

Transcript Rebecca McKetin:

Introduction

I just want to start off by saying, when most people think of ice they think of what comes out of their freezer. But what I research is actually the drug ice – or crystal methamphetamine. Hands up if you have heard of this drug? Okay, keep your hands up. I want everyone to put their hands up. Everyone in the audience put your hands up. Now, I want you to put your hands down, if you have never had a cup of coffee in your life? I want you to put your hands down, if you've had a can of coke in your life; if you've ever drank coke? Okay, did you know that each and every one of you is a stimulant user. Now when we think of drugs we think of illegal things, which is what I research. But what most people don't realise is there are lots of legal things like alcohol, cigarettes, and caffeine – that we find in coke and coffee – which I have to say 'I'm definitely an addict of!' because I have a cup of coffee every single morning, can't go without it. And so, the kind of things I'm going to be telling you about today, while they might seem far removed from your life, you can actually think about them in terms of your own personal experience. And at some point in your future, you are going to come across these things through your friends, through your family, or maybe even through your own personal experience.

What I Do

Now, I come from the University of New South Wales. It's a fantastic institution, and within that there's this centre called The National Drug and Alcohol research centre, which has 100 or so people dedicated to studying drug and alcohol use, and its impact on Australian society. So, you might wonder how I ended up researching Ice. Now, a lot of people think that I used to be an Ice user, but that's not the case. I started out at a public school on the North Coast of NSW, called Toormina High. Where I went to school we didn't get talks like this. In fact the first time I saw a University was after I

applied to go to one, and came to look where I was going to live. When I was at school I did all of the science subjects because I like science – engineering, physics, and chemistry. And I actually wanted to be a Physicist. But where I grew up, there weren't any Physicists and no one could really tell me what that was. So, I kind of gave up on that, and I thought I should go for something more sensible with a professional background. And I ended up doing what's called a Bachelor of Science with Psychology, because it had the science component but I thought I could become a psychologist.

Cocaine and pain

And this was the title of my thesis... and what it means is: I looked at how cocaine can stop pain. Which might sound odd, but drugs like heroin and morphine are brilliant at stopping pain. But they're also very addictive, so my honours supervisor had the idea that maybe other addictive drugs could stop pain. And indeed it was the case, because they stop fear and they stop you feeling bad even if you can still feel the pain. So it actually was true that it could stop pain to some extent.

Paying attention

I got interested in this, but then, I enrolled in a masters of research. And they said, 'Well actually, what we would like you to do now, is something on amphetamine and looking at attention.' And this was in rats! And after about a year, I got jack of this 'cause it's very hard to assess attention in a rat. So, I gave up, and I actually applied to do a PhD instead: looking at attention in real rats who are using the drug out in society. So, I got a scholarship from this... where I work now, the National Drug and Alcohol Research Centre. Looking... basically what I did was, I went out and recruited about 100 illicit amphetamine and methamphetamine users, and I tested their memory. I put little caps on them; and measured their brainwaves; and then I even gave people methamphetamine, and measured their brainwaves like healthy controls, to see how influenced... how the brain works. I'm going to tell you a little bit about that later. But unfortunately, by the...this is one of the problems

when you work in illicit drug use: it's a very political, controversial area. Now, when I did my PhD, the government was really concerned about amphetamine use. By the time I finished my PhD... not interested. Heroin's the big new problem. So, national priorities for drug research didn't include my topic; very, very hard to get funding.

Getting a real job

So I had to take a little break, and go and get a real job in the real world. I don't know if you can see it in the background here... the... basically this is the world centre for drug control, over in Vienna. I saw an ad; an email, posted on our urn in the kitchen, that said, 'We're looking for young scientists to come and work with us, on monitoring global drug trends.' And I thought. 'Wow! What an exciting opportunity!' So, I said, 'Yes.' I think they were kind of desperate 'cause they said, 'Yes'. They took me... went over to Vienna. This was the building. It all sounded really flash. And then, they sent me to Africa...which was fantastic! It's the experience of a lifetime, and I'll never regret going. It was hard. I thought it was going to be fun. When I got there they said... they gave me this fancy title. I was still a researcher, but I was now an epidemiologist and regional advisor for 23 countries. I had to go around and meet the Ministers for Health in all of those countries, and convince them that they needed to assess their drug use problem. Now you wouldn't think there'd be drug use in Africa but because of the civil problems in some of the countries the borders are quite open and so, there's actually trafficking routes right across the country. Young kids involved with trafficking drugs; who take drugs instead of money, start injecting them and end up in a lot of trouble. But the main drugs by and large, were alcohol and cannabis. Now alcohol, because it's... a lot of these countries are very poor, people can't afford to buy it from the shop. So it's made illegally. And what happens when you make alcohol illegally is it can have a very high methanol content. Methanol's toxic and it can kill you. So, one of the big public health problems was that people would go to a party, and there might be like 10, 40, 100 deaths from getting drunk because of the alcohol that someone had made had too much methanol in it. This is me in Luzuko. This is a local pub believe

it or not. It's in a mud hut and they make their own home brew. I did taste a tiny bit, out of obligation, and they sit there all day and get drunk on it. This is just to show you some of the challenges, it's not so much about research but I worked a lot with the police there, who were trying to stop drug trafficking. It's very difficult because we think of border control; and the planes coming in to land; and the quarantine. Well, this is how people go home for the day. This is a woman who's packed up her shop, and she's going home, wherever home is. So, she may have cannabis in on top of her head. It's probably not likely but that was actually one of the challenges that the police faced.

Asian drug trafficking

Now, while I was doing this research in Africa, there was a bit of a methamphetamine epidemic kicking off in Asia. So, I spent the last couple of weeks of my job with the UN, working at the regional office in Bangkok which is here. I've since been back there for a few months just to hang out with them and do some work in Asia. And this involves setting up an amphetamine type stimulants centre, which monitors methamphetamine use but also other stimulus, like ecstasy. And what it involves is monitoring the drug use across the region and training people, within countries, in how to actually assess the prevalence of drug use. And then they get together and have a regional meeting to tell each other about what's going on in their countries. So, this is an example of one such meeting. Got to go up to Beijing. This is one of the fun things about doing research. People say, you know, 'Come and have a meeting with us'... in some exotic place. So, this is actually a drug treatment centre. I don't think it's a typical one. It's set up specifically for government visitors and UN delegations. It has nice... lots of propaganda about not using drugs, in the background. You can see inside it's very austere but, it's set up so much for visitors, that you've got the signs in Chinese characters and then in English underneath. It was two hours out of Beijing and we even had police escorts to take us out there for the day, just to look at this centre. This is a picture that some of the methamphetamine that they get in Asia. It's different than what's available in Australia. It looks like little ecstasy pills. This is fascinating. This drug is produced by the billions. Billions of pills each year

are made in the northern part of Burma. It's controlled by the Wa State Army. That faction controls that part of the country. And this is a major industry for them. And they ship these pills out across the region. They're even stamped with the Wa army's logo. It's a business. And these green pills are used to count the actual drug shipment. So this packet contains 200 pills, because you get one green one for every 100. So, this is a fair dinkum business. This is not something... someone making something in their backyard. They also make Ice. This is an Ice lab that was seized in Malaysia. It's a fair dinkum legitimate factory. If you went past it you'd think they were making something that, you know, was going to be sold in the shop. But they're actually making Ice. These are the drums of chemicals that go into making it. These are the reaction vessels. Think of your conical flask, in your lab, in your science classes. This is the same kind of thing on a huge, huge scale. This can produce kilograms to tonnes of the drug over a month.

Drugs in Thailand

Now, what I want to do, is talk about the science of *ya ba*. In Thailand, where I went to visit recently, they call it *ya ba*, which means crazy medicine. Call it that because it can actually send you crazy.

Ice and its effects

So, what does it do in the brain? I don't think you're going to be able to see this slide as well as I can, but in the background here, there's actually a dendrite which is a nerve cell in your brain. What Ice does is, it increases a chemical called dopamine, which is your own brain's natural feel good chemical. And it works a little bit... there's a molecule of methamphetamine there... and it works a little bit like a lock in a key. So, it locks into the same receptors as dopamine does, to increase the activation of that system. So, it's actually tapping into your body's own natural reward system. You can see here... this is the how a nerve cell works in the brain. This is one nerve cell talking to another. You've got dopamine in one nerve cell, it comes out here... and it locks into this receptor here... and makes the nerve cell fire.

This is a dopamine coming out... and activating the next cell. This is a methamphetamine mimicking the dopamine and increasing its action. So, it's increasing that chemical in the brain. It might not sound too bad; it's just activating the brain's natural reward system. But what happens if you take it: is it actually decreases that system as functioning, and in the long run it can kill some of the nerve cells. What it does is, it degenerates the ends of the nerve cells. It's a bit like pruning a tree. It might grow back, but it will grow back looking a bit different. And recently we found out, it breaks down the whole nerve cell. Now, this is a human brain, it's an X-ray, a special X-ray of a human brain that shows the activity of the dopamine here in a healthy person. And this is someone who's been using methamphetamine for a long time. And you can see how that part of the brain with the dopamine is really dampened down. It's not working properly. If you give it a bit of time it starts to come back. So, this is one month after they've quit using the drug... and this is 14 months later – it's starting to look normal. So we are seeing some recovery, but it's a little bit uncertain whether it's complete recovery. We don't know that at this point in time.

Consequences

So what are the consequences? Well, the main consequences, and the one that I do research on, is psychosis. Now, people talk about psychosis and they think, 'Ah that's some crazy thing that' you know, 'that other people get.' What I actually mean by psychosis... scientifically what we mean... is seeing or hearing things that aren't there: believing things that are really clearly obviously implausible – we call that a delusion; and, in the case of methamphetamine, when people get psychosis, it's often that they believe people are going to hurt them when they're not really going to hurt them, and they get very frightened. It can really vary. It's interesting. Did you know that maybe 5, 10, 15 per cent of you guys, are going to experience this, if you haven't already, some mild symptom like this. You often think that, you know, it's such a weird thing that no one gets it. But it is actually true that a lot of people get these kind of experiences on a very low-grade scale. But what happens is, they get exacerbated when people use drugs or if they have an

underlying problem, and they can get quite severe and disabling. It's not the same as schizophrenia, which is a more chronic illness. So, what does it feel like? I've just put a quote here from someone. We interview people about this. And this is what someone told us it felt like when they were experiencing psychosis: 'I kept seeing people having conversations with people who weren't there. I sat on the tram tracks having a conversation with someone one day. And I had no idea there was no one there. My friends watched me and couldn't believe what I was doing. A tram was coming, and when they realised it wasn't going to move away, they came and picked me up off the tracks.' So, that's what happens when people hallucinate. They might be quite harmless but they can get themselves into trouble because they can get hurt. This is another one, which is more like about the paranoia that people feel. 'Yeah, everyone was out to get me. I always felt like I was being followed. I'd get the taxi drivers to drop me miles away from where I was going so I'd have to walk back for ages. I was afraid people were coming to get me. I swear today, that there's something behind it. Personally, I think it's true.' So, that's not a very bad one, but this person was absolutely convinced. And in a later part of the story, they actually called the police because they thought someone was waiting to hurt them. And they were also having hallucinations. In the end the 'person' turned out to be a mop that was leaning against the wall, and they misinterpreted that 'person'. So it was okay.

How to research drug use

You might wonder how we actually research this. Well, when you do your science studies you get to do things where you have a control condition and you have an experimental condition. You randomly put people in one group, people in another group, and then you see what happens. And then you can say that, if something happened in your experimental group but it was because of what you did. If we did this with Meth users: we'd have to take a group of healthy people; take you now; randomly assign you to a life of Ice addiction; and then see whether you experience psychosis. And it's obviously not very ethical. Don't laugh, because it has been done. There was one guy, who put people in a room and gave them escalating doses of Ice, and then

watched the symptoms of psychosis emerge. But today, we have this thing called ethics committees, so we don't do that. What we do is, we actually go out in the field and we survey people. We might come to your schools. We might survey you. We go to raves; we survey people there about their drug use. This one was where we went out into the community and we interviewed 309 methamphetamine users. And what we found was that the prevalence of these psychotic symptoms was 11 times higher than in the general population. We also find evidence of a dose response. And this is just to give you some of the data from the study; give you an idea of what it looks like when you put it down in a paper. You can see the more days people use... there's a little bit of an upward trend... so, they're more likely to have the psychotic symptoms, which is what you'd expect if a drug was causing the psychotic symptoms. There's other ways we can look at it, we can do it what we call intervention studies. So, we have 500 dependent methamphetamine users and then we treat them for their drug use. And we see if the drug use goes down whether the symptoms go down. You can see here... this is the preliminary data from a trial where all of them were dependent...and then, you can see in red, that the dependence drops after the treatment. So they're not using methamphetamine anymore, here. The green line is their psychosis. We see not such strong drops but similar drops, in the psychotic symptoms. And then finally, we do some really interesting studies; longitudinal research. So, we've got a group of 200, or over 200, methamphetamine users and we get them to keep a diary of their drug use. And then, we ring them up every month, and assess how their mental health is going and their psychotic symptoms. We can see how it co-varies over time with their drug use.

Celebration our efforts

And the most important part is when we finish. And after every 100 participants that we recruit for one of these studies, because it's really hard work, we go out to dinner; have a celebration. You can see here the young women who have been working on the study. And just finally I'd like to thank the whole team. It takes lot of work to collect this data, but as you can see

there's a lot of young people who are interested in doing this. And most of them are women. So, thank you.

Music

Resources

These resources may be accessed via the Teaching and Learning Exchange www.tale.edu.au

Sites2See: Understanding drug issues

<http://lrrpublic.cli.det.nsw.edu.au/lrrSecure/Cli/Download.aspx?resID=7855&v=1&preview=true>

Science talk 2007: Adam Cawley (drug testing in sports)

<http://lrrpublic.cli.det.nsw.edu.au/lrrSecure/Cli/ResourceInfo.aspx?resID=6672&v=1>

What's Your Poison? – Ecstasy (two video clips When the fun stops & The psychiatrist's couch)

<http://australianscreen.com.au/titles/whats-your-poison-ecstasy/clip2/>

This resource is based on outcomes from the NSW Board of Studies 7-10 Science syllabus and the Preliminary and HSC Science Syllabuses.

Syllabus links

•BOS Science 7 to 10 syllabus link1.

Stage 4/5 - Prescribed Focus Areas

Students will develop knowledge and understanding of:

- * the history of science
- * the nature and practice of science
- * applications and uses of science
- * current issues, research and development.

Students learn about:

4/5.2 the nature and practice of science

Students learn to:

- a) evaluate the role of creativity, curiosity, objectivity and logical reasoning in describing phenomena, carrying out investigations and in the devising and testing of hypotheses

- b) apply scientific processes to test the validity of ideas and theories
- e) use examples which show that scientists isolate a set of observations, identify trends and patterns and construct hypotheses or models to explain these

Students learn about:

4/5. the application and uses of science

Students learn to:

- d) give reasons why society should support scientific research

Students learn about:

4/5.5 current issues, research and developments in science

Students learn to:

- a) describe some recent scientific contributions made by male and female scientists, including Australians, and discuss the effect of their contributions
- b) evaluate the potential impact of some issues raised in the mass media that require some scientific understanding

- d) identify possible career paths in science.

Stage 6 – Prescribed Focus Areas

Skills

P12 discusses the validity and reliability of data gathered from first-hand investigations and secondary sources

H12 evaluates ways in which accuracy and reliability could be improved in investigations

H14 assesses the validity of conclusions from gathered data and information

Extract from Science 7 to 10 syllabus, and Preliminary and HSC science syllabuses July 2009, © Board of Studies², NSW.

Quality teaching

This resource provides opportunities to incorporate the following elements of Quality teaching in NSW public schools by:

- * giving students an opportunity to discover the nature and practice of science (Deep knowledge, Connectedness, Metalanguage, Knowledge integration)

* stimulating thought about what inspires people to become scientists
(Connectedness, Problematic knowledge).

Websites

Visit these websites for more information on the work of Dr Rebecca McKetin, and the content about which she speaks in this talk.

UNSW: Heavy users of ice

http://www.unsw.edu.au/news/pad/articles/2005/jul/Methamphetamine_drug.html

ABC The Health Report: Drug dependence

<http://www.abc.net.au/rn/healthreport/stories/2009/2488283.htm>

REACHOUT.com:

<http://au.reachout.com/find/articles/ice-crystal-methamphetamine-hydrochloride>

Melbourne University: upclose podcast Crystal Meth (Ice) Use – Myths And Realities

<http://upclose.unimelb.edu.au/episode/15>

The Medical Journal of Australian – Ice: cool drug or real problem?

http://www.mja.com.au/public/issues/186_07_020407/ful11359_fm.html

beyondblue – Tackling teen drug use:

http://www.beyondblue.org.au/index.aspx?link_id=105.898&oid=931&print=true

wiseGEEK – Where is the Brain's Pleasure Centre?

<http://www.wisegeek.com/where-is-the-brains-pleasure-center.htm>