UNITED STATES DEPARTMENT OF JUSTICE

DRUG ENFORCEMENT ADMINISTRATION

IN THE MATTER OF:	:	
Schedules of Controlled Substances: Placement of 2,5-dimethoxy-4-iodoamphetamine (DOI) and 2,5-dimethoxy-4-chloroamphetamine (DOC) in Schedule I	:	Docket No. 24-24

Friday,
November 15, 2024

700 Army Navy Drive
Arlington, Virginia

The above-entitled matter came on for hearing, pursuant to notice, at 9:00 a.m. EST

BEFORE: THE HONORABLE PAUL E. SOEFFING, Administrative Law Judge

APPEARANCES:

On Behalf of the Government:

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ALSO PRESENT:

THERESA M. CARBONARO, Government's Expert
T.J. GLEASON, Law Clerk
ALAINA M. JASTER, Petitioner's Expert

CONTENTS

P-R-O-C-E-E-D-I-N-G-S

(9:03 a.m.)

JUDGE SOEFFING: Welcome back, everyone. Dr. Elder is still on the stand. I remind you, Dr. Elder, you are still under oath. And Ms. Attanasio, you may conduct your cross-examination.

MS. ATTANASIO: Thank you, Your Honor.

CROSS-EXAMINATION

BY MS. ATTANASIO:

Q Good morning, Dr. Elder.

A Good morning.

Q Are you familiar with Dr. Alaina Jaster?

A Yes, I am.

Q Have you worked together?

A Yes.

Q You've appeared on panels together?

A Yes, that's correct.

Q You've appeared on her podcast?

A Yes, on one of the early episodes.

Q Did Dr. Jaster ask you to appear at this hearing?

A We talked together about this

effort, so. I wouldn't say she asked me.

Q You were in the courtroom during the presentation of the Government's case?

A For some of it, yeah.

Q And you're aware that Dr. Alaina Jaster was the first witness to appear on behalf of the Government?

A I'm -- I'm not sure. I wasn't here on the second day of the --

JUDGE SOEFFING: Do you mean for the respondents, for Petitioners?

MS. ATTANASIO: Yes.

JUDGE SOEFFING: Okay.

BY MS. ATTANASIO:

Q Have you spoken with Dr. Jaster regarding her testimony?

A I have not, no.

Q Have you spoken with anyone about Dr. Jaster's testimony?

A No. Only to say I haven't heard it.

Q Have you read or watched any videos about this hearing?

A No.

Q You testified that you worked in a lab where the principal investigator retired

and terminated his DEA registration?

A That's right. Or transferred it, the people -- I think -- I know he cancelled it, and then we had to just get a new one.

Q Okay. Dr. Patrick Beardsley?

A That's correct, yes.

Q And Dr. Beardsley studied opioids?

A Dr. Beardsley had a very long career, so he studied many different classes of drugs, opioids were his primary focus at the end there.

Q And he used drug discrimination studies to assess abuse liability?

A Yes. Dr. Beardsley had done drug discrimination studies among many others.

Q So you would agree that drug discrimination studies are useful in assessing abuse liability?

A I don't know if I would agree with that. Actually, of course, they're a component of abuse liability assessment, but they're not the end all, be all, I guess I would say.

Q But still good to use?

A I'd say they're a piece of evidence that should be taken into account, but not

something that's indicative -- not absolutely indicative of abuse liability, just similarities between drugs and their interoceptive effects.

Q You spoke a little bit about seizures of DOI and DOC, and seeing it or not seeing it on the gray market?

A I did.

Q But you have no independent evidence that the seizures reported to DEA of DOI were not, in fact, DOI?

A I don't have any independent evidence to suggest that what the DEA has seized was not DOI.

Q And you have no independent evidence that the seizures reported to DEA of DOC were not, in fact, DOC?

A No. I don't have any evidence to refute that.

Q You have no independent evidence to show that the only comments about ingesting are false?

A I also don't have any evidence that they're true, so.

Q But no evidence that they're false

either?

A No hard evidence.

Q You testified yesterday that comments on internet forums are unreliable?

A Yes, I did.

Q However, you've relied on those kinds of reports from internet user forums in your own articles?

A Yes. And I do believe I stated yesterday that reports on internet forums can be useful for background information and when surveyed to provide a rationale for further studies, which is how I used them, I believe.

Q You testified a bit yesterday about clinical trials. Are you aware of any clinical trials with DOI?

A I don't believe DOI is currently in clinical trials.

Q DOC?

A Neither of the two chemicals have made it to clinical trials currently.

Q Would scheduling DOI hurt your specific research now?

A The research that I'm currently conducting in private industry?

Q Yes?

A Materially, on a day-to-day basis, probably not. In terms of background and medical knowledge that we rely on for our, again, rationale and designing our experiments, potentially.

Q But you are not using DOI in your research now?

A I am not currently. I work in clinical research currently.

Q And you are not using DOI -- DOC, excuse me, in your research now?

A That's correct.

Q You testified that an advisor, I believe, again, Dr. Beardsley, retired and as a result, drugs had to be returned to a reverse distributor?

A Yes, correct.

Q And you acknowledged that this had nothing to do with a particular scheduling action, the drugs were already scheduled when you obtained them?

A Yeah. I understand that. They were of all -- many -- many different Schedules from I to V.

Q Yesterday, you also mentioned a situation where your lab was working with substances that were Scheduled, and that caused a disruption to research?

A That's correct.

Q Were these fentanyl-related substances?

A In one instance they were fentanyl-related substances, yes.

Q And the purpose of the research was to aid DEA in determining the pharmacological effects of these substances so DEA could consider scheduling these substances?

A That was part of the rationale for the research, correct. Another rationale was to assess their respiratory depressant effects and liability to produce overdose, so.

Q And many of these fentanyl-related substances were scheduled?

A That's correct, they were actually scheduled wholesale by a specific act, I believe.

Q And was that a surprise to you?

A No. I don't -- I don't think that was surprising.

MS. ATTANASIO: One moment, Your Honor. No further questions, Your Honor.

JUDGE SOEFFING: Thank you. Mr. Rush, would you like to conduct redirect?

MR. RUSH: Yes, Your Honor.

REDIRECT EXAMINATION

BY MR. RUSH:

Q How did you spend last night?

A I had to drive back to Baltimore to get a different computer, drove back here, and stayed at a friend's house at Arlington who's unrelated to this hearing.

Q Regarding drug discrimination studies, can you please tell us what you believe to be the most accurate way of determining abuse liability?

A Absolutely. Specifically, in regards to drug discrimination studies, I think, I would say that when assessing abuse liability as we can see with eight factors, abuse liability assessments need to be holistic and not rely on a single measure.

So drug discrimination can tell you that an animal recognizes certain interoceptive effects, but internal subjective effects of a

drug. But that doesn't necessarily mean that those effects are abuse-related, reinforcing of the same exact character.

So I think that it can be used as a component, overall component of the drug, a drug's abuse potential assessment. But I think it's been shown pretty clearly that various drugs that are not scheduled and have no abuse liability, that humans can substitute for drugs of abuse.

MR. RUSH: Thank you, Your Honor. We have no further questions.

JUDGE SOEFFING: Thank you, Mr. Rush. Ms. Attanasio, any re-cross?

MS. ATTANASIO: No, Your Honor.

JUDGE SOEFFING: Okay. All right, Dr. Elder. Thank you for your testimony. You are excused. I direct you not to discuss your testimony with anyone until the conclusion of the hearing.

THE WITNESS: Thank you, Your Honor.

JUDGE SOEFFING: Okay. Mr. Phelps, who's calling your next witness?

MR. PHELPS: Yes, Your Honor. It's going to be Dr. Cameron calling in. If we could

maybe go off the record for just a minute --

JUDGE SOEFFING: Okay. We're off the record.

(Whereupon, the foregoing matter went off the record at 9:14 a.m. and went back on the record at 9:27 a.m.)

JUDGE SOEFFING: We are back on the record.

MR. PHELPS: Oh, I was just going to give you a heads-up, that we actually made a change, I'm going to be handling Dr. Cameron.

JUDGE SOEFFING: Okay. Very good. So Mr. Phelps, then, you may call your next witness.

MR. PHELPS: Thank you, Your Honor. Good morning, Dr. Cameron.

DR. CAMERON: Good morning.

JUDGE SOEFFING: Okay. So Mr. Phelps, you're calling Dr. Cameron?

MR. PHELPS: Yes. Oh, my apologies --

JUDGE SOEFFING: No, I need to swear her in?

MR. PHELPS: Yes. Oh, Petitioners call Dr. Lindsay Cameron.

JUDGE SOEFFING: Okay. Good morning, Dr. Cameron.

DR. CAMERON: Good morning.

JUDGE SOEFFING: Dr. Cameron, please raise your right hand.

WHEREUPON,

DR. LINDSAY CAMERON

was called as a witness by Counsel for the Petitioners, and, having been first duly sworn, assumed the witness stand, was examined and testified as follows:

JUDGE SOEFFING: Please state your first name, your last name, and spell them both for the record.

THE WITNESS: Lindsay Cameron, L-I-N-D-S-A-Y, Cameron, C-A-M-E-R-O-N.

JUDGE SOEFFING: Okay. And, Dr. Cameron, during your testimony, you should not look at any materials or documents, except exhibits you are directed to look at by counsel or me, do you understand?

THE WITNESS: Yes.

JUDGE SOEFFING: Okay. You can put your hand down.

THE WITNESS: Okay.

JUDGE SOEFFING: Thank you. Mr. Phelps, you may inquire.

MR. PHELPS: Yes. Thank you, Your Honor.

DIRECT EXAMINATION

BY MR. PHELPS:

Q Good morning, Dr. Cameron. Thank you for being here with us today.

A Thank you for having me.

Q Can you tell us first, you're our first video witness today. Can you tell us where you are calling in from?

A I'm in Palo Alto, California.

Q Okay. Thank you. So I'd like to direct your attention to what has been marked for exhibit purposes -- identification purposes as SSDP Exhibit No. 71.

A Okay.

Q Do you have that there with you?

A Exhibit 71?

Q Yes. With your -- you may not have the number on it, it's your CV.

A Oh, yes. I have my CV.

Q So, okay, so. So do you recognize that document in front of you?

A Yes.
Q And can you tell us what it is?
A It's my CV.
Q Okay --
A So it's -- okay.
Q And did you prepare that document?
A Yes.
Q And is the document that you have in -- is it an accurate -- the document you have in front of you, is it an accurate depiction of your CV as you provided it to us earlier in this case?
A Yes.

MR. PHELPS: At this time, Your Honor, we would move to admit what's marked for exhibit purposes -- identification purposes, excuse me, as Exhibit No. 71.

JUDGE SOEFFING: Dr. Cameron, how many pages is the exhibit that you have in front of you, your CV?

THE WITNESS: Five.

JUDGE SOEFFING: Okay. Government, any objection?

MS. KREINHEDER: No, Your Honor. Can you hear me?

JUDGE SOEFFING: Yeah. Did you get that on the record, Mr. Reporter? No objection --

COURT REPORTER: All I got was, can you hear me.

MS. KREINHEDER: No objections, Your Honor.

JUDGE SOEFFING: Thank you, Ms. Kreinheder. Okay. Petitioner Exhibit marked for identification No. 71 has been offered. In the absence of objection, it is received in the record as Petitioner Exhibit 71. It's in, you may use it.

(Whereupon, the document previously marked as Petitioner Exhibit No. 71 for identification was received into evidence.)

BY MR. PHELPS:

Q Dr. Cameron, what degrees do you hold?

A I hold a bachelor degree from McGill University in pharmacology and therapeutics, so drug design and development. I hold a Ph.D. in neuroscience.

Q And where did -- where did you pursue that undergraduate education?

A McGill University in Montreal.

Q And where did you pursue your Ph.D.?

A At University of California-Davis.

Q And what do you hold your Ph.D. in?

A Neuroscience.

Q And can you tell me a little bit about your Ph.D. coursework curriculum?

A Sure. So I had to take everything from molecular and cellular biology, understanding ion channels of neurons and molecular signaling pathways, up to systems neuroscience, some theoretical understandings of different types of frameworks, circuits in the brain, up to cognitive neuroscience in humans, other types of tests, those are done by taking statistics and coding as well.

Q And in addition to your course curriculum, what else did your Ph.D. program consist of?

A I mean, other than the courses, I had to do two different qualifying exams, so one on general knowledge that I passed, and also, one on -- that is specific to my theses, which I also passed. I submitted a dissertation, I defended it, yeah.

Q And can you talk a little bit about your dissertation research?

A Yeah. So my undergraduate degree was in drug design and development with a lot of chemistry involved. For my Ph.D., I did my Ph.D. in neuroscience, but I did it actually in the chemistry lab.

So I synthesized novel compounds and tested them, so I tested existing drugs and synthesized novel ones. And then I would test them both in vitro, in dishes of cell culture, as well as in vivo in rodent models. So I'm pretty well-versed in terms of drug design, development, and testing.

JUDGE SOEFFING: Okay. Let me just take a pause here and, Dr. Cameron, because this is being done via VTC, it's not live here, we're having a little bit of -- or the court reporter's having a little bit of difficulty capturing everything you're saying, I think.

So if you could slow down a little bit and just try to enunciate your words a little bit better, that way that would assist in the compiling of the transcript.

THE WITNESS: Okay. Sounds good.

Do I need to speak louder at all?

JUDGE SOEFFING: I don't think volume is -- no, volume is not a concern here, thank you.

THE WITNESS: Okay. No problem. Do you want me to reiterate what I just said?

JUDGE SOEFFING: No. We have everything. That would just make it easier going forward.

THE WITNESS: Okay. Great.

JUDGE SOEFFING: Thank you, Dr. Cameron. Yes, Ms. Kreinheder?

MS. KREINHEDER: The Government would like to point out that there is a witness in the courtroom who is in violation of the sequestration order.

JUDGE SOEFFING: Well, I guess, Mr. Phelps, do you intend to recall Dr. Elder?

MR. PHELPS: We do not, Your Honor. We would ask that he be excused as a witness in this proceeding.

JUDGE SOEFFING: So he's been excused as a witness. The Petitioners are not intending to recall him, so he's welcome to stay. He will not be able to be recalled, of

course, at this point.

And he's already been instructed not to discuss his testimony with anybody else until the conclusion of the hearing, so that still applies. Thank you, Ms. Kreinheder. And Mr. Phelps, you may ask your next question.

BY MR. PHELPS:

Q I'd like to go down to the next section of your CV there, and it's listed as research experience. Before we get into the specifics of that, could you just talk in general what has your research experience consisted of as a whole? What have you studied?

A I've done everything from like chemical synthesis up to testing molecular pathways and signaling pathways, both in cell culture as well as in rodent models, and I've done a lot of behavior.

So testing drugs is what I do generally throughout my Ph.D., as well as a primary focus of what I do now. After I graduated, I joined here, which is the Department of Psychiatry at Stanford University, and I focus a lot on addiction work

here.

Q And so you said that you studied a lot of behavior. Can you explain kind of what you mean by that?

A Yeah. So I study animal behavior. I like to say that usually, you know, for an average person, you might not think mice or rats are good models. But what I want to say is that, so if you have a dog, and you know that your dog is, you know, sad or happy, if you spend enough time around rodents like I do, you can very much and easily tell if they're doing well or not.

And so we have a whole bunch of different tests that we can test animals with to study anti-depressant like effects, test things anxiety or post-traumatic stress disorder, addiction, things like rewarding feelings. So these are all like very typical tests that I do in lab also.

Q And would -- just to clarify, would the way that you test or observe those behaviors in the rodents in your lab, how would that contrast to the way you might evaluate the behaviors, like you discussed of say, a pet

dog?

JUDGE SOEFFING: So, Mr. Phelps, are you going to offer her as an expert witness at this point? Or are you still probing her credentials?

MR. PHELPS: Yes -- yes, Your Honor.

JUDGE SOEFFING: Okay.

MR. PHELPS: We're going to get into the research specifics, I just wanted to get kind of a general overview before we went through some of the specifics there.

JUDGE SOEFFING: Okay. All right. You may proceed.

BY MR. PHELPS:

Q What's different about how you may observe behaviors in rodents in your lab versus behaviors in say, your pet dog at home?

A Well, you run very specific tests, but you can test for basically like motivation to get things -- motivation to escape, anhedonia, you could test anxiety, you can test -- and you can just -- it's very easy.

I mean we have ways of quantifying it, but it's very obvious to see when an animal is motivated to escape or get a reward or

something, as opposed to having given up. So those are very common things to test, when testing for something like depression or drug seeking, addictive, drug seeking, stuff like that.

Q And what kind of drugs did you study in your Ph.D. work?

A I studied a lot of different drugs, including synthesizing and making my own. They ranged from traditional anti-depressants, ones that are on the market now, like sertraline, or fluoxetine, up to more what we call fast-acting anti-depressants, so things like ketamine, LSD, DOI, MDMA, amphetamines.

Yeah and now I'm allowed to study a little bit more along the opioid side of things, so things like -- opioids like fentanyl or morphine. And then I also study cocaine and methamphetamine as well, so kind of a whole -- a whole array of drugs I've studied.

Q Okay. And you said that a lot of that research is focused around addiction. Can you explain how that relates to the work you're currently doing at, it looks to me from your CV, Stanford University; is that correct?

A Yeah. So I'm at Stanford University. I have a couple of different projects going on right here. One of them is understanding the neural circuits that underly fentanyl seeking and fentanyl addiction. And then I'm trying to find different therapeutics that may be able to counteract opioid seeking.

Q And, Dr. Cameron, how does addiction -- how does that relate to the field of neuropsychiatric disorders?

A So addiction is a substance use disorder. So you can have opioid use disorder, alcohol use disorder, et cetera. And those all fall under different psychiatric conditions.

Q And could you explain a little bit what neuropsychiatric disorders as a whole are?

A So they're just disorders of the brain, of mental health. So if there's mental health dysregulation, that's a psychiatric disorder, so something like depression, anxiety, post-traumatic stress disorder, addiction, those types of things.

Q And has the research described here in your CV, what kind of -- how does that research relate to the study of

neuropsychiatric disorders as a whole?

A So they're all animal models of things like depression or anxiety, so you can test those. I don't know if you're -- if you want me to like name the tests that I do here in the lab. So like things like the forced swim test or sucrose preference are great for testing the anti-depressant effects of drugs.

You can look at anxiolytic effects using something like the open field test or the elevated plus maze. We can test post-traumatic stress disorder, which is usually use a paradigm called fear extinction or fear conditioning. And then nowadays, I focus more on addiction, so I typically use studies like intravenous self-administration as well as conditioned-place preference.

Q And outside of your work specifically at Stanford, what other -- where else have you studied neuropsychiatric disorders?

A I mean, I did it for my Ph.D. at the University of California-Davis. And that's most of what my education is in, so.

Q Most of your -- just to clarify,

most of your education has been in neuropsychiatric disorders?

A Yeah. I kind of specialized from the beginning. So I've studied neuropharmacology, neuroscience, psychiatry. I've kind of bounced around between all those departments and fields kind of within this realm.

Q And of the publications listed, starting on Page 3 of your CV, which of those are in the field of neuropsychiatric disorders?

A All of them.

Q And that's all 14?

A Yes.

Q And that's across a wide variety of various neuropsychiatric disorders?

A Yes. But specifically those four I mentioned, so anxiety, depression, PTSD, and addiction.

Q And on -- oh, excuse me, there's a 15 on the Page 4. The grants that you list on Page 4 of that CV, how are those related to the study of neuropsychiatric disorders?

A I usually write grants on whatever project I'm working on at certain times. So I

can look at like how different drugs, or I got a grant for -- for example, the metabolomics. So I could basically get different drugs and look how that changed the metabolism of various neurons, how they changed their function after use.

They all fund basic drug discovery and/or research into neuropsychiatric disorders. So you can kind of look at my work from two different angles.

One is drug design and development, and the other flip side of it is developing drugs, or using drugs to understand disease better. So it's both kind of like an understanding of the disease, but also like seeing what we can do to treat that.

Q And of the various awards listed there on Page 4, how many of those awards are for your study of neuropsychiatric disorders?

A All of them.

Q And you've got several invited lectures there also on Page 4. How many of those are in the field -- were discussions or lectures in the field of neuropsychiatric disorders?

A All of them.

MR. PHELPS: Your Honor, at this time we would move to have Dr. Cameron admitted as an expert in the study, or excuse me, in the field of neuropsychiatric disorders.

JUDGE SOEFFING: Okay. Government, any objection?

MS. KREINHEDER: Can we request one moment to consult, Your Honor?

JUDGE SOEFFING: Certainly.

(Pause.)

MR. PHELPS: Your Honor, it's only the, just out of curiosity, it's only the audio that's been recorded on this, right, not the video?

JUDGE SOEFFING: That's right.

MR. PHELPS: I just look incredibly ghostly up there in the light on that video. So just checking what the record's going to reflect.

MS. KREINHEDER: Your Honor, the Government has no objection to this witness.

JUDGE SOEFFING: Okay. Thank you. The Petitioners have offered Dr. Cameron as an expert in the field of neuropsychiatric

disorders. In the absence of any objection by the Government, the tribunal accepts the witness as an expert in the field of neuropsychiatric disorders.

BY MR. PHELPS:

Q Dr. Cameron --

MS. KREINHEDER: Objection, Your Honor. The Government would like to object to this witness based on the fact that we've already heard two experts and one non-expert testify to essentially the same issues. Her pre-hearing statement has little difference from the testimony we've already heard. We'd like to limit the testimony to that which is not unduly repetitious.

JUDGE SOEFFING: Okay. And so I'll overrule the objection. There's no question pending at this point. We have talked previously about limiting repetitious testimony.

I assume she's going to be talking about things that are different and her work and how the potential scheduling of these substances could affect her work.

To the extent that she's testifying

as to the same matters as other witnesses, I may, you know, sustain a future objection based on repetition.

MR. PHELPS: Understood, Your Honor, we agree. We do believe that Dr. Cameron is going to be providing unique insight that's sufficiently different from the others with, point out just specifically in the pre-hearing statement, the second to last paragraph on Page 14, that she'll be testifying about the abuse potential of DOI, which is specifically listed in the -- as part of the factors, so just wanted to bring that up.

JUDGE SOEFFING: Okay. Okay, I appreciate your tailoring your questions to elicit new testimony.

MR. PHELPS: Yes. Thank you, Your Honor.

JUDGE SOEFFING: Thank you.

BY MR. PHELPS:

Q So Dr. Cameron, could you talk a little bit other labs you've collaborated with to investigate psychedelic action?

A Yes. So I did my Ph.D. at UC-Davis, in the lab of David Olson, who is kind of a

pioneer in terms of both novel drug design as well as test -- like using drugs or chemicals as tools to investigate neuropsychiatric disorders.

I've collaborated with people like Dr. John Gray, where we can look at like how drugs change the excitability of cells, Jennifer Whistler, Diasynou Fioravante, Anna La Torre, to name a couple.

The lab of Jamie Peters was really integral for testing the addictive properties during my Ph.D. and used, well, for examining the changes in cortical structure after drug administration.

Now I'm in the lab of Dr. Rob Malenka and Karl Deisseroth. So Karl Deisseroth is a pioneer in the field of neuroscience. And Rob Malenka is one of the founders for discovering synaptic plasticity or how the brain changes specifically with regards to addiction. So those are kind of the labs that I've worked within.

Q And what is -- can you talk about specifically research involving the field of phenethylamines in your research?

A Yeah. So phenethylamines are a type of drug, they're a type of psychedelic, that have been used. I tested them a lot, mostly phenethylamines I tested in vitro a lot.

So you can see that they cause neural growth and spine growth in cortical neurons, which is suggestive of therapeutic potential actually, rather than anything else. And some of my lab back at UC-Davis, both with me and kind of as my colleagues have looked into -- almost like anti-depressant effects of these compounds.

Q Okay. And DOI and DOC fall into that class of phenethylamines?

A Yes. I've specifically worked with DOI, I have not worked with DOC. But due to its like chemical structure, I would assume it has very similar effects. They're all kind of in the same class.

Q And can you explain, well I guess, can you explain how you evaluate the safety profile of a drug in general, not specific to these substances? But what does it mean to evaluate a drug safety profile?

A Yeah. So you can different doses

and you can see at what an animal starts not behaving well. Some things you can look at are its locomotion ability, it's like, cardiac effects. You can look at neurotoxicity. Some assays you can run in lab would be like an MTT Assay would be a great example.

I, in my Ph.D., I was specifically looking about something that probably had -- would have heart side effects by interacting with something called a hERG channel.

So what you can do is you can patch, and you can see if that channel is affected by these drugs or not. There's a whole bunch of different assays you can do with that safety profile.

Q Okay. And just to take it -- all right. Just to take a step back, what exactly do you mean by the safety profile of a drug?

A Usually like, is it -- is it safe, does it cause toxicity in any way or long lasting adverse effects. But also you typically want something to be non-addictive or non-habit forming.

Q Is that related to -- how does evaluating a drug's safety profile relate to a

harm/benefit kind of analysis?

A Well, so you -- you want it to have more benefits, so whether that be anti-depressant effects, or effects for treating PTSD, or effects for anti-addictive effects. So you want to have your benefits outweigh your costs.

So you want to have minimal toxicity, minimal abuse or dependence potential. And you want that to be, you know, heavily skewed in the benefits side of things.

Q And we've already heard a good bit of the basic chemistry of how DOI and its significant selectivity to the 5-HT2A receptors. So you don't need to get into that specifically, but could you -- or in general how it works, but could you explain specifically how that significant selectivity is important in understanding mental health and neuropsychiatric disorders?

A Absolutely. So every single cell in the brain has serotonin receptors. There are 14 different receptors, and the serotonin 2A receptor is the most heavily expressed receptor. So it's more common than every other

serotonin receptor in the brain.

It's heavily expressed in the prefrontal cortex, which is the front part of your brain that is responsible for things like motivation or planning or achieving your goals. You can imagine that your prefrontal cortex is a part of your brain which is heavily affected in neuropsychiatric disorders.

So things like depression, anxiety, PTSD, and addiction, you actually have dysfunction of the prefrontal cortex. And so activating the prefrontal cortex is often seen as a good way to help patients with these disorders.

So the brain has serotonin receptors everywhere and serotonin's 2A receptor is an incredibly important receptor because it is so heavily expressed, it's the most heavily expressed. And so -- and it is a key receptor in the involvement of developing anti-depressant compounds.

Q And based on your own work using DOI and your review of other literature about DOI, how would you describe that specific drug's safety profile?

A Quite safe. I have looked at it in the context of neurons on dishes and looking at the effects of basically treating animals and then looking at their brains afterwards. And what you see is it actually has beneficial effects.

So it causes these -- growth of these cortical neurons, it causes increased dendritogenesis, spinogenesis, synaptogenesis, as compared to other fast acting anti-depressants. So they actually tend to show therapeutic properties more so than anything else.

In other literature, people have shown that it seems to be quite anxiolytic, so it calms animals down. And it seems to be actually useful for treating addiction, possibly, in that it can reverse or block a preference for drug seeking of hedonic drugs, like alcohol or opioids.

Q How does a drug's safety profile relate to its abuse potential?

A So you want it to have low dependence on what would make it safe, right. So it's not a hedonic drug seeking like

something like fentanyl or morphine or heroin or cocaine or methamphetamine.

So you would want to have, you know, part of the safety profile would be not causing this physical and/or mental dependence on these drugs. And so, but that's what you would want.

In the case of DOI, we actually worked through that, so primates who are given access to DOI, do not self-administer. And self-administration is probably the absolute best study we could do with regards to studying addiction.

So the fact that primates don't self-administer DOI would suggest that there's not really an abuse liability there.

JUDGE SOEFFING: Okay. Before you ask your next question, Mr. Phelps, again, Dr. Cameron, if you could just please slow down a little bit, it would assist the court reporter --

THE WITNESS: Yes, sorry.

JUDGE SOEFFING: -- and capture your testimony. That's all right. Just a reminder to try to speak a little more slowly. Thank you. You may ask your next question, Mr.

Phelps.

THE WITNESS: Okay. Sorry. Thank you.

MR. PHELPS: Thank you, Your Honor.

BY MR. PHELPS:

Q And based on -- based on your own research using DOI and other research that you've studied or are familiar with, what kind of evidence have you seen for DOI's abuse potential?

A Out of personal experience?

Q Well, as an expert in the field who's studied, not only your own studies, but other studies that you're familiar with, what evidence have you seen across those for DOI's abuse potential?

A Yes. So I have not seen basically anything. I'm in a lab here that studies methamphetamine, cocaine, opioids, and there's not really a comparison at all. If anything, DOI actually has an ability to be anti-addictive, as I mentioned before. So it can actually reverse drug seeking of other drugs.

I think that the most key evidence is something that I also just -- just mentioned

is that animals don't seek this. They're not motivated to go and seek this again, you know. It's not addictive in that they return and try to find more of it.

Q And for the -- can you sort of -- can you compare the abuse liability between DOI and alcohol?

A That study, to my knowledge, has not been like directly tested. There is a study that said that it could probably be reduce alcohol seeking.

MS. KREINHEDER: Objection, Your Honor.

JUDGE SOEFFING: Yes?

MS. KREINHEDER: She's not answering the question that was asked.

THE WITNESS: I don't really –

(Simultaneous speaking.)

MR. PHELPS: I can rephrase.

JUDGE SOEFFING: Hold on. Hold on Doctor. Sustained. I will allow you to re-ask your question.

MR. PHELPS: Thank you, Your Honor.

BY MR. PHELPS:

Q So you're familiar with the -- well,

let me just clarify. What's the difference between abuse potential and abuse liability, if there is any?

A I mean, abuse potential is how rewarding a drug is and does it cause physical and mental dependence, right. So does an animal or a human go and seek it willingly?

And often, what we say in addiction, is that it's not just a positive thing, but it doesn't come to the detriment of, you know, your job or your family or your income.

So are you willing to undergo these kind of negative things because you need that drug so much, right. So that's what I would describe as abuse potential, is that -- that seeking and that drive and that motivation to get the drug.

Abuse liability, that sounds more like a legal term to me, so I'm going to kind of step back from that one. But it sounds like how much could this, you know, impair. And I think it's intricately tied with the abuse potential.

So if there's low abuse potential, I would guess that there's low abuse liability.

But liability is like a legal word, it's not a scientific word, per se, so, just.

Q And you're familiar with the abuse potential or abuse liability of other drugs besides DOI?

A Yes.

Q And can you compare the abuse liability of DOI to other more widely available or used substances such as alcohol?

A I -- yeah. So there haven't been animal studies that have tested this directly. Because typically DOI is not considered an addictive drug, so it's not even studied as much in this realm. If anything, it's the anti-addictive effects that are studied, not the addictive effects.

Q Okay. So not speaking specifically about direct comparison studies, but you're familiar with other studies and of studies specifically about the abuse potential to other drugs, right?

A Yeah.

Q Okay.

MS. KREINHEDER: Objection, Your Honor.

JUDGE SOEFFING: Yes?

MS. KREINHEDER: This question's been asked and answered.

JUDGE SOEFFING: Well, he's asked it regarding alcohol, but he seems to be broadening the question to other drugs?

MR. PHELPS: Yeah. I think she still was maybe misunderstanding the question. And then I just was asking specifically --

JUDGE SOEFFING: I'll overrule the objection. Go ahead and rephrase.

MR. PHELPS: Okay. Thank you.

BY MR. PHELPS:

Q Could you describe the abuse potential of alcohol in --

A Generally?

Q Yes.

A Yeah. So animals will seek alcohol if you give them access to water or alcohol. They will start drinking alcohol and they will drink it. They will develop a preference for alcohol over water.

They can develop preferences for even locations for where they drink alcohol, they'll continue to go back to those same

places. This is seen in humans as well. And I think you were trying to ask about other drugs as well.

This is seen as well, so things like methamphetamine or cocaine or opioids, animals will self-administer these drugs. They will return back to those -- those same places. They quickly develop a dependence, so usually it takes a little while for them to learn.

They're not like humans where you can say here, try this drug, right. So animals will have to press a lever or find a drug or something and take it. And they quickly learn that it makes them feel good and so they return back to those same places and seek those drugs again. So this is done with alcohol and other addictive drugs.

And that's very well known, it's like a hallmark of addiction research. Sorry, that was really fast, I can rephrase that slower if you need me to.

JUDGE SOEFFING: That's fine. That's fine, Doctor.

THE WITNESS: Okay.

BY MR. PHELPS:

Q So across those, if -- and I want to be clear here, right, your -- in your understanding across the literature and across various substances in evaluating their abuse potential, if you were ranking the abuse potentials of some of the drugs you described from highest to lowest, where would DOI fall in that ranking?

MS. KREINHEDER: Objection, Your Honor.

THE WITNESS: At the bottom.

JUDGE SOEFFING: Yes? Hold on.

MS. KREINHEDER: This question asks for an answer that's outside of her expertise, she's not an expert in pharmacology.

THE WITNESS: I have a degree in pharmacology.

JUDGE SOEFFING: Hold on -- hold on, it's just the attorney's discussion for right now.

MR. PHELPS: So similar to liability, expert or expertise is a particular legal term of our --

JUDGE SOEFFING: You're, you know, you're trusting me, so, you know, I think that

this is getting outside of the scope of the pre-hearing statement, too.

And she was going to testify about evidence of abuse potential but now we're getting into comparisons and other things which seem to be -- she's not offered as a substance abuse expert or anything as some of the other witnesses were.

MR. PHELPS: And Your Honor, I would say that substance abuse falls within the field of neuropsychiatric disorders, that's what she's testified to, that's what she's an expert in. And substance abuse is certainly -- that's within that field of expertise.

JUDGE SOEFFING: Well, I'll allow her to answer this question then I think you need to move on from there.

MR. PHELPS: Okay.

JUDGE SOEFFING: So I'll overrule the objection, but that will end this line of questioning.

MR. PHELPS: Okay.

JUDGE SOEFFING: Do you recall the question, Doctor?

BY MR. PHELPS:

Q Do you need me to repeat the question?

A Was it about the ranking?

Q Yes, ma'am.

A Yeah. So DOI would be at the bottom, absolutely. Something like opioids would be way at the top, with meth and probably alcohol somewhere in there.

Q Okay. Thank you. In your professional experience, how familiar are you with drug discrimination studies?

A I am familiar with them, yes.

Q Okay. And in your particular research, and the research that you are familiar with, how is drug discrimination used to study abuse potential?

A It's not.

Q Can you explain that?

A Yes. So drug discrimination is used to compare how similar two drugs are. So for example, do I need to explain how the assay works, just -- just, you know, so you know?

Q No. We've -- I think we've had --

MR. PHELPS: Your Honor, just to clarify, I don't want to leave anything out.

We've had sufficient discussion about drug discrimination studies as the assays' work?

JUDGE SOEFFING: I think that's been covered, yes.

MR. PHELPS: Okay.

THE WITNESS: Okay. Great. So the idea is that an animal will press a lever if it finds the test drug, for example, DOI.

MS. KREINHEDER: Objection, Your Honor.

JUDGE SOEFFING: Yes, Ms. Kreinheder?

MS. KREINHEDER: This is outside the scope of the pre-hearing statement. She did not discuss drug discrimination in the pre-hearing statement.

MR. PHELPS: As an expert in this field, she's certainly able to discuss the use of particular tests to measure the area of her expertise and what's studied there.

She can offer an expert opinion about the use of drug discrimination studies compared to other studies that she does to do the research that she does.

JUDGE SOEFFING: Well, I think she's

already testified to that and she says it's not used to study addiction.

MR. PHELPS: Yes. And I was just asking her to explain why not. I think that's an extremely relevant question considering the seemingly entire bulk of the Government's case or that the heart of the Government's case is that drug discrimination studies are the, quote, gold standard for measuring abuse liability.

And she's given expert opinion in direct contradiction of the Government's claim so it's certainly relevant and should be considered with significant weight to this Court if an expert in this field is saying that those studies are not used to her knowledge to study this kind of thing.

JUDGE SOEFFING: Ms. Kreinheder?

MS. KREINHEDER: Your Honor. They -- there was two words they could have put in to the pre-hearing statement, drug discrimination. And we've heard the same testimony from other witnesses prior to this about what drug discrimination is and why it's important or not important.

JUDGE SOEFFING: So Mr. Phelps, I will allow you to ask the question and move on. But that's -- I do not think there was disclosure of this in the pre-hearing statement. You talked about areas to be covered.

And this is one of the things, why it's important to be specific in the pre-hearing statements. I will allow you to ask this question, but we have heard a lot about drug discrimination, so I'd ask you to move on, okay.

So I'll overrule the objection, but we're not going to hear more going down this same path.

BY MR. PHELPS:

Q Dr. Cameron, in your expertise, can you explain why?

A Yeah. So drug discrimination basically tests how similar two drugs are. And that can be, you know, this -- and it's a rat, so you can't ask them what they are experiencing. So they can have a stomachache and press the lever that gives them a stomachache, it does not mean that it gives

them abuse potential or anything.

It just tests how similar the experience of the drug is. And so -- and so, in the case of trying to see if something is addictive or not, it would make more sense to compare it against something that is highly addictive.

So if someone were to show me that DOI was used in drug discrimination with fentanyl and they fully substitute it, then that has a huge abuse liability. Those studies have not been done at all.

So drug discrimination is not a good measure at all. In fact, it's incredibly old and no one in the field of addiction uses drug discrimination anymore. And in fact, NIDA, which is the National Institute of Drug Abuse, has said that the gold standard for studying addiction is self-administration.

And they're -- they're basically like not funding grants unless they involve self-administration. Drug discrimination is -- is -- it just tests how similar two drugs are. It says literally nothing about abuse potential, there are different types of tests

you would want to do if you want to study abuse potential.

Q Thank you. Just one last question along this line. In your expert opinion, what do you think about the statement that drug discrimination studies are the gold standard for studying addiction?

A I very much disagree with that statement.

MS. KREINHEDER: Objection, Your Honor.

JUDGE SOEFFING: Well --

THE WITNESS: It is absolutely not used.

JUDGE SOEFFING: Overruled.

THE WITNESS: It's used in drug discovery.

JUDGE SOEFFING: That's all for drug discrimination.

MR. PHELPS: Absolutely, Your Honor.

BY MR. PHELPS:

Q Could you just describe generally about what you've been finding about how DOI is related to addiction?

A Yeah. So I mean, I'm not -- I study

things like fentanyl now. DOI, the studies that I would want seen are self-administration, which are -- which has been done in primates, and animals do not self-administer, which would be the key finding. It's even better than that if it's done in primates. So if animals are not self-administering this, that would be key.

Q And specifically you, I guess, let me clarify that a little bit. Can you just talk kind of in broad terms about what your research has shown about the anti-addictive properties of DOI?

A Yeah. So some -- there are several studies that show that you can reverse the rewarding effects or the rewarding memory of things like alcohol or opioids.

My research specifically, has looked on these effects on the prefrontal cortex. And so it looks like you can, you know, cause parts of that brain region to strengthen. And that is known to override drug seeking.

So that's kind of the premise of a lot of our studies actually, is to strengthen this part of the brain which reduces drug seeking. And it does do that, it increases

their function, it increases their growth in key regions of the brain.

Q And in your expertise and opinion, how could you see that research being applied to human or clinical research?

A So I -- it is being applied in other ways --

MS. KREINHEDER: Objection, Your Honor.

THE WITNESS: To reduce alcohol --

JUDGE SOEFFING: Hold on a second. Yes?

MS. KREINHEDER: This is also not within her expertise, she is an expert in neuropsychiatric disorders, not drug research.

MR. PHELPS: Can they clarify what they mean, that she's not an expert in research?

MS. KREINHEDER: She's qualified as an expert in neuropsychiatric disorders specifically --

THE WITNESS: My job title is literally --

JUDGE SOEFFING: Hold on, Doctor. This is a discussion between the attorneys,

sorry.

MS. KREINHEDER: She's giving her opinion.

JUDGE SOEFFING: Well, she's opining on where the research may lead, as I understand the question, right?

MR. PHELPS: That's correct, Your Honor.

JUDGE SOEFFING: I'm going to overrule the objection. I will allow for her to answer.

BY MR. PHELPS:

Q So in your expert opinion, where did you foresee -- well, actually just to be clear, your expertise in neuropsychiatric disorders, is that in neuropsychiatric disorders of -- or I guess -- we can skip that.

In your expert opinion, if this research were to continue, how could you potentially see it being applied in human or clinical research?

A Yes. So the serotonin 2A receptor is -- is a key receptor that will likely play a role in most anti-addictive pursuits like at this time. So there are clinical trials.

I'm not sure if there's any with DOI specifically, but there's other 2A agonists that are being investigated for anti-addictive effects for alcohol and for opioids in multiple different countries, so both the U.S. and Canada, and I believe the U.K. as well.

So 2A agonists are a very hot topic for trying to -- to treat these disorders. And DOI is very useful because it's one of the most specific 2A agonists, more so than the ones that are being studied right now.

So it has the potential to be even more epic. It needs to be studied, but that's kind of where the research is heading.

Q And in your expert opinion, is that research that you could see yourself possibly potentially studying one day?

A Absolutely.

MS. KREINHEDER: Objection, Your Honor. This is irrelevant testimony.

JUDGE SOEFFING: So we are veering a little bit off course here. I see the final paragraph in the pre-hearing statement is talking about barriers for researchers.

MR. PHELPS: That was going to be

next --

JUDGE SOEFFING: Trying to relate it, but okay.

MR. PHELPS: Yeah, that's exactly where I was going, Your Honor.

JUDGE SOEFFING: I'll overrule the objection while you move on.

MR. PHELPS: Thank you.

BY MR. PHELPS:

Q So, Dr. Cameron, can you explain how placing DOI and DOC into Schedule I would affect this potentially groundbreaking research that you're finding right now?

A Yeah. So as I've mentioned, I mentioned multiples times, I actually think it has therapeutic effects, more so than any type of addictive or liability effects. A lot of research still needs to be done.

It would affect researchers like me if, like it takes years to get a DEA license and start up a lab. And to be able to study one of these things. It would impact those --

MS. KREINHEDER: Objection, Your Honor.

JUDGE SOEFFING: Hold on.

THE WITNESS: Okay.

JUDGE SOEFFING: All right. Hold on a sec. What's the?

MS. KREINHEDER: She's speculating on the future of the science.

JUDGE SOEFFING: Well, I'll allow you to examine that on your cross. Okay. Overruled. You may complete your answer.

THE WITNESS: Okay. It was -- it would affect research groups like on an individual level, but also, impair the field from moving forward. There is potential to use this and I just think that adding barriers would -- would greatly inhibit the progress of this field.

And then, kind of in those same lines, but just to zoom out a little bit, like I said, every neuron in the brain has serotonin receptors.

The serotonin 2A receptor is the most heavily expressed of it and this is one of the best tools we have to just study basic receptor function.

It is one of the most specific agonists, 2A, that we have. And by blocking

access to it, you're -- it -- it would significantly restrict any sort of progress with regards to any type of serotonin research, let alone just neuropsychiatric disorders.

BY MR. PHELPS:

Q And just one last question on this, I think. In your expert opinion, how could the impairment of this research potentially affect public health?

A So I -- I do think that -- so one thing that I think is like a huge issue right now is the opioid crisis, right, fentanyl use across the U.S. Something like this is -- is huge and very pressing and all over the news.

It costs billions of dollars for the -- the government, right. It -- it affects millions of people across the country and other countries. And something like DOI, which might have the potential for -- for counteracting that or giving these patients help.

Or even if you want to look at it from financial, like reducing the amount of money that the government funnels into opioid abuse, this -- this has a potential.

And even if it's just to understand

the role of the serotonin to a receptor in combatting opioid or addictive use. It -- it would have significant effects.

MR. PHELPS: Thank you. If I could just confer briefly? No further witness -- no further questions for this witness, Your Honor. Thank you.

JUDGE SOEFFING: Thank you, Mr. Phelps. Ms. Kreinheder would you like to conduct cross-examination?

MS. KREINHEDER: Yes. But I request a moment with my colleagues?

JUDGE SOEFFING: Yes.

MS. KREINHEDER: It's getting close to 10:30, should we take a break?

JUDGE SOEFFING: Would you like to break at this point?

MS. KREINHEDER: Yes.

JUDGE SOEFFING: Okay. We'll take morning break for 15 minutes.

MR. PHELPS: Great, so Dr. Cameron --

JUDGE SOEFFING: We're off the record.

(Whereupon, the foregoing matter

went off the record at 10:26 a.m. and went back on the record at 10:52 a.m.)

JUDGE SOEFFING: Okay. We are back on the record. Dr. Cameron, you hear me all right? Good. All right. I remind you are still under oath. And Ms. Kreinheder, you may conduct your cross-examination.

MS. KREINHEDER: Thank you.

CROSS-EXAMINATION

BY MS. KREINHEDER:

Q Good morning, Dr. Cameron.

A Good morning.

Q Have you conducted self-administration tests using LSD?

A No.

Q Have you conducted self-administration tests with psilocybin?

A No.

Q What about DOM?

A No.

Q You said that --

A The tests have been done before, they're known in the literature. Part of the reason of me not testing them, is because they've been done already. So I don't -- I

don't know if you want me to comment on that or not, but yes, I have not personally done them.

Q So you've read research about this topic?

A Yes.

Q Did you bring any of this research today?

A Yeah. It's like on my computer.

Q But you haven't presented it to the Court?

A Do you -- is this about LSD and psilocybin?

JUDGE SOEFFING: Just -- just answer the question, Dr. Cameron, I'm sorry.

THE WITNESS: Sorry, I don't know what you mean by bring it to the Court. I have it on my laptop and I can speak about it as an expert. I don't know what you mean by bring it to the Court.

BY MS. KREINHEDER:

Q It is just a simple question, yes or no? I'll move on. You also said that DOI and DOC are similar?

A Yes.

Q Do DOM or DOB have the same or

similar degree of selectivity of activating the same serotonin receptors?

A They're similar.

Q Did you say that DOI is being investigated in the U.K. or Canada during your testimony?

A I said that serotonin 2A drugs are being investigated. I don't know about DOI specifically.

Q Okay. Thank you. You also said that DOI has a lower abuse potential than alcohol; is that correct?

A It hasn't been tested directly, but it has been tested to reduce alcohol abuse.

Q My question was, did you say that DOI has a lower abuse potential than alcohol, yes or no?

A It likely does, but it hasn't been tested directly --

Q Did you also say that it has a lower abuse potential than opioids?

A Yes. I mean again, it hasn't been tested side-by-side directly, but it very likely would.

Q In your opinion, are there any harms

related to DOI?

A Not significant, they need to be investigated as development.

Q So you feel more comfortable giving DOI to someone over a glass of wine?

A I'm not saying that.

Q Do you feel that there are any harms related to psilocybin?

A I think there is significant fewer harms of psilocybin.

Q Fewer harms than what?

A Sorry, can you repeat the question?

Q Do you feel that there are any harms related to psilocybin?

A There's not many. I think that they're generally quite safe as a drug.

Q Do you feel that there are any --

A If -- okay.

Q Go ahead.

JUDGE SOEFFING: You can complete your answer.

THE WITNESS: Within an -- sorry. There's not a lot of issues with psilocybin. As a drug, it has a pretty good safety profile, but should be administered with the right care

and under the right conditions.

BY MS. KREINHEDER:

Q Do you feel that there are any harms related to LSD? And this is just a yes or no question.

A It's a pretty safe drug.

Q You have not done any research into -- I'm sorry. You have not done any surveys of the entire community that researches the DOI; is that correct?

A I don't understand the question. Do you mean the entire community of humans who use it, do you mean the entire scientific community?

Q I will repeat the question. Have you done a survey of the entire community that researches DOI?

A I speak with a lot of these, and a lot of them are my colleagues.

Q Did you say that it takes several years to get a Schedule I and researcher registration from the DEA?

A Yeah. It usually takes a very long time.

Q Who did you speak with at the DEA

about this topic?

A I've applied for licenses under my PI's here at Stanford. I've done the paperwork and submitted it with them.

Q You applied for a DEA Schedule I researcher registration?

A No. The professors that I work with have a Schedule I license, and I worked with them so that I understood the process for when I do it myself. So I am aware of all the steps that are taken and how long that takes.

Q And it's your testimony that an application with the DEA would take several years to be granted?

A Between the -- between starting it at an institutional level to get a state approval to getting FDA and DEA approval to finally obtaining the drug can take -- I haven't seen it done in less than a year, ever.

Q Did you work in a lab with a PI who had a Schedule I researcher registration during your graduate studies?

A Yes.

Q And who was that?

A Dr. David Olson, University of

California-Davis.

Q Just one second. Have you spoken to anyone at DEA specifically about applying for a DEA registration?

A No. It's usually done through our admin.

MS. KREINHEDER: Okay. No further questions.

JUDGE SOEFFING: Thank you, Ms. Kreinheder. Mr. Phelps, would you like to conduct redirect?

MR. PHELPS: Yes, Your Honor.

REDIRECT EXAMINATION

BY MR. PHELPS:

Q Dr. Cameron, I would just like to go back over with you for a little clarification about some of the things that the Government's attorney was just questioning you about.

So while you haven't personally conducted self-administration studies of LSD, psilocybin, or DOM, are you aware if those studies have been done?

A Yes. They have been done, and animals do not self-administer them. They are not typically -- animals do not seek them out,

they do not self-administer, there's no motivation or any sign of hedonic drug use or compulsive drug seeking. I'm not as -- full disclosure, I'm not as well-versed in DOM, but I can say that with certainty for LSD and psilocybin.

Q And throughout your professional experience, how thoroughly would you say you've reviewed the literature regarding self-administration studies of those drugs you were describing?

A I feel like I've researched the literature quite a bit. It was involved in my Ph.D. dissertation, and it is pertinent to the studies that I do now, which involve a lot of things like self-administration assays.

So I've -- I've written grants on it. I have bits and pieces of papers that are within different papers or reviews, that I've written about it as well.

Q And you did testify that there's similarities between DOI and DOC, right?

A Yes. So chemically, they're very similar compounds as they have a similar -- similar safety profile, similar receptor

pharmacology in terms of like which receptors they target on. So generally they're -- they're quite similar.

Q And how does the pharmacology of DOI and DOC compare to the pharmacology of these other drugs, LSD in particular?

A So they all hit the serotonin 2A receptor, which is again, that receptor that I've been talking about that likely has very high therapeutic potential. So they all kind of interact with that receptor, yeah.

Q Okay. And in your experience studying these various drugs and -- let me think how I want to phrase this. How does LSD interact with these brain targets, serotonin or others, compared to DOI?

A So DOI would probably be more selective and hit the serotonin 2A receptor. As I've mentioned a number of times, it's one of the most selective drugs that we have.

LSD does interact with the serotonin 2A receptor pretty potently, but it also hits a plethora of other receptors as well. So it's not as clean a drug, I would say.

Q Okay. And what does the

similarities in pharmacological profiles of drugs tell you about how --

MR. PHELPS: I'm sorry, Your Honor, I just have to say, I'm in the middle of questioning and being distracted by the comments coming over here from opposing counsel, so I just need to collect my thoughts for a moment.

JUDGE SOEFFING: Okay. Take your time, Mr. Phelps. Ask to keep the whispering to a minimum and to use note cards or something, if possible, to keep the noise level down.

MR. PHELPS: Thank you.

BY MR. PHELPS:

Q Dr. Cameron, what do similarities in pharmacological profiles of drugs tell you about similarities or differences of other elements of those drugs?

MS. KREINHEDER: Objection, Your Honor. This is outside the scope of my cross-examination.

MR. PHELPS: She was specifically questioning about similarities and differences between these other drugs and there was -- this

is totally in line with her questioning.

JUDGE SOEFFING: Overruled.

BY MR. PHELPS:

Q Do you need me to repeat the question?

A So can I answer it?

Q Oh, yes.

JUDGE SOEFFING: Yes, you may answer.

THE WITNESS: So usually when you have a drug with a molecular structure, if the molecular structures have the same core structure, they're going to have similar core action.

So I think maybe what you're getting at is the similarities between DOI and DOM which is, like if we know things about DOI, a lot of what we can know can be extrapolated to DOM. And -- and this can be done for any type of plastic drug, right. So there's like classes of, for example, barbiturates, right.

There are different types of them and they all have similar chemical structures and they do similar things. The same with SSRIs or whatever. So in the case of DOI, DOM,

DOB, DOC, whatever, they all have kind of a similar core structure, which is targeting serotonin 2A receptor which you've asked me about before and they do similar things and have similar safety profiles.

They do have tweaks, they aren't exactly the same. But it is a class of drugs that generally have a lot of similarities and cross over.

Q So how does small differences in the chemical structures of these compounds lead to changes in their behavioral effects?

A You can modify chemical structures to -- to see which modifications, which part of the molecule does what. And you could do that -- that's what I did for my Ph.D., is I made different variations of drugs.

And you can test to see what drug does that, and how does changing it change the molecule. So you could, in theory, do the same thing with DOI and the related compounds. Not totally sure if that's what's the answer.

Q You said that there haven't been side-by-side comparisons in direct testing regarding abuse potential of alcohol and DOI

and other drugs and DOI. In your expert opinion, why do you think that is?

A Because DOI's not typically considered an addictive drug.

Q And --

A Animals don't self-administer it, so we don't study it as if it were an addictive drug.

Q And when you're going for grant funding for these type of things, how do you think a grant proposal of an assay directly comparing alcohol and DOI would be received?

MS. KREINHEDER: Objection, Your Honor. This is outside the scope of cross.

JUDGE SOEFFING: Yes, sustained.

BY MR. PHELPS:

Q Dr. Cameron, the Government asked you if you had done surveys of the entire community that researches DOI. How much of the community that researches DOI would you say you've done surveys of?

A I mean this is my, you know, professional field. So I interact with these people all the time at conferences in different cities, in different countries, across a

variety of topics. So this is definitely the community in which I operate.

Q Could you explain how the -- well, let me say it this way.

What would you say in your expert opinion, is the general scientific consensus around the abuse potential of DOI?

A I would say the consensus is that there is low abuse potential. It is a very useful tool in field to study the serotonin 2A receptor and could have beneficial effects.

Q And again, in your expert opinion, what would you say is the scientific consensus around the potential harms to public health of scheduling DOI?

A I think it would impair research and the progress of many molecules, not just DOI. So the progress of DOI being studied might be impaired. But I've kind of mentioned before that it's a key tool in neuroscience studying that is -- is essential for studying the role of the serotonin 2A receptor specifically.

So if you want to study LSD or psilocybin or non-hallucinogenic analogs which are also being tested in clinical trials, I'm

sure you have all heard of the fact that these drugs are being tested widely now.

If we want to understand how these drugs work, if we want to make better versions of them, safer versions of them, we need to understand how they work. And they work typically, it's thought, through the serotonin 2A receptor.

So it's an invaluable tool. It -- it could have therapeutic properties on its own, but it's important for not only, you know, studying DOI or studying the serotonin 2A receptor, but all these other drugs and all these other therapeutics that are being studied now.

Q Okay. So thank you for that answer. I want to -- if you could specifically tell me what, in your expert opinion and in your familiarity with the field, what would you say is the scientific consensus about the potential impact on public health of scheduling of DOI?

MS. KREINHEDER: Objection, Your Honor. This is outside the scope of her expertise.

JUDGE SOEFFING: Well, I think we've

heard about this as well so --

MR. PHELPS: The only -- no problem we can move on.

JUDGE SOEFFING: It's been asked and answer. We've covered several -- I'll sustain the objection.

MR. PHELPS: Okay. Thank you.

BY MR. PHELPS:

Q Just a few final questions for you, Dr. Cameron. There was some questioning from the Government's witness about application for Schedule I licenses.

A Uh-huh.

Q And you testified that you have not directly applied for a Schedule I license under your own name; is that accurate?

A Yes.

Q When you started at the lab you're at now, just I -- I'm just trying to clarify because I wasn't quite sure when you were answering the other questions of. Did your PI already have Schedule I licenses or did you work -- or did they obtain them while you were there?

A So they had the general license, but

I had to apply for a specific drug under that license to do the research to do the research that I wanted to do.

So I worked with the PI and with the team in order to just add it to the license, and that takes over a year. So that's -- to be fair, that's not even a full license from granting up.

Q Oh, so it was -- okay. Can you explain a little bit about the general licensing versus the specific licensing that you mentioned?

A I -- I don't know a lot about it, because I don't really, you know, these admin things. But there's several processes, including get institutional approval, getting state approval, getting, I think it's FDA and DEA approval and you have to get all of that and then you have to obtain the drug, usually through something like NIDA.

So that -- it's you get a license and then you have to have like your safe put in and there can't be any windows, and the floors need to be a number of feet thick and stuff like that. So that's how you get a license.

And then you have to like get each individual drug approved or something like that, it's my understanding.

Q Okay. So and that's your understanding through going through the process of getting the specific license?

A Yeah --

Q Or --

A So, yep. So the labs that I've worked with have had these Schedule I licenses. And then to add another drug is like basically a year of paperwork. So getting that initial license is more -- more than them. But I'm not totally sure about that because I haven't done that process myself. Does that make sense?

MR. PHELPS: Yes. Thank you. No further questions for this witness, Your Honor. We would ask that she be permanently excused.

JUDGE SOEFFING: Okay. Well, I'm going to give the Government a chance to --

MR. PHELPS: Oh, no problem.

JUDGE SOEFFING: -- conduct any recross first. So thank you, Mr. Phelps. Ms. Kreinheder, would you like to conduct recross?

MS. KREINHEDER: Yes, Your Honor.

RECROSS-EXAMINATION

BY MS. KREINHEDER:

Q Doctor, you testified -- sorry. You testified that you were familiar with the process of obtaining a Schedule I researcher registration from DEA?

A Yeah. I worked with a team to get the license to study Schedule I substances.

Q Later during your testimony, you testified that admin people handle that? Is that correct?

A You work with a team of people, including safety people, including EH&S, drug inspection people, yes. You work as a team.

Q Could you please explain what specific part of the process you are familiar with?

A So I had to write the applications with my PI, that we did together, and we submitted to various admin for approval. And sometimes there's some back and forth and some revisions, then you could submit to the next, you know, agency or whatever you need to submit to.

And we often have different admin

people on our team actually submit the documents, give the revision questions to us, we handle the revisions, and resubmit it, that kind of thing.

Q So you filled out an application; is that correct?

A Well, yeah, but I -- yeah. But I had to like write paragraphs and letters and stuff. It's not just, you know, fill in the blank.

Q Do you know what specific application you filled out in the past?

A I don't remember them off the top of my head. This was a couple years ago now.

Q So your testimony that it takes several years to obtain this registration is founded in what, exactly?

A So -- so to get a Schedule I license, can take a year at minimum. And that is founded in the fact that my Ph.D. advisor had to do this and he couldn't even start his research in his laboratory until he had this license.

And I have also had experience adding drugs to an existing Schedule I license

and that also takes at least a year before you actually are able to do experiments with it. Does that?

Q Yes. So just so I'm clear, your PI told you how long it took to get the license from start to finish?

A Yes. Because -- yes, because I am interested in doing this in the future and I am going to be needing to set this up in my own lab. So like my person fit very nice in being open with this information and telling me what the steps are that are involved.

MS. KREINHEDER: No further questions.

JUDGE SOEFFING: Thank you, Ms. Kreinheder. All right. Let's go off the record.

(Whereupon, the foregoing matter went off the record at 11:21 a.m. and went back on the record at 11:23 a.m.)

JUDGE SOEFFING: Dr. Cameron, thank you for your testimony today. You are excused. I direct you not to discuss your testimony with anyone until the conclusion of the hearing.

And Mr. Phelps, did I hear you correctly that there's no intention to recall her?

MR. PHELPS: That is correct, Your Honor. We would ask that Dr. Cameron be permanently excused.

JUDGE SOEFFING: Okay. All right. Does the Government anticipate needing to recall her for any reason?

MS. KREINHEDER: No, Your Honor.

JUDGE SOEFFING: Okay. All right. Dr. Cameron, you are excused. We don't expect you to be recalled. But again, please do not discuss your testimony with anybody until the hearing is concluded. Thank you.

THE WITNESS: Okay. Thank you.

JUDGE SOEFFING: Okay. Mr. Phelps, Mr. Rush, call your next witness?

MR. RUSH: We'd like to call Joseph Hennessey.

JUDGE SOEFFING: Okay and is this -- in person. All right. Very good. Mr. Hennessey. And Mr. Rush, you're conducting the direct examination?

MR. RUSH: Yes, yes, I am.

JUDGE SOEFFING: All right. Mr.

Hennessey, please raise your right hand.

WHEREUPON,

JOSEPH HENNESSEY

was called as a witness by Counsel for the Petitioners, and, having been first duly sworn, assumed the witness stand, was examined and testified as follows:

JUDGE SOEFFING: Please state your first name, your last name, and spell them both for the record?

THE WITNESS: Joseph Hennessey, J-O-S-E-P-H H-E-N-N-E-S-S-E-Y.

JUDGE SOEFFING: Thank you. Counsel, you may enquire.

MR. RUSH: Thank you, Your Honor.

DIRECT EXAMINATION

BY MR. RUSH:

Q Would you please refer to Exhibit 75?

A Yes.

Q Do you recognize this document?

A Yes. This is my CV.

Q Did you write this document?

A I did.

Q Please look at the document. And is

this the form that you drafted it and is it accurate representation of what you wrote?

A Yes. This is accurate.

Q Would you please describe your education that you have?

A I have a bachelor of science in biomedical sciences and philosophy from Marquette University. And I am currently an M.D. Ph.D. student at the Medical College of Wisconsin. I have finished my pre-clinical years of medical school.

Q And are those both accredited universities?

A Yes, it is.

Q During your time of study, have you received any honors or awards?

A I have.

Q Could you please describe what those are?

A Yes. These are listed on my CV. These include awards for excellence in academic achievement, excellence in study, and excellence in research of biomedical sciences and philosophy.

Q Have you conducted any research?

A I have.

Q Would you please describe to us what that research is and what it entailed?

A At Marquette, I studied behaviors related to drug addiction and animal models as well as tracing circuitry of neuronal pathways in the brain.

And at the Medical College of Wisconsin with Dr. John McCorvy, I used functional assays of receptor activation to study a wide variety of aminergic G-protein coupled receptors.

And at these GPCRs including serotonin GPCRs, I personally tested hundreds of psychedelics and psychedelic-related compounds.

Q Did this involve laboratory research to conduct this research?

A Yes, it did.

Q And did that research involve the use of DOI?

A Yes, it did.

Q Do you have any research work that you have performed that has been published?

A Yes, I do. Those are listed on the

second page of my CV and include two papers, the first which is titled, "Psychedelics promote neuroplasticity through the activation of intracellular 5-HT2A receptors", and the second is listed after that.

Q And were those peer-reviewed articles?

A Yes, they were.

Q Utilizing your expertise and knowledge, have you engaged in any sort of leadership opportunities?

A Yes, I have while in undergrad and as a medical student.

Q Have you participated in any academic conferences?

A I have. They're not listed on my CV, but I've attended the Society for Neuroscience.

MR. RUSH: At this time, we'd like to request that Mr. Hennessey be certified as an expert in pharmacology and the therapeutic effects of DOI and DOC specifically as they relate to serotonin G-protein coupled receptors.

(Crosstalk.)

JUDGE SOEFFING: Any objection?

MR. MANN: Voir dire?

JUDGE SOEFFING: Yes. The Government may voir dire.

VOIR DIRE EXAMINATION

BY MR. MANN:

Q Good morning, Mr. Hennessey.

A Good morning.

Q You're still a student, aren't you?

A Yes.

Q Okay. You do not have a Ph.D.?

A Correct.

Q All right. And you're a second year student; is that correct?

A Yeah. I'm -- I'm in my second year. I finished all of pre-clinical medical school.

Q Okay. So I'm looking at your CV here. Do you see that, Exhibit number 75?

A Yes, I do.

Q All right. It says here that your expected finish date in the medical science training program isn't until 2031, correct?

A Correct, yes. I'm --

Q Okay. That's all I'm asking. So you're expected finish date here as a doctor of

medicine isn't until 2031; is that correct?

A Correct.

Q All right. And a doctor of philosophy, that expected finish date isn't until 2028; is that correct?

A That's correct.

Q Okay. You've won some honors and awards?

A Correct.

Q The Edward Carroll Award for Excellence in Academic Achievement. What did that -- what was that about?

A That was having the highest GPA in my major.

Q Okay. What'd it have to do with DOI or DOC?

A That was in biomedical sciences. So I took a lot of high level course work in neuroscience and including topics such as behavioral economics relating to addiction and other neuroscientific topics.

Q My question was, how does that relate to DOI or DOC?

A It does not.

Q This is what this hearing is about,

you understand. So how did that award relate to DOI or DOC? Did it relate it to it at all?

A In that very narrow sense, it was not related to DOI or DOC.

Q And this award from the Francis X. Boden Award for Excellence in the study of philosophy, did that relate to DOI or DOC?

A No, not in that very succinct sense.

Q And this award in the Biomedical Science Excellence and Research award, did that relate to DOI or DOC?

A That was related to substance use but not DOI or DOC.

Q Okay. All right. It says here that you are from June 2022 to June 2023, a research technician; is that right?

A Correct.

Q All right. And you said that you wrote or you've published two papers?

A Correct.

Q Did you write them?

A I wrote parts of them, but not the entire paper.

Q How much of them?

A The sections which I did the

experiments for.

Q And what's the percentage of the paper that you actually wrote, the Vargas MV paper, the first one?

A It's hard to give an exact percentage.

Q Okay.

A But it was fairly, I mean, probably about 5 percent.

Q Okay. And what's the percentage of the paper you wrote this Wallach, J paper?

A Also somewhat low percentage, 5 to 10 percent.

Q All right. And you understand that the person who is listed first in a paper is generally the one who does most of the work?

A I understand.

Q And the person who is listed last in the paper is the one who did some significant work, and that's the reason they're listed last; is that correct?

A Not entirely, no.

Q Do you disagree with that statement?

A I do disagree with it.

Q Okay. All right. And you're not

listed first, nor are you listed last in any of these papers; is that right?

A Correct.

Q All right. And you went to -- you've attended how many conferences?

A Conferences -- no national conferences.

Q Have you attended any conferences related to DOI or DOC?

A Yeah, there was work presented relating to DOI at Society for Neuroscience in Chicago.

Q How many of those conferences did you attend?

A I've been to one.

Q One -- one conference. Okay.

MR. MANN: One moment. Well, Your Honor, the Government opposes offering Mr. Hennessey as an expert on the pharmacology and therapeutic effects of DOI and DOC. Specifically as they relate to serotonin G-protein coupled receptors.

I do not believe that he -- first of all, he does not have a degree other than a bachelor's degree. He is still a student. His

work is still very much in progress. It appears that his goals -- his educational goals won't be reached until 2028 at the earliest. The other two won't be reached until 2031.

He's listed here only as a research technician. He wrote very, very low percentages of these two publications. He's attended only one conference involving DOC and DOI. He hardly qualifies as an expert.

Furthermore, Exhibit 75 was never offered into evidence, has never been accepted into the record. So there is no CV in the record here to even accompany his qualification. So we would be opposed on those grounds.

JUDGE SOEFFING: Thank you, Mr. Mann. Mr. Rush, I will give you an opportunity to respond.

MR. RUSH: Yes, Your Honor. In the interest -- Yes, Your Honor. In the interests of expediency, we're not going to dispute and argue about whether you have to receive awards specifically and not take the drug to be considered an expert. We'll agree that Mr. Hennessey is not an expert and we'll just like

him to appear as a fact witness.

JUDGE SOEFFING: Okay. Very well. So you're withdrawing your request that he be admitted as an expert in the proceeding?

MR. RUSH: That's correct, Your Honor.

JUDGE SOEFFING: All right. Very well. You may proceed in your questioning of the witness.

MR. RUSH: Thank you, Your Honor.

DIRECT EXAMINATION (CONT'D.)

BY MR. RUSH:

Q So you had commented or -- what type of research do you work on?

A I will begin my graduate studies in January, so I'm not currently conducting research. But when I was with Dr. John McCorvy from 2022 to 2023, I used functional assays like bioluminescence resonance energy transfer, also known as BRET, to study the activation and inhibition of G-protein coupled receptors by drugs.

Q And what is a serotonin G-protein coupled receptor?

MR. MANN: Your Honor, again, we are

into repeating over and over again the same testimony here. To the extent that this is different, I don't think it has any relevance.

And if it is different -- to the extent that it's different I don't think it has any relevance and I don't think it is different. I think it's just going to be the same thing over and over again.

JUDGE SOEFFING: Okay. So I'm going to overrule the objection. We're not going to spend a lot of time on this, but to kind of lay the basis for the following questions, I will allow some limited testimony since this witness, you know, was not here for much of the earlier proceedings, so overruled.

MR. RUSH: It's understood, Your Honor. And we'll try to keep this brief and move this along.

BY MR. RUSH:

Q Just briefly if you could, so we just understand exactly this generally is, but please keep it brief?

A Would you like me to respond?

Q Yes.

JUDGE SOEFFING: Yes, please answer

the question.

THE WITNESS: Oh, yes. We were primarily interested in psychedelics and I was involved in testing psychedelics at -- across all 12 serotonin GPCRs to get a better understanding of how they activate these receptors and to what degree they differentially activate certain receptors over others.

BY MR. RUSH:

Q And you stated before you are pursuing a degree, a medical degree and a Ph.D. When did you say it was -- I just want to refresh, when did you say the graduation date was?

A For the Ph.D., 2028, and the M.D., 2031.

Q All right. And the scheduling of DOI, if it was added to scheduling, how would that affect your current research and your obtaining the degree?

A Yes. So I've already joined a lab that has a Schedule II license from the DEA, but does not have a Schedule I license. And we are interested in studying psychedelics as it

relates to cognitive flexibility in depression, like models of depression in rodents.

And we have already started designing and conducting pilot experiments with DOI in order to get this work moving. And in conjunction with my Ph.D. advisor, who will be John Mantsch, we are targeting a date of April 2nd, I believe it is, 2025, to submit an F30 fellowship for this work.

And if DOI were to be placed into Schedule I, I certainly would not be able to meet that fellowship deadline. And it would adversely affect the timelines that I have to complete my Ph.D.

Q Would you explain what that fellowship is?

A Yeah. It's a fellowship for M.D./Ph.D. students. It's a training grant from the NIH, it's awarded through certain NIH institutions like the National Institute of Mental Health or NIDA, et cetera, and it's for training the next generation of scientists. And it's a very, very impactful award, and it provides money for funding for research.

Q Alluding specifically to your own

knowledge and not applying your opinion or speculation, regarding any discussions that you may have had with other people or conversations with other students regarding this, what has responses regarding or what is your take regarding their perceptions on how it would affect their academic and research paths if it were to be scheduled, DOI?

MR. MANN: Objection, Your Honor. He's just asked for a whole lot of hearsay.

MR. RUSH: Your Honor, hearsay is admissible in this Court with your discretion. The rules of hearsay evidence do not strictly apply here.

JUDGE SOEFFING: Yes. We've already heard, this is also starting to get to be repetitive. I mean, I'll overrule the objection. But I'm not sure there's a lot of weight I'm going to be giving to this testimony.

MR. RUSH: Understood, Your Honor.

JUDGE SOEFFING: You may answer the question.

THE WITNESS: Oh, yeah. In speaking, in my personal experience speaking

with my Ph.D. mentors, the scheduling of DOI would adversely affect our -- our plans for future research, which includes research into potential treatments for depression and addiction.

MR. RUSH: Your Honor, we have no further questions for this witness.

JUDGE SOEFFING: Okay. Thank you, Mr. Rush. Mr. Mann, would you like to conduct cross-examination?

MR. MANN: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. MANN:

Q Mr. Hennessey, you worked with John McCorvy, correct?

A That's correct.

Q And John McCorvy had a Schedule I DEA registration, did he not?

A That's correct.

Q Okay. Did you work with John McCorvy on researching DOM?

A It -- it has been researched in the lab. I -- I personally have not tested that drug.

Q Was that research involving DOB?

A We -- we test many hundreds of compounds in that lab. It's hard to know -- to know specific drugs, but it has been tested in the lab, not by me.

Q Okay. And you mentioned that you've talked to a number of mentors; is that correct?

A Yes.

Q Okay. And who are they?

A John McCorvy and John Mantsch.

Q Okay. Does John Mantsch have a DEA registration?

A He has a Schedule II license as he studies cocaine and, yeah.

Q Okay. You're here making representations about the DEA procedures and how to obtain a DEA registration and how long it takes. And could you please tell me who at DEA did you speak with to get your information?

A I did not make those claims that you just said. But I have not spoken to --

Q Oh, you have not testified about the procedure for getting a DEA registration and how difficult it will be?

A No. I have not personally testified about that.

Q Okay. So you don't know how difficult it is to get a DEA registration, do you?

A I've spoken with people who have gone through the process.

Q Yeah, and my question is do you know how difficult it is to get a DEA registration, whether it is difficult or not?

A Yes.

Q All right. And who did you speak with at DEA who informed you -- who informed your opinion that it is difficult to obtain a DEA registration?

A I've spoken with John Mantsch and John McCorvy, both of whom have gone through the process personally.

Q So John McCorvy works at DEA, is that your testimony? I asked you who you spoke with at DEA to determine whether it is difficult or not to obtain a DEA registration. Who did you speak with at DEA?

JUDGE SOEFFING: Hold, Mr. Mann, just one question at a time, let him answer.

THE WITNESS: I have not spoken with anyone at DEA.

MR. MANN: Thank you.

JUDGE SOEFFING: All right. No further questions, Mr. Mann?

MR. MANN: That's all, thank you.

JUDGE SOEFFING: Mr. Rush, anything on redirect?

MR. RUSH: No. We have no questions, Your Honor, we, I mean, release the witness.

JUDGE SOEFFING: All right. Do you expect to recall this witness?

MR. RUSH: No, we do not, Your Honor.

JUDGE SOEFFING: All right. Thank you for your testimony, Mr. Hennessey, you are excused. I direct you not to discuss your testimony with anyone until the conclusion of the hearing, so can you discuss with your -- with your attorneys.

THE WITNESS: Okay. Thank you.

JUDGE SOEFFING: All right. Mr. Phelps, Mr. Rush, do you want to call your next witness?

MR. PHELPS: Yes, Your Honor. Our next witness is going to be Dr. Pasha

Davoudian. He will be appearing via video. So if we could have just a few minutes to make those arrangements.

JUDGE SOEFFING: Okay. We'll go off the record and I will step out while you get him online.

MR. PHELPS: Thank you, Your Honor.

(Whereupon, the foregoing matter went off the record at 11:47 a.m. and went back on the record at 11:59 a.m.)

JUDGE SOEFFING: We're back on the record, yes.

MR. PHELPS: Thank you, Your Honor. Petitioners call Dr. Jason Younkin.

JUDGE SOEFFING: Okay, Dr. Younkin, can you hear me?

DR. YOUNKIN: Yes, I can, sir.

JUDGE SOEFFING: Okay, very good.

Dr. Younkin, please raise your right hand.

Whereupon,

DR. JASON YOUNKIN

a witness, was called by Counsel for the Petitioners and, after having been first duly sworn, assumed the witness stand and was

examined and testified as follows:

JUDGE SOEFFING: Please state your first name, your last name, and spell them both for the record.

THE WITNESS: Jason, J-A-S-O-N, Younkin, Y-O-U-N-K-I-N.

JUDGE SOEFFING: And Dr. Younkin, during your testimony, you should not look at any materials or documents except exhibits that you are directed to look at by Counsel or me, do you understand?

THE WITNESS: Yes, I do.

JUDGE SOEFFING: Okay, you can put your hand down.

And Mr. Phelps, you may inquire.

MR. PHELPS: Thank you, Your Honor.

DIRECT EXAMINATION

BY MR. PHELPS:

Q Thank you for being here today, Dr. Younkin. I'd like to begin by taking a look at what's been marked for exhibit purposes as students for -- SSDP Ramos Exhibit 83. The first line on that page reads, Jason Younkin Curriculum Vitae. Do you have that there?

A No, I assumed you were pulling that

up.

Q Oh, I apologize. Do you have access to pull that up there?

A I actually have it open for something else, and yes.

Q Thank you.

A I did have it open, but it only took a second. Okay, I have it open.

Q And do you recognize this document, Dr. Younkin?

A Yes, I do.

Q And did you write this document?

A Yes, I did.

MR. PHELPS: Your Honor, at this time we would move to admit what's marked for identification purposes as Exhibit 83.

JUDGE SOEFFING: Okay, I don't think he actually said what it was.

MR. PHELPS: Oh, I'm sorry. Let me -- let me take a step back. Yeah, a little more foundation.

BY MR. PHELPS:

Q Could you tell us what that document is, Dr. Younkin?

A It is my personal curriculum vitae,

or CV, same thing as a resume. Do you need more details?

Q I think that identifies the --

JUDGE SOEFFING: Let me just ask, Dr. Younkin, how many pages is it?

THE WITNESS: Seven.

JUDGE SOEFFING: Okay, thank you.

MR. PHELPS: Thank you, Your Honor. At this time, Petitioners would move to admit what's marked for identification purposes as SSDP Ramos, Exhibit 83.

JUDGE SOEFFING: Okay. Government, who's handling this witness? Ms. Attanasio, any objection to this?

MS. ATTANASIO: No objection, Your Honor.

JUDGE SOEFFING: Okay. Petitioner's Exhibit marked for identification number 83 has been offered. In the absence of objection, it is received in the record as Petitioner's Exhibit 83.

(Whereupon, the document marked as Petitioner Exhibit No. 83 for identification was received into evidence.)

JUDGE SOEFFING: It's in. You may

use it.

MR. PHELPS: Thank you, Your Honor.

BY MR. PHELPS:

Q Dr. Younkin, what degrees do you hold?

A A PhD in neuroscience from Virginia Commonwealth University, bachelor's degree in neuroscience from College of William & Mary, associate's in science from Thomas Nelson Community College. That is it.

Q And where was that that you pursued your undergraduate education?

A The College of William & Mary.

Q And what specifically did you study there?

A Neuroscience.

Q And where did you pursue your PhD program?

A Virginia Commonwealth University.

Q And what do you hold your PhD in?

A Neuroscience.

Q Can you talk just a little bit about the PhD coursework curriculum you completed to obtain that degree?

A Started with a five credit course in

biochemistry, a first half and a second half. Five credits each. There were two neuroscience classes. I don't remember the exact titles of those classes, but they reached three credits.

One was basically the anatomy, the other was basically the function. And then after that, there was a 600 level course in pharmacology. There was a 500 level course in biostatistics. There were multiple 600 level courses in physiology and biophysics. That was the actual department that I was in. The neuroscience degree is a program, not a department.

There were numerous different seminar versions along the way. Also present classes that basically were presentations. Either presenting my work in progress to a different group or presenting a journal article called Journal Club.

Q And in addition to that coursework curriculum, what else did your PhD program consist of?

A Much time spent in the actual dissertation lab of my dissertation advisor. That was also considered a course. Whatever

credits we had up to that point, we would add on however much to make 15 credits.

So, at the beginning, it was like two or three credits, but once those courses were done, it was more like 15 credits. So full-time research in my dissertation lab.

Q And can you talk a little bit about your dissertation research?

A It was about anti-psychotic drugs and their effects on three different receptors, their GPCRs. The main one was the serotonin 2A receptor. It forms a heteromer with the metabotropic glutamate receptor 2.

It also forms a separate heteromer with the dopamine 2 receptor. So previous work had been done on the mGlu2/2AR version. I did some work that brought it into mammalian cells.

And then the brunt of the rest was with a fairly newly discovered heteromer between the D2R and the serotonin 2AR. And about two-thirds of my dissertation was looking at the functional changes when they formed a heteromer together.

Q And is there any particular scientific terminology used to describe this

interplay of dopamine and serotonin receptors?

A The receptors themselves, they can either bind as a heteromer, but also the functional crosstalk between the two.

Q Can you please define for us what crosstalk is?

A In this case we were looking at actual physical contact that would change the crosstalk. And the crosstalk means if one receptor is functioning the way it functions, it can affect the function of the other receptor.

So basically the signaling downstream gets changed depending on the binding of the two receptors together and what drugs are added on one side affecting the function of the other side.

In this case, at that time, mostly anti-psychotics, but also what we were calling pro-psychotics, which are essentially psychedelics.

Q So you use psychedelics as part of your study of crosstalk in dopamine and serotonin receptors?

A Yes, specifically DOI.

Q I'd like to -- well besides your academic education that you -- that you discussed, do you have any other -- have you completed any other education programs?

A Yes, along the way on the CV that I assume you're all looking at, I listed it as professional military. Here, the strategic education part was an online learning to be able to teach online.

But then also in the military I went through Naval Nuclear Electronics Technician Schools, the A-School, the Power School, and Prototype. That was in the United States Navy in Orlando, Florida and Ballston Spa, New York.

Q Could you talk a little bit about that Navy or Naval Nuclear Electronics Technician A-School?

A The A-School was the beginning of the two-year program. It was seven weeks and it was intensive learning of electronic systems and electrical circuitry. Do you want me to segue into Power School and Prototype?

Q Oh yes, please, if those are -- yes. The Power School then was the nuclear -- at the beginning of the nuclear side of that. Now

that we had a trade essentially, then we went through six months of Power School and it is considered the top school in the world for anything involving nuclear power ahead of MIT, Duke, places like that.

And finally the Prototype was the final six months where we actually operated and maintained a nuclear reactor before we graduated all that and went to the fleet.

Q And -- in that -- in that Navy nuclear program, did you -- well, I guess how did it -- how did your -- how did your -- you're moving through those Navy -- Naval nuclear programs. Well, let me clarify. Is there any relationship between what you learned in that Navy nuclear program to your other academic education?

A I would say that it was mostly a completely different topic, but it was -- being nuclear, was obviously heavily physics, which led to the biophysics department that I was in for the PhD at VCU.

And that led to a knowledge of electrophysiology, which was a heavy part of that dissertation work that I did. And then

later on as a postdoc at -- sorry, VCU, it also led to a good knowledge of the physics behind certain photonics methods involving fluorescence, luminescence, things like that.

Q Okay.

A And all of those I'm describing were used to test psychedelics, or potential psychedelics.

Q And Dr. Younkin, have you published -- have you published research regarding your crosstalk study?

A Yes.

Q And looking at pages four and five of that CV, could you give -- could you just give us the number of those publications that were specifically related to the crosstalk study?

A So out of the eight publications, six of them are related to the crosstalk.

Q And out of the -- the presentations that are listed on pages six and seven, how many of those presentations that you gave were dealing with your crosstalk studies?

A So I'm counting right now. All but the -- all but the top three. So 1, 2, 3, 4,

5, 6, 7, 8, 9, 10. The top three were later on as a postdoc, specifically for psychedelics.

Q And Dr. Younkin, what's your current title or position?

A Assistant Professor, Biology Department at VSU.

MR. PHELPS: Your Honor, at this time we would move to admit Dr. Younkin as an expert in the study of crosstalk between dopamine and serotonin receptors.

JUDGE SOEFFING: Ms. Attanasio, any objection?

MS. ATTANASIO: Yes, Your Honor. We object to him being qualified as an expert in crosstalk between dopamine and serotonin because there was nothing in the pre-hearing statement that really discloses or relates to the expertise noticed to it. It appears that he's really, in the pre-hearing statement, that he is really just talking about research harm.

There's no facts about DOI and DOC. He says he may use DOI in one of his studies. He calls himself a junior investigator, so -- and he does not talk about anything relating to the eight-factor test.

JUDGE SOEFFING: Okay. Did you want to conduct any voir dire or just make the objection?

MS. ATTANASIO: Just make the objection.

MR. PHELPS: And if I could respond to that, Your Honor, we're specifically -- if we look at -- first of all, in regards to notice, there was notice in the supplemental pre-hearing statement that this is what he was an expert on. And looking at the original pre-hearing statement, the second sentence specifically mentions his study of crosstalk between dopamine and serotonin receptors. The motion was specifically related to that expert designation.

Anything else that she was talking about is not relevant to the court's determination of his expertise. And there's been no voir dire or questioning of his qualifications in the very specific limited topic that he's listed in as an expert.

MS. ATTANASIO: There -- excuse me, Your Honor, if I may. There is no need to voir dire him as an expert in this, because there's

no facts in the pre-hearing statement that talks about it.

All it says is that he studied the crosstalk between dopamine and serotonin receptors. Nowhere in the pre-hearing statement does it talk about what this even means, what's it about, et cetera.

JUDGE SOEFFING: Okay. So what I'm going to do is -- all right. The Petitioners have offered Dr. Younkin as an expert in the study of crosstalk between dopamine and serotonin receptors. The Government has objected to the qualification of Dr. Younkin as an expert in that field.

However, based on the witness's knowledge, skill, experience, training, and education, I will overrule the objection. The Tribunal will accept the witness as an expert in the study of crosstalk between dopamine and serotonin receptors.

I do think the Petitioners have shown that he is qualified to be an expert in that area. Whether, and to what extent, it relates to the additional testimony he may provide, we will see on that.

It may not have any bearing on the facts that he testifies to, but I will recognize him as an expert based on his credentials and his knowledge, skill, experience, education, so.

MR. PHELPS: Thank you, Your Honor.

JUDGE SOEFFING: So to be clear, the witness is being accepted as an expert in the study of crosstalk between dopamine and serotonin receptors.

MR. PHELPS: Thank you.

BY MR. PHELPS:

Q Dr. Younkin, can you explain what DOI has to do with your expertise in the crosstalk between dopamine and serotonin receptors?

MS. ATTANASIO: Objection, Your Honor, outside the scope of the pre-hearing statement.

MR. PHELPS: Your Honor, this is exactly what they were asking us to show, so.

JUDGE SOEFFING: Well, let's see where it is.

MR. PHELPS: Well, it mentions DOI there at the bottom of the first paragraph.

And again, I mean, this is -- I think what the Government seems to be asking for is they wanted written word-for-word testimony to know word-for-word what they want to say. If that was --

JUDGE SOEFFING: No, that's not the standard. And certainly that's not the standard I've been holding anybody to. There's been a lot of leeway given by the Tribunal for people to talk about things that were maybe not specifically identified here. I do appreciate the efforts that both sides have made to try to limit to be the most relevant to what I've allowed.

MR. PHELPS: Just a single question, Your Honor, and that's -- we don't even have to go into details or follow-up. I just would like him to be able to answer that one question of how DOI relates to his expertise in that field.

JUDGE SOEFFING: I'll allow it. Overruled.

THE WITNESS: Can you repeat the question?

BY MR. PHELPS:

Q Yes, sir. Can you explain the significance of DOI in your study of crosstalk between dopamine and serotonin receptors?

A So I had mentioned placing drugs into the system. They're going to bind to one receptor or the other. The only known and used agonist for the serotonin 2A receptor, an agonist means it activates it.

MS. ATTANASIO: Objection, Your Honor. He's becoming cumulative now.

JUDGE SOEFFING: Overruled. I'll let him finish his answer to this question.

MR. PHELPS: Thank you, Your Honor.

BY MR. PHELPS:

Q Please continue, Dr. Younkin.

A So to study the effect of an agonist on that side of a heteromer, of the heteromer between the two receptors, DOI is basically the only one we can use because it is a pro-psychotic, which is what we were calling it at the time. Now we call it psychedelic. That's why DOI is integral to that study.

Q So, Dr. Younkin -- you say, I guess I'm -- maybe I can seek a little clarification from your Court -- from the Court, Your Honor,

based on the Government's repeated objections.

At the bottom of the first paragraph of the joint pre-hearing statement, there is a -- this is where he mentioned specifically the use of DOI. I just want to seek the Court's permission to just let him explain that one sentence and then we'll move on from the specifics of his research.

JUDGE SOEFFING: Go ahead.

MR. PHELPS: Thank you, Your Honor.

BY MR. PHELPS:

Q Dr. Younkin, can you talk a little bit about your future plans to use DOI in studies with zebrafish?

A So as the only unscheduled psychedelic, and the strongest one in many different assays, it becomes the only real comparison. So when I -- when I am established and have my zebrafish rig set up, there are several ways to study the zebrafish and I admit that I cannot speak on that right now. I just know they exist.

Once that's set up, I need DOI to be able to compare any of the new potential therapeutic psychedelic drugs to the DOI and

its effects. And there are other agonists of the serotonin 2a. However, DOI is the only psychedelic one that is not scheduled, or hallucinogenic one, I should say.

Q Thank you. And we've heard a lot of testimony so far about experiments or assays using rodents and cells. What is it about zebrafish specifically that's -- why zebrafish?

A So, much cheaper to begin with. A practical reason is I have that rig already here at BSU waiting for me to use. And with several different ways to do it, it becomes an excellent complement to other studies would be things you just mentioned that I'm sure have been already mentioned many times, the head twitch in mice and various other assays.

So with the zebrafish, cheap, quick, and the availability of DOI makes, makes it not only easy to compare to DOI, but like I said, DOI is the comparison for a psychedelic that affects the serotonin 2a.

Q Thank you. So, how would -- how would DOI being placed in Schedule I impact your research with the zebrafish?

A So to do the research here with the

zebrafish at BSU, I would not have a comparison and it will take -- I estimate at least a year to get a DEA license to be able to have DOI again, plus all the other various psychedelics that are scheduled currently. So it would be a minimum of a year delay to just get started.

The term junior PI was brought up. Junior PI really just means new PI. To establish myself as a PI and get funding, I'm going to need to be able to run this zebrafish assay and have something to compare it to. So any delay, a year or more, is going to cost me time to become a PI. And we haven't even said what PI is, principal investigator, and the ability -- and the ability to get funding. If I can expound, I mean, the whole point of me joining this was to give a real-life version of what happens if this goes on a schedule.

It will delay me and anybody else who wants to do new research involving psychedelics, because they will have to get -- they'll either have to join a lab that has a DEA license or get their own DEA license.

Q Thank you. How did you -- how did you come to your estimate that it would take

you a year? Actually, let me be more specific on that. Who did -- who did you specifically talk to or consult with to make that determination?

A At one point, while I was a postdoc in the Javier Gonzalez-Maeso Lab, I asked him -- I asked him how long it took him to get his DEA license. He estimated about six months.

MS. ATTANASIO: Objection, Your Honor, hearsay.

JUDGE SOEFFING: Okay, it is hearsay. We have allowed other testimony on this based on the experiences of the researchers and their various labs, so I'll overrule the objection.

MR. PHELPS: Please continue.

JUDGE SOEFFING: You can continue your answer.

THE WITNESS: Yeah, so having talked to him and getting an idea of how long it took him, I applied that to BSU where none of this has been done. I think a year is actually a lowball estimate, in all honesty. I think it'll probably take upwards of two years, but I wanted to be fair and say two, and say the one

year.

Nothing like this has been done here. There is no DEA license on this campus. It's a whole new thing that I have to figure out.

BY MR. PHELPS:

Q Have you consulted with anyone employed through the DEA -- employed through the DEA directly, and you're learning about this process?

A Not yet, no.

Q Thank you. No further questions for this witness, Your Honor.

JUDGE SOEFFING: Okay, thank you, Mr. Phelps.

Ms. Attanasio, would you like to conduct a cross-examination?

MS. ATTANASIO: Yes, Your Honor, one moment.

No further questions, Your Honor, actually.

JUDGE SOEFFING: Okay, very good.

Dr. Younkin, thank you for your testimony. You are excused. I direct you not to discuss your testimony with anyone until the

conclusion of the hearing. Thank you.

THE WITNESS: Thank you.

MR. PHELPS: We would ask that Dr. Younkin be permanently excused as well.

JUDGE SOEFFING: Okay, no intention to recall him?

MR. PHELPS: No, Your Honor.

JUDGE SOEFFING: Government, no intention to recall?

MS. ATTANASIO: No, Your Honor.

JUDGE SOEFFING: We don't expect you to be recalled, Mr. Younkin, or Dr. Younkin. Thank you.

All right, let's go off the record.

(Whereupon, the above-entitled matter went off the record at 12:26 p.m. and resumed at 12:27 p.m.)

JUDGE SOEFFING: Back on the record. We will adjourn for one hour for lunch.

(Whereupon, the above-entitled matter went off the record at 12:27 p.m. and resumed at 1:38 p.m.)

JUDGE SOEFFING: We're back on the record. Welcome back, everybody.

Mr. Phelps, are you ready to call

your next witness?

MR. PHELPS: We are, Your Honor. Petitioners would call Dr. Mario de la Fuente Revenga.

JUDGE SOEFFING: All right. Shall I refer to you as -- what's the best way to refer to you, Doctor? First of all, can you hear me?

DR. DE LA FUENTE: Dr. de la Fuente would be appropriate.

JUDGE SOEFFING: Dr. de la Fuente?

JUDGE SOEFFING: Okay. Very good. Welcome. Doctor, please raise your right hand. Okay. Let's go off the record.

(Whereupon, the above-entitled matter went off the record at 1:38 p.m. and resumed at 2:01 p.m.)

JUDGE SOEFFING: All right. Back on the record. Okay. So we were not able to establish a good connection with Dr. de la Fuente so he will be subject to being called later in the case.

Mr. Phelps, you may call your next witness.

MR. PHELPS: Thank you, Your Honor. Petitioners call Dr. David Earl Nichols.

JUDGE SOEFFING: All right. Dr. Nichols, please raise your right hand.

Whereupon,

DAVID NICHOLS

a witness, was called by Counsel for the Petitioners and, after having been first duly sworn, assumed the witness stand and was examined and testified as follows:

JUDGE SOEFFING: Please state your first name, your last name, and spell them both for the record.

THE WITNESS: My name is David Earle Nichols. Did you ask me to spell it?

JUDGE SOEFFING: Yes, please.

THE WITNESS: D-A-V-I-D N-I-C-H-O-L-S.

JUDGE SOEFFING: Thank you. Dr. Nichols, during your testimony, you should not look at any materials or documents except exhibits you are directed to look at by Counsel or me. Do you understand?

THE WITNESS: Yes.

JUDGE SOEFFING: Okay.

Counsel, you may inquire.

MR. PHELPS: Thank you, your honor.

DIRECT EXAMINATION

BY MR. PHELPS:

Q Good afternoon, Dr. Nichols. Thank you for being here on short notice. I'd like to direct your attention to what's been marked for identification purposes as Exhibit No. 79. It has the title Curriculum Vitae across the top.

A Okay. Do you want me to bring it up to my computer here?

Q Yes, sir, please.

A Just give me a second. Okay.

Q Do you recognize this document, sir?

A Just a minute. My computer started going faster when I did this. Just a second. Can you ask your question again? Maybe I could --.

Q Yes. Do you recognize that document?

A Yes. It's my curriculum vitae.

Q And did you -- are you familiar with the contents of that document?

A In essence, yes.

Q Did you create that document?

A Yes.

MR. PHELPS: Your Honor, Petitioners would move to admit what's marked for exhibit purposes -- identification purposes as Exhibit No. 79 into the record.

JUDGE SOEFFING: Mr. Mann, any objection?

MR. MANN: Only to the extent that the document hasn't really been described, its number of pages and what it contains.

JUDGE SOEFFING: Okay.

MR. PHELPS: Certainly, we can lay a little more foundation.

BY MR. PHELPS:

Q The document that you're -- that you're looking at, how many pages is that, Dr. Nichols?

A Let me scan to the back really quickly. It totals 57 pages.

Q Thank you. And I don't want you to go through the entire 57 pages, I don't think, but as you're scrolling back up, could you make note if you recognize the contents within those 57 pages?

A Well, yes, I wrote the CV, so yes.

Q Okay.

MR. PHELPS: Your Honor, at this time, Petitioners would move to admit what's marked for identification purposes as Exhibit Number 79.

MR. MANN: No objection.

JUDGE SOEFFING: All right. Petitioner's exhibit marked for identification number 79 has been offered. In the absence of objection, it is received in the record as Petitioner's Exhibit 79.

(Whereupon, the document marked as Petitioner Exhibit No. 79 for identification was received into evidence.)

JUDGE SOEFFING: It's in. You may use it.

MR. PHELPS: Thank you, Your Honor.

BY MR. PHELPS:

Q Dr. Nichols, what degrees do you hold?

A My first degree is a Bachelor of Science degree in chemistry, and I have a PhD in medicinal chemistry.

Q And where did you pursue your undergraduate education?

A My undergraduate degree in chemistry

was from the University of Cincinnati. I completed that in 1969.

Q And what did you study as an undergrad?

A Basically, I was a chemistry major with a minor in biological sciences, so all the standard chemistry tests and basic biology, biochemistry, and then, of course, the usual history and English and literature courses, things like that.

Q And where did you pursue your PhD?

A I was in the College of Pharmacy at the University of Iowa in the Department of Division of Medicinal Chemistry.

Q And what do you hold your PhD in?

A It's in medicinal chemistry, which is the subject that sort of describes the relationship between chemical structures and their biological activities.

Q Can you talk a little bit about your PhD coursework curriculum?

A So in medicinal chemistry, it's somewhat interdisciplinary. We took all the same courses that a chemistry major would take. Analytical chemistry, organic chemistry,

advanced organic chemistry, mechanistic chemistry.

And in addition, those are the major courses. And then we also took minor courses in things like biochemistry, pharmacology, to round things out. And then specialized courses we took in actually medicinal chemistry and drug design, interpreting dose response curves and that sort of thing.

Q And in addition to that curriculum you just described, what else did your PhD program consist of?

A Well, we had laboratory research where we actually made specific molecules to be tested. I also worked closely with the pharmacology department, which was in the next building over in the College of Medicine. Many of the compounds that I made as a graduate student were tested in the pharmacology department.

And then subsequently, after I got my PhD in January of 1973, I then spent time as a postdoctoral fellow in pharmacology, learning more about how biological assays were run, how to interpret biological data, that sort of

thing.

Q And what was the topic of your dissertation research?

A I was studying what were called psychotomimetics, which also could have been called hallucinogens, and more popularly were called psychedelics. So my PhD work was on the synthesis of novel molecules that fit into that category of psychedelics, basically.

Q Can you explain what you mean about the synthesis of those chemicals?

A So, we would actually envision the structure of an organic molecule, and then think about ways to make it and actually do the laboratory work to put the reagents together.

Usually those were multiple-step syntheses, and you couldn't just put two things together and get a molecule. You would have a sequence of steps you would have to carry out to get to the final molecule.

Most of the molecules that I did were related, in terms of their chemical structure, to the molecule mescaline, which is a naturally occurring compound from the peyote cactus.

Q Was DOI involved at all in your dissertation research?

A Actually, while I was a graduate student, I received a patent for the synthesis of those types of molecules related to people.

MR. MANN: Your Honor --

JUDGE SOEFFING: Hold on.

MR. MANN: -- specific questions be asked and answered, and we don't go on to a narrative about something else.

JUDGE SOEFFING: I think we can give some free reign in exploring his background so overruled.

MR. PHELPS: I just want to note, we will be keeping this tailored, too, as we've been doing.

BY MR. PHELPS:

Q Please continue, Dr. Nichols.

A Actually, I developed the synthesis for making the optical isomers of DOI, and that was the patent that I received while I was a graduate student.

Q So we've heard a lot of chemistry talk in the last few days, but I haven't heard specifically about the isomers. Could you just

explain the basic chemistry behind that?

A Basically, all living organisms are made of amino acids. They're comprised of proteins, which are made of amino acids. All amino acids are of only one type.

If you think about your left hand and your right hand, they're mirror images. So if you hold your right hand in front of a mirror, the image in the mirror is actually of your left hand. Many organic molecules have such optical isomers or mirror images.

They're called, sometimes, enantiomers or optical isomers. Hallucinogenic amphetamines like DOI have both a right and left-handed mirror image. They're called enantiomers or optical isomers. I developed a method for making the optical isomers of substituted hallucinogenic molecules, including DOI.

Q Is there a difference in how different isomers of the same chemical function?

A Yes, because the body is made of amino acids of only one type. They're called L-amino acids. Amino acids also have these

optical isomers.

In nature, the ones that comprise our bodies are made only of the L-amino acids. The receptors that drugs bind to are made of these proteins and amino acids that are only of one type of what's called chirality, left-handed or right-handed.

If you have a drug where you have two possible mirror images, like DOI, they interact differently with the receptors because the receptors are only one kind of amino acid.

For example, DOI, the most potent isomer of DOI, is designated as R, and it rotates plane polarized light to the left. It's a levorotatory. That's the more potent of the isomers of DOI.

Q Approximately how many peer-reviewed articles have you published on your research?

A I think it's around 300. I mean, I can check my CV, but somewhere around, let's see. I guess I could scroll down here pretty quickly.

Actually, peer-reviewed publications, as of today, I have 293. Then I have a number of book chapters and monographs

that were written. They're not peer-reviewed, but also they're scientific publications. About 300 are peer-reviewed.

Q Thank you. Of those 300 -- so peer-reviewed articles and the other publications you described, how many of those would you say deal with the structure activity relationships of psychedelic agents?

A More than half. I had three research grants that were supported by the government. One had to do with psychedelics or hallucinogens, and that ran for 28 years, I think.

Then I had one to study drugs that could potentially be used in treating Parkinson's disease or schizophrenia. There was a fewer of those.

Then I had a third grant that I worked on for 12 years that was to study drugs related to MDMA or ecstasy.

Q Where have you published that research?

A Mostly in scientific journals. Many of mine were in the Journal of Medicinal Chemistry, which is the main publication of the

American Chemical Society. But I also had a joint appointment and was a pharmacology professor at Purdue as well. Many of my publications were also published in pharmacology journals.

Q And in addition to your PhD program that you described, do you have any other educational experience that's relevant to the study of the structure activity relationships of psychedelic agents?

A Well I did a postdoctoral fellowship in pharmacology. I did behavioral pharmacology. And when I was at Purdue, I actually was given a joint appointment as a professor of pharmacology.

I also taught pharmacology. I also was an adjunct professor in the Indiana University School of Medicine. I taught portions of courses in pharmacology to the medical students. So I jointly taught in chemistry, medicinal chemistry, and pharmacology. And that really facilitated my research in psychedelics because most medicinal chemists are principally chemists. They send their compounds to someone else for testing,

but I could do the testing in-house.

So I taught -- I had graduate students that were trained both in chemistry and also in pharmacology. It was kind of a mixture of doing two different things.

Q And could you just explain specifically what is the study of the structure activity relationships of psychedelic agents? What does structure activity relationships mean?

A So every organic molecule has a specific structure. We have mixtures of carbon atoms and aromatic rings and so forth. And they interact in the body with various types of enzymes or receptors.

So in the absence of a photograph of what that receptor actually looks like, what you do is make a series of chemical molecules, and then you put them into that biological system to see what is their relative activity.

Do they activate that receptor, or do they inhibit that receptor, or do they activate some enzyme, et cetera. And so the degree to which a molecule will activate a receptor or an enzyme is related to its

chemical structure.

So if you modify a molecule, it will change its activity. So by making a series of molecules, a series of structurally related molecules, and then looking at how they interact with that biological target, which ones are more potent, which ones are less potent, you can actually infer something about what the shape of that receptor is.

We were trying to understand what the receptor was that these hallucinogens or psychedelics are bound to. We didn't have a picture of it, so we made a series of molecules, and then we would test them in these biological systems to see which were more potent than others.

And that would lead us to inferences about what that receptor looked like, sort of the mirror image, if you will, of the molecule.

Q And is the study of structure activity relationships limited to only psychedelic agents?

A All drugs that are out there, every drug that's been made, every pharmaceutical company, all medicinal chemists basically focus

on that. What is it about the molecule itself that gives it the particular properties it has in activating a receptor, or turning on an enzyme, or turning off an enzyme?

This is basically the way that drugs are developed, by understanding when you modify one molecule and it changes its biological activity, and does that give you a new drug, or does it give you a new direction? Or you can do a series of modifications and find something that's the most active.

Q And could you please describe any experience you may have testifying as an expert witness in other proceedings?

A I've testified in a couple of criminal cases. I don't usually do that. And then I was qualified as an expert, and I testified as an expert in a number of cases where pharmaceutical companies had a patent, and some other company was trying to invalidate their patent.

And I testified as an expert with respect to the chemistry and pharmacology of those drugs and whether it was a legitimate discovery or not. So I've been in a number of

courtroom situations, maybe 10 or 12 over the years.

DR. PHELPS: Your Honor, at this time we would move to have Dr. Nichols admitted as an expert in the study of the structure-activity relationships of psychedelic agents.

JUDGE SOEFFING: Mr. Mann?

MR. MANN: Judge, we have no objection to him being admitted as an expert. We can move on to the subject matter disclosed in the pre-hearing statement.

JUDGE SOEFFING: Okay. The Petitioners have offered Dr. Nichols as an expert in the study of the structure-activity relationships of psychedelic agents.

In the absence of any objection by the Government, the tribunal accepts the witness as an expert in the study of the structure-activity relationships of psychedelic agents.

MR. PHELPS: Thank you, Your Honor.

BY MR. PHELPS:

Q Dr. Nichols, could you tell us when you first started working with psychedelic agents?

A That was actually the subject of my graduate work, which I began in 1969.

Q And when you were doing that research, did your lab have a DEA Schedule I license?

A Yes, I did. I had a Schedule I license that included 15 specific compounds.

Q And was -- maybe I got confused there. Was that during your grad school that you were talking about that you had one?

A No. The Controlled Substances Act was not passed until 1970, and I started in 1969.

And I don't know what the licensing requirements were when it first started, but the laboratory where I was working, Dr. Charles Barfknecht did not have a Schedule I license. So we made a lot of compounds, which ultimately became controlled substance, but at the time we made them in 1969, 1970, and so forth, they weren't actually controlled substances. Later on, they were included in the Schedule I category, but not when I was a graduate student.

Q Were there significant differences

in how you studied those chemicals prior to the passage of the Controlled Substances Act?

A When I was a graduate student and a post-doctorate fellow, the compounds that I worked with, by and large, were not included as controlled substances in the DEA registration. It was after I got to Purdue and wanted to continue this work in my own laboratory that I had to get a Schedule I license and started putting the compounds in that license that I was working with.

Q How did that change the practices in your lab?

A Well, when I was a graduate student and even a post-doc, we basically just kept them -- we just kept the substances in bottles that were in drawers. We didn't really have to worry about diversion, which is what the DEA was really focused on.

When I got to Purdue, to get my Schedule I license, I had to have a safe. I actually have a locked file cabinet. It had to be in a specific area with a locked entry door and restricted access. And then, I had to keep an inventory of all the controlled substance.

We had to have an inventory book of how much we had and how much was taken out at various times by specific individuals who were authorized to work with those. So we had -- the record-keeping was more onerous then.

Q What other kinds of -- well, let me take a step back. Other than your own personal research into the structure activity relationships of psychedelic agents, did you stay up to date with other researchers conducting similar work?

A Oh, yes. I, basically, to be a researcher in the field, you pretty much have to keep up with what other people are doing. So you see if they make breakthroughs and that may affect what you do or give you a different perspective. So I, basically, was familiar with the whole field, yes.

Q Okay. And what changes did you see across the field as a whole as a result of the passing of the Controlled Substances Act?

A Well, when I was a graduate student, there were no really controls. We just put them into a -- in a laboratory drawer. We didn't have to really worry about that. Then,

when I got to Purdue and I had to get a Schedule I license, that involved an inspection of my facilities, random inspections of my inventory at various times.

Over the period of time that I was at Purdue for 38 years, the regulations became more stringent. When I first got my Schedule I license, you simply had to register with the DEA. And then, they changed the procedures later on. They wanted to know the experiments you were going to do, how much you were going to use. And then they changed the procedures so that they have to get another review by someone, I believe, at the Food and Drug Administration. They started inspecting more often.

So, in the beginning, the regulations were more flexible. You didn't really have to specify how much you needed at any point in time. I don't remember that I had to do that. But later on, you really -- they wanted to know how much you were going to use, how many animals you were going to use. You had to justify the amount you were going to use by a number of animals and the drug per dose,

so really a lot more regulation in terms of the drugs.

And even drugs, for example, I have a Schedule I license for working with mescaline, which is like one of the oldest psychedelics. That's isolated from the peyote cactus. Typically, the amounts that I would need for my lab would be 20 or 30 milligrams for rat studies or mouse studies. Whereas, the human dose would be 200 or 300 milligrams. So, even though I had trivial amounts of the mescaline, I still had to keep the same records.

Q And outside of your own research, how did those changes in the regulations impact the broader landscape of the study of the structure activity relationships of psychedelic agents?

MR. MANN: Objection, Your Honor. This witness is not being offered as an expert in research or the broad spectrum of research that's going on. He can only speak about his own experiences.

MR. PHELPS: That's a total mischaracterization of his expertise. It is

the study of the structure activity relationships of psychedelic agents, not his own personal study.

JUDGE SOEFFING: So overrule the objection. He may answer

BY MR. PHELPS:

Q Dr. Nichols, how did the broader landscape of this type of research, how was it impacted by these changing regulations?

A Well, I, over the years, met many other scientists. I was considered a neuroscientist, and I met many other neuroscientists. And when I -- when they would find out that I was working on psychedelics, a lot of the times, they were, I would say, somewhat envious.

And they would say things like, well, that sounds really interesting, but it's too much of a headache to get into that field, or it's too hard to get money for that field; I don't want to get into it. So there was any -- any impediment to research really affected anybody who wanted to work in this field.

You know, you may not know much

about academics, but if you're an academic, when you start off as an assistant professor, you have basically five years to get a grant for your research most places. If you don't get a grant, you don't get a -- you don't get tenure and promotion, and so you'd look for another job.

So it was a risky field. I was one of the very few that was doing any research on psychedelics. I knew a lot of people that had an interest in the field, and they were somewhat envious. Like, you know, boy, that's a lot of work; how did you get into that field, and why are you doing it, and so forth, and so on. And I knew a lot of people personally that would say --

MR. PHELPS: Your Honor, I'm sorry to interrupt the witness. I'm trying to keep my thoughts composed here, and I keep being distracted by the talk at the other table. If we could just have some direction there, please?

JUDGE SOEFFING: Okay. Well, I think they're doing their best. There are a lot of people involved in this case, and you

are going off the -- a lot of this is not covered in the prehearing statement.

So I can see why Government counsel needs to consult with each other because you're talking a lot about the history of the changes that happened when the Controlled Substances Act was implemented, and I don't see that in the prehearing statement. So I can kind of understand why the Government counsel needs to consult. I think they are trying to be as quiet as possible.

MR. PHELPS: Okay. Well --

JUDGE SOEFFING: I'll again say, you know, if we could try to keep the whispering to a minimum. I'm sorry that it's been distracting to you, but I will give that instructions.

Mr. Mann, you had something to say?

MR. MANN: Yeah, may I be heard, Judge? And I'm sorry about the distraction.

He has been qualified as an expert in the study of the structure activity relationships of psychedelic agents. I really fail to see how that makes him an expert on the entire scope of research activity involving

these two controlled substances. I don't see there how there is any connection between those two.

He's offering an opinion about all of the other people who are researching DOI and DOC, presumably. And his expertise is confined to an ability for the Tribunal to understand the structure activity relationships of psychedelic agents. I just don't get it.

MR. PHELPS: And Your Honor, if I could respond?

JUDGE SOEFFING: Certainly.

MR. PHELPS: The expertise is specifically in the study of the structure relationships of psychedelic agents. He has been involved in the study of those since 1969, and his history, his understanding of the history of the study of these substances, that's what he's an expert in.

It's not saying he's an expert in testing, or -- he's an expert in the study of, which to say that being an expert in the study of a particular field does not include the history of the study in that field and the context in which the study of these structure

activity relationships of psychedelic agents take place is -- I mean, the study of something is includes the history and the context in which that research and studying is taking place.

He's not testifying. He's not -- he hasn't been admitted as an expert in his own lab expertise or his own personal ability to do different things with structure activity relationships. He is an expert in the study of this. And every sentence of his testimony has been directly related to the study of the structure activity relationships of psychedelic agents.

JUDGE SOEFFING: Mr. Mann?

MR. MANN: Yes, Judge. I think a more suitable analogy here is that this is like a trigonometry professor trying to act as an expert in education. He is a -- of the study of activity relationships with psychedelic agents. Of course, none of that is meant -- none of that is expounded upon in the prehearing statement. But that's what he's been accepted as an expert in.

He's not an expert in research

techniques, research patterns, research behavior, and research history. If he was going to testify about that, he should've been qualified as an expert in those areas, and that was not disclosed to the Government.

MR. PHELPS: I'm just baffled at what the Government's understanding of what the study of something entails, Your Honor.

JUDGE SOEFFING: So here's what -- okay. I think he has talked about the fact that he needed to keep up on other areas of research, what other researchers were doing, so that he knew what the effect or potential effect would be on his own research. So, again, I'm going to give some leeway here.

I do think that because of the prehearing statement and what he's been accepted as an expert in, the Tribunal is most interested in what he has to say about the structure activity relationships. We have heard from other witnesses, and I expect we'll hear more about general research activity, so, you know, I --

MR. PHELPS: Well, and I'm sorry to interrupt, Your Honor. The reason I'm

specifically trying to go through this is because it's my understanding that the Court is fairly familiar, at this point, with these granular level details of the study of these substances. And so, Dr. Nichols provides a very unique particular expertise within this study that's beyond what we've been hearing about for the last four days.

So, if you'd like him to talk chemistry and those kind of things, we can go down that road, but I thought it would be most helpful for this Court to have a broader understanding of the historical context in which this study is taking place, and really the what everything we've heard in the last four days is taking place in.

JUDGE SOEFFING: Well, I'm not seeing a lot of the history. Like the stuff he's talking about from 1969, 1970, when the Controlled Substances Act was first enacted and how that changed things, I don't see that in the prehearing statement.

MR. PHELPS: Your Honor, at the bottom of page 26, he does say he will testify to the great difficulty to obtain a license to

work with Schedule I substances. And I think that's exactly what he's testifying about right now.

JUDGE SOEFFING: Well, I take that to be current, the difficulty to get a license today, a registration today to work with Schedule I substances, not what was going on in 1969, 1970. I think this is about contemporary issues and what's going today with the DEA and whether these should be scheduled and not what was happening in 1969, 1970.

So, I mean, a little bit of that is fine to lay some background, but you're spending a lot of time on it. I don't see that in the prehearing statement, so I do understand the Government's frustration on that. But you know, as you see, my practice is to give some leeway to people on things.

MR. PHELPS: Certainly. We don't have to do an entire history lesson. I understand the Court's direction, and we can, yeah, not a problem.

JUDGE SOEFFING: Okay. That'd be appreciated. Thank you.

MR. PHELPS: Certainly.

JUDGE SOEFFING: You may ask your next question.

MR. PHELPS: Thank you.

So, Dr. Nichols, what do you know about the difficulty of obtaining a Schedule I license today?

THE WITNESS: It's more difficult than it was when I started my work. I saw it evolve over the period of time I was at Purdue as the regulations and oversight became more and more onerous; I'll use that word.

My son is also a researcher at Louisiana State University of Health's Medical School. He got a Schedule I license to work with compounds, and that was more recent. That was 2007, I think, around then. And I watched his frustration as they bungled his inspection the first time. It took him a long time to get his license. He expressed his frustration to me.

Other people have told me the same thing. In New York University, where they use psilocybin for treating patients, the local DEA comes in and inspects their safe very regularly to see if any is missing.

MR. MANN: Objection, Your Honor. None of this has been disclosed in the prehearing statement, and it's all hearsay.

MR. PHELPS: Again, this is exactly what the Court was asking to give context to this today. This is in the study of his labeled expertise. This is entirely relevant.

JUDGE SOEFFING: Well, it is hearsay. I have accepted that previously. He's making certain characterizations about how DEA conducted its investigations. I'm not likely to give a lot of weight to this. It's not specifically laid out.

Certainly, you talk about he will testify to the difficulty to obtain a Schedule I registration, but prehearing statements were supposed to give some more detail and not just the subject matter you cover, but what the testimony would be. So I would ordinarily expect to see a little more detail in there. I'll sustain the objection in light of that. Ask your next question.

MR. PHELPS: So, Dr. Nichols, how many Schedule I licenses have you personally been involved in applying for or helping others

apply for since 1969?

MR. MANN: Objection. Compound question.

JUDGE SOEFFING: Sustained as to the form of the question. If you could, break that up.

MR. PHELPS: Yes. Dr. Nichols, how many Schedule I licenses have you obtained for your own personal research over the course of your career?

THE WITNESS: I had one Schedule I license which was expanded to include 15 specific controlled substances.

BY MR. PHELPS:

Q And that was the original?

A Yes. You renew the license regularly.

Q Okay. And have you maintained that license since that time?

A I did until my retirement from Purdue in 2012. The lab I work in now has a different license, so I work in that lab.

Q Okay. And approximately how many licenses have you assisted other researchers in obtaining over the course of your career?

A I've probably had discussions with half a dozen or so people who got licenses when they would ask for, you know, my hints, what do you think I should do; should I do this; what do I need to do?

Unfortunately, I don't have notarized documents from all of those people to tell you, so I can't tell you specifically. But I did help just because I had a license. People knew I had a license, and they would come to me and say how do we do this, how hard is it, what do I need to do? So I counseled a number of people. I would guess at least half a dozen, maybe even ten.

Q Now, Dr. Nichols, I'd like to talk a little bit about your historical experience with laboratory safety and diversion prevention. You said that there's historically been changes in how laboratory safety and diversion prevention --

MR. PHELPS: Let me take those one at a time, Your Honor. They're listed together in the supplemental prehearing statement, but we can take those one at a time.

Dr. Nichols, could you tell us about

your historical experience with laboratory safety, particularly within the context of the study of psychedelics?

THE WITNESS: Laboratory safety? Well, psychedelics are very safe molecules, so it was never a safety issue. Basically, we just had to do things in a way that was acceptable to the Drug Enforcement Administration, which meant keeping records. People that were authorized to obtain Schedule I substances, I had a list of those people.

We had to keep the track of how much they took out and when they took it out and that sort of thing, so regular inventories, and then the DEA would come in randomly at various times to check and see if your inventory was up to snuff.

BY MR. PHELPS:

Q Can you tell us a little bit about your historical experience with diversion prevention
in the study of psychedelic agents?

A Once the CSA was passed in 1970, then I started Purdue in 1974. As of that point, I had to apply for a license. I had to

have a specific secure storage area. I happened to be in an office that had an outer chamber where the secretary was, so that door was locked; my inner door was locked. We didn't have alarms. It was just controlled just by whoever had access to the room. And all of the controlled substances were locked up in the safe in my office.

Q And you testified previously that, based on your understanding, it was this diversion prevention was a main concern in the passing of the Controlled Substances Act?

A I don't know the motivations at that point, but the DEA's goal is to prevent diversion of controlled substances, so I was aware of that.

Q Okay. Have you, in your years of experience since 1969, seen evidence of diversion of DOI?

A No. I don't think that DOI ever became popular.

On my -- you know, I would read Microgram sometimes, and you would see news reports. Lots of things had been confiscated in underground labs. I can't recall ever

seeing an incidence of DOI. My impression is it wasn't a very popular drug because it was very long-lasting.

Q And when you were at Purdue doing your work, who was -- where did you receive your funding for the study of psychedelics?

A That grant was funded by the National Institute on Drug Abuse.

Q And could you explain a little bit about how that grant worked?

A When I first got the grant, I had it for 28 years. I first got it was the study of structure activity relationships of psychedelics. So not a -- there wasn't much known about psychedelics. We knew that there was LSD or mescaline, psilocybin, but there wasn't much known beyond that.

And so, I was focused on understanding the kinds of drugs that would have similar properties and what their targets were in the body. And I used rats, mice, isolated tissues, receptor-binding assays to really understand the interface between the chemicals and the biology.

Q Have you stayed up to date on the

current study of psychedelic research since your retirement in 2012?

A Yes. After I retired, I moved to Chapel Hill and was granted the courtesy appointment in the laboratories of Dr. Bryan Roth. He's had an extensive program to study crystal structures of psychedelics bound through receptors. I've consulted. I did some chemistry myself here. I'm also the co-founder of a startup company that's studying psychedelics as anti-inflammatory agents.

So I've been continuously involved in this research area since my retirement from Purdue in 2012. And I continue to publish. I have four papers now in press this year having to do with psychedelics.

Q Dr. Nichols, how did the DEA's scheduling of hallucinogens originally, when this happened more than 50 years ago, impact the discovery of the medical utility of psychedelics?

MR. MANN: Objection. Not disclosed in the prehearing statement.

MR. PHELPS: Your Honor, if you look at the second to last paragraph on page 26, we

will specifically testify how DEA's scheduling of hallucinogens more than 50 years ago significantly hindered discovery of their medical utility.

MR. MANN: I'm sorry. I withdraw the objection.

JUDGE SOEFFING: It's withdrawn.

You may answer the question, Doctor.

THE WITNESS: Can you restate the question?

BY MR. PHELPS:

Q Yes. So you would consider yourself up to date on the latest psychedelic research?

A Yes.

Q And without going into too much detail because we've heard a good bit about it, what have been some of the recent discoveries that you're aware of in your review of the literature?

A So what most people are aware of is the fact that psychedelics -- in particular, psilocybin has been used -- can reverse the symptoms of treatment-resistant depression. A single treatment can provide profound relief from depression in patients who have not

responded to conventional treatments like SSRIs.

LSD has been used to show that a single treatment with LSD can reverse anxiety and depression. DMT has been used in the form of ayahuasca, also as just DMT, to show that it can reverse depression. These are novel treatments for depression and anxiety disorders.

It's been shown that psilocybin can attenuate alcohol-seeking behavior in humans who have alcohol use disorder. And psilocybin therapy can disrupt smoking addiction. A paper which has not been published has shown that psilocybin can reverse the symptoms of obsessive-compulsive disorder.

A paper done at the University of Alabama at Birmingham, by Peter Hendricks, has shown -- has been published that has shown that psilocybin can reverse addiction in persons who are addicted to cocaine. They're finding lots and lots of things. This has all been since about 2016 when the first papers came out.

So psychedelics have been shown to have tremendous potential in treating central

nervous system disorders, depression, anxiety, and substance use disorders. And we've discovered and start basis for our company that psychedelics are useful in treating depression and anti-inflammatory -- and inflammatory conditions.

In fact, a company has been founded called 2A Biosciences, which is focused specifically on studying psychedelics as anti-inflammatory agents. None of this work would've happened were these agents -- it would've happened much sooner had these not been controlled substances.

Q So, in your expert opinion, how did the DEA's scheduling of these psychedelics more than 50 years ago hinder the discovery of their medical utility?

MR. MANN: Objection. This is not within his scope of his expertise.

MR. PHELPS: This is --

JUDGE SOEFFING: Overruled. He may answer.

THE WITNESS: I should mention that I have written several papers on the history of psychedelics and psychiatry. I'm well aware of

the history of all this.

So what I started to say before was if you're an assistant professor, you have five years to get a grant, or you'll lose your position.

Many people that I have met personally -- and I don't have documentation of all of them -- many people have said I wish I could work in this field but it's too much trouble. I'd have to get a license. There's no money. The government still doesn't fund research with psychedelics. Most of the research has been funded by philanthropists. Even to the present time, there's only one or two grants that have been funded to study psychedelics.

So this idea that they're dangerous substances and their regulation by the DEA, in my opinion, has been a disinhibiting effect. It's kept people out of the field for more than 50 years. These discoveries could have been made years ago if these drugs had been more available for researchers.

The claim is that by regulating them, it doesn't keep legitimate researchers

out of the field, but it does, in fact. And if you talk to anyone in the field, they'll tell you. Having to get the safe, having your records inspected all the time, the application procedures, it's a disincentive for people to be in this field.

Now, I don't know how much sooner these things would've been discovered had there not been such regulation, but I don't think it would've taken 50 years to discover some of the things that we know now about them.

Q And so, just to zoom out a little bit, how would you say that everything you just described affected public health?

A Well, we have a desperate need for treatment --

JUDGE SOEFFING: Hold on, Doctor. Hold on a second, Doctor. There's an objection.

Mr. Mann?

MR. MANN: This has not been disclosed in the prehearing statement.

MR. PHELPS: It -- specifically medical utility, I think is relevant to public health.

JUDGE SOEFFING: Overruled. That seems pretty similar to the last question you asked, but there's more to the answer. Overruled.

MR. PHELPS: Fair enough.

So what would you say the scheduling of these substances 50 years ago, what would you say was their impact on public health in a broader sense?

THE WITNESS: Terribly damaging, in my opinion.

BY MR. PHELPS:

Q And in your expert opinion, what is the potential risk to public health of scheduling -- of placing DOI into Schedule I?

A Placing DOI in Schedule I, I think, would be a disaster. It's the only substance that acts at these types of receptors that's available for researchers to use that don't have a Schedule I license.

Q Just a couple more questions, Mr. Nichols, and we'll wrap it up.

Are you familiar with the chemist named Alexander Shulgin?

A Yes. He and I were colleagues.

Q And are you familiar with Dr. Shulgin's work on DOI?

A I don't know specifically because he worked on a lot of different compounds. I'm sure that he has said something about it in one of his books, but that wasn't the focus. That was a main focus of his -- of his work.

Q Okay. You said that you were colleagues with Dr. Shulgin?

A He was the only other person who was working in this field, and as a result, I met him early on because that's the research I was doing, and he was the only other person doing research in this field. So I communicated with him regularly.

Q And through your personal working with him, were you familiar with Dr. Shulgin's assessment of the dangerousness of psychedelic substances?

MR. MANN: Objection. Your Honor, I don't see where this is in the prehearing statement.

JUDGE SOEFFING: Mr. Phelps?

MR. PHELPS: We'll withdraw the question, Your Honor.

JUDGE SOEFFING: Okay. Question is withdrawn.

BY MR. PHELPS:

Q One last question for you, Dr. Nichols. In your expert opinion, why shouldn't these compounds be placed in Schedule I?

A What we know is that psychedelics work by activating a receptor in the brain called the Serotonin 2A Receptor. We now know today that that receptor is extremely important in controlling things like addiction, depression, end-of-life anxiety, et cetera.

If you want to study that receptor, there are very few tools. They are all psychedelics, and the only psychedelic that's not controlled is DOI. There are over 800 publications that DOI was used, where DOI was used as a chemical tool to study that receptor.

And if I can be permitted, I'll tell you a specific example of a case where I know that the regulation of DOI as a Schedule I substance would have destroyed an area of study that's currently ongoing. Am I allowed to talk?

Q Yes.

MR. MANN: Objection.

JUDGE SOEFFING: You may complete your answer, Dr. Nichols.

THE WITNESS: Does that mean I can give the specific example?

JUDGE SOEFFING: Yes, you may.

THE WITNESS: So my son is a pharmacologist at Louisiana State University in New Orleans. He was there when Katrina hit and destroyed all the samples he'd brought with him from his post-doctorate fellowship at Vanderbilt. He wanted to study psychedelics, but everything he had brought, all his samples were destroyed.

When he got his lab back up and running again, he wanted to work in this field, but he didn't have a Schedule I license. And he contacted me and said, is there any substance that's an agonist that acts at the Serotonin 2A Receptor, a psychedelic that's not a controlled substance?

And I said, there's only one. It's called DOI. He said, do you have one; do you have any? I sent him the DOI because I had

developed a method for synthesizing it.

He had a post-doctoral fellow he had recently recruited that was looking at cardiac damage, and he had some cells, aortic smooth muscle cells that he'd grown up. And he wanted to test them because he was going to have to discard them because they had grown up, and they were almost in contact with each other, and you can't use cells once they start contacting each other.

He asked my son, do you have a compound that I could test? My son had the bottle of DOI on the bench, and he said, can I test this DOI against these cells? My son laughed because he said DOI is a psychedelic, and we're looking at it for anti-inflammatory effects.

And this post-doc, a Chinese fellow, said, yes, I know, but I have to destroy these cells. Do you mind if test DOI on these cells? My son laughed and said go ahead.

He came back a week later, very excited. He said that compound, DOI, is the most potent anti-inflammatory I've ever seen. It has a concentration where it's effective of

20 times 10 to the minus 10th molar, 20 picomolar. I've never seen anything that potent before.

My son didn't believe him. And so, he ran the assays himself and reproduced that value. That was his first publication on psychedelic as an anti-inflammatory.

Two companies have been founded now. One called Eleusis, which has been merged with another company, and then the compound I'm currently involved with, 2A Biosciences, developing specifically anti-inflammatory agents based on psychedelics.

Had DOI been a controlled substance then, we would not have discovered they have the anti-inflammatory properties, and this whole other field of investigation would not have occurred if DOI had been Schedule I.

It was an accidental discovery. He didn't expect it to happen. He got some DOI, which was not a controlled substance, and tested it. If it had been a controlled substance, he wouldn't have gotten it. This discovery never would've occurred.

That's a specific example that I'm

familiar with of where if DOI had been Schedule I, it would've killed this whole area of investigation, which has been the basis for two startup companies and the current company I'm with now.

These anti-inflammatory agents are more potent than any known anti-inflammatory agents, including steroids and the standard anti-inflammatory agents like ibuprofen, et cetera. It's a whole new area of investigation that was only discovered because DOI was not a controlled substance.

MR. PHELPS: No further questions for this witness, Your Honor.

JUDGE SOEFFING: All right. Thank you, Mr. Phelps.

Mr. Mann?

MR. MANN: Yes. Thank you.

Good afternoon, Dr. Nichols.

THE WITNESS: Afternoon.

CROSS-EXAMINATION

BY MR. MANN:

Q I just want to clarify something. You said that DOI is the only 2A receptor and agonist that is not controlled?

A Agonist. Yes.
Q That's the only one that's not controlled, no others?
A That's the one at the time when he was doing his work, yes.
Q And what time was that?
A What's that?
Q When was that?
A 2007.
Q Now, you testified about that you used to keep your psychedelic drugs in bottles in drawers; is that correct?
A When I was a graduate student, yes.
Q Okay. And you don't like the idea that you have to lock them up now; is that correct?
A Well, that's the regulation. That's what you have to do to work with them.
Q And you don't agree with that, do you?
A No. If they're a controlled substance, they should be locked up. I understand the way they're --
Q Okay. So you agree there -- you agree there's a reason why the drugs should be

locked up, correct?

A To prevent diversion, yes.

Q All right. And you described the record-keeping requirements as onerous; is that true?

A I believe they are, yes.

Q So you disagree with the idea that the Controlled Substances Act requires people who work with psychedelics to actually keep records of where those psychedelic drugs are coming from, where they went, how they were used, how they were disposed of, whatever; is that correct?

MR. PHELPS: Objection. Your Honor, that's a mischaracterization of his testimony.

JUDGE SOEFFING: Overruled. He can give the answer that he wants to give.

THE WITNESS: You've asked a very broad question that goes to the heart of rulemaking and lawmaking. I'm not a legislator. I'm not in the Senate or the House. Those are the regulations that people have to follow. But they're onerous because it disincentivizes people who want to get into the field.

BY MR. MANN:

Q Okay. So, as someone who has worked with psychedelics, do you feel like you should've been able to obtain and use psychedelics without keeping any records for anyone to inspect; is that correct?

A I didn't say that.

Q What did you say?

A I didn't say that. I just said the record-keeping was onerous.

Just a minute now. This -- didn't have my phone turned off. Sorry.

Q So you think there is no public safety reason for requiring someone to keep records of the psychedelics which they obtain and use?

A I didn't say that.

Q What are you saying? Why are you calling it onerous?

A If you understood academics, it's quite often that an academic will get an idea to try something. And if they can buy that chemical from a chemical company and run the experiment, they'll run the experiment, and they'll satisfy the curiosity.

That's not possible with psychedelics. If you have an idea about studying the Serotonin 2A Receptor, and you want to get a tool to study it, the only way to do it, if it's controlled, is to go to the DEA, apply for a license, and wait a year -- if you're lucky -- to get your license to do it. By then, most investigators, unless they're dedicated to the field, will have given up and gone in a different direction.

Q All right. Let me ask you this. Do you see any public safety benefit in keeping records of the psychedelics which you obtain and use, yes or no?

A Do I -- say that -- could you restate your question?

Q Do you see any public safety benefit in being required to keep records of the psychedelics which you obtain and use?

A I think it's reasonable to keep records.

Q All right. Now, you described a situation, and it went by really quickly. You said that somebody attempted to get a DEA registration, and the DEA bungled the

investigation.

A That was actually my son.

Q Okay. And what's your son's name?

A Charles Nichols.

Q And does Charles Nichols have a DEA registration?

A He does now, yes.

Q Is it a Schedule I registration?

A Yes, it is.

Q And how was the investigation bungled?

A In the inspection, they lost the results of the inspection, had to come back and reinspect him again. It took him, if I recall, about a year to get a license.

Q And you're saying that was the DEA's fault?

A Yes, it was.

Q Okay. You talked about reading the DEA Micrograms; you're familiar with those then, right?

A I used to look at those, yes.

Q And do you dispute that some of the Micrograms have been actually entered into evidence in this case and that those Micrograms

show seizures of DOI?

A I'm not aware of that, but I'm not aware that DOI has ever become that popular.

Q You have no reason to dispute those Micrograms that are entered into the record at this time, correct?

A I don't know what they say. I can't tell you whether I dispute them or not.

Q All right.

A If they're simply stating that they found them in a seizure, I can believe that.

Q Have you been listening to the Government's case in this matter?

A No, I haven't.

Q Have you been listening to any of the other witnesses testifying for the Petitioners?

A No. No, this is my first --

Q Have you talked to anyone -- have you talked to anyone about the testimony from the Petitioners?

A No.

Q Okay. What were you doing before the passage of the Controlled Substances Act?

A I was working with psychedelics

doing research as a graduate student and as a post-doc.

Q And what were -- were you continuing to work with psychedelics after the passage of the Controlled Substances Act?

A That's when I went to Purdue. I had to get a license to work with them.

Q So you did not quit your job, did you?

A No, because this is an area that I was dedicated to, and I wanted to get into this area.

MR. MANN: Just one moment.

Thank you, Doctor.

JUDGE SOEFFING: Mr. Phelps, you may conduct any redirect.

MR. PHELPS: If I can just confer with my co-counsel here?

JUDGE SOEFFING: Certainly.

MR. PHELPS: Just briefly, Your Honor.

Dr. Nichols, oh -- oh, no.

MR. GLEASON: He's still on.

MR. PHELPS: Oh, he is still on? Okay.

THE WITNESS: You can't get rid of me that easily.

(Laughter.)

MR. PHELPS: Are we good to proceed, Your Honor?

JUDGE SOEFFING: Yes, yes.

MR. PHELPS: Thank you.

JUDGE SOEFFING: The record will reflect there were some slight technical difficulties with the TV screen. You may continue.

MR. PHELPS: Thank you.

REDIRECT EXAMINATION

BY MR. PHELPS:

Q Dr. Nichols, you were asked on cross-examination about record keeping in science and in these laboratory settings. In your knowledge and expertise, do scientists keep records of the happenings in their lab regardless of whether those records are related to DEA licensure?

A Yes. You have to keep records of your experiments, so somebody could potentially reproduce them in the future.

Q Okay. So could you just put that

into a little bit of context that -- about the onerousness of the DEA record-keeping versus standard scientific record-keeping?

A Well, only my students and post-docs had laboratory notebooks that I could review at various times.

With respect to controlled substances, everyone wasn't able to use those. I had to have specific people that were approved to use them, and then I had to make sure that the inventories were taken care of. So it was a different -- it was a different inventory, different type of records.

And the other thing I would mention, and I tried to say this at the end of my last statements, I had decided as a graduate student that I really wanted to understand psychedelics. This was my goal in life to do research in this field, so I didn't mind when I had to get a Schedule I license and have to keep the records, et cetera. That's something that I understood came with the territory.

What I'm talking about is someone who wasn't devoted to being in this field to studying these. If they wanted to do research

or look at the Serotonin 2A Receptor and look at the psychedelics, they would've been disinclined to do it because it would've required additional record keeping. It would've required a safe. It would've required investigation, a background check, listing what they were going to do.

And so, there's a different level of paperwork. If you weren't devoted to studying these as a scientific exercise, you wouldn't do that. I did it because that was what I decided I wanted to do with my career was understand these drugs.

But if -- there are many pharmacologists who I met who were very interested in but didn't want to do research because they couldn't get a -- they'd have to get a license. It would -- well, ask my son. It took him over a year to get a license to work with a Schedule I substance.

In academics, sometimes, you just can't wait. You want to do an experiment, see what happens. Somebody says, well, no, you're going to have to get a license. It's going to take you six months or a year or whatever to

get it approved. Sometimes that just isn't compatible with what you want to do.

MR. PHELPS: No further questions for this witness, Your Honor. Thank you.

JUDGE SOEFFING: Okay. Thank you, Mr. Phelps.

Mr. Mann, any recross?

MR. MANN: No, Your Honor.

JUDGE SOEFFING: All right. Dr. Nichols, thank you. Before we let you go, the court reporter --

COURT REPORTER: I don't.

JUDGE SOEFFING: You don't? Okay. Never mind. We thought we had something we wanted you to spell for us, but we don't any longer. So, Dr. Nichols, thank you for your testimony. You are excused. I direct you not to discuss your testimony with anyone until the conclusion of the hearing.

MR. PHELPS: And we would ask that he be permanently excused, Your Honor.

JUDGE SOEFFING: Okay. You don't intend to recall him.

Government, any intention to recall this witness?

MR. MANN: No.

JUDGE SOEFFING: Okay. Dr. Nichols, we're not expecting that you will be recalled in this case.

Thank you again for your testimony, and we will disconnect you from the VTC now.

THE WITNESS: All right. Thank you.

JUDGE SOEFFING: All right. Let's go off the record.

(Whereupon, the above-entitled matter went off the record at 3:14 p.m. and resumed at 3:15 p.m.)

JUDGE SOEFFING: We're back on the record. We are -- we will take our afternoon break and reconvene in 15 minutes.

(Whereupon, the above-entitled matter went off the record at 3:15 p.m. and resumed at 3:53 p.m.)

JUDGE SOEFFING: We'll go back on the record. Okay. So, before going back on the record, the Tribunal held a discussion with Mr. Phelps and Mr. Mann.

Mr. Phelps has been trying to get a couple of witnesses who were scheduled to be on the VTC today, but there have been technical

issues with one and a medical emergency with the patient of another one.

So, by the agreement of the parties, and with the Tribunal's permission, we will end today's session just before 4:00 p.m. We will adjourn until 9:00 a.m. on Monday. And at that point, it sounds like there is sufficient lineup of witnesses to proceed with the case of Petitioners.

MR. PHELPS: Yes, Your Honor. And with the weekend to kind of line things up, I know it was a little hectic today. We appreciate the Court working with us, but we've got the weekend to get things lined up for Monday, Tuesday.

JUDGE SOEFFING: Okay. And Mr. Mann, Government is fine with that, proceeding that way?

MR. MANN: Yes, Your Honor.

JUDGE SOEFFING: Very well. We are adjourned. Have a nice weekend, everyone. See you on Monday. We're off the record.

(Whereupon, the above-entitled matter went off the record at 3:54 p.m.)

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C E R T I F I C A T E

This is to certify that the foregoing transcript

In the matter of: Schedules of Controlled Subtances

Before: US Drug Enforcement Administration

Date: 11-15-24

Place: Arlington, Virginia

was duly recorded and accurately transcribed under my direction; further, that said transcript is a true and accurate complete record of the proceedings.

Neal R Gross

Court Reporter