



Brain's addiction: what makes heavy drug users different?

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Susceptibility to addiction can be seen as a form of Russian Roulette. kriffster

Professor Andrew J. Lawrence, the Florey Neuroscience Institute's head of behavioural neuroscience, and head of the addiction neuroscience laboratory, investigates the brain's role in drug-seeking, drug-taking and drug-induced neural adaptation. Enjoy.

One of the reasons there's considerable polarisation whenever the subject of addiction is raised is the stereotyped associations of addicts with illegality.

In reality, this is the thin end of the wedge; by far the most harm and mortality is related to alcohol and tobacco use, both of which are legal.

While one can question the motivations driving people to experiment with drugs/alcohol in the first instance, addiction, once developed, can be regarded as a chronic, relapsing disorder.

Most people know somebody who has repeatedly tried, but failed, to stop smoking with periods of abstinence in-between relapses – that's addiction in a nutshell. Despite this, only a relatively small number of people who ever use a drug actually become addicted to it. Why?

This is a difficult question to answer, but pieces of the puzzle are gradually coming together.

Some genes have been implicated in addiction; but, unlike other disorders ([Huntington's disease](#), for example), there's no single causative gene that can be labelled as an addiction gene. It's most unlikely there ever will be.

Also, many addicts are what is known as "[dual diagnosis](#)" patients with co-morbid (co-existent) psychiatric problems that add a further layer of complexity.



Ms. Tina

Nevertheless, an individual with one or more alterations in specific genes may be more vulnerable to developing addiction after experimenting with drug use.

In that regard, drug use could be viewed as a form of Russian Roulette – if we don't know the combined genetic vulnerability, we are playing a dangerous game.

At another level, there is increasing evidence that drugs/alcohol can drive changes in the expression of genes via what are called [epigenetic mechanisms](#).

Again, these adaptations can dramatically alter the way the brain functions.

If we consider function, recent studies provide strong evidence there's a subset of individuals who are more prone to long-lasting drug-induced alterations in brain function.

Again, before drug use occurs we do not know who all of these vulnerable individuals are, reinforcing the notion of Russian Roulette.

While drugs of abuse alter brain function in all people, for many this is a temporary situation. But after repeated drug use, some people will experience enduring alterations in the way certain brain pathways work.



bleu man

Critically, these pathways are implicated in decision making, behavioural regulation and link past experiences to actions (such as an environmental cue associated with drug use).

So while continued drug use and relapses can be seen as poor choices, these decisions are made by a system that has effectively been hijacked by prior drug use. Understanding the mechanisms behind this phenomenon are therefore a pressing question in addiction research.

Can the affected brain pathways recover? For the majority of people, this seems to be the case, since they only experience a temporary change in brain function and do not become addicted.

Studying the mechanisms of functional recovery in non-addicts that use drugs/alcohol episodically could therefore shed light on what is dysfunctional in addicts. To do this, we need robust model systems that recapitulate the human experience.

Fortunately, animal models are progressing to the stage where questions of this nature are becoming easier to deal with than ever. Nevertheless, while the question may seem straightforward, getting an answer will likely be more complicated!

While choice is a significant component in continued drug use, this reflects the working of a somewhat dysfunctional brain. What seems rational to one person may be an impossible task for another.

Exploring how we can address the problem of a dysfunctional (addicted) brain, from all possible angles (neurobiological, psychological, sociological etc), should be a matter of urgency.

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