



# Medicine in Television Series

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# Breaking Bad and Methamphetamine Addiction

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*If any series has garnered close to unanimous approval among both critics and viewers, it is without a doubt the story told over five seasons about a common chemistry teacher's descent into hell, a man who becomes the largest methamphetamine distributor in New Mexico. Thanks to Bryan Cranston's outstanding acting, the character of Walter White has become a TV icon. Having won sixteen Emmys, the series, along with Mad Men, has turned cable channel AMC into a serious competitor with the all-powerful HBO. After the show's 2013 finale, its creator Vince Gilligan presented Better Call Saul, based on a secondary character from the original series.*

The main theme of the series Breaking Bad is synthesis and distribution of methamphetamine in a small US town on the border with Mexico. In a highly realistic way, the series depicts how the methamphetamine market can be a lucrative business, since there is huge demand for this product and because its synthesis is inexpensive, its chemical precursors being relatively cheap and easy to purchase legally. Meanwhile, the series deals with two crucial problems linked to methamphetamine trafficking. The first is the violence associated with the war for absolute market control, and the second, abusive consumption of this substance and its negative consequences. On the latter point, the series faithfully shows how methamphetamine is a highly addictive abusive drug which is mainly consumed for its long-lasting euphoria-inducing properties. It produces its psychostimulant effects by increasing monoamine extracellular concentrations in the brain. The fast, constant increase of noradrenaline is the cause of its known "toxic syndrome", characterized by tachycardia, hypertension, mydriasis, diaphoresis and psychomotor agitation. Prolonged release of central monoamines and activation of the sympathetic nervous system produce most of the acute neurological complications associated with methamphetamine use, such as cerebrovascular

accidents, convulsions, agitation and hyperthermia, and they are mostly the cause of abuse and addiction to this substance as well.<sup>1</sup> The subject of addiction presented in the series agrees with scientific evidence and clearly shows the addictive process. So, according to one of the most influential theories, addiction to abusive drugs is established by the interaction of a vulnerable individual with the neurobiological changes the drug causes, which depend on the amount of exposure. Addiction is a recurring illness that consists of different phases, including the intensification of consumption or escalation, increase in the need to consume, loss of control and relapse into using even after prolonged abstinence.<sup>2</sup>

## **The three faces of methamphetamine synthesis and distribution**

Jesse Pinkman is a young high school dropout with substance abuse problems, who is rejected by his family because he cannot get off drugs and back into society.

Though he failed chemistry at high school, he has the formula for preparing methamphetamine –or crystal meth as it is called on the streets– which he prepares in a secret lab in his garage. Jesse's formula, which is based on chemically re-

ducing pseudoephedrine, is the method used in real life. Jesse's friends, Badger and Skinny Pete, are also drug addicts and undertake to source the raw material by buying the nasal decongestant Sudafed, which contains pseudoephedrine, from different pharmacies. Once the pseudoephedrine is extracted, it is reduced using iodine and red phosphorus to form methamphetamine or N-methylamphetamine. Jesse's methamphetamine distribution is small-scale, using his drug-addict friends as pushers, who mainly sell the drug locally. According to the Spanish National Plan on Drugs, in Spain, methamphetamine is known by the names speed, meth, chalk, ice or crystal, and is consumed by smoking. It can also be taken orally, inhaled or injected, which determines the type and magnitude of the effects it produces.

Walter White is a highly intelligent man whose creative aspirations in the chemistry field are foiled, so he ends up as a high school chemistry teacher. The situation makes him deeply bitter because of the lack of incentive and his financial problems. Moreover, he has serious health problems involving costly treatment. By chance, Walter finds out that Jesse, a former student of his, is synthesizing methamphetamine under dangerous conditions. He decides to suggest a more efficient manner of synthesizing a large quantity of extremely pure methamphetamine. His idea is to earn a lot of money so that his family can live comfortably after his death from lung cancer. Walter is a disciplined, well-organized man, with an astonishing ability in chemistry, traits which will serve him well to improve the purity of the meth and set up a lab in a van that can travel out to desert regions to effectively elude the city's police controls. In the series, Walter stops using the pseudoephedrine-based method because of the difficulty of acquiring large quantities of this precursor. Instead, he suggests using a methamphetamine preparation method known as "reductive amination" or "2P2 method", which consists of reducing phenyl-2-propanone (P2P) using phenylacetone and methylamine. Methylamine is used in industry, but it is a substance that is tightly controlled by the anti-drug law enforcement agencies.

This method of methamphetamine synthesis is shown in episode "Seven Thirty-Seven" of the series, the first in the second season. Walter's brother-in-law, who works for the US Drug Enforcement Administration (DEA), is surprised to see the video of a theft of methylamine and comments: "P2P –they're cooking old school biker meth". His comment refers to the fact that during the 1970s and early 1980s, methamphetamine was produced by this method and distributed by the Hell's Angels motorcycle club in northern California, until it stopped being used due to the classification of P2P on the list of controlled substances.<sup>3</sup> By the mid-1990s, most P2P labs had been substituted by pseudoephedrine/ephedrine-based labs.<sup>3</sup> However, the law relating to methamphetamine precursors in the years 1993, 1995 and 2005 in the US meant that both ephedrine and pseudoephedrine also became controlled substances.<sup>4</sup> This fact contributed to a decrease in the market and the recovery of the old P2P method of synthesizing the drug. So, in late 2010, 69% of American and Mexican samples examined showed that they were produced using the P2P method.<sup>4</sup>

Some discrepancies between the TV fiction and reality have to do with the incredible purity that the methamphetamine prepared by Walter seems to have. So one feature of Walter's methamphetamine is its blue color, which in strict chemical terms does not agree with its claim to be 99% pure, given that this color is a sign of impurity. Another discrepancy with real life is related to the fact that the ultra-pure methamphetamine that Walter prepares is found on the streets in equal purity, which does not normally happen because distributors tend to adulterate the drug with other compounds to increase its volume and earn more profit.

Walter also changes the means of methamphetamine distribution to make the business more lucrative, associating with an extremely dangerous Latin distribution network. These two means of methamphetamine distribution are faithfully reflected in the series. The first, on a small scale, carried out locally by drug addicts, and the other on a large scale, controlled by mafia.

Gustavo Fring is a Latin drug trafficker who controls the business in the American west in an



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organized way. He passes completely under the radar because he has an infallible money laundering system. Walter and Jesse are associated with him to synthesize big amounts of meth in a large secret lab that Fring sets up for them in the city where they live. This fact is similar to the reality of the so-called super-labs, that are known in Mexico and which probably also existed in the US at some point. In the tenth episode of the fourth season, called "Health", Gus Fring takes Jesse to Mexico by force to make him try his hand at synthesizing ultra-pure methamphetamine in the Juárez Cartel. There, he sees one of these super-labs, run by this criminal gang. Fring is a dangerous man who does not hesitate to eliminate the boss of the Mexican cartel, who is competing for the trafficking and distribution of methamphetamine on American turf. The methamphetamine trafficking by Mexican criminal gangs as described in the series is plausible, given that the decrease in methamphetamine production in the US noted since 2003 was countered by an increase in Mexican production. The Mexican drug cartels became more involved in that trafficking, and the amount of methamphetamine confiscated on the border between the US and Mexico increased considerably in 2003.<sup>4</sup> In 2008, Canadian trafficking organizations increased their participation in meth production worldwide, while Mexican cartels invaded the market in the US.<sup>4</sup>

### The different profiles of meth addicts

The second season of *Breaking Bad* depicts in a fairly realistic manner some of the existing patterns among methamphetamine users. On one hand, Jesse and his friends generally sniff or smoke the drug, so that moderate doses produce quick effects such as euphoria, heightened attention, a loss of appetite, increased libido and self-esteem, and improved mood. Yet Jesse appears in the series as a true addict who does not limit the amount of methamphetamine he uses because he has unlimited access to it. In a scene from the second season's eleventh episode "Mandala", when Jesse meets Walter to talk business, we see the effects associated with consuming high doses of methamphetamine as Jesse is stricken

by dysphoria, restlessness and anxiety. Furthermore, he displays bruxism (clenching or grinding his teeth for no reason) and the shakes. In the series, Jesse is the typical meth addict who little by little loses control of his life and the support of his parents due to his addiction. So, in "Down", the fourth episode in the second season, we see how Jesse becomes homeless because his parents have found out he has set up a meth lab in the house he inherited from his aunt. In Jesse we see the relapse into seeking out the drug and returning to using after adverse situations or depressing episodes, such as in "Mandala", when he feels guilty and sad about the death of his friend Combo and starts to shoot up heroin with his addict girlfriend. This episode offers fairly realistic scenes about the effects heroin has, in clear contrast to the effects of methamphetamine. Injected heroin induces a wholly pleasant sensation, characterized by a marked indifference to internal and external stimuli. The peak of euphoria occurs seconds after injecting the drug and tends to last several minutes, while the feeling of well-being can last from four to six hours. However, heroin does not induce psychomotor action, given that it is a depressant of the central nervous system. Large amounts of heroin can cause extreme drowsiness, with the risk of inducing a state of coma or decreasing the cough and expectorant reflex, which can cause one to choke on one's own vomit. This is reflected in the tragic case of Jane, Jesse's girlfriend, who dies in precisely this way.

On the other hand, methamphetamine also induces a fast peak of euphoria that can last for many hours, depending on whether it is inhaled, smoked or injected, through activation of the central nervous system by its effect of releasing monoamines. At the end of the second season, in episode thirteen, "ABQ", Walter takes Jesse to rehab. We see his affective deterioration, feeling guilt at his girlfriend's death. The situation Jesse finds himself in is no doubt because of the affective deterioration characteristic of those who chronically abuse methamphetamine, who frequently have problems experiencing pleasure (anhedonia) and fall into deep depression from the exhaustion of cerebral reserves of dopamine

and serotonin in the neuronal terminals.<sup>1</sup> Through Jesse's character, the series shows addiction truthfully, since the affective problems and possible cognitive deficit that Jesse experiences contribute significantly to perpetuating the addictive cycle, characterized by abuse, loss of control and relapse.<sup>2</sup>

The third episode, "Open House", in the fourth season, shows how Jesse increasingly loses control over his actions and seems quite unbalanced when, after killing Gale, he throws an interminable party in his house with other drug addicts, consuming huge amounts of methamphetamine. The situation degenerates, evolving from dancing to violence. This episode shows the reality of methamphetamine use in the form of binges, which can last several days, and where the euphoric effects of the drug progressively decrease over time, while dysphoria and compulsive and repetitive behaviors increase. This use profile is perfectly captured by Jesse's party, where after several days of euphoria and dancing, the guests start to become violent and engage in risky sexual behavior. The behaviors described in the series (which Jesse dramatizes) are linked to pathological deregulation of the cerebral circuits involved in pleasure and motivation caused by the addiction. So, taking most abusive drugs, including methamphetamine, increases dopaminergic transmission in specific cerebral centers that reinforce the behavior of seeking and consuming the drug, facilitating the reiteration of learned behaviors and encouraging addiction. From the uncontrolled need to obtain the drug stems the relapse, the basis of which is a pathological form of neuronal plasticity in the excitatory glutamatergic system. Such deregulation means that the individual addict places excessive motivational importance on stimuli that predict drug availability and it reduces his or her ability to stop using it.<sup>5</sup>

Meanwhile we have the characters of Spoooge and his girlfriend, two addicts on the fringes of and disconnected from society. These characters show the reality of chronic methamphetamine addicts, who are often multi-drug addicts. But because they cannot pay for cocaine or heroin,

they consume meth because it is cheaper. They will do anything to get the drug, even prostitute themselves, as Spoooge's girlfriend does. The episode "Peekaboo", in the second season, shows the marginal conditions in which this couple live, with a small child who is totally uncared for. These two characters suffer from serious side effects that truly occur after chronic meth use; for example, both show evidence of malnutrition and poor dental health associated with serious cavities and the loss of teeth. The latter is due to the drug's acidic properties combined with a lack of oral hygiene. Xerostomia (dry mouth) also adds to the dental problems resulting from methamphetamine use. Spoooge and his girlfriend also have skin damage as a result of the compulsive scratching that accompanies methamphetamine use. Such injuries tend to get infected, resulting in a bacterial cellulitis that spreads to become bacteremia and sepsis in some cases.

In addition to these examples of methamphetamine users in the series, two other individuals use the drug but do not become addicts. This aspect, which the series does not examine, is linked to existing differences in the population in terms of individual vulnerability of entering the addictive cycle after sporadic or recreational drug use. Experts believe that 12 to 20 out of every 100 people who begin to use drugs will develop addiction. Yet the risk that these addicts relapse into using the drug, even after prolonged periods of abstinence, is extremely high.<sup>2</sup> In 2013, the *Washington Post*<sup>6</sup> published an article on the type of person, known as a "functional addict", who consumes methamphetamine and seems able to remain socially active. Some of the examples mentioned were working mothers, or people holding down several boring and poorly paid jobs who use meth to boost their energy and alleviate the tedium of their social and working conditions, or university students wanting to improve their cognitive capacities. As has been mentioned, the addictive process depends on the drug use and its interaction with the individual's preexisting genetic or behavioral vulnerability. So some of these people, perhaps the most vulnerable, enter the spiral of addiction and lose control over their



drug use to the point of failing at work and disconnecting socially.

### Could *Breaking Bad* encourage methamphetamine use?

Though the series deals realistically with methamphetamine addiction and its devastating effects, some believe that *Breaking Bad* may have encouraged consumption of this drug. In 2014, several articles appeared in the Spanish press indicating an increase in the confiscation of methamphetamine in the UK and rising use in Germany in the past five years. For some, this fact could be related to the series, while others claim that “it is more correct to say that the series has made people aware of this drug”.<sup>7</sup> On the other hand, a report from the DEA indicated that the number of methamphetamine-related incidents in the US in 2012 was the lowest since 2008, the year the series started. So it does not seem to have influenced in the consumption of this substance.

Though methamphetamine use could be dropping in the US, it remains high in Asia, and worldwide consumption has become an epidemic. According to the UN Office on Drugs and Crime (UNODC), it is estimated there are 25 million amphetamine users worldwide, a larger number than cocaine (14 million) and heroin users (11 million).<sup>8</sup> Furthermore, studies indicate that methamphetamine synthesis and distribution has increased in countries such as Poland, the Czech

Republic and the Russian Federation, as well as developing countries in Africa and Central America.<sup>9</sup> In Spain, methamphetamine consumption is low due to its high price, and seems to be linked above all to elitist use on the gay scene.<sup>7</sup>

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