INTEGRATING SYSTEMATIC CUE EXPOSURE WITH STANDARD TREATMENT IN RECOVERING DRUG DEPENDENT PATIENTS

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Abstract — Repeated drug administration readily produces classically conditioned responses in animal and human experimental studies. The majority of patients applying for treatment of drug dependence show both autonomic and subjective responses when exposed to drug-related stimuli. These responses are presumed to have been conditioned during a period of active drug use, persist after traditional treatment for drug dependence, and may constitute one of several factors which predispose to relapse. Preliminary data are presented from a novel treatment approach which is designed to test whether drug-conditioned responses can be reduced or extinguished by systematic exposure to drug-related cues and whether such extinction improves the overall results of treatment.

RELAPSE

Relapse to drug use in a formerly dependent person is one of the core features of addiction. The typical addict may continue drug use for years before seriously trying to break the habit by entering a treatment program. While the length of time before requesting treatment varies, the addict is likely to have been changed by a long period of exposure to compulsive drug use. Thus, it is not surprising that the reasons for relapse after treatment may be totally different from the reasons which led to the initial drug use (see O'Brien, Ehrman, & Ternes, 1986). Both psychosocial and biological factors probably contribute to the phenomenon of relapse. A critical part of treatment is analyzing those factors which increase the likelihood of relapse after a period of abstinence.

We have focused our attention on methods to achieve the long-term rehabilitation of drug-dependent persons. Treatment success is measured by the functioning of patients over the weeks, months and years after an initial course of treatment. Short-term treatment, including detoxification and 28-day rehabilitation, is not meaningful unless there is a program to continue treatment on an outpatient basis and prevent relapse. Like arthritis, the condition we are treating is one that has a proclivity to relapse repeatedly, even after apparently successful short-term treatment. In follow-up studies, we attempt to analyze what precipitates a return to the use of drugs and what seems to be responsible for a prolonged drug-free period. For drug dependence disorders in general, we and others have found multiple factors that tend to lead to relapse.

One of these relapse factors may be the presence of Pavlovian conditioned responses produced by repeated drug administration in the presence of specific stimuli. Conditioned responses produced by drug administration were first reported from Pavlov's laboratory (Pavlov, 1927). Since then, they have been reported for many drugs in animals and in man (Grabowski & O'Brien, 1981). These conditioned responses can be classified as drug-like or drug-opposite. The drug-opposite responses can mimic the drug withdrawal syndrome. If these responses occur just before a dose of the drug is received, they produce attenuation of drug effects. This attenuation of drug effects produced by conditioned responses can be called "tolerance" and it may form a partial explanation for the diminished drug effects.
Conditioned drug-like responses can also be produced by pairing distinct stimuli with drug administration. After repeated pairing, the stimuli themselves can produce drug-like effects (Grabowski & O'Brien, 1981; Lynch, Stein, & Ferstinger, 1976). These drug-like responses have been produced in animal experiments and in human studies (O'Brien, 1975); such a conditioning mechanism may form a partial explanation for what are known as the “placebo effects” of drugs. This presumes that drug-like or “placebo effects” have been conditioned by past exposure to drugs under similar circumstances. Our research over the years has provided clues as to which conditioning paradigms are most likely to produce either drug-like conditioned responses or drug-opposite responses. Both animal and human data suggest that stimulants such as amphetamine and cocaine are more likely to produce drug-like conditioned responses, while opioids in human subjects produce more prominent drug-opposite responses. There also appear to be influences of timing of the conditioning stimulus and unconditioned stimulus, but much more research will be required to sort out these factors.

Abraham Wikler was the first to suggest that conditioned responses may play a role in the relapse to drug use so commonly seen in former addicts. In the 1940’s Wikler (1948) reported that former opioid addicts would sometimes report symptoms of opioid withdrawal when talking about drugs during group therapy sessions, or when they returned to areas where they had previously used drugs. Wikler labeled this phenomenon “conditioned withdrawal,” speculating that environmental stimuli had acquired the ability (through classical conditioning) to elicit many of the signs and symptoms of pharmacological withdrawal. He further hypothesized that cues formerly associated with drug effects or drug withdrawal might play an important role in triggering relapse to drug use in the abstinent opioid abuser.

In the years since Wikler’s original observations, there have been several studies demonstrating the existence of conditioned withdrawal in animals (Goldberg & Schuster, 1970; Wikler & Pescor, 1967) and in humans (O’Brien, 1975; O’Brien, Testa, O’Brien, Brady, & Wells, 1977). We and others have also reported withdrawal-like symptoms and/or signs in opiate addicts exposed to drug-related stimuli (Sideroff & Jarvik, 1980; Teasdale, 1973; Termes, O’Brien, Grabowski, Wellerstein, & Jordan-Hayes, 1980). Given this evidence, the existence of conditioned withdrawal is generally accepted, but its actual clinical importance remains uncertain.

One way of assessing clinical importance is to determine whether modification of conditioned responses can influence the course of addiction. For the past several years our research group has engaged in efforts to extinguish or reduce putative conditioned responses in patient volunteers and compare their clinical course with that of control patients.

The responses we have targeted in our extinction program include subjective responses such as “craving,” “high,” and feelings of drug withdrawal. We also have studied the effects of the extinction program on autonomic responses such as changes in pulse, blood pressure, skin resistance and skin temperature. The procedure for modifying these responses is based on systematic, gradual exposure to drug-associated cues. The general approach in most of these projects has been first to select conditioned “trigger” stimuli (e.g., sight of syringe, drug-talk, cook-up paraphernalia), which reliably elicit conditioned drug responses in the target population, and then to attempt to reduce these responses through repeated, nonreinforced exposure (extinction).

Our research group has studied the conditioned responses associated with chronic opioid use, speculating that some of these responses (particularly conditioned craving and withdrawal) could lead to drug use and relapse in the abstinent patient (McLellan, Childress,
Ehrman & O'Brien, 1986; O'Brien, 1975; O'Brien et al., 1977; Ternes et al., 1980). In a large scale treatment-outcome study employing extinction trials in methadone patients (McLellan et al., 1986), we found that these drug-related stimuli were reliable elicitors of conditioned opioid-related responses, particularly conditioned craving and conditioned withdrawal. With 20 or more extinction sessions, conditioned craving was significantly reduced, but conditioned withdrawal was still in evidence. We have continued our work in a population of abstinent patients who have been detoxified from cocaine or opioid dependence. The remainder of this paper will focus on the cocaine population.

**CUES ASSOCIATED WITH COCAINE USE**

The recent upsurge of cocaine use among our patients has given us the opportunity to study and document the kinds of conditioned responses which may occur in chronic cocaine abusers (Childress, McLellan, Ehrman, & O'Brien, 1987, 1988). Cocaine use tends to be episodic. Whether the user has stopped taking cocaine because of toxicity, incarceration or admission to hospital for detoxification, there is a strong tendency to resume taking cocaine after a short abstinent period. Detoxified cocaine users report cocaine craving in certain situations despite their expressed and apparently genuine intention to refrain from returning to drug use. Some report intense craving, arousal and palpitations when they encounter objects as diverse as the sugar bowl in a restaurant, talcum powder while changing a child's diaper, or seeing a friend with whom they had used cocaine. Many of these situations involve a white substance which—because of the patient's repeated experience with white, crystalline cocaine—now signals cocaine to the former user. Detoxified former cocaine-dependent patients also experience similar responses to cocaine-using friends, drug-buying locations, a pharmaceutical odor—almost anything that has been repeatedly associated with getting and using cocaine. The stimuli act as a trigger for arousal and craving. By the time a patient enters treatment, most of his environment consists of reminders of his cocaine use.

Cocaine ‘‘reminders’’ may create big problems for the patient attempting to stay drug-free. When he returns from treatment to his home environment, much of what he sees will be linked to his earlier cocaine use. Strong craving may be evoked, leading to drug use and rapid relapse to the drug-dependent state. Though many different factors may contribute to the extremely high rate of relapse among users of cocaine, we suspect cocaine ‘‘reminders’’ could play a significant role. Our current work is aimed at trying (a) to characterize the kinds of responses patients experience when they are exposed to cocaine ‘‘reminders,’’ (b) to measure these responses, and (c) to reduce these responses through innovative treatment strategies.

At our research center, we recently have begun a large-scale study attempted to understand and treat the causes of relapse in cocaine dependence. As one part of this program, we are investigating the possibility that reducing or eliminating conditioned responses—by a process of systematic cue exposure or extinction—may reduce the rate of relapse in abstinent patients who formerly were cocaine dependent. This approach is a potentially useful adjunct to traditional abstinence-oriented treatment programs. Traditional treatment approaches have intuitively recognized the power of cocaine reminders. Thus, abstinent patients are warned to avoid ‘‘people, places and things’’ associated with prior cocaine use (Marlatt, 1983). In reality, complete avoidance is very unlikely, even in a well-motivated patient. Patients need additional tools for coping with or reducing drug craving.

Our treatment strategy is actually complementary to an avoidance approach: We give patients repeated exposure to cocaine ‘‘reminders’’ while they are in a safe environment, in an attempt to reduce the craving and arousal often triggered by these stimuli. This treatment approach is based on the view that cocaine ‘‘reminders’’ essentially are classically
conditioned stimuli which acquire their "reminder power" through repeated pairings with cocaine's pharmacologic effects over the natural course of a patient's drug use. By repeatedly exposing the patient to cocaine "reminders" without cocaine, it should be possible to reduce or extinguish the power of such cues to trigger the conditioned responses (arousal, craving, etc.) which could lead to drug use and relapse.

Integration of cue exposure within a comprehensive treatment program

Relapse to drug use after detoxification is influenced by several factors both internal and external to the patient. To prevent relapse, all categories of relapse-producing factors should be addressed, including pharmacological, social occupational, medical, legal, and family issues. If conditioning factors play a role in relapse, the influence of conditioning probably varies with the individual patient depending on the relative importance of other relapse-producing factors. Thus, we have integrated the extinction procedure within the context of a treatment program which addresses a wide range of issues thought to be important to the recovering addict.

Based upon our treatment experience with cocaine patients, as well as our prior work with opiate abusers, the following design features were considered important in organizing a study of the relevance of conditioned responses in the treatment of cocaine dependence:

1. Patients should be abstinent in order for us to adequately evaluate the potential benefit of extinction on relapse to cocaine use.
2. Initial extinction trials should be conducted in a protected therapeutic setting, to minimize the possibility of drug use in association with the strong craving/arousal triggered by the cocaine "reminders."
3. Cocaine "reminders" themselves should be tied closely to the patient's cocaine history, particularly to preferred mode of cocaine administration (intra-nasal, intravenous or smoked). Pilot patients reported that seeing or hearing tapes of cocaine use in a nonpreferred modality did not stimulate craving or arousal.
4. The complexity of cocaine's effects could result in a highly varied group of conditioned responses. When smoked or injected, cocaine results in a rapid onset of euphoria and pleasurable sensations, often followed, only a few minutes later, by dysphoria, nervousness, and extreme drug craving. These biphasic "roller coaster" effects are further complicated by the appearance of toxic symptoms (suspiciousness, paranoia, etc.) after high doses, long binges, or even a long history of less frequent use. And finally, after ceasing continued use, patients may complain of "crash" feelings, which may include depression, irritability and fatigue. Since the same environmental stimuli may be linked to several different phases of cocaine's actions, there could be several different kinds of responses to the same cocaine reminder.

Test of the effect of adding extinction to treatment for cocaine dependence

Although individual patients seem to benefit from systematic cue exposure or extinction, the only way to determine whether any technique adds significantly to the treatment of a disorder is to obtain a relatively homogeneous sample of patients and randomly assign them to the experimental treatment or to a control condition. We have studied more than 50 cocaine-dependent patients, and preliminary data are presented here. All of these subjects were male veterans who entered the Substance Abuse Treatment Unit of the Philadelphia VA Medical Center with a primary problem of cocaine dependence. These patients ranged in age from 28 to 53, and averaged 3 years of cocaine use. Though several of these patients also had histories of alcohol and marijuana use, those with a significant history of opiate dependence were specifically excluded. In general these relatively "pure" cocaine abuse patients tended to have significantly shorter addiction histories and fewer previous treatment episodes than recent admissions presenting for treatment of opiate or polydrug dependence.
Thus far, data from 30 drug-free former cocaine dependent patients have been analyzed. All had at least 7-10 days of abstinence from cocaine and were beyond the “crash” phase of cocaine withdrawal. The first nine patients were not randomized but instead were placed directly on the cue exposure protocol as pilot patients. They participated in developing of symptom lists, laboratory measurements, and preliminary extinction procedures. The second group of 21 patients were randomly assigned to experimental or control groups as described below. Data presented here were obtained primarily from two sources: (a) laboratory measurement sessions, and (b) extinction sessions.

Laboratory measurement sessions. Prior to extinction or other treatments, all patients were tested for their initial responsivity to cocaine-related stimuli in a 90-min laboratory measurement session. These laboratory test sessions are conducted in an environmentally controlled, electrically shielded recording chamber. Both physiological and subjective measures are obtained. Physiological measures include peripheral skin temperature (TEMP), galvanic skin resistance (GSR), a general arousal index, heart rate (HR), and respiration (RESP). These physiological measures are simultaneously recorded on a polygraph and a Bio-Med computer database for later analyses. Subjective measures are obtained by asking each abstinent patient to rate, on a 1-10 scale, the degree of subjective cocaine “high,” “craving,” or “crash” (withdrawal) experienced under each set of stimulus conditions. The following stimulus components are used: (a) Neutral Baseline, (b) Neutral Videotape (a nature story), (c) Neutral Activity (video pong game), (d) Drug Baseline, (e) Drug-related Videotape (buy-sell and cocaine administration rituals), (f) Drug-related Activity (handling drug paraphernalia and performing a simulated cocaine administration), and (g) Recovery Baseline. Both Neutral and Drug-related stimuli were developed through our work with pilot patients. Each patient’s drug-related videotapes and paraphernalia were linked to his preferred (usually his most recent) mode of using cocaine.

Treatment assignment. After pretreatment testing, patients were randomly assigned to one of four treatment conditions: (a) Supportive-Expressive Psychotherapy + Extinction (SE-X); (b) Supportive-Expressive Psychotherapy + activities to control for the extra attention received by patients assigned to the extinction condition (SE-C); (c) Standard Drug Counseling + Extinction (DC-X), and (d) Standard Drug Counseling + Control activities (DC-C). “Control activities” consist of sessions (equal in length and number to extinction sessions) with self-help tapes featuring suggestions for developing a healthy lifestyle, better relationships, and so on. Drug counseling is administered by experienced counselors according to a treatment manual and represents good standard treatment for substance abuse. Supportive-Expressive psychotherapy is administered by experienced doctoral level psychologists and has been found to be significantly more effective than drug counseling for opioid dependent patients (Woody et al., 1983). The efficacy of psychotherapy for cocaine dependence has not been previously examined in a controlled study.

Treatment sessions. Inpatients assigned to extinction groups received 15 hour-long sessions of repeated, nonreinforced exposure to cocaine “reminders” during the two-week period of hospitalization following initial detoxification from cocaine. (Therapy or counseling sessions were administered on a three times per week basis during this two-week period.) The two-week inpatient treatment phase was followed by a two-month outpatient phase offering 8 additional weekly sessions of extinction or control activities (as well as weekly therapy or counseling, depending on group assignment). All these treatment sessions were additional to standard treatment for cocaine dependence at our clinic. The data presented here focus primarily on the 15 inpatient extinction sessions.

Each hour-long cocaine extinction session contained three 5-min audiotape segments, three 5-min exposures to a cocaine-related videotape and three simulated cocaine adminis-
nation rituals. These drug-related stimuli were presented in sequence—audio-video-activity—and repeated three times. This procedure provides nine drug-related stimulus exposures per session, for a total of 135 exposures over the course of 15 sessions.

Though most inpatient extinction sessions are conducted on the treatment ward, sessions number 1, 8 and 15 are conducted in the laboratory chamber to allow for monitoring of physiological responses over the course of extinction. For both laboratory and hospital ward extinction sessions, subjective data are based on the Within Session Rating Scale (Childress, McLellan, & O'Brien, 1986) for cocaine symptoms (WSRS-C), a quantified report which assesses both the type and intensity of conditioned responses that a patient may experience upon exposure to cocaine-related stimuli (CS). With this instrument, the patient is first asked to rate the overall intensity of high, craving, and "crash" (withdrawal) using a 1–10 scale for each. The type and intensity of symptoms is then probed through an accompanying list of 50 responses associated with early high (euphoria), toxic (e.g., paranoia) and "crash" phases of cocaine use. The entire WSRS is administered at the beginning and again at the end of each hour-long extinction session.

RESULTS OF PRE-EXTINCTION TESTING

The following interim results illustrate the phenomena and provide a progress report on the status of our on-going treatment study.

**Pretreatment laboratory testing (N = 30)**

We now have laboratory pretest and extinction data from 9 pilot patients and 21 additional patients who were randomly assigned to one of the four treatment combinations previously described. All these treatments were initiated in an inpatient setting (postdetoxification) and continued on an outpatient basis postdischarge.

Data from the laboratory pretest prior to treatment confirm our preliminary finding that cocaine abusers respond differentially to Neutral versus Drug (cocaine)-related stimuli. A two-way ANOVA performed on the skin temperature data yielded significant main effects of stimulus Type (Neutral vs. Drug (cocaine)-related, $p < .001$), Mode (Video vs. Activity, $p < .001$) on peripheral skin temperature, with no significant interaction effect. These temperature data are presented graphically in Figure 1, showing that reductions in peripheral skin temperature (an index of arousal) were greater to Drug (cocaine)-related stimuli than to Neutral stimuli ($p < .001$), and were generally greater in response to activities than to video stimuli.

The average temperature reduction to cocaine-related stimuli (including "nonresponders") was approximately $4^\circ$ Fahrenheit. Among those classed as "responders," however, dramatic reductions of 8 to 12$^\circ$ Fahrenheit (in response to cocaine-related stimuli) were not uncommon. The magnitude and pattern of these temperature changes in response to cocaine-related stimuli is very similar to the changes which occur in former opioid addicts in response to opioid-related stimuli, frequently reported by our laboratory (Childress, McLellan, & O'Brien, 1984, 1986).

For the physiological variable of galvanic skin resistance (GSR) a two-way ANOVA similarly revealed significant main effects of both stimulus Type (Neutral vs. Drug (cocaine)-related, $p < .04$) and stimulus Mode (Video vs. Activity, $p < .001$). There was a significant Type $\times$ Mode interaction effect ($p < .008$); GSR values were significantly different between Neutral versus Drug-related Video stimuli, but not between Neutral versus Drug-related Activities. Analyses of heart rate data showed trends similar to those for GSR, but just missed statistical significance.

**Subjective responses (N = 26).** An overall ANOVA (with stimulus condition as the
repeated measure) was performed upon each of the subjective variables of self-rated high, craving, and withdrawal. For each variable, four difference scores were derived to represent the change in subjective response under each stimulus condition: Neutral video (Neutral Video - Baseline), Neutral activity (Neutral activity - Baseline), Drug video (Drug video - Baseline) and Drug activity (Drug activity - Baseline). These overall analyses revealed a significant effect of stimulus condition upon cocaine craving ($p < 0.0000$), high ($p < .01$) and withdrawal/"crash" ($p < .01$). Of these responses, craving was clearly the most prevalent, reported two to three times as often as either high or withdrawal/"crash" responses.

At least one-third of these patients were adamant "nonresponders," insisting the pretest stimuli triggered no craving, arousal or other responses. For these patients, physiological arousal (as reflected in either decreased skin temperature or a fall in GSR) was sometimes present, even though subjective arousal was denied.

**Extinction sessions**

Subjective responses. A one-way ANOVA with repeated measures was performed for each of the subjective variables of craving, high, and withdrawal/"crash," using sessions as the repeated measure. These analyses revealed a significant effect of sessions upon all three subjective variables: craving ($p < .0000$), high ($p < .0001$), and withdrawal/"crash" ($p < .0000$). Of these responses, craving was the most prevalent and persistent, reducing gradually over the course of 15 extinction sessions. Reports of high and "crash"/withdrawal were less common, and were largely extinguished by the sixth hour of extinction. Figure 2 shows the reduction in three subjective responses: craving, high and crash/withdrawal as a function of extinction trials.

Physiological responses. Measures of skin temperature and GSR both show significant reductions as a function of extinction trials. Figure 3 compares the change in temperature responsivity from extinction Session 1 to Session 15 (the final inpatient session). Though the

![Fig. 1. Skin temperature response in cocaine abusers to Neutral versus cocaine-related stimuli ($N = 30$).](image)
skin temperature and GSR responses were reduced as a function of extinction trials, their relative persistence is underscored by the fact that some arousal is still in evidence even after 15 hour-long exposure sessions.

**TREATMENT OUTCOME**

In general, the outcome of treatment for cocaine dependence is not good after the patients leave the hospital. The majority of patients drop out of outpatient treatment quickly and commonly return to using cocaine. For this study, the outpatient phase was 8 weeks of treatment after discharge from the hospital. Thus far, the drop-out rate for the standard treatment group (DC-C) is enormous. The mean time in outpatient treatment for this control group is roughly one week. The SE-C group is a little better at 3.5 weeks. Both extinction groups show substantially more retention in treatment than the two nonextinction groups. The SE-X group had an average of 6.5 weeks of treatment and the DC-X group had an average of 7 weeks.

The critical measure of outcome, of course, is cocaine use. The goal is complete abstinence; but during the course of treatment, some cocaine use typically occurs even in successfully treated patients. Thus, a quantitative measure of cocaine use would be desirable. This presents problems in measurement, however. Since cocaine metabolites can be detected in urine for at least three days (and occasionally for five to six days), using a small amount of cocaine while in outpatient treatment can produce a positive urine test and may not be readily distinguishable from much heavier use. Patient self-reports may be distorted, but they can add significantly to the quantitative information. Thus far, the two extinction groups have more weeks with clean urines than the two nonextinction groups. We are encouraged by this preliminary finding because the DC-X group is performing better than the SE-C treatment group. This is the first time in our treatment studies of substance abuse that we...
have found drug counselors performing so well in comparison to doctoral level professionals administering psychotherapy. Although the results are still preliminary, they suggest that the extinction procedure is acceptable to patients and staff and that it may be adding something to treatment retention and outcome.

Clearly, detoxified cocaine abusers can experience conditioned craving and arousal to cocaine reminder stimuli. These responses can be both intense and persistent, meaning that the abstinent cocaine abuser may be vulnerable long after detoxification is complete. Though the program of extinction described here is effective in reducing craving to cocaine-related stimuli presented in the context of the laboratory or clinic, patients often still report craving in the natural environment. We are currently considering two approaches to improve generalization from the lab to the street: One approach would attempt to increase the generalization of extinction by the use of even more realistic stimuli (e.g., the sight of real cocaine) and individualized stimulus contexts (e.g., *in vivo* repeated exposures). Previously, we have been reluctant to employ *in vivo* exposures near “copping” corners or shooting galleries because of possible risk to both patients and clinical staff. Somewhat less dangerous stimuli could involve the patient’s own home, or the use of “neighborhood” videos taped from a moving car. A second approach would explore the effectiveness of several other techniques in actively countering or reducing the conditioned craving and arousal which occur in response to “reminder” stimuli. These techniques could include training of alternative behaviors (competing responses), aversive imagery, and cognitive techniques. Our upcoming treatment protocols will feature elements from both these approaches, including the use of more individualized cocaine reminders and the training of active techniques for dealing with the powerful responses to these stimuli.

**SUMMARY**

Though data collection is still in progress, several significant findings are already apparent from our study of cocaine “reminders”:

![Graph showing change in skin temperature response to cocaine-related stimuli as a function of extinction (Session 1 vs. Session 15). BL = Baseline, A = cocaine-related audiotape, V = videotape, T = task (cocaine ritual). Number of subjects (abstinent cocaine abusers) = 26.](image-url)
1. Detoxified cocaine abusers do show a differential responsivity to drug-related cocaine "reminders" as compared to neutral stimuli. In our laboratory setting, patients responded to cocaine "reminders" with strong signs of physiological arousal, including dramatic reductions in peripheral skin temperature, and a fall in skin resistance. Subjectively, patients experienced increased cocaine craving, and, with lesser frequency, feelings of cocaine-like "high" and cocaine "crash" or withdrawal.

2. In extinction sessions, repeated, nonreinforced exposure to cocaine "reminders" led to a complete reduction in craving to these stimuli by the 15th hour-long session in most patients. High and "crash" responses were virtually eliminated by the sixth hour of extinction.

3. Physiological arousal to cocaine "reminders" was often still in evidence even after 15 hours of extinction.

4. Even after completing the current extinction protocol, cocaine abusers may crave—and use—cocaine when experiencing drug "reminders" in the natural environment.

5. The results of all treatment approaches for cocaine dependence are modest, but the preliminary results of this controlled study show that the groups of patients receiving the extinction treatment have better retention in the outpatient program and more cocaine-free weeks than patients receiving standard treatment without extinction.

REFERENCES


Cue exposure with standard treatment

