

Hooked: Why bad habits are hard to break

In the battle against addiction, "just say no" is magical thinking, says Dr. Nora Volkow. She's the head of the National Institute on Drug Abuse, and after spending decades studying the brains of addicts, Dr. Volkow has determined that drug addiction is a chronic disease that physically changes the brain. Dr. Volkow has found that even images of an addictive substance, such as alcohol or drugs, can produce a dopamine response in an addict's brain, and some foods can trigger a similar reaction. Morley Safer reports on Volkow's revolutionary research into addiction, as well as on her revolutionary family history.

The following is a script of "Hooked" which aired on April 29, 2012. Morley Safer is the correspondent. David Browning, producer.

What's your poison, your addiction? Is it legal or illegal? Whatever it is you're hooked on, from coffee to cocaine, smoking pot to pigging out, Nora Volkow has your number. She's the head of the National Institute on Drug Abuse. For three decades now, Volkow has been looking - literally - into the brains of addicts: not just hard drug users, but smokers and overeaters too.

Nobody knows more about how we get hooked and why bad habits are so hard to break. Dr. Volkow grew up in Mexico in a family with a famous ancestor and a tragic history. She's made history herself by challenging many of the old ideas about our addiction to addiction.

Morley Safer: What do you make of that common phrase, "Just say no?"

Nora Volkow: If it were so easy I think that we would have no problem with obesity, we would have no problem with drugs. I think we have to be honest. We've all been in a situation where we were tempted by something. And we didn't want to do it. And we didn't have the self control to stop it. For example, I love chocolates, everybody knows that. And I love also coffee. But I'm very wired person, so I shouldn't drink more coffee. But at some times, I cannot resist that. And that is because not always I have the same level of self control. So saying to someone "Just say no" is magical thinking.

Volkow's thinking has revolutionized how science and medicine now view drug addiction: as a disease, not a character defect. Her research pinpoints how drugs affect learning, memory, and above all, self control.

Nora Volkow: We know that drug addiction is a chronic disease. It changes, drugs change the brain. Physically changes it. And these changes are very long lasting, and persist for a long period of time after the person stops taking the drug.

[Technician: OK, ready to go in?

Drug addict: I'm ready.

Technician: OK, here we go.]

She's been a pioneer in using MRIs -- brain scans -- to figure out the chemistry of addiction.

[Technician: Remain still and relaxed with just your eyes closed, OK?]

This subject is a recovering heroin addict. One of hundreds of drug abusers Volkow and her staff have examined over the years. Zeroing in on a critical substance: dopamine.

Nora Volkow: Dopamine so happens to be one of the main chemicals regulating pleasure centers in the brain. And as such, it's therefore the mechanism by which nature motivates our behavior.

At the most basic level, dopamine has saved us from extinction by making the key elements for survival of the species - food and sex - pleasurable. Dopamine sends signals to receptors in the brain saying: this feels good.

Morley Safer: What is it, a hamburger?

Nora Volkow: It's a hamburger...

Show a hungry person a hamburger and their brain scan shows: a dopamine rush.

Nora Volkow: It just basically stimulates release of dopamine. And the more they release, the more they want the food. We always say, "Well, why do we have a problem with obesity in our society?" And I said, "My God, we're surrounded by stimuli with which we're conditioned. If you like hamburgers you may see that McDonald's yellow arches and then dopamine goes inside your brain and you want it. And you don't know why you want it.

And, Volkow has found images of alcohol and drugs produce similar signals, which the addict can't resist.

Nora Volkow: When a person is addicted, they get conditioned just like Pavlovian dogs.

During a brain scan, a cocaine addict was shown a nature scene. The image created no change in dopamine levels. The same test with a picture of someone using cocaine. Result: a marked rise in dopamine.

Nora Volkow: Here, in an addictive person, you're starting to get the conditions stimulated -

Morley Safer: Just from a photograph.

Nora Volkow: From observing. And that's why drugs are so malignant. You see a stimuli, dopamine goes up in your brain, and that in turn drives the behavior of the person to try to get the drug. And that's an unconscious thing. It's not even conscious.

Her budget reflects the urgency of the work: a billion dollars a year for a wide array of research projects. She was the first to demonstrate how cocaine can damage the brain by triggering small strokes. And she's identified a common trait most addicts share, involving receptors, the molecules that receive dopamine signals.

Nora Volkow: We're seeing consistently a reduction in the levels of these dopamine receptors, in this case heroin, alcohol, methamphetamine, cocaine, but also marijuana and cigarette smokers.

Problem is the brain just isn't wired to handle the intense high that drugs give. A kind of shutoff valve kicks in: reducing the number of receptors in the brain that receive dopamine's feel good message.

Nora Volkow: What happens with repeated administration of these drugs is that the ability of them to generate a sense of pleasure decreases and decreases and decreases. And there's a point where the person starts to take them, not to feel good. But to feel normal.

And other changes in the brain explain why so many addicts -- no matter how hard they try -- just can't quit.

Morley Safer: There is that school of thought that says, "Look, all you need is to be strong-willed. Your problem is you're weak. Show some determination and you can beat this addiction.

Nora Volkow: There are certain areas of the brain that are directly implicated in our capacity to exert free will. The frontal cortex is one of them: crucial, crucial. So if drugs damage the areas of the brain that we need in order to exert free will then it's like driving a car without brakes. You don't want to hit someone. But if you don't have brakes how do you stop the car?

[Nora Volkow: One of the areas that's most sensitive to marijuana is the area involved with memory and learning...]

Volkow pays particular attention to educating teenagers about the harsh realities of addiction. Her agency does a yearly survey of their drug use. The good news is there's been a continuing decline in smoking and drinking. The not-so-good news: marijuana use remains high, with one out of three high school seniors surveyed saying they'd smoked it in the past year. And the really bad news is a massive increase in both teens and adults using prescription painkillers to get high: mainly Vicodin, Oxycontin and other opiates.

Nora Volkow: You know how many prescriptions there were for opiate medications last year in this country? 210 million prescriptions for opiate medications. 210 million prescriptions in one year.

That's enough pain pills to keep every adult in the country medicated 24 hours a day for a month. There's been a huge spike in hospital emergency cases, and overdoses from pain pills killed nearly 15,000 people in a year's time.

Nora Volkow: Either we're a nation in severe pain or we're overprescribing.

Morley Safer: When doctors prescribe these very powerful pain medications - do they know what they're doing?

Nora Volkow: Being honest, I think that many physicians have not been properly trained on how to prescribe opiate medications.

Even as a teenager at Mexico's National University, Volkow herself was no stranger to the heartbreak addiction has caused to so many families. Addiction research became an obsession.

Nora Volkow: As a medical student, I was very frustrated by the fact that people that were addicted to drugs were not dealt with as individuals suffering from a medical disease. And I had seen that actually from my own family because on my mother's side there is a family history of

alcoholism. And it was never considered that my uncle had actually a medical disease itself. And therefore he never received the help that could have benefitted not just him, but his family.

And here our story takes a turn. To the house where Nora Volkow grew up in Mexico City - and the most harrowing chapter in her family's grim history.

Nora Volkow: This house is extraordinary to live in. But there was of course a dark element to it. I was always very conscious of the fact that my great-grandfather had been killed here.

Her great grandfather still stalks world history. He was Leon Trotsky, the Russian revolutionary leader forced into exile after a power struggle with Dictator Joseph Stalin.

Nora Volkow: I remember very clearly being extraordinarily scared to go into the room where Trotsky was killed. I would not be able to do it in the darkness. Something remains there.

Morley Safer: Sort of ghosts, in a way.

Nora Volkow: Ghosts in our brain. Through the memory.

Trotsky arrived in Mexico in 1936 with his wife Natalia, greeted by the country's most famous artists: Diego Rivera and Frida Kahlo. It was a dangerous era for anyone in the Trotsky family.

[Leon Trotsky: It is foolish to hope...]

For his criticism of Stalin, and his more democratic ideas, Trotsky's relatives were methodically tracked down by Stalinist agents: imprisoned, shot, hounded into suicide.

Morley Safer: By the time you came here, how many of your close family had been executed?

Esteban Volkow: Well, I think, most all.

Esteban Volkow is Nora Volkow's father, Trotsky's grandson. 73 years ago, he came to live here with Trotsky. He was 13 years old, an orphan. His parents, victims of the Stalinist terror.

Nora Volkow: His mother committed suicide. His father was killed in a concentration camp. He then ended up with Trotsky because he was the person that was responsible for him.

A year after his arrival, in the dead of night, there was a machine gun attack on the house by Stalinist agents. Trotsky was unhurt. Esteban hid behind his bed.

Esteban Volkow: They shoot in my bed, yes, about six, seven bullets -

Morley Safer: You got hit by one of the bullets.

Esteban Volkow: Yes, only a scratch, yes.

Watch towers were built on the house. But just three months later, Stalin finally got his man.

Esteban Volkow: I saw that something strange was happening in the house.

An assassin made his way into Trotsky's office and pierced his skull with an ice axe. August 20th, 1940.

Esteban Volkow: I came in the library and to a little opening, I could see my grandfather on the floor with Natalia. And he was blood around him. And he give the instruction "Keep the boy away. I don't want him to see - "

Morley Safer: He was still conscious?

Esteban Volkow: Sure, sure.

Doctors did what they could, but Trotsky died a day later. He's buried in the family garden. Esteban Volkow went on to become a chemist who helped develop the birth control pill. Nora Volkow was born 15 years after Trotsky's death. Addicted, since childhood, to the pursuit of science.

Patricia Volkow: There was a Christmas that the only doll was for me and there was a microscope that was for her, OK?

She has three sisters. Veronica, a writer. Patricia, a doctor in a public hospital, and Natalia, a government statistician.

Natalia Volkow: I think yes, we all have this sense of public service, social consciousness, responsibility towards not only yourself as individual, but for your society.

Morley Safer: Are you proud of the accomplishments of your kids?

Esteban Volkow: More or less. (laughter)

The road from the house of ghosts in Mexico has taken Nora Volkow to a place of influence in Washington. She starts each day with a seven-mile run, getting a healthy dose of dopamine. And looking forward down the road, she sees a day when science might banish the curse of addiction.

Nora Volkow: A cure would be fantastic. And that means you get a medication like an antibiotic. I cure you.

Volkow's labs and others around the country are working to develop vaccines to block drugs from entering the brain. The complexities are enormous, and progress is slow.

Nora Volkow: We're not there yet. But perhaps one day we may be. And in my brain, if you don't dare to think very ambitious things, you'll never be there.

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