

How Nicotine Impacts Your Brain & Enhances Focus | Dr. Andrew Huberman

Today it's really simple Nicotine only binds to the nicotinic acetylcholine receptors And there are a bunch of different ones on a bunch of different tissues and the differences in those receptors dictate What sorts of effects the nicotine will have on those tissues So let's talk about what those effects are And let's do that by dividing the effects of nicotine into effects on the brain So everything from the neck up and on the body the so-called central nervous system and the periphery Although I want to point out that your spinal cord is part of the central nervous system So in fairness to the reality your brain and spinal cord are all central nervous system everything else is considered the periphery Now there are a lot of different nicotinic acetylcholine receptors But for those of you that wanna know you aficionados or if you're ultra curious about this the main effects of nicotine in the brain are mediated by nicotine binding to the so called alpha four beta two receptor alpha four beta two receptor Even if you don't care about receptor subtypes that's gonna come up later when we discuss why nicotine suppresses appetite In fact one of the major reasons why people don't want to quit smoking or they quit smoking or another form of ingesting nicotine and then they relapse They they go back to smoking or ingesting nicotine in some other way is because indeed nicotine will increase metabolism and reduce hunger In large part by binding to this alpha four beta two receptor in a particular area of the brain we're gonna return to that in a little bit But if you've ever heard that nicotine kills the appetite indeed it does It's not the behavior of smoking itself It's not because you always have a cigarette in your mouth that you're not eating more food Although I suppose that might be a minor effect There are direct effects of nicotine on both appetite That is it reduces appetite and direct effects on metabolism That is it increases metabolism through its effects on some other areas of the brain and body We're talking about in a moment Now within the brain nicotine binds to this alpha four beta two receptor in various locations in the brain And there are three and maybe 1/4 that we talk about neurochemical effects of nicotine after you ingest it First things first When you ingest nicotine by smoking nicotine containing tobacco or if you place tobacco in contact with the mucosal lining of the nasal passages in the mouth takes about 2 to 15 minutes for that nicotine to enter the bloodstream smoking hits the

bloodstream faster vaping even faster I should mention for a variety of reasons and placing tobacco directly in contact with the mucosal lining is going to be the slowest Now as I mentioned before nicotine gets into the bloodstream and then because nicotine can pass through the so called blood brain barrier the BBB which is basically a fence around the brain because it can pass through the blood brain barrier It's going to have very rapid effects on the brain in these four major categories of neurochemicals and neural circuits The first of those categories And this is a very important one This is one that was brought up in the episode on dopamine motivation and drive And I think not just all scientists but all human beings should know that within their brain they have what is called the mesolimbic reward pathway The mesolimbic reward pathway If you just want to call it the dopamine reward pathway is as the name suggests a set of connections between a brain area called the ventral tegmental area you don't have to remember the names of these things of course But if you want to that's fine too the ventral tegmental area or VT A connects to another area called the nucleus accumbens Now here's what's very important nicotine triggers the release of dopamine from the nucleus accumbens This is what gives nicotine it's rewarding properties it increases motivation it tends to give a not so subtle but very transient increase in feelings of well being and alertness and motivation And that's because of the increase in dopamine caused by nicotine directly within the nucleus Accumbens Nicotine also triggers the release of certain neurochemicals from the ventral tegmental area itself And those impinge on nucleus accumbens and increase dopamine levels further This is what makes the rewarding properties are sometimes referred to as the reinforcing properties of nicotine so powerful This is why so many billions of people ingest nicotine in one form or another It's also why nicotine is so hard to quit because there's a potent increase in dopamine from multiple neural circuit pathways within this mesolimbic reward circuitry Now within the mesolimbic reward circuitry there's an interesting feature there are accelerators that essentially push out more dopamine get more dopamine released and there are breaks of the so called Gaba ergic variety Gaba is an inhibitory neurotransmitter You don't need to know too much about it to just understand that nicotine both increases dopamine but also decreases the activity of Gaba And so this is like pushing on the accelerator for dopamine but also removing the brake So there's a two pronged effect of nicotine on reinforcement reward dopamine related pathways the feel good motivation pathways and that is an increase in dopamine and a decrease in Gaba And

again that's all mediated through this mesolimbic reward pathway involving the ventral tegmental area and the nucleus accumbens So if you can conceptualize even just 5% of what I just told you or even if you can just remember nicotine increases dopamine and that's why it feels so good It makes you want more of it You will have everything you need to know in mind in order to understand both the why nicotine is so highly used and indeed abused why it's so hard to quit And that will point to avenues as to how to quit or reduce intake And it also points to how nicotine can actually be used in an antidepressant way should you choose And we will talk about what the various criteria are for choosing that but just understand nicotine increases motivation it decreases negative feelings of mood it increases positive feelings of mood and motivation