind of I guess normalize some of this some people have superstitions that border on or even become compulsions they really come to believe that if they don't knock on wood that something terrible is going to happen maybe something in particular or in the case of the baseball pitcher they come to believe that if they don't touch the right ear before they reel back on the pitch that the pitch won't be any good or that they're going to lose the game I don't know what their thought process is now I also don't know what the rat is thinking but the rat is clearly doing something or thinking something is related to the final outcome I don't know of any studies where they've intervened with the particular superstition like behaviors of the rat to see whether or not the rat somehow doesn't continue to do the motor sequence to get the pellet we don't know the rats I don't speak rat most people don't or if you speak to a rat if it speaks back it's not in English the point is that superstitions are beliefs that we on an individual scale come to believe are linked to the probability of an outcome when in fact we know we actually know in our rational minds they have no real relationship to the outcome superstitions can become full blown compulsions and obsessions when we repeat them often enough that they become automatic and I think this is what we observe most of the time when we see a pitcher touching their ear or for instance in tennis you see this a lot you'll see they'll slap their shoes often I see this they'll slap their under sides of their souls they may tell themselves that this is I don't know maybe moving out some of the dust or something in the bottoms of their souls that gives them more traction and they want that to be ready for the serve or something like that and maybe there's some truth to that but here what we're referring to are behaviors that really have no rational relationship to the rat rational relationship to the outcome and yet we perform in a compulsive way people with OCD yes tend to have more superstitions people with more superstitions yes tend to have a tendency towards OCD and I should mention obsessive compulsive personality disorder if you think way back to the first part of this episode when I was just describing what the brain does right what does your brain do housekeeping functions to keep you alive and it's a prediction machine your neural circuits you have an enormous amount of biological investment of real estate literally cells and chemicals that are there to try and make your world predictable and to try and give you control or at least the sense of control over that world and that's a normal process low level superstitions moderate superstitions represent a kind of a healthy range I would say of behaviors that are aimed at generating predictability that don't disrupt normal function obsessive compulsive personality disorder provide is not too severe would I think represent the next level along that continuum and then obsessive compulsive disorder as I pointed out earlier is really a case of highly debilitating highly intrusive really overtake of neural circuitry over our thoughts and behaviors that requires very dedicated very persistent and very effective treatments in order to stop those obsessions and compulsions and the anxiety that links them somewhat counterintuitively by teaching people to tolerate that level of increasing anxiety and interrupt those patterns unfortunately as we described earlier such treatments exist cognitive behavioral therapy drug treatments like SSRIs although also drug treatments that tap into the glutamate system and into perhaps also the dopamine system the so-called neuroleptics and then as we described there's now an extensive exploration of things like ketamine, psilocybin, cannabis the initial studies don't seem to hold much promise for cannabis and CBD and the treatment of OCD but who knows maybe more studies will come along that will change that story and then of course brain machine interface like transcranial magnx stimulation and then just to remind you what I already told you before combinations of behavioral and drug treatments and brain machine interface I think is really where the future lies fortunately good treatments exist we cannot say that any one individual treatment works for everybody there are fairly large percentages of people that won't respond to one set of treatments or another and therefore one has to try different ones and then there are the so-called supplementation based or more holistic therapies today I've tried to cover each and all of these in a fairly substantial amount of detail I realize this is a fairly long episode that is intentional much like our episode on ADHD on attention deficit hyperactivity disorder I received an enormous number of requests to talk about OCD and my decision to make this a very long and detailed episode about OCD it really doesn't stem from any desire to subject you to too much information or to avoid the opportunity to just list things off what I've tried to provide is an opportunity to really drill deep into the neural circuitry and an understanding of where OCD comes from how OCD is different from things like the personality disorders that I described and also to give you a sense of how the individual behavioral and drug treatments work and perhaps don't work so that you can really make the best informed choices again highlighting the fact that OCD is an extremely common extremely common and yet extremely debilitating condition and one that I hope that if any of you have or that you know people that have it that you'll both gain sympathy and understanding for what they're dealing with perhaps as a consequence of some of the information presented today and maybe help them direct their treatment find better treatment and of course apply those treatments for some relief if you're learning from and or enjoying this podcast please subscribe to our YouTube channel that's a terrific zero cost way to support us in addition please subscribe to the podcast on Spotify and Apple and on both Spotify and Apple you can also leave us up to a five star review and give us feedback the best place to give us written feedback however is on the YouTube channel within the comments section there you can leave us feedback or suggestions about topics you'd like us to cover or guess you'd like us to interview here on the human lab podcast in addition please check out the sponsors mentioned at the beginning of today's podcast that's the best way to support us during today's podcast and on many previous episodes of the human lab podcast we talk about supplements while supplements aren't necessary for everybody many people direct tremendous benefit from them for things like sleep and focus and anxiety and so on the human lab podcast is now partnered with momentous supplements because momentous supplements are of the very highest quality they ship everywhere in the world not just in the US and we wanted to have one location where people could go in order to access the supplements that we describe and detail the various roles of here on the human lab podcast if you go to live momentous.com slash human men you can find those supplements the catalog of supplements available there is going to be expanding quite a bit in the weeks and months to come but right now already there are a number of different supplements for enhancing focus enhancing sleep and so on that are available again that's live momentous.com slash human if you're not already following human lab on Instagram and Twitter please do so there I cover science and science related tools some of which overlap with the content on the human lab podcast some of which is distinct from the content on the human lab podcast so again that's human lab on Instagram and human lab also on Twitter if you haven't already subscribed to our neural network newsletter this is a monthly newsletter it's completely zero cost you go to human lab.com you go into the menu you click on newsletter you can see some example newsletters for instance a toolkit for sleep you can download that right away you don't even have to sign up for the newsletter you can get the toolkit for neuroplasticity for the use of cold for the use of heat in health and etc all of that's there and if you sign up for the newsletter you'll get the monthly newsletter sent to you we don't share your email information with anybody and we have a very clear privacy policies there so again it's the neural network newsletter available within the newsletter tab under the menu at human lab.com in closing I'd like to thank you for this in-depth discussion about the mechanisms and various treatments for obsessive compulsive disorder and some of the related disorders and as always thank you for your interest in science.