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Neurological Impact of Heavy Marijuana Use

THE CLINICIAN'S ROUNDTABLE - DOES HEAVY MARIJUANA USE ALTER BRAIN TISSUE

Does heavy marijuana use alter your brain tissue. I am your host, Dr. Larry Kaskel, joining me today is Dr. Jean Lud Cadet, Chief of the Molecular Neuropsychiatry Branch of the NIH and NIDA.

DR. LARRY KASKEL:

Dr. Cadet welcome to the show.

DR. JEAN LUD CADET:

Very glad to be here.

DR. LARRY KASKEL:

Can we start just by talking about how common marijuana use is in the year 2008?

DR. JEAN LUD CADET:

The last papers that were published on the epidemiology suggest that about 15 million people have used marijuana in the last month. In 2006, about 73% of current illicit drug users used marijuana and about 53% of those use marijuana alone.

DR. LARRY KASKEL:

So what are the accepted behavioral and physiological effects of smoking marijuana long term?

DR. JEAN LUD CADET:

Lots of scientists have looked at the acute effects of marijuana in terms of the cardiovascular system and also in terms of brain system. For example in controlled studies, marijuana has been shown to cause tachycardia. It has also been shown to cause orthostatic hypotension with some people complaining of syncopal changes. Interestingly it increases myocardial oxygen demand and in some cases in older individuals has been reported to cause acute myocardial infarction.

DR. LARRY KASKEL:

Those are the negative effects, are their any known positive effect?

DR. JEAN LUD CADET:

The reason why people use marijuana is because it makes them feel good, it relaxes people. So those are the positive effects of marijuana, the psychological well being effects of the drug.

DR. LARRY KASKEL:

Dr. Cadet you did a study that was published in Drug and Alcohol Dependence on altered brain tissue. Can you tell me a little bit about that study?

DR. JEAN LUD CADET:

In that study we admitted a number of people to a research unit that we have in the intramural program of the NIDA Intramural Program. So in that study we looked at MRI and at the same time we were doing some PET study. So the MRI, magnetic resonance imaging, we looked at the brain composition and using computer program and what we found was that the marijuana users had change in the composition in the brain that were very significant.

DR. LARRY KASKEL:

What part of the brain Dr. Cadet has the most cannabinoid receptors?

DR. JEAN LUD CADET:

You can finding a lot of cannabinoid receptors in the frontal cortex in the basal ganglia, that is the stria dome putamen. Lot of cannabinoid receptors in the hippocampus. There is another very, very important area that people don't talk about much, it's the nucleus accumbens which is the area that is part of the rewarding system in mammalian brain.

DR. LARRY KASKEL:

What part of the brain stimulates the munchies that people get when they smoke marijuana?

DR. JEAN LUD CADET:

That's probably related to the hypothalamus feeding centers because they have CB1 receptors have been found in the hypothalamic nuclei.

DR. LARRY KASKEL:

If you have just tuned in, you are listening to the Clinician's Roundtable on ReachMD. I am your host, Dr. Larry Kaskel and my guest today is Dr. Jean Cadet, Chief of Neuropsychiatry Branch of the NIDA and NIH and we are talking about how marijuana can actually alter brain tissue.

Dr. Cadet the study you did in neuroimage on PET scanning, what do you see differently when you look at people that are heavy users versus normal users or light users or no users.

DR. JEAN LUD CADET:

In this paper that we published in 2005 where we looked at the neuro substrate or faulty decision making in marijuana users. We looked at cognitive testing, test called The Iowa Gambling Task and we also looked at imaging using PET. So in that study what we found was that patients who chronically use marijuana had abnormalities in learning which were correlated to abnormalities in the frontal lobe. So….

DR. LARRY KASKEL:

That's interesting. So you had a physiological effect and an anatomical effect?

DR. JEAN LUD CADET:

That is correct.

DR. LARRY KASKEL:

And what about in people that were nonusers, was that your control group?

DR. JEAN LUD CADET:

Our control group was a nonuser group. So if you look at the nonuser group, they activate their brain one way and when you look at the marijuana users, they didn't activate the same brain systems. It is as if the people who are using marijuana were compensating for abnormalities and some of those brain systems that are felt to be related to performing this Iowa Gambling Task.

DR. LARRY KASKEL:

Tell me a little bit more about the Iowa Gambling Task, do you have them playing blackjack and poker?

DR. JEAN LUD CADET:

It is actually similar to that because what they have to do is pick from a different deck. If you make decision over a time in 1 what they call the low-risk deck, you make more money, but if you pick from the high-risk deck you might make some money on occasions, but you end up losing money in the long term, yet the marijuana users tend to take cards from the high-risk deck more often than people who are control group in that study.

DR. LARRY KASKEL:

So it sounds like if you spend time in Las Vegas, you should not smoke pot or you will even lose more.

DR. JEAN LUD CADET:

That's actually very interesting because what this tells you is that high-risk gamblers might actually have abnormalities in some brain regions.

DR. LARRY KASKEL:

That’s a new study, to scan people with gambling problems and see if they have similar or lack of take up on PET scans.

DR. JEAN LUD CADET:

That’s a very important set of study to do. I think there is a group, I cannot remember them offhand who are actually doing that study and the interesting thing about it, if you look at the psychiatric diagnosis in terms of what's listed on the pathological gambling and drug abusers, marijuana abusers, cocaine abusers, they have a lot of characteristics that are very, very similar.

DR. LARRY KASKEL:

Has anyone been able to reproduce the results of your study or has it not been attempted? You know either the physiological one or the PET image scanning.

DR. JEAN LUD CADET:

Other people have replicated that the marijuana users make that decision in terms of using the high-risk deck instead of the low-risk deck. That’s been replicated. In terms of the physiological studies, we are not aware of anybody who has done the study similar to the

way we have done it, but other people have reported the abnormalities in the frontal lobe of marijuana users. People like Linda Chang have done studies using PET and looking at marijuana users and they find abnormalities in marijuana users.

DR. LARRY KASKEL:

Dr. Cadet are these results permanent of if someone is a heavy user and they quit, will their brain kind of come back to normal?

DR. JEAN LUD CADET:

It is very difficult to tell based on what we have done. What we have done is bring a patient in and study them over a period of a month. So we bring them in on the research unit. They stop using drug after they arrive, they are not exposed to drug for about a month and we test them at the end of that month. Our reports basically deal mostly with that time period of being abstinent from drug for about a month. So the only thing we can really report about is abstinence of 1 month, you still have the abnormalities, but if somebody were to be abstinent for 6 months or a year, we are presuming given the state of the art in brain recovery that a lot of these people would do much better in terms of learning and memory tasks after 6 months to a year. Because as you know the literature now suggests that we keep on making new cells in our brain and there is potential for recovery.

DR. LARRY KASKEL:

When you mentioned the parts of the brain that have the most cannabinoid receptors, you mentioned the basal ganglia and I immediately thought of, does this make a patient more likely to develop Parkinson disease later in life if they kind of destroy that part of the brain. Is there any connection between those 2?

DR. JEAN LUD CADET:

Not with marijuana users, we are not predicting that people will develop Parkinson's disease. It more likely in terms of movement disorders, the 2 drugs one could think about that might do that, methamphetamines and Ecstasy, but in terms of the cannabinoid receptors, the way they are located and the chronic administration of this drug, you should look at dopamine level in the stria dome, there isn't any evidence that dopamine level which is responsible for the symptoms of Parkinson's disease decrease, so we do not expect that they will develop movement disorders such as tremors or rigidity kind you seen in Parkinson's disease.

DR. LARRY KASKEL:

Dr. Cadet the drug Acomplia which was not approved in the United States, but has been approved in Europe and other countries, were you upset that it wasn't approved. Do you agree that it shouldn't have been approved. Do you have any experience with it?

DR. JEAN LUD CADET:

We haven't had any experience with it. I have talked to, I guess I had talked recently to somebody who was interested in that drug and I don't think the people in the United States think that those drugs will be approved in the United States. I have not worked with them, so I don't have a view about it, but from what I was told, I don't think it would be approved in the United States.

DR. LARRY KASKEL:

My last question is a personal one. I am a practicing internist and I have many patients who smoke marijuana chronically and they seem to be doing well, but if they do suffer some consequences and I want to get them to stop, is there something you know of that I can help them stop smoking marijuana?

DR. JEAN LUD CADET:

It is very difficult as you know addiction is a recurrent disease as in diabetes and high blood pressure. Patients do well if they take the medications that you give them and with addiction it is very, very difficult because people take these drugs because these drugs make them feel good, so it is even more of a problem trying to get people to stay abstinent. My best thing is to look in your lookout to see whether there is a very good addiction medicine that as know, there is the addiction practitioner in every city and state nowadays, so I will refer them to a practitioner who has experience dealing with that patient population. That is the best we can do in terms of trying to treat a population, it is very difficult. People like using marijuana, it is very difficult for them to give it up. Could be a potential problem. The reason I am saying that is because in the case of somebody if you are following patients who have had a myocardial infarction and given that study that was published out of Harvard, the chance of them suffering from another myocardial infarction is increased, the mortality rate is also increased if they continue to use marijuana. For the young population, the major side effects of marijuana might not be a major issue at this point in time, but people who use marijuana get to be in their 40s in their 50s and if they have other risk factors, I think that's where your problem as a physician arises because you need to be able to work with those patients and they might not want to give up using marijuana.

DR. LARRY KASKEL:

Dr. Jean Cadet thank you very much for coming on the show.

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