

# Chapter 6

## Ayahuasca and the Treatment of Drug Addiction

José Carlos Bouso and Jordi Riba

**Abstract** The public health impact of addiction, with its high relapse rates and the limited efficacy of available treatments, has prompted the search for alternative therapeutic approaches. In recent times, there has been renewed interest in the anti-addictive potential of psychedelics. Consumption of ayahuasca, the N,N-dimethyltryptamine-containing Amazonian plant tea, is experiencing unprecedented expansion. The ritual use of this brew, obtained from *Banisteriopsis caapi* and *Psychotria viridis*, in shamanistic and religious contexts is now popular in Europe and North America. Studies of long-term ayahuasca-church members in Brazil have recorded discontinuation of drug use after starting ayahuasca use. Furthermore, several centers that offer therapies based on ayahuasca as a means to treat addictive behavior claim higher success rates than more traditional approaches. In this chapter, we review the pharmacology of ayahuasca and the data available concerning its efficacy in the treatment of drug addiction. Although the therapeutic potential of ayahuasca, based on the evidence examined, is promising, the lack of systematic studies precludes firm conclusions. Ideally, research methodology should be improved, with future studies implementing well-planned clinical protocols with adequate controls, end-points, and follow-up.

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J. C. Bouso (✉)

Institut Hospital del Mar d'Investigacions Mèdiques de Barcelona (IMIM), International Center for Ethnobotanical Education, Research and Service (ICEERS), C/Sants 168, 3<sup>o</sup> 1<sup>a</sup> 08028 Barcelona, Spain  
e-mail: jcbouso@iceers.org  
URL: <http://www.iceers.org>

J. Riba

Departament de Farmacologia i Terapèutica, Universitat Autònoma de Barcelona and Centre d'Investigació de Medicaments, Hospital de la Santa Creu i Sant Pau, C/Sant Antoni Maria Claret, 167 08025 Barcelona, Spain  
e-mail: jriba@santpau.cat

## What is Ayahuasca and Who Takes it?

Ayahuasca is a psychotropic brew widely used throughout the Amazon Basin by the indigenous and *mestizo* peoples in their magical, ritual, and medicinal practices (Schultes and Hofmann 1979). In its most common form, ayahuasca is obtained by brewing the stems of *Banisteriopsis caapi*, a vine containing the  $\beta$ -carboline alkaloids harmine, harmaline, and tetrahydroharmine, together with the leaves of the bush *Psychotria viridis* or the leaves of the vine *Diplopterys cabrerana*, depending on the ecological area. Both plants are rich in the psychedelic compound N,N-dimethyltryptamine (DMT). In reality, however, the Amazonian ayahuasca mixtures are much more complex regarding their plant content, and the only ingredient that all mixtures necessarily contain is *Banisteriopsis caapi*. Whatever the combination, *B. caapi* is usually boiled and then, depending on the specific indigenous group, and even on the particular shaman, other plants are generally added. According to Ott (1994), around 100 plant species from 39 different families are known to be used as ayahuasca additives. Several of these admixture plants have medicinal properties and some contain stimulant and visionary compounds (for a comprehensive list of the different admixture plants used, see Ott 1994). Each Amazonian ayahuasca brew may therefore have its own idiosyncratic effects that are unique to that particular preparation. The Amazonian peoples' tremendously rich knowledge of plants is perfectly illustrated in the quote: "Every time one of the old shamans dies, it's as if a library has burned to the ground" (Plotkin 1994).

The narrow Western conception of considering ayahuasca as the mixture of *B. caapi* and *P. viridis* or, from a pharmacological perspective, as the combination of a monoamine oxidase inhibitor (MAOI) and DMT, is perhaps the consequence of the popularity and worldwide expansion of the so-called "ayahuasca religions" (Labate et al. 2008). Ayahuasca religions originated in Brazil and they all share the syncretism between Christian beliefs and Amazonian cosmivision. For most Amazonian cultures, ayahuasca is the tool that allows entry into the spiritual, *real* world, where the entities that rule the forces of the world and nature live. By entering this world and invoking the spiritual entities, ayahuasca can be used for whatever purpose one desires: for healing, for sorcery, for finding lost objects and persons, or just to know and understand the nature of reality. In sum, an Amazonian perspective according to which ayahuasca is considered an entity or spiritual being seems to be universal to all the classes of Amazonian *ayahuasqueros*, such as shamans, *vegetalistas*, and ayahuasca religion practitioners. (For a recent, updated and comprehensive review of the Amazonian cosmivision of ayahuasca, see Beyer 2009; see also McRae 1992, for the history and evolution of the Santo Daime church).

In the particular case of the Brazilian ayahuasca religions, Amazonian shamanic cosmological elements are combined with Christian mythologies in a kind of syncretism. Each concrete religion has its own influences, offering a fascinating diversity of rituals, syncretisms, and belief systems. The two most popular and

most widespread ayahuasca religions are the Santo Daime church and the União do Vegetal (UDV). Barquinha is another important ayahuasca religion, but unlike Santo Daime and the UDV, it has not spread internationally. With the exception of the UDV, which is rather rigid and pyramidal, Brazilian ayahuasca religions are dynamic and flexible. Religious groups are constantly dissolving and new groups are created, adopting new names and variations in the doctrine. It is therefore almost impossible to know how many different religious groups really exist. What they all have in common, however, is that they consider that the ayahuasca beverage is the mixture of *B. caapi* and *P. viridis*, and there are rarely any other plants added to their beverages. Even those religious groups that used different ayahuasca formulas in their origins—as was the case of the UDV (Labate et al. 2011)—do not currently accept any plants other than *B. caapi* and *P. viridis* in their ayahuasca.

With the international expansion of the ayahuasca churches, and because of the Internet and globalization, foreigners are becoming familiar with the world around ayahuasca. At the same time, traditional healers, shamans, all kinds of medicine men, and vegetalistas are offering ayahuasca ceremonies outside of their natural ecosystems, and traveling to different parts of the world. There is also a very intense “ayahuasca tourism” (Winkelman 2005), consisting of foreigners traveling to South America just to spend a few days in some jungle location where shamans administer ayahuasca. In the large cities of some countries such as Peru or Ecuador, it is also quite common to encounter travel agencies that offer the occasional short tourist trip to visit a shaman and participate in an ayahuasca session.

In sum, most people belonging to the “ayahuasca culture,” independently of whether they are members of an ayahuasca church or followers of a specific shaman, medicine man or practitioner, share the use of ayahuasca not as a drug where people find some kind of psychoactive effect or new experience, but as a kind of therapy or healing process, which they sincerely believe is specific and unique to ayahuasca. It is no surprise then, that they, the ayahuasqueros (the people who use ayahuasca), refer to the beverage as *la medicina* (“the medicine”).

## **Neuropsychopharmacology and Long-Term Effects of Ayahuasca**

The visionary effects of ayahuasca are thought to be caused essentially by DMT, which can access the brain thanks to the action of the  $\beta$ -carbolines present in the tea. DMT is not active orally because the MAO in the gastrointestinal tract and liver destroys it in a first-pass effect. (For a recent, exhaustive review of the pharmacology of DMT and MAOIs, see dos Santos 2011). In the recent and distant past, Amazonian peoples developed methods of administering DMT to experience its psychoactive effects, circumventing gastrointestinal metabolism. Inhalation of DMT in snuffs and ingestion in combination with MAOIs in ayahuasca are the most commonly used strategies.

In an attempt to understand its pharmacology, and to characterize its subjective effects and its impact on human physiology, we administered ayahuasca in laboratory conditions. We developed a series of experiments in which ayahuasca was given to healthy volunteers to study the above-mentioned objectives. We used Brazilian ayahuasca prepared from *B. caapi* and *P. viridis* in all our experiments. The ayahuasca was lyophilized and the powder was quantified for alkaloid contents and encapsulated. The ayahuasca thus administered in our laboratory had the same characteristics as “natural” ayahuasca, but lacked the water. The advantage of this form of ayahuasca is that, by administering it in a capsule, we could standardize doses and control for the participants’ and experimenters’ expectations using placebos and blind designs.

In the studies performed to date, we administered doses ranging between 0.5 and 1 mg of DMT per kilogram of body weight. To characterize the subjective effects, we used the Hallucinogen Rating Scale (HRS) (Riba, Rodríguez-Fornells, Strassmann, and Barbanoj 2001a), the Addiction Research Center Inventory (ARCI) (Lamas, Farré, Llorente, and Camí 1994), and visual analog scales (VAS). Using these instruments, a characteristic pattern of effects emerged. VAS items, which were administered repeatedly throughout an experimental session to study the time course of effects, were significantly increased even at the 0.5 dose compared to placebo. Doses of 0.75 and 1 mg/kg of DMT also increased scores on various subscales of the HRS and the ARCI. It was interesting to note that there were no differences between the various doses administered and placebo in the “volition” subscale of the HRS, a measure of the degree of incapacitation experienced by the participant, which means that volunteers were able to interact with the environment without apparent impairment (Riba et al. 2001b). These psychological effects were replicated in subsequent studies assessing physiological variables and the potential development of tolerance or sensitization (Riba et al. 2003; dos Santos et al. 2011, 2012). An interesting finding in this series of experiments was that the intensity of psychological effects of ayahuasca appeared to be dose-dependent. This dose-response relationship is not typically observed in field conditions when expectation is not controlled carefully.

In our pharmacological studies we also found that following ayahuasca administration, the maximum intensity of the subjective and physiological effects coincided with the peak of DMT plasma concentrations. Another interesting pharmacokinetic finding was the unexpectedly low levels of harmine present in the plasma samples of most participants. This suggests intense metabolism and is also indicative that, at least in some people, harmine contributes little to the central effects of ayahuasca (Riba et al. 2003). Ayahuasca also induced cardiovascular effects, which were less intense than expected, basically consisting of moderate elevations of diastolic blood pressure (Riba et al. 2003; dos Santos et al. 2011, 2012). Furthermore, it promoted the liberation of prolactin and cortisol, but not growth hormone (dos Santos et al. 2011, 2012), and induced time-dependent modifications in the distribution of circulating immune cells. The study of lymphocyte subpopulations showed that the percentages of CD4 and CD3 cells decreased during the acute effects of ayahuasca, while the percentages of natural

killer cells increased. All physiological parameters returned to baseline in the 24 h after administration. In a recent study where two different doses of ayahuasca were administered 4 h apart, we observed a trend to tolerance for cardiovascular measures but not for subjective effects (dos Santos et al. 2012). No studies have yet assessed the possible impact of repeated ayahuasca intake on immunity and health in long-term ayahuasca users.

At the neurophysiological level, ayahuasca induces significant effects on the spontaneous electrical activity of the brain, shifting the energy distribution in the electroencephalogram (EEG) toward the higher end of the power spectrum. This shift toward the so-called faster frequencies of the EEG can be measured as an increase in the relative power of the EEG beta band (Riba et al. 2002). While this effect can be interpreted as reflecting enhanced central nervous system (CNS) activity, this activation is different from that induced by traditional psychostimulants, as we demonstrated in a study where ayahuasca was compared with *d*-amphetamine (dos Santos et al. 2011). Another interesting finding from the clinical trials mentioned is the identification of areas the brain where activity is modified under the acute effects of ayahuasca. As discussed below in more detail, at the peak of the ayahuasca experience, activation is observed in cortical and paralimbic areas of the brain involved in cognitive control, emotion, and memory (Riba et al. 2006). The impact of ayahuasca intake on brain activity was also evidenced studying sleep architecture. Daytime consumption of the tea many hours before sleep time effectively inhibited rapid eye movement (REM) sleep, decreasing its duration both in absolute values and as a percentage of total sleep time (Barbanoj et al. 2008).

Regarding long-term effects of ayahuasca, our group also published one of the few longitudinal studies conducted to date. The study included acceptable sample sizes and assessed mental health and cognitive performance in long-term ayahuasca users (Fábregas et al. 2010; Bouso et al. 2012). A group of 127 ayahuasca users who were members of various Brazilian ayahuasca churches and had been using ayahuasca for at least 15 years were compared with a control group in a series of measures of personality, psychopathology, life attitudes, and neuropsychological performance at baseline and 1 year later. No evidence was found regarding psychological maladjustment, mental health deterioration, or cognitive impairment in the ayahuasca-using group. What is more, ayahuasca users scored better than controls in most measures. These results are in line with previous studies with more limited sample sizes where short- (Barbosa et al. 2005; Santos et al. 2007), mid- (Barbosa et al. 2009; Doering-Silveira et al. 2005a; Da Silveria et al. 2005) and long-term (Grob et al. 1996; Halpern et al. 2008) effects of ayahuasca use were assessed. Although the published studies tend to conclude that ayahuasca use can be regarded as reasonably safe, in some case reports, ayahuasca appears to have precipitated serious mental health problems requiring psychiatric treatment (Santos and Strassman 2008; Lima et al. 2002). The reason for this discrepancy in findings may be some kind of bias in the selection of subjects in the cited studies. For example, in the pharmacological studies by our group, subjects had to pass a psychiatric interview and to have sufficient previous experience with psychedelics.

Another requirement was that they had not suffered serious adverse consequences. Another possible bias is that in the mid- and long-term studies, participants were all frequent ayahuasca users. It is therefore possible that people who took ayahuasca and had intense bad experiences or psychiatric complications as a consequence of ayahuasca intake had stopped using ayahuasca altogether and were therefore not available for examination. Future research into the mental health consequences of ayahuasca use should follow individuals or people who begin to use ayahuasca and become involved in its regular use, but decide to stop it suddenly for some reason (Bouso et al. 2012; Bouso and Riba 2012; Barbosa et al. 2012).

## **Ayahuasca and the Treatment of Drug Addiction**

Although ayahuasca has become popular among the psychedelic community as a kind of medicine to treat drug abuse and addiction (there are nearly 150,000 citations in Google for the words “ayahuasca drug addiction”), evidence is weak, fragmentary, and disperse. Its fame as a potential anti-addiction treatment is supported mainly by claims from former drug users who recovered after joining an ayahuasca religion and also by reports from several clinics treating drug addicts with ayahuasca, such as Takiwasi (“the house that sings” in Quechua) in Peru, where patients have been treated using ayahuasca and other traditional plants and healing techniques for over 20 years. Takiwasi is therefore the world pioneer center using this kind of treatment. Other centers in Peru and in other parts of the world also offer patients treatments with ayahuasca, but few have published any assessment of their interventions. Here we review all the fragmentary evidence obtained from the medico-anthropological literature and the reports of various treatment centers regarding the effectiveness of ayahuasca in the treatment of drug addiction. It is important to note that, as no peer reviewed studies have yet been published on this topic, the information discussed can only be considered as anecdotal.

In their preliminary report regarding the long-term effects of ayahuasca assessing personality, psychiatric status, and neuropsychology, Grob et al. (1996) compared a sample of 15 subjects from the UDV church with 15 non-ayahuasca users. They found that although none of the UDV members had a current psychiatric diagnosis, five had previously met criteria for alcohol abuse according to DSM-III-R and ICD-10. Furthermore, in the life story interviews, the investigators also recorded that 11 subjects had a history of moderate to severe alcohol use prior to joining the UDV, with five of them reporting episodes of bingeing associated with violent behavior. Two had been jailed because of their violence. Four subjects also related prior involvement with other drugs of abuse, including cocaine and amphetamine. Eight of the 11 subjects with prior histories of alcohol and other drug use and misuse were addicted to nicotine at the time of their first encounter with the UDV and ritual ayahuasca use. The authors said, “A common theme was the perceived belief while in the induced altered state of consciousness that they

were on a self-destructive path that would inevitably lead to their ruin and even demise unless they radically changed their personal conduct and orientation.” A more recent study, conducted by Halpern et al. (2008), assessed 32 regular ayahuasca users, all members of the Santo Daime church in Oregon in the USA. The study found that 24 subjects met criteria for drug/alcohol abuse or dependence in the past, and one met criteria for marijuana dependence, but was in remission at the moment of the assessment. Of the 24 who had alcohol problems in the past, six described church participation as the key turning point in their recovery.

On our part, we have conducted informal interviews with several patients diagnosed with drug dependence and ayahuasca providers such as psychotherapists and neoshamans who use ayahuasca to treat drug abuse. Information from our informants suggested that the therapeutic potential of ayahuasca came from the visions that patients experience when they are under the psychoactive effects. This coincides with findings by Grob et al. (1996), as quoted in the paragraph above. The somatic component of ayahuasca (known in shamanistic jargon as *purga* or purge, a kind of internal cleansing as a result of vomiting) is also very important throughout the therapeutic process. The purga, however, seems to be more useful in terms of body detoxification and the visions seem to be more useful in terms of psychological healing. For many of the ayahuasca providers, however, the purga and the visions are important effects throughout the therapeutic process: Patients undergoing purga not only excrete toxins from their bodies, but also seem to “expel” morbid mental contents. The visions induced by ayahuasca may transfer patients to the past and bring back repressed memories that they can work through, restructure thoughts on how they are conducting their lives, and establish plans where life without drugs is a real possibility. At the same time, ayahuasca intoxication has a physical impact on the body and one of its manifestations is precisely the purga. In this way, the simultaneous experience of physical malaise, visions, and reflections on their life-path help them begin to give up toxic habits. In effect, it is not uncommon that individuals begin to take care more regarding their nutrition and health after they begin to participate in ayahuasca ceremonies (Harris and Gurel 2012).

Recent neuroimaging studies may explain the process underlying the therapeutic schema that both ayahuasca providers and patients report. Using the neuroimaging technique SPECT (single photon emission tomography), Riba et al. (2006) found that acute ayahuasca administration influences regional cerebral blood flow in specific brain areas. Ayahuasca increases the activity of the anterior insula bilaterally, with greater intensity in the right hemisphere. It also hyperactivates the anterior cingulate/frontomedial cortex of the right hemisphere, areas previously known to be implicated in somatic awareness, subjective feeling states, the processing of emotional information, and emotional arousal. Additional increases were observed in the left amygdala/parahippocampal gyrus, structures also involved in emotional arousal and the processing of memories. It might be speculated that ayahuasca helps to bring to consciousness memories from the past, to re-experience associated emotions, and to reprocess them in order to make plans for the future. The reason why these processes may help people reshape their life

attitudes may be explained by another recent neuroimaging study. This study, carried out by a Brazilian group using fMRI (functional magnetic resonance), found that while subjects were under the effects of ayahuasca remembering a picture they had been previously shown, the same visual areas in the occipital cortex were activated as when subjects saw the same picture under normal conditions. According to the authors of this fMRI study, their results “indicate that ayahuasca seeings stem from the activation of an extensive network generally involved with vision, memory, and intention. By boosting the intensity of recalled images to the same level of natural image, ayahuasca lends a status of reality to inner experiences” (de Araujo et al. 2011). In other words, patients feel that the visions and emotions that emerge under the effects of ayahuasca are “real,” and, if they are real, then one can work therapeutically toward “real” new behaviors in the future.

One might argue that drug-dependent patients starting ayahuasca use are simply substituting one psychoactive substance for another. However, in our longitudinal study, long-term ayahuasca users showed no differences from nonusers in Novelty Seeking and Impulsiveness (Pedrero-Pérez and Mota 2008). Since high scores in these measures have been associated with drug use (Pedrero-Pérez and Rojo Mota 2008; Verdejo-García et al. 2008), the mere search for new experiences may not be the reason underlying their involvement with ayahuasca. On the contrary, members of the ayahuasca religions reported that the experiences transcend the merely perceptual or recreational aspects of psychoactive drug effects.

In a study performed on a group of adolescents from the UDV with a median of 50 ayahuasca experiences each and at least 2 years of continuous ayahuasca intake, the authors could not find differences in the patterns of drug use between UDV members and their controls, but there was a nonsignificant reduction in alcohol use in the ayahuasca group (Doering-Silveira et al. 2005b). In one of our 1-year longitudinal studies with a large group of members from Brazilian ayahuasca churches (Fábregas et al. 2010), ayahuasca users also showed significantly lower scores than controls on the alcohol use and psychiatric status subscales included in the Addiction Severity Index (ASI), a semi-structured interview designed to assess the impact of drug use in a multi-dimensional fashion (Medical Status, Employment/Support, Drug and Alcohol Use, Legal Status, Family/Social Relationships, and Psychiatric Status). We concluded, “The ritual use of ayahuasca, as assessed with the ASI in currently active users, does not seem to be associated with the psychosocial problems that other drugs of abuse typically cause.” Ayahuasca does not therefore appear to be associated with the deleterious psychosocial effects typically caused by other drugs of abuse. Even more, according to our longitudinal study, ayahuasca users take fewer drugs than controls, but have a longer history of drug use before their involvement in their ritual use of ayahuasca.

Some anthropological research has shown how ayahuasca can be useful when it is taken in a religious context. Field research by Ricciardi (2008) and Labigalini (1998), interviewing informants from the UDV who were recovering from drug addiction after their enrollment in the UDV, found that an “existential vacuum” was a common primary reason for subjects to use drugs compulsively. Ayahuasca



served to put them into contact with the “sacred,” and having an experience of transcendence allowed them to re-orient their behavior in order to give up drugs. Obviously, the doctrine also played a major role in the abstinence process, as did support from the group, which serves as a factor of social cohesion and increases confidence in the recovery. Again, in our longitudinal study, we found that religious ayahuasca users had lower scores in Self-Directiveness (Fabregas et al. 2010), a personality trait that is socioculturally mediated (Cloninger et al. 1993). This might suggest that the doctrine is more relevant than individuality in the self-direction of the initiates. The vacuum reported by Ricciardi’s (2008) informants may be filled by the combination of the doctrine and the ayahuasca experience.

Only one study has published quantitative data on the rates of prior and present drug dependence problems related to the moment subjects joined an ayahuasca church. A total of 83 individuals (41 men and 42 women, aged between 18 and 40 years old) participated in this research (Labate et al. this volume). Thirty-six (44 %) participants had been members of the church for at least 3 years. They filled in a self-administered questionnaire that had two parts. The first part was a list of drugs, and the second part was a series of seven items based on DSM-IV criteria. In the list of drugs, the subjects had to mark which drug or drugs they had used in the past and which ones they were currently using. They next had to score the seven items, first from the point of view of their past situation, and then from their present situation at the moment of the survey. If subjects scored five items (of seven) positively, they were considered drug dependent according to DSM-IV criteria. The criterion for remission was not to be presently using that drug. The results showed that 38 (46 %) subjects did not meet criteria for a history of drug dependence. Of 41 subjects that met criteria for dependence in the past, 37 (90 %) had stopped taking drugs, while only 4 (10 %) remained dependent. Nineteen percent of the 41 had recovered from tobacco dependence, 27 % from alcohol dependence, 24 % from cocaine dependence, 8 % from crack dependence, and 5 % from other substance dependence (MDMA, solvents, LSD, and heroin). Though these are quite spectacular results, it is difficult to know if abstinence was achieved thanks to the potential anti-addictive properties of ayahuasca, or thanks to their involvement with a formal religious group. Taking all these data into account, however, it seems clear that involvement with an ayahuasca religion may provide a useful alternative for many people wishing to overcome drug dependence.

In his pioneering book, *The Varieties of Religious Experience*, written one century ago, James (1902/1992) stated: “The only radical remedy I know for dipsomania is religiomania.” Although it is quite difficult to isolate the components (such as group cohesion, ayahuasca, and doctrine) that mediate positive outcomes, in our longitudinal study we obtained some indicators that may be in consonance with James’ famous quote: Ayahuasca users scored significantly higher than controls in Self-Transcendence, a personality trait that is believed to be socioculturally mediated (Cloninger et al. 1993). Subjects also scored higher in the Spiritual Orientation Inventory (a measure of spirituality) and in Purpose of Life (Bouso et al. 2012). For certain drug-dependent subjects, therefore, belonging to a

religious group may be a positive step toward quitting an addiction, and ayahuasca probably strengthens this benefit, potentiating group cohesion while taken under the context of a doctrinal purpose. Whether or not this is so, it is interesting to note that in the study mentioned, ayahuasca users and nonusers did not differ in the personality trait Cooperativeness, so only the fact of ingesting ayahuasca, even in the context of a religious setting, does not seem to make somebody a “better person,” if the trait of Cooperativeness (and its subdimensions, Social Acceptance, Empathy, Helpfulness, Compassion, and Pure-Hearted Conscience) are an indicator of “goodness.”

The other context where ayahuasca is used in the treatment of drug addiction is in ayahuasca clinics. Usually, an ayahuasca clinic is a center located somewhere in the forest where the tea is administered in the context of ceremonies and retreats, and where Western medicine and shamanistic knowledge are usually integrated. Takiwasi is the most famous center of this kind in the world. It is located in Tarapoto, Peru. Local ayahuasqueros work alongside psychologists and physicians, integrating shamanistic and Western knowledge. The Peruvian authorities recognize Takiwasi’s therapeutic method. Takiwasi also provides treatments using other plants and different kinds of traditional Amazonian medicines and practices. Because of the international fame and reputation that Takiwasi has achieved over the last 20 years, other centers in the Tarapoto area also offer ayahuasca retreats to treat addictions. Besides clinics of this type in Peru, underground therapists and centers that use ayahuasca in the treatment of drug addiction problems are scattered throughout the world.

Despite the popularity of ayahuasca as a potential medicine to treat drug addiction (there are even some documentary films about ayahuasca as an anti-addictive medicine; see for example, *The Jungle Prescription* [<http://flavors.me/ayahuasca>]), and the increasing number of centers where ayahuasca is administered as a treatment for addiction, data regarding real efficacy are lacking. One classic report, which also explains the therapeutic method developed in Takiwasi, offers some data regarding the patients treated in the center from 1992 to 1998 (Mabit 2002). More than 380 patients were admitted between these dates but just 211 initiated treatment. At Takiwasi, treatment is considered to start after 1 month of acclimatization. It is then that the first ayahuasca ceremony takes place. The duration of the stay in Takiwasi is 9 months and there are follow-ups over the next 2 years. Of these 211 patients, 175 were first-time patients and 36 were returning patients; 28 % reached the 6th month of treatment, and 23.4 % finished the entire treatment. Sixty-six percent of the patients were cocaine-paste users; 80 % consumed alcohol alone or in addition to other drugs. Fifty-five percent had already tried treatment, and 33 % had resorted to mental health services. The average age was 30 years and the average duration of substance use at the time of admission was 12.5 years. However, the percentage of those receiving a medical discharge was at most moderate. Most discharges were voluntary; 52 % compared to 23 % medical discharges, 23 % runaways, and 3 % expulsions. Based on the outcome, patient progression during their stay was classified as “good” (favorable development, problems apparently resolved thanks to a true structural change

manifested upon several life levels), “better” (some improvement, with evident structural changes, but vestiges of the original problem still present), and “same or bad” (relapse of consumption of substances, although often more discrete, no convincing structural change, frequent abandonment of substances for alcohol). Out of the total, 31 % were classified as “good” and 23 % as “better” while 23 % were classified as “same or bad” and 23 % “unknown.” According to Mabit (2002): “With hindsight, we can affirm that about 35 % of those who have lost contact with the Center are, in the end, ‘good’ or ‘better’ (that’s 8 % of the total), which means that about 62 % of the patients have, in the end, positively benefited of the model proposed at the Takiwasi Center. When one only takes into account the subgroup of the patients receiving a medical discharge (those who have completed the entire program), the positive results rise to 67 %.”

Finally, promising results on the efficacy of ayahuasca in the treatment of drug addiction have been reported from IDEAA (“Instituto de Etnopsicología Amazónica Aplicada”), a former treatment center located in the Brazilian Amazon. Because ayahuasca use is legal for religious but not therapeutic purposes in Brazil (CONAD 2010), IDEAA has now ceased its activities. IDEAA was a center of integrative psychotherapy that mainly combined transpersonal psychotherapy, several Oriental techniques of meditation, such as Yoga and Tai Chi, and ayahuasca rituals following Western and Amazonian traditions, such as those taken from the Santo Daime church. For a detailed explanation of IDEAA’s therapeutic method, see Fernández and Fábregas (in this volume) and Villaescusa (2008).

Although psychosocial status and evolution was recorded in IDEAA, and follow-ups were conducted for most patients, no data on follow-up has been published to date. To our knowledge, IDEAA was the only ayahuasca center using a standardized protocol of data collection. The protocol included the administration of psychometric rating scales, such as the Temperament and Character Inventory-Revised (Cloninger et al. 1993), to assess personality; the SCL-90-R (Derogatis 2001) to assess psychopathology; the SOI (Elkins et al. 1988); the PLT (Crumbaugh and Maholick 1976) to assess spirituality and purpose in life; and the Frontal Systems Behavior Scale (FrSBe) (Grace and Malloy 2001) to assess executive function deficits. Neuropsychological performance tests such as the Stroop Test (Golden 1994) and some memory subtests from the Wechsler Adult Intelligence Scale-III (Wechsler 1997) were also administered. Assessments were made before and after treatment. In a preliminary study that analyzed data from 13 subjects who underwent treatment for cocaine addiction at IDEAA, positive outcomes were found in all the variables assessed. There was a positive change in the “Self-Directedness” dimension of the TCI-R, a result that is related to good therapeutic outcome. Also, there was a reduction in the “Impulsivity” subscale of the TCI-R, and an improvement in some psychopathological dimensions, reflected as decreases in some subscales of the SCL-90-R, such as Obsession-Compulsion and Anxiety. Moderate decreases were also observed in the Paranoia, Psychosis, Phobia, and Hostility subscales. Several neuropsychological functions also improved, as was reflected in both the FrSBe, a neuropsychological behavioral rating scale, and the tests of performance Fernández et al. (in this volume). Again,

these data can only be considered anecdotal. There was no control group, the sample size was small, and some changes may simply be related to the fact that recovery can perhaps be reached simply with the mere passing of time while living in a beautiful jungle setting.

To our knowledge, the data presented above amounts to all the scientific information available to date regarding efficacy of ayahuasca in the treatment of drug addiction.

## Conclusions and Future Research

Ayahuasca is a traditional plant preparation that is receiving increasing attention as a potential treatment for drug abuse and addictive disorders. Many private centers around the world offer rehabilitation stays with ayahuasca to treat addictive behaviors. Almost all of these centers combine traditional medicine and ceremonies with Western psychotherapy and medicines. Although the pharmacology of ayahuasca is relatively well characterized, and studies on the consequences for mental health of the long-term use of ayahuasca are increasing, evidence on the efficacy of ayahuasca to treat drug addiction is scarce. It seems that in the context of a highly ritualized setting where intense social forces are at work, ayahuasca can be useful for drug-dependent patients. Future studies should investigate the different factors involved in the potential therapeutic effects of ayahuasca.

Since ayahuasca treatments for drug addiction have a long tradition in South American countries, where the combination of traditional medicines with Western psychotherapy is common, it would be ideal if these centers could record information in a systematic way in order to address the question of efficacy. Ideally, clinical trials should be conducted and protocols should be elaborated for data collection before, during, and after discharge. Ayahuasca providers should also gather information on potential hazards both in the short and the long term. Ideally too, clinical trials should be designed and their outcomes compared with results from naturalistic settings. Only in this way will the question be answered as to whether ayahuasca should be included in the therapeutic arsenal as a treatment for drug addiction.

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