

Ketamine Psychedelic Therapy (KPT): A Review of the Results of Ten Years of Research

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Abstract—Ketamine is a prescription drug used for general anesthesia. In subanesthetic doses, it induces profound psychedelic experiences and hallucinations. The subanesthetic effect of ketamine was the hypothesized therapeutic mechanism in the authors' use of ketamine-assisted psychotherapy for alcoholism. The results of a controlled clinical trial demonstrated a considerable increase in efficacy of the authors' standard alcoholism treatment when supplemented by ketamine psychedelic therapy (KPT). Total abstinence for more than one year was observed in 73 out of 111 (65.8%) alcoholic patients in the KPT group, compared to 24% (24 out of 100 patients) of the conventional treatment control group ($p < 0.01$). The authors' studies of the underlying psychological mechanisms of KPT have indicated that ketamine-assisted psychedelic therapy of alcoholic patients induces a harmonization of the Minnesota Multiphasic Personality Inventory (MMPI) personality profile, positive transformation of nonverbalized (mostly unconscious) self-concept and emotional attitudes to various aspects of self and other people, positive changes in life values and purposes, important insights into the meaning of life and an increase in the level of spiritual development. Most importantly, these psychological changes were shown to favor a sober lifestyle. The data from biochemical investigations showed that the pharmacological action of KPT affects both monoaminergic and opioidergic neurotransmitter metabolism, i.e., those neurochemical systems which are involved in the pathogenesis of alcohol dependence. The data from EEG computer-assisted analysis demonstrated that ketamine increases theta activity in cerebrocortical regions of alcoholic patients. This is evidence of the reinforcement of limbic cortex interaction during the KPT session.

Keywords—alcoholism, hallucinogen, ketamine, psychedelics, psychotherapy, Russia

A review of the literature suggests that the psychedelic experience may have beneficial effects in many ways: contributing to the cathartic process, stabilizing positive psychological changes, enhancing personal growth and self-awareness, catalyzing insights into existential problems, increasing creative activities, broadening spiritual horizons, and harmonizing relationships with the world and other people (Strassman 1995; Krupitsky & Grinenko 1992;

Grinspoon and Bakalar 1979). All these effects can be auspicious for a sober life.

Many studies in the 1950s and 1960s suggested that psychedelic psychotherapy might be an effective treatment for alcoholism (Grinspoon & Bakalar 1979), but use of differing methodologies made it difficult to generalize across studies. The requisite development of appropriate sophistication of these studies was not possible after psychedelics

The authors wish to thank the staff of the Research Laboratory of Leningrad Regional Center for Alcoholism and Drug Addiction Therapy who took part in their studies during the last 10 years. We are particularly grateful to Drs. A. Paley, A. Burakov, G. Karandashova, V. Ivanov, T. Romanova, T. Berkaliyev, and to many others who contributed a great deal to their work. Also, the authors' deep appreciation goes to the research fellows and physicians of the various scientific research institutes involved in their studies, particularly Drs. I. Dunaevsky, I. Kungurtsev, O. Luchakova and L. Pripulina. Finally, we are very thankful to the Multidisciplinary Association for Psychedelic Studies (MAPS) and to Rick Doblin, MAPS president, for his assistance and support of the

research we were doing. In addition, Dr. Krupitsky would especially like to express his deep appreciation to Jon Frederick and Sylvia Thyssen for their crucial assistance in editing this paper, and to Dr. Rick Strassman for the inspiration and guidance that he has provided.

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were scheduled in 1970 and their use in research was strictly limited. However, at about this time, ketamine and ketamine-like anesthetic agents were being shown to elicit "psychedelic" emergent phenomena in patients (Stafford 1983; Khorramzadeh & Lofty 1976; Loh et al. 1972). This property of ketamine was utilized for therapeutic purposes in ketamine-assisted therapy for alcoholism because ketamine induced a profound psychedelic experience in doses about one-sixth to one-tenth of that usually used in surgery for general anesthesia. Ketamine has some advantages over other psychedelics as an adjunct to psychotherapy. It is safe and short acting (the psychoactive effects last about an hour). In addition, ketamine is not on Schedule I as are other psychedelics and is already a prescription drug.

KPT METHOD

First Stage

Three main stages in the authors' method of ketamine psychedelic therapy (KPT) can be distinguished (Krupitsky et al. 1992). The first stage is preparation. In this stage, preliminary psychotherapy is carried out with patients. During these psychotherapeutic sessions, it is explained to the patients that relief from their dependence on alcohol will be induced in a special state of consciousness. In this state, they will have deep experiences that will help them realize the negative effects of alcohol abuse and the positive aspects of sobriety. Patients are told that the psychedelic session may induce important insights concerning their personal problems, their systems of values, their notions of self and the world around them, and the meaning of their lives. All of these insights may entail positive changes in their personalities, which will be important for their shift to a sober lifestyle. During the ketamine sessions, patients often experience separation of consciousness from the body and dissolving of the ego; as a result, it is very important to prepare them carefully for such unusual experiences. The patients are told that they will enter some unusual states of consciousness and are instructed to surrender fully to the experience.

During several preparatory sessions, it is emphasized that personally significant mental concepts concerning the negative aspects of the patient's alcoholism have been repressed into the unconscious. The patient is told that during the session these concepts will manifest themselves into consciousness in peculiar symbolic forms in emotionally saturated visions (hallucinations), allowing the patient to see and sense the unconscious roots of his alcohol problems. This experience will help the patient to understand that alcohol problems are directly related to more deeply rooted personality problems and are often the consequence of the latter. The conscious recognition of these concepts, along with the painful experience of the negative aspects of alcoholism, will result in the patient's psychological

rejection of alcohol abuse and the establishment of a stable orientation towards sobriety.

This information is not presented to the patient in the form of a didactic monologue from a psychotherapist. The abstract "psychotherapeutic myth" is not simply explained to the patient; it is discussed with him or her and embroidered with specific concrete content during a dialogue. The therapist pays close attention to issues such as the patient's personal motives for treatment and sobriety, goals for a sober life, ideas concerning the cause of the disease and its consequences, opinions as to what hinders sobriety and what favors it, and so on. An individually tailored "psychotherapeutic myth" is formed during this dialogue. It becomes the most important therapeutic factor responsible for the psychological content of the second stage of the KPT. It is also very important to create an atmosphere of confidence and mutual understanding between the psychotherapist and the patient during the first stage of KPT.

Second Stage

The second stage is the ketamine session itself. During this procedure aethimizol (1.5% 3 ml, i.m.) is injected into the patient; after this bemegride (0.5% 10 ml, i.v.) is injected, and then ketamine (Krupitsky 1992). Ketamine doses of 2.5 mg/kg, i.m. were used. The intramuscular route is preferred because the effect is more gradual and the psychedelic experience lasts longer. With an intravenous injection, the effect lasts only about 15 to 20 minutes, but after an intramuscular injection, it lasts from about 45 minutes to an hour. Bemegride enhances the emotional experiences and visions produced by ketamine (Krupitsky 1995), and aethimizol promotes the storage of experiences in long-term memory (Smirnov & Borodkin 1979). Moreover, both of these drugs (aethimizol and bemegride) are analeptic drugs which enhance cortical activity and thus widen the opportunities for psychotherapeutic dialogue with the patient during the ketamine session. In the last several years, the authors' have also begun to prescribe a central calcium channel antagonist (nimodipine, 60 mg. a day, orally) before the KPT session to improve the patient's memory about his or her psychedelic experience, because it was shown that calcium channel antagonists reverse memory disturbances produced by ketamine in rats (Saha et al. 1990). A previous study has shown that nimodipine improves memory of the ketamine session, specifically about psychotherapeutic suggestions and the psychedelic experience (Krupitsky et al. 1995).

With a background of specially chosen music (generally, New Age composers such as Kitaro and Jean Michel Jarre) the patient having a KPT session is exposed to psychotherapeutic influences. The content of these influences is based on the concrete data of the patient's case history and is directed toward the resolution of the patient's

personality problems and toward the formation of a stable orientation towards sobriety. The goal is to help patients create a new meaning and purpose in life during this session. The specific character of this KPT method allows one to carry out a special psychotherapeutic dialogue with the patient undergoing the psychedelic experience. The positive values and meaning of a sober life style and the negative aspects of alcohol abuse are emphasized during this dialogue, which has a specific personal orientation for each patient. It is very important to carefully direct the patient's psychedelic experiences by verbal influences and by establishing a musical background that supports the symbolic resolution of personality conflicts and facilitates cathartic peak experiences. Moreover, at certain moments in the psychedelic session, usually at moments of highly intense hallucinatory experiences, the patient is given an opportunity to smell alcohol. The introduction of the smell of alcohol serves to enhance the negative emotional coloring of the alcoholic themes in the patient's psychedelic experience, thus forming in the patient an aversion towards alcohol and an alcoholic lifestyle.

The second stage of KPT is conducted by two physicians, a psychiatrist and an anesthesiologist, because some complications and side-effects—such as increased blood pressure, convulsions and depression of breath—are possible, though exceedingly rare. After 45 minutes to an hour, the patient slowly comes back from the experience. During the recovery period, which takes about one or two hours, the patient begins to feel ordinary reality returning. At this point in the session, the patient usually begins to describe his or her experience and some discussion and interpretation is begun. After the session, the patient goes to rest. Patients are asked to write down a detailed self-report of their experiences that evening.

Third Stage

The third stage is group psychotherapy, which is carried out the day after the KPT session. Patients are gathered in a group the day after treatment, because when they all share the experience, it is usually more powerful. During this session the patients, with the aid of the psychiatrist, discuss and interpret the personal significance of the symbolic content of their experiences. This discussion is directed toward helping the patients make a correlation between their psychedelic experience and their intra- and interpersonal problems (primarily those connected with alcohol abuse), and thereby to solidify their desire for a sober life. The therapist tries to assist the patients in the psychological integration of the spiritual transformation which can result from the psychedelic experience. This uniquely profound and powerful experience often helps them to generate new insights that enable them to integrate new, often unexpected meanings, values and attitudes about the self and the world.

CLINICAL STUDY OF THE EFFICACY OF KPT IN THE TREATMENT OF ALCOHOLISM

One hundred eleven male alcoholic patients were treated following the KPT method. All participants in the KPT procedure gave voluntary written consent. These patients were chronic alcoholics who could not control their drinking. Their age ranged from 23 to 56 with an average age of 36.5 ± 7 years. Alcohol withdrawal syndrome, one of the major diagnostic criteria for alcoholism, had been present for an average of 5.3 ± 0.5 years. The KPT procedure followed the standardized three-month treatment course at the Leningrad Regional Center for Alcoholism and Drug Addiction Therapy. These three months constituted the first phase of therapy. During this first phase, the patients' alcohol withdrawal syndrome and any related anxiety or affective disorders and somatic disorders were treated. Then, rational, cognitive individual and group psychotherapy was begun in order to establish a mental set of sobriety and a negative attitude to alcohol. Broader issues than the problem of alcohol abuse were explored, including the patient's life history, relationships, and world view. Later, patients in the ketamine program were told that they would undergo a new treatment which would allow them to see and feel the deep unconscious roots of their problems. Patients were helped to understand that their alcohol problem was perhaps only a superficial symptom of these problems.

The control group was composed of a corresponding set of 100 male alcoholics. Their average age was 38.4 ± 0.81 , and their alcohol withdrawal syndrome had been present for an average of 6.8 ± 0.54 years. These patients underwent the same three-month treatment course at the same hospital, but received only conventional, standard methods of treatment. A *t* test for values was used, and there were no significant differences between the experimental and control groups either in the patients' age or in their severity of alcoholism.

It is possible that the requirement that patients volunteer for KPT may have introduced some selection bias into the data, in that the KPT group may have been more motivated to obtain sobriety than the control group. A more rigorous design would have been random assignment to either the KPT treatment or the control group from among a group of patients who had expressed a willingness to experience KPT. Nevertheless, all patients in both the control group and the experimental group came to the hospital voluntarily for treatment. In addition, all patients willingly participated in some form of psychotherapy to complete their course of treatment, with the control group choosing conventional psychotherapy and the experimental group choosing KPT. While it is not possible to conclude that the motivational dynamics were exactly the same in the subjects in the experimental and the control group, it is quite

likely that the motivation for treatment was somewhat similar in both groups.

To determine the efficacy of the treatment, follow-up information was collected about all the patients who had taken part in this study a year after their release. According to the data, abstinence of more than one year was observed in 73 out of 111 people (65.8%) who had undergone KPT. Thirty people (27.0%) had relapsed. Data could not be obtained on eight patients (7.2%). In the control group of 100 patients whose treatment consisted only of conventional methods, only 24 patients (24%) remained sober for more than one year. Sixty-nine patients (69%) had relapsed. We could not obtain data for seven (7%) of the control patients. These data suggest that ketamine-assisted psychedelic therapy increases the efficacy of conventional alcoholism treatment.

The 111 patients were treated sequentially over a four-year period. Monthly evaluations were conducted on each patient. Two- and three-year follow-up statistics were collected at only one time, one year after the last patient was treated. Two years had elapsed for only 81 of the original 111 patients at the time of the final follow-up study. Abstinence of more than two years was observed in 33 out of these 81 patients (40.7%). Thirty-eight patients (46.9%) had relapsed. Two-year follow-up data on 10 patients (12.4%) could not be obtained.

Three-year follow-up data were collected for all 42 patients who had undergone KPT within the previous three years (three years had elapsed for only 42 of the original 111 patients at the time of the follow-up study). According to the data, abstinence of more than three years was observed in 14 out of these 42 patients (33.3%); 24 patients (57.2%) had relapsed. Three-year follow-up data on four patients (9.5%) could not be obtained.

Unfortunately, two- and three-year follow-up data on the control group could not be collected because of financial limitations. The difficulty was due in part to the huge catchment area for these patients, as big as most states in the United States. The most that can be said is that the two- and three-year follow-up data for the experimental group compare favorably with the two- and three-year follow-up data from conventional treatment in the region, which, according to official but unpublished statistics, found between 5 to 15% of the patients remaining sober two to three years after treatment (Leningrad Region Ministry of Health 1995).

Several months after being released from the hospital, most of the patients treated by KPT stated that it had contributed significantly to their sobriety. For instance, seven months after he was released, patient A.C. reported, "The experience related with the KPT session is vividly imprinted in my mind and is a kind of 'taboo' on drinking"

STUDY OF THE UNDERLYING MECHANISMS OF KPT

All patients for these particular studies were randomly selected from among those patients who gave their consent to undergo KPT. Selection was made by medical staff who were blind to the purpose of the studies. The randomization was done informally. Technically, patients who were conveniently available at the time were referred by medical staff of the clinical area of the hospital (which includes five departments for alcoholism and drug addiction therapy with 50 beds each). Everybody was accepted except those with contraindications, such as severe cardiovascular disorders, family and/or personal history of major psychiatric disorders, organic brain damage or severe neurological disorders.

Underlying Psychological Mechanisms

Content Analysis Data. Content analysis of the psychedelic experiences written down by our patients after their KPT sessions was carried out. These descriptions (see Appendix I) often had common plots: violent movement in various types of tunnels and corridors, experience of the separation of consciousness from the body, symbolic experience of death and rebirth, identification with inanimate objects, fear of an apocalyptic end to the world, the sensation of losing one's self image, deep suffering from loneliness, rupture of relations with the family, a feeling of being lost in the universe, a sensation of lack of self-control, feeling dependent upon the frightening chaotic movement, falling through space, a terror of closed spaces and no exit, an unexpected exit and rebirth associated with an oceanic feeling and becoming part of the universe, a feeling of being connected with a Supreme Power or God, and a perceived awareness of the reality of other dimensions or worlds no less real than ours. Ketamine produced diverse experiences ranging from spiritual rapture to fear and even horror, sometimes all in the same person. All of these experiences were extremely intense, clear and compelling. Many people reported great difficulty in expressing their experiences in words.

It should be noted that, despite the common topics in the patients' experiences, themes were almost always individually specific and reflected in symbolic form the individuals' case histories and personality problems (Appendix I). Supported by group psychotherapy, patients were able to interpret more clearly what they had experienced, initially in symbolic form, during their session and to address the personal psychological problems that were uncovered during the ketamine session. These problems in particular were associated with alcohol dependence and the positive prospects for a sober life; patients attributed the negative aspects of the ketamine session to alcohol and

beneficial effects of the ketamine session to the idea of a sober life. This provided favorable psychological conditions for the patients to feel, reflect upon and accept the personal implications of a sober lifestyle. Moreover, after KPT the patients reported a sensation of "catharsis" and "resolution" of a whole series of psychological problems, especially those associated with alcohol dependence (Patient V.S.: "What has accumulated in me, that is, everything associated with drinking, burst out of my consciousness, my soul. I feel relieved. . ."). The reflection upon and processing of patients' psychedelic experiences is undoubtedly an important mechanism in preventing relapse and in forming and solidifying attitudes and behaviors conducive to sobriety.

It is of interest to note that a content analysis of the written self-reports of 108 male alcoholic patients whose personality characteristics were defined by the Minnesota Multiphasic Personality Inventory (MMPI), adapted in Russian (Sobchik 1990), demonstrated a number of statistically significant correlations between some MMPI scales assessed before KPT and the content of the psychedelic experience described in self-reports. For example, the scores of the hypochondria scale (Hs) were significantly correlated with such characteristics of patients' self-reports as "feeling of separation of consciousness from the body," "fear," "rapid movement in labyrinths," "memories about friends," "positive attitude to the psychotherapist," "feeling of flight," etc. The scores of the psychopathic deviation scale (Pd) were significantly correlated with such characteristics of self-reports as "feeling of separation of consciousness from the body," "curiosity," "depersonalization experience" (losing ego), "cosmic experiences," etc. The scale of hypomania (Ma) was significantly correlated with 14 characteristics of patient self-reports, psychopathic deviation scale (Pd) with 10 characteristics, hypochondria (Hs) with eight, depression scale (D) with six, hysteria scale (Hy) with five, social introversion scale (Si) with five, masculinity scale (Mf-m) with three, schizophrenia scale (Sc) with three, psychastenia scale (Pt) with three, and paranoia scale (Pa) with one. Thus, one may conclude that the ketamine psychedelic experiences were to a certain extent determined by the personality characteristics of the patients.

In addition, the relationship between the content of the ketamine session experiences and the MMPI profile changes caused by KPT was examined and statistically significant correlations were found, suggesting that the content of the ketamine session experiences to a certain extent determined the personality changes caused by KPT.

The correlation between the intensity of the negative experiences during the ketamine session and the length of remission was also studied. The "negative experiences" were considered to be the experiences associated with fear, horror, anxiety and other negative emotions (which often

involved alcohol-related themes in the plot of the hallucinations). The intensity of the negative experiences was assessed quantitatively (from a score of 0 for no negative experiences, to 3 for severe negative experiences), according to the data of the patients' self-reports, by a specially trained psychologist who did not participate in the treatment procedure. It was found that the more negative experiences during the ketamine session, the longer remission was observed (correlation coefficient 5.1, $p < 0.01$). This underscored the importance of addressing the negative aspects of alcoholism directly at the deep levels of the mind during the ketamine session. The enhanced recollection of negative effects may have prevented the psychological defenses of information suppression in consciousness deemed important in alcoholism (Gaboyev 1989). In this case, a patient either denies his or her illness, or the internal representation of his or her disease has no emotional component to it. Thus, the role of the therapist is to help release suppressed ideas regarding the disease, which the authors believe KPT is successful in doing.

Influence of KPT on Personality. All patients in the experimental group were examined with the MMPI before and after KPT. Analysis of psychological changes in the experimental group shown in the MMPI data indicated a dynamic shift in patient MMPI profiles (see Table 1). After KPT, the indices were decreased for the majority of the main MMPI scales. The most statistically significant decreases in the profile were in the scales for hypochondria, depression, hysteria, psychastenia, schizophrenia, sensitivity-repression, and in Taylor's scale of anxiety. At the same time, the score in the ego strength scale increased. On the whole, such favorable psychological dynamics testify to the fact that the patients became more sure of themselves, their possibilities and their futures, less anxious and neurotic and more emotionally open after KPT. Against the background of these general tendencies, in the majority of cases some essential individual variations (changes in such scales as masculinity-femininity, paranoia, hypomania, and sensitivity-repression) appeared that reflected a certain harmonizing of the patients' personality profiles.

Thirty-seven randomly selected patients treated by KPT were also examined with Plutchik's Life Style Index (LSI) (Plutchik & Conte 1989) to assess changes in the structure of psychological ego defenses. It was established that a decrease in the regression defense mechanism occurred after KPT (from 28.6 ± 3.1 to 20.6 ± 2.2 ; $p < 0.01$). This means that patients became more mature and responsible for themselves after KPT. Other ego defense mechanisms (suppression, substitution, etc.) were not significantly changed.

Thirty randomly selected alcoholic patients (age 40.1 ± 1.8) treated with KPT were examined with the Locus

Table 1
The Influence of KPT on MMPI Personality Profiles

MMPI Scales (T-marks)	MMPI Filling Time	
	Before KPT	After KPT
Lie (L)	50.0±1.67	52.9±1.25*
Validity (F)	61.9±2.12	58.9±1.44
Correction (K)	52.1±1.37	54.5±1.29*
Hypochondriasis (Hs)	55.7±1.67	52.5±1.56*
Depression (D)	65.7±2.16	60.2±2.01**
Conversion hysteria (Hy)	53.2±1.59	50.8±1.02*
Psychopathic deviate (Pd)	65.8±1.86	64.9±1.90
Masculinity-femininity male (Mf-m)	60.2±1.33	60.2±1.37
Paranoia (Pa)	58.1±2.24	55.9±1.90
Psychasthenia (Pt)	59.6±1.63	56.1±2.01*
Schizophrenia (Sc)	61.02±0.02	56.4±2.05**
Hypomania (Ma)	56.5±1.82	56.1±2.01
Social introversion (Si)	55.4±1.18	54.5±1.14
Iowa manifest anxiety (Taylor) (At)	56.9±2.04	51.7±1.85***
Sensitivity-repression (S-R)	58.7±3.15	50.9±3.07**
Ego strength (Es)	42.8±1.49	46.6±1.30**
Aging (Ag)	41.4±1.14	40.9±0.99
Ego overcontrol (Eo)	46.1±1.01	46.5±1.08
Need for affection (Hy ₂)	45.3±0.97	46.3±0.88

*Statistical significance of differences between MMPI marks before and after KPT (Student's t-test = $p < 0.05$).

**Statistical significance of differences between MMPI marks before and after KPT (Student's t-test = $p < 0.01$).

***Statistical significance of differences between MMPI marks before and after KPT (Student's t-test = $p < 0.001$).

of Control Scale (LCS) developed by J. Rotter (Phares 1976) and adapted in Russia by Bazhin, Golyunkina and Etkind (1993). All patients were assessed with LCS twice: before and after KPT.

It was established that the locus of control in the personality of alcoholic patients became significantly more internal after KPT (from 11.1 ± 4.8 to 30.3 ± 5.3 ; $p < 0.01$). This means that patients became more sure about their ability to control and manage different situations in their lives. They became more responsible for their lives and futures after KPT. It is important to note that changes in all of the personality tests (MMPI, LSI and LCS) were in agreement with each other and that all these changes were very positive and auspicious for a sober life.

Psychosemantic Changes. We also studied changes in the psychosemantic domain induced by KPT. The study used the data from 69 randomly selected alcoholic inpatients treated by KPT (age 37.2 ± 1.04). All patients were examined using the personality differential (PD) test (Bazhin & Etkind 1983) and the color test of attitudes (CTA) (Etkind 1980) before treatment and after (the PD is a personality-oriented version of Osgood's semantic differential—see Osgood, Susi & Tannenbaum 1957).

Both PD and CTA were organized in such a way that one could define peculiarities of the alcoholic patients' personality attitude systems. The combination of PD and CTA allowed, to a certain extent, assessment of changes of attitude which occurred both at the conscious (PD) and

unconscious (CTA) levels after KPT. Using these tests allowed analysis of the following spheres of a personality's attitudes: attitude to oneself, to one's close relatives, to the ideal image of self, to the psychotherapist and one's own alcoholism, to the images "me sober," "me drunk," "me in the future," "a man completely abstaining from alcohol," and to "a man who is able to control his drinking."

In order to conduct the CTA, the patient was first requested to arrange eight colors of Luscher's test in order of correspondence (similarity) to each of the above-mentioned images, from the "most similar, suitable" to the "most different, unsuitable." After the first task, the patient was asked to arrange the same colors in order of preference for the colors themselves, not in reference to any specific image. Then the order of the two arrangements was compared to assess quantitatively the patient's attitude toward the defined images. By comparing the resemblance of these two arrangements (one regarding the images and one in order of preference) it is possible to assess the patient's nonverbal/unconscious attitude towards each of the images. The arrangement of Luscher's eight colors in order of correspondence (similarity) to each specific image reflects the patient's emotional perception of that image; the allotment of the same eight colors in order of preference (from the most preferable to the least preferable) reflects the patient's preference for that color (i.e., how much the patient likes these colors). Thus, a quantitative comparison of these two allotments (comparing the

Table 2
The Influence of KPT on Verbal and Nonverbal Emotional Attitudes

Images	CTA(%)		PD(%)		Δ (CTA-PD)%	
	Before KPT	After KPT	Before KPT	After KPT	Before KPT	After KPT
The ideal image of self	38.57 $\pm$ 2.93	30.25 $\pm$ 4.00*	6.69 $\pm$ 1.60.	6.41 $\pm$ 0.67	31.88 $\pm$ 2.93	23.84 $\pm$ 3.73*
Me now	46.31 $\pm$ 4.00	38.78 $\pm$ 4.00	21.31 $\pm$ 3.07	15.63 $\pm$ 1.20*	25.00 $\pm$ 3.73	23.15 $\pm$ 3.47
Me before treatment	83.53 $\pm$ 3.20	85.38 $\pm$ 2.67	42.34 $\pm$ 3.47	44.78 $\pm$ 3.60	41.19 $\pm$ 3.60	40.60 $\pm$ 3.33
Alcoholism	82.38 $\pm$ 3.47	86.66 $\pm$ 3.73	79.97 $\pm$ 2.40	81.53 $\pm$ 2.80	2.41 $\pm$ 2.13	5.13 $\pm$ 1.60
Psychotherapist	46.31 $\pm$ 3.73	30.66 $\pm$ 4.00**	8.03 $\pm$ 1.20	9.69 $\pm$ 1.60	38.28 $\pm$ 3.33	20.97 $\pm$ 3.33**
Close relatives	42.53 $\pm$ 4.00	34.56 $\pm$ 4.12*	15.94 $\pm$ 3.07	18.75 $\pm$ 3.07	26.59 $\pm$ 3.33	15.81 $\pm$ 4.00*
Me sober	29.90 $\pm$ 3.02	23.81 $\pm$ 3.06*	15.64 $\pm$ 1.77	13.06 $\pm$ 1.69	14.26 $\pm$ 3.60	10.75 $\pm$ 3.06
Me drunk	62.16 $\pm$ 4.15	71.96 $\pm$ 4.42*	38.41 $\pm$ 3.65	44.40 $\pm$ 4.17	23.75 $\pm$ 5.14	27.56 $\pm$ 4.82
Me in the future	29.73 $\pm$ 2.87	29.22 $\pm$ 3.74	12.14 $\pm$ 1.76	10.48 $\pm$ 1.57	17.59 $\pm$ 3.15	18.74 $\pm$ 3.16
A man completely abstaining from alcohol	32.26 $\pm$ 3.82	28.21 $\pm$ 3.14	12.28 $\pm$ 1.71	11.04 $\pm$ 1.47	19.98 $\pm$ 3.73	17.17 $\pm$ 3.12
A man who is able to control his drinking	48.81 $\pm$ 4.87	48.75 $\pm$ 5.05	35.91 $\pm$ 3.31	34.23 $\pm$ 3.53	12.90 $\pm$ 5.01	14.52 $\pm$ 5.16

CTA=Color Test of Attitudes; PD=Personality Differential

* Statistical significance of differences between values before and after KPT (Student's t-test) = $p < 0.05$.

**Statistical significance of differences between values before and after KPT (Student's t-test) = $p < 0.01$.

respective order of colors) demonstrates the patient's emotional, nonverbal/unconscious attitude to the image.

Analysis of the CTA results (Table 2) revealed that after KPT significant positive changes occurred in the patients' nonverbal emotional attitudes toward the psychotherapist, close relatives, the ideal image of self, and to the image "me sober." At the same time, attitudes toward the image "me drunk" became more negative. According to the PD data, significant positive changes occurred after KPT only in respect to the attitude of the patient toward himself (Table 2).

After KPT a considerable decrease occurred in the differences between the specific indices of CTA and those of PD in respect to the same images (Table 2). This decrease evidenced a reduction of the difference between the verbal/conscious and nonverbal/unconscious assessments of personal attitudes. Such reduction was mainly related to the change in the CTA indices and appeared to be strongest for the sphere of attitudes to the psychotherapist, relatives, the image "me sober" and the ideal image of self.

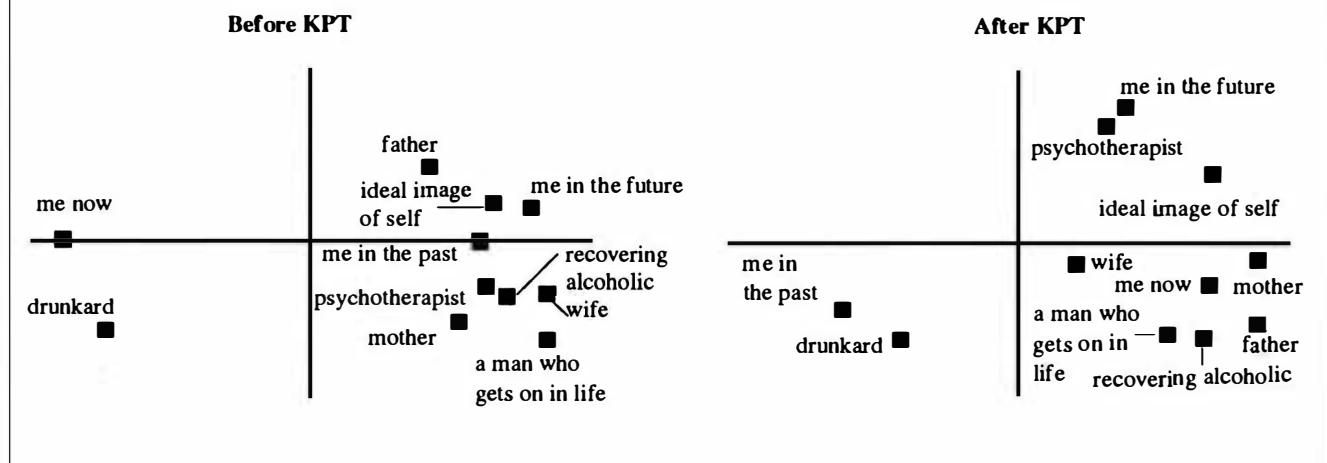
Thus, KPT produced considerable and significant positive changes in the domain of patient attitudes, which took place due to the transformation of nonverbal/unconscious emotional attitudes. KPT resulted in a decreased level of dissonance between isosemantic indices as measured by

CTA and PD. This could be interpreted as a reduction of dissonance between verbal/conscious and nonverbal/unconscious thoughts and feelings regarding alcohol use and personality characteristics and relationships.

According to the CTA data, strong positive changes occurred in patients' nonverbal/unconscious assessments of their attitudes to the psychotherapist, close relatives, to the image "me sober," and to the ideal image of self. This means that the patients had internally grown to accept emotionally these images and, in turn, the attitudes to sobriety connected with them. Thus, KPT may be of benefit in the treatment of alcoholism because it transforms unconscious attitudes, particularly those related to sobriety. The enhancement of the relationship to the therapist might also have had a therapeutic effect by improving transference.

A special note should be made of the discrepancies between the verbal and nonverbal estimates of a patient's personal attitudes registered before KPT. These discrepancies reflect the presence of an essential discord between the conscious and unconscious estimates of the patient's attitudes. This discord reflects a peculiar difference between the subject's unconscious and conscious mind. This possibly characterizes the ambivalence of the patient's position and the disagreement between what is declared at the verbal level and what takes place at the level of the immediate

FIGURE 1
Semantic Space of the Mean Color Repertory Grid of Alcoholic Patients



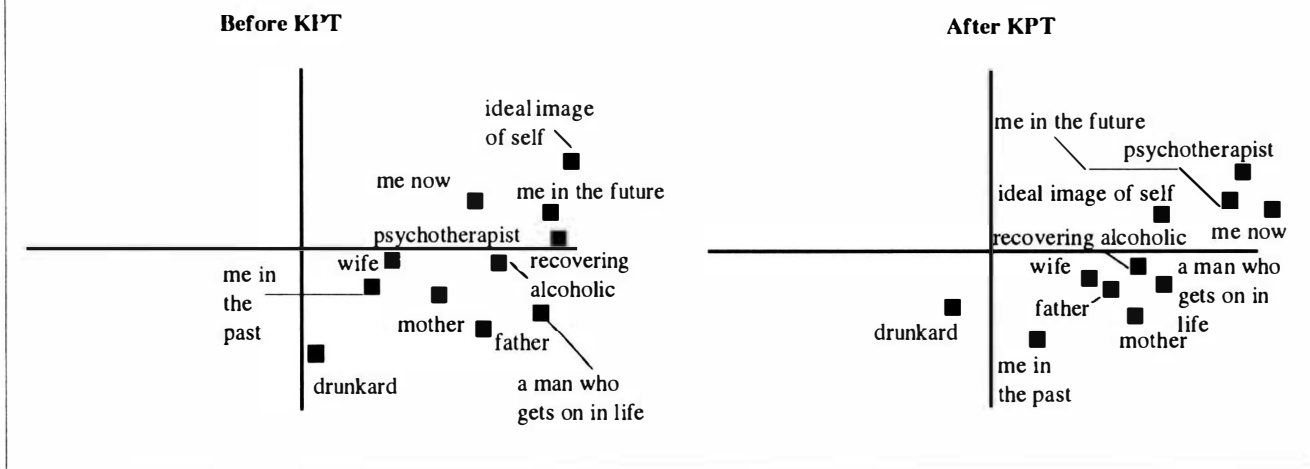
emotional experience. Such discord may give rise to psychological discomfort, internal tension, and difficulties in communication with the environment. These in turn erode a person's adaptive capacity, which may ultimately lead to relapse. Therefore, the reduction of discord resulting from KPT should be considered a development in a patient's psychological status which favors sobriety. It is important to note that the reduction of differences in verbal and nonverbal assessments of the patient's attitudes resulting from KPT (as well as the harmonization of the MMPI profile resulting from KPT) may be the result of the awareness (often in some symbolic form) and partial resolution of important internal conflicts and personality problems that are connected with alcohol abuse and its consequences. This is confirmed both by the patients' statements during the psychedelic session and by their self-reports written after the session. One might suggest that in so far as the discord between conscious and unconscious attitudes is decreased, as suggested by PD and CTA scores, internal conflicts are resolved. This resolution may therefore reduce the pathological need to drink.

In summary, this research shows that KPT results in a correction of the personality of alcoholic patients, that this correction promotes sobriety, and that processes occurring at the unconscious level play a considerable role in promoting sobriety.

A study with repertory grids (Kelly matrices) was carried out with 10 randomly selected alcoholic patients treated with KPT. The repertory grid technique allowed assessment of subtle changes in a patient's self-concept (self-identification) caused by KPT. The technique of "assessment repertory grids" or Kelly matrices (Fransella & Bannister 1977) was employed for this purpose. The grids were arranged so that their 11 elements were replaced by various aspects of the patient's ego as well as other persons significant to the patient, such as "me in the present," "me in the past," "me

in the future," "ideal image of self," "wife," "mother," "father," "recovering alcoholic," "drunkard," "psychotherapist," and "a man who is well-adjusted." For the constructs, 12 pairs of categories (construct poles) were preset to describe characteristics of the patient's personality and value orientations such as "responsible-irresponsible," "self-controlled-impulsive," "strongwilled-weakling," "active-passive," "self-confident-lacking in self-confidence," and so on for "independent," "striving for health," "striving for high living standards," "striving for social recognition," "striving for self-perfection," "striving for family life," and "wise." Two techniques for filling the repertory grids were used. In the first (conventional) one, the patient placed each of the elements at a certain point on the calibrated scales preset by the construct poles (assessed each element with all construct scales). The second technique was specially developed by the authors' to measure changes in nonverbal (and in this sense, less reflexive) psychosemantics. This involved the following procedures: first, the patient arranged eight colors of the Lüscher test in the order of correspondence (similarity) to each of the grid elements, from the most similar, suitable color to the most different, unsuitable one. Then, the patient arranged the same colors in the order of correspondence to the poles of each of the constructs. Comparing the positions of the colors in the two arrangements, by the correspondence to a certain element and by the correspondence to the poles of a certain construct, the authors quantitatively estimated the closeness of this element to the poles of the given construct. The more similar the order of the eight colors in the two allotments, the closer the element to one of the construct poles. For example, when arranging eight colors according to similarity (correspondence) to the element "me in the future," one patient may choose the first color to be green, the second yellow and so on until the seventh and eighth are gray and black. For the construct "active-passive," the

FIGURE 2
Semantic Space of the Mean Verbal Repertory Grid of Alcoholic Patients



same patient may locate yellow closest to active, then green and so on with black and then gray being closest to passive. It is then possible to compare quantitatively the similarity of these two allotments. By this method an element can be located between the poles of a given construct. For the hypothetical patient mentioned above, the element "me in the future" is clearly closer to active than to passive.

The second (color) technique allowed us to obtain nonverbal (and, to a considerable extent, unconscious emotional) estimates of the elements in terms of the categories of given constructs. All 10 alcoholic patients were tested with verbal and color repertory grids before and after KPT. Then mean verbal repertory grid (MVRG) and mean color (nonverbal) repertory grid (MCRG) were calculated for all 10 patients together. Finally, four MVRG and MCRG (two before KPT and two after) were processed by the standard programs of repertory grid computer-assisted analysis (Fransella & Bannister 1977), and then semantic spaces of the personality (spatial representation of a semantic personality structure) were constructed (Figures 1 and 2). The semantic space of the personality (constructed on the basis of multidimensional assessments of elements with constructs) shows semantic interrelationships and interconnections between elements and/or constructs of the repertory grid.

The results of this study (see Figure 1) demonstrated positive changes in the semantic space of the personality of alcoholic patients, particularly in the space of personality characteristics of the color repertory grids. The image "me now" was close to the image "drunkard" and far from the group of such positive images as "recovering alcoholic," "ideal image of self," "wife," "a man who is well adjusted" and others in the semantic space of the MCRG before KPT. After KPT the image "me now" became close to the group of positive images described above and far from the image "drunkard" in the space of MCRG. At the same time, the

image "drunkard" became closer to the image "me in the past." These data show that alcoholic patients emotionally perceived (identified) themselves as drunkards before KPT. After KPT their emotional perception of themselves had changed: they emotionally identified themselves with "recovering alcoholic" and other positive images in the semantic space of personality characteristics and value orientations, and identified themselves as drunkards only in the past.

The changes in the verbal repertory grids were not as significant as those in the color repertory grids (Figure 2). Only the image "drunkard" became a little bit more distant from the group of positive images and closer to the image "me in the past." It is interesting to note that patients already identified themselves with the positive images at the level of verbal self-identification in the semantic space of personality characteristics and value orientations before KPT, whereas they identified themselves in the same way at the level of nonverbal/unconscious (mostly emotional) perception only after KPT. That means, first, that KPT created a profound nonverbal self-concept associated with sobriety, and second, that KPT brought about a correspondence of verbal/conscious and nonverbal/unconscious perceptions of the self and the world.

These data demonstrate that KPT positively transformed mostly the nonverbal (unconscious, mainly emotional) perceptions by alcoholic patients of their individual selves. Thus, it is possible to conclude that KPT positively transformed primarily the emotional self-identification (self-concept) of alcoholic patients.

Effect on Life Values. All 30 patients assessed with LCS were also examined with the Questionnaire of Terminal Life Values (QTLV) developed by Senin (1991) and based on Rokeach's approach to human values and beliefs (Rokeach 1973, 1972). Patients were examined with QTLV twice: before and after KPT.

Table 3
The Influence of KPT on Life Values

	Time of Assessment	
	Before KPT	After KPT
Life values		
Social recognition	27.5±1.0	31.1±1.1*
High standard of living	31.4±1.6	32.1±1.2
Creativity	25.6±1.4	29.6±1.4*
Active social contacts	28.0±1.3	31.4±1.3
Self-perfection	28.2±1.4	33.6±1.4**
Achievement of life purposes	28.3±1.4	33.1±1.3*
Spiritual contentment	30.1±1.4	34.7±1.0**
Individual independence	26.7±1.1	30.8±1.0**
Areas of life values' actualization		
Professional	51.2±2.2	56.0±1.4
Educational	45.3±2.4	52.5±2.3*
Family	46.3±1.8	51.6±1.5*
Social life	38.8±1.9	46.3±2.0**
Hobbies	44.2±2.1	49.2±2.1

*Statistical significance of differences between values before and after KPT (Student's t-test) = $p < 0.05$.

**Statistical significance of differences between values before and after KPT (Student's t-test) = $p < 0.01$.

This study demonstrated a number of significant positive changes in patients' values as a result of KPT (Table 3). KPT enhanced the importance of the life values of creativity, self-perfection, spiritual contentment, social recognition, achievement of life purposes and individual independence. These changes were mostly expressed in such areas of life values actualization as family, education and social life (Table 3). It is evident that such a positive transformation of patients' life values system brings about an enhanced motivation for a sober life and favors sobriety.

Effect on Understanding the Meaning and Purpose of One's Own Life. Ten randomly selected alcoholic patients (age 41.1 ± 2.4) were studied before and after KPT with the Purpose-in-Life Test (PLT) elaborated by Crumbaugh (1968) and based on Frankl's (1978) concept of the individual's aspiration for meaning in life. The PLT was adapted in Russia by Leontiev (1992) in the Department of Psychology of Moscow State University. This study has shown that KPT in alcoholic patients causes a significant increase in the index measuring the understanding of the meaning of life (from 89.7 ± 5.7 to 115.3 ± 3.2 ; $p < 0.01$). Before KPT, the index for the understanding of the meaning of life was below the average normal level. After KPT, it was higher than that level.

These changes mean that after KPT patients were better able to understand the meaning of their lives, their life purposes and perspectives. After KPT, their lives became more interesting, emotionally deeper and filled with meaning. They felt themselves better able to live in accordance with their concept of the meaning of life and life purposes as a result of KPT. Such changes favor sober life, particularly from the standpoint of Frankl's approach, which

considers alcoholism as an "existential neurosis," consequent to losing the meaning of life and the appearance of a specific "existential void" (Frankl 1978), which we believe KPT is able to fill in at least to some extent.

Effect on Spirituality. The influence of a profound mystical (transformative) experience during KPT on the level of spiritual development was studied. For the assessment of changes in spirituality, the authors developed a Spirituality Scale based on the combination of the Spirituality Self-Assessment Scale developed by Charles Whitfield, who studied the importance of spirituality in alcoholism therapy in Alcoholics Anonymous (Whitfield 1984), and the Life Changes Inventory developed by Ken Ring to estimate changes in values and purposes of life produced by near-death experiences (Ring 1984). Three randomly selected groups of people were assessed with this Spirituality Scale: (1) 25 alcoholic patients before and after KPT (average age 37.8 ± 1.3); (2) 21 alcoholic patients before and after a 15-day course of autogenic training, a technique of deep relaxation and self-hypnosis (average age 40.9 ± 1.7); (3) 35 healthy volunteers before and after a four-month course of studying meditation (average age 37.9 ± 1.6).

The Spirituality Scale demonstrated that the increase in the level of spiritual development of alcoholic patients who had undergone KPT was comparable with the increase induced in healthy volunteers by a special course of meditation, and was much greater than the changes in spiritual development induced in alcoholics by a training program of relaxation techniques and self-hypnosis (Table 4). The increased spiritual development induced by KPT in alcoholic patients may be very favorable for sobriety. Moreover,

Table 4

**The Influence of KPT on Spirituality (in Comparison with Other Influences)
According to the Spirituality Scale**

	Meditation Group	KPT Group	Autogenic Training (Self-Hypnosis) Group
The number of answers testifying to:			
spiritual growth	28.1±0.8	21.3±0.8	1.8±0.1
the absence of spiritual growth	12.9±0.9	19.7±2.1	39.2±0.1

the results of the study of KPT's influence on spirituality indicate that KPT does much more than simply create an attitude to a sober life. These results suggest that KPT brings about profound positive changes in life values and purposes, in attitudes to the different aspects of life and death, and, in turn, in the alcoholics' world views.

Many reports suggest that religious or spiritual conversion is an important factor in "spontaneous" recovery from drug abuse. Indeed, Alcoholics Anonymous programs have a distinctly spiritual/religious orientation (Grof 1990; Corrington 1989; Whitfield 1984). A therapy that enhances the likelihood of a conversion experience therefore might have utility in the treatment of substance abuse. Psychedelic-assisted psychotherapy may represent one method of eliciting religious or spiritual experiences in patients with chemical dependence.

The enhanced spirituality in patients after KPT may be an important element of its therapeutic action. Many patients who had never thought about spirituality or the meaning of life reported having profound religious transformative experiences. During the ketamine session, people often experienced the separation of consciousness from the body and the dissolving of the ego. For many patients, it was a profound insight to think that they could exist without their bodies as pure consciousness or pure spirit. Some of them said that as a result of their experience, they understood the Christian notion of the separation of soul and body. Some people reported contact with God. After coming back to ordinary consciousness, they felt sure that they had contact with a higher power. Many patients reported the existence of other dimensions or other worlds that are parallel to ours and seem as real as or even more real than our own. Some patients experienced the expansion of consciousness to encompass the whole universe, whole cosmos, etc. They often said: "I ceased to exist. I disappeared, yet still just my consciousness existed. It was like I became the whole universe or the whole cosmos" (see Appendix I).

It seems ironic that so many of these patients, through their experiences, were converted to a more spiritual approach to life, despite living in a country where people have been brought up for generations with atheism. The authors believe that these positive clinical results in main-

taining sobriety were not achieved simply because they were more successful in establishing a motivation for sobriety and a deeper negative attitude to alcohol but also because of changes in the values, relationships, and world view of these patients. Patients began to see other purposes, other values, other meaning and pleasures in their lives, and this was an important reason for their sobriety.

The changes in the results from the battery of psychological tests show that the patients grew more self-confident, surer in their abilities and their futures, less anxious and neurotic, more balanced, emotionally open and self-sufficient, and more responsible for their lives and futures. A transformation of patients' emotional attitudes, a decrease in the level of inner discord, anxiety, internal tension, discomfort, and emotional isolation, and an improved self-assessment and the appearance of a tendency to overcome the passive aspects of their personalities were all observed. A positive transformation of the patients' system of life values and meaning and even changes in world view were also noted. All these changes favor sober life.

In conclusion, the authors believe that the efficacy of KPT can be interpreted from psychodynamic, hypnotherapeutic/suggestive and spiritual perspectives.

Underlying Biochemical Mechanisms

Biochemical investigations of the underlying mechanisms of KPT were also carried out. Blood was taken from 21 randomly selected male alcoholic patients a day before the KPT and during the ketamine session. Dopamine, GABA and serotonin concentrations in blood, monoamine oxidase type A (MAO-A) activities in blood serum and MAO type B (MAO-B) in blood platelets, ceruloplasmin activity and β -endorphin content were determined. The dopamine concentration was determined by Kogan's method (Kogan & Netchayev 1979); GABA by the method of Sutton and Simmonds (1974); serotonin by the method of Loboda and Makarov (Kolb & Kamysnikov 1976); MAO-A activity was determined by the method of Stroyev and Gusak (1983); and ceruloplasmin activity by Moshkov's method (Moshkov et al. 1986). Blood platelets were extracted by the usual method (Baluda et al. 1980) and then MAO-B activity with benzylamine as substrate

Table 5
Changes in Biochemical Indices during KPT Session

Indices	Before KPT	During KPT
Serotonin ($\mu\text{g/ml}$)	0.035 $\pm$ 0.001	0.037 $\pm$ 0.001
Dopamine (ng/ml)	117.9 $\pm$ 5.6	141.3 $\pm$ 7.8 *
GABA (ng/ml)	39.6 $\pm$ 1.9	39.6 $\pm$ 2.2
MAO-A ($\mu\text{mol/lh}$)	10.47 $\pm$ 0.68	7.87 $\pm$ 0.73 *
MAO-B (nmol/mgh)	80.49 $\pm$ 4.70	67.15 $\pm$ 4.31 **
Ceruloplasmin (mg%)	21.7 $\pm$ 0.9	24.3 $\pm$ 1.2 **
β -endorphine (pmol/l)	10.30 $\pm$ 0.93	15.25 $\pm$ 1.65 *

*Statistical significance of differences between values before and during KPT (Student's t-test) = $p < 0.01$.
 **Statistical significance of differences between values before and during KPT (Student's t-test) = $p < 0.05$.

was determined (Voloshina & Moskvitina 1985). β -endorphin levels in blood serum were determined by radioimmunoassay (Ayrapetov et al. 1985).

The results of the biochemical investigations (Table 5) show that during the ketamine session a real decrease in the activity of MAO-A in blood serum and MAO-B in blood platelets occurred, and there were increased dopamine levels in the blood. Serotonin and GABA concentrations were not altered significantly. Increase of ceruloplasmin activity was statistically significant and the β -endorphin level increased during the KPT session (Krupitsky et al. 1990). These changes in the metabolism of neurotransmitters allow some opinions to be formed about the underlying neurochemical mechanisms of ketamine's psychedelic action (Krupitsky et al. 1990). For example, an increase of ceruloplasmin activity causes a corresponding increase in the conversion of monoamines into adrenochromes, which have hallucinogenic activity (Nalbandyan 1986; Anokhina 1975). This particularly takes place under the conditions of inhibited MAO activity and increased dopamine levels. This is of interest because such conditions are typical for the action of many hallucinogens (Hamox 1984; McKenney, Towers & Abbotts 1984).

The fact that the pharmacological action of KPT affected both monoaminergic and opioidergic systems, i.e., those neurochemical brain systems which are involved in the development (pathogenesis) of alcohol dependence, is an important result of this biochemical investigation; it is possible that this action contributes to the efficacy of KMT.

Underlying Neurophysiological Mechanisms

Another component of the authors' research was EEG computer-assisted analysis of the underlying mechanisms

of KPT for alcoholism. EEG recordings were taken of seven randomly selected male alcoholic patients (average age 35.0 $\pm$ 4.4) before, during and after the ketamine session by placing 16 electrodes according to the international 10/20% scheme. Ear electrodes were used as the reference. After analog-digital conversion, standard programs of computer-assisted spectral EEG analysis (fast Fourier transformation) and topographic mapping of EEG (EEG topography) were employed. According to the data of EEG computer-assisted analysis, it was discovered that ketamine increases delta-activity (1.5-2X) and particularly theta-activity (3-4X) in all regions of the cerebral cortex (Table 6 and Figure 3). This is evidence of limbic system activation during the ketamine session as well as evidence of the reinforcement of the limbic cortex interaction (Pribram 1971). These findings can also be considered to a certain extent as indirect evidence of the strengthening of the interactions between the conscious and unconscious levels of the mind during the KPT (Simonov 1987).

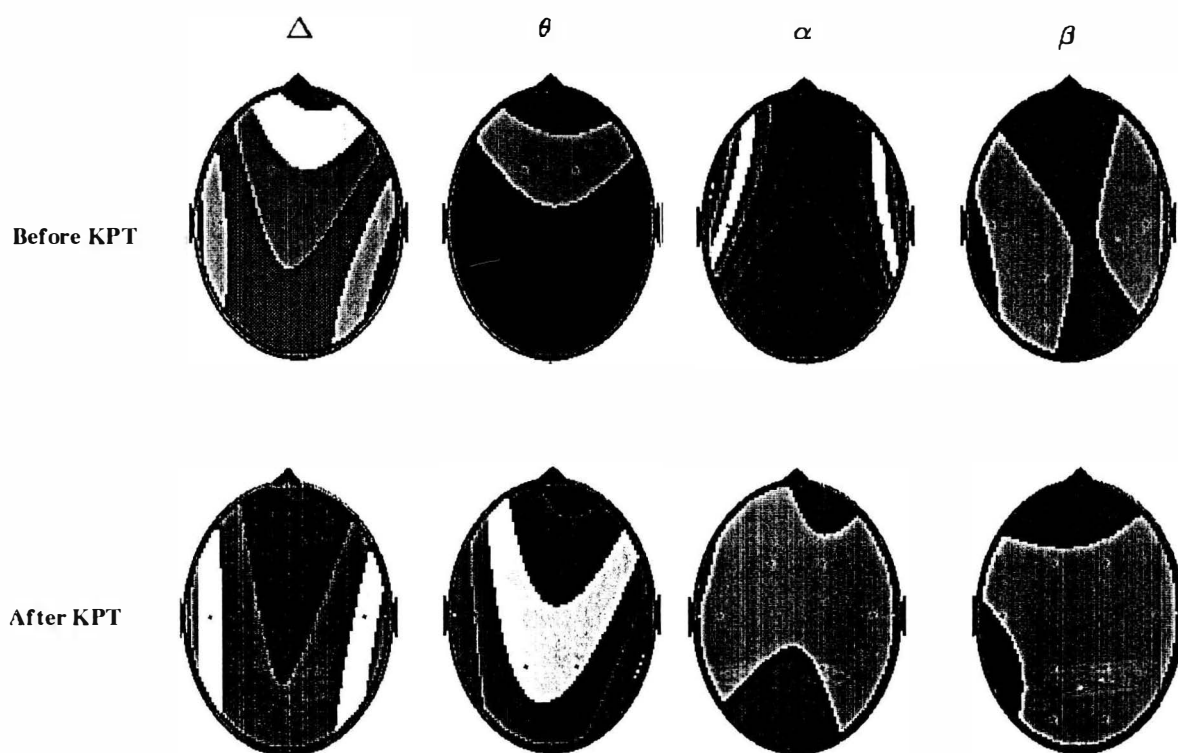
These EEG results are consistent with the results of animal studies into ketamine's underlying neurophysiological mechanisms of action. In particular, it was suggested that ketamine blocks thalamocortical projections and at the same time activates limbic structures (Kayama 1973). Thus, ketamine significantly blocks transmission of incoming signals from all sensory modalities, including signals from the outer world and one's own body (pain, proprioception), that go into the cortex via the thalamus. In these circumstances, the interaction of the cortex with the activated limbic structures is significantly enhanced. To put it another way, the cortex is more functionally related to the limbic structures, which are known to be involved in the processes of emotions, motivations, memory, and subconscious experiences and perceptions (Simonov 1987).

Table 6
EEG Power Spectrum Modulations During KPT Session

EEG Diapazones Power (%)	Left Hemisphere Electrode Positions				Right Hemisphere Electrode Positions			
	Temporal	Occipital	Parietal	Frontal	Temporal	Occipital	Parietal	Frontal
Before KPT								
Delta	24.9±3.7	17.5±5.5	20.5±4.5	26.1±2.7	22.2±2.4	15.3±3.6	18.6±4.2	24.7±2.4
Theta	9.8±3.2	7.0±3.0	7.9±2.4	12.1±4.2	9.2±2.1	7.1±2.6	7.6±1.9	12.8±4.5
Alpha	50.6±4.9	60.0±7.5	59.2±7.3	46.3±6.1	49.7±6.3	62.7±9.0	56.9±7.2	45.3±3.4
Beta	14.7±2.1	15.5±1.3	12.4±1.9	15.5±2.1	18.9±4.7	14.9±4.5	16.9±5.1	17.2±2.9
During KPT								
Delta	40.2±5.1	38.7±4.4	38.1±4.6	37.4±3.9	36.8±2.2	36.9±3.8	37.0±3.8	35.1±3.1
Theta	34.3±4.5	28.1±2.8	33.8±4.3	34.4±3.0	32.9±3.3	31.0±4.1	32.5±3.3	37.5±3.5
Alpha	13.7±1.6	19.3±3.7	16.0±3.7	14.1±3.1	16.1±5.5	17.2±4.9	17.0±5.4	14.1±3.1
Beta	11.8±1.8	13.9±3.2	12.1±1.4	14.1±3.1	14.2±2.4	14.9±2.8	13.5±2.3	13.3±2.3
After KPT								
Delta	24.5±3.4	16.0±2.1	20.6±1.9	26.0±3.7	23.1±4.7	13.9±2.1	20.9±4.8	26.6±4.3
Theta	11.4±1.4	6.5±1.2	7.5±1.1	11.5±3.2	9.2±2.0	6.3±1.8	7.5±1.3	11.5±3.2
Alpha	49.8±2.9	65.9±3.1	58.5±12.4	47.3±8.2	54.2±7.5	68.0±3.8	58.5±6.6	47.9±6.5
Beta	14.3±2.2	11.6±1.2	13.4±2.3	15.2±2.5	13.5±2.1	11.8±1.5	13.1±2.3	14.0±1.7

The increasing of delta and theta activities and decreasing of alpha activity are statistically significant in all brain regions during KPT session.

FIGURE 3
EEG Power Spectrum Map



There is also a substantial body of evidence demonstrating that ketamine's major underlying mechanism of action on the brain is the blockade of the N-methyl-D-aspartate (NMDA) receptors, which are mostly located in the cortex and hippocampus and are involved in processes of integration and transmission into the cortex of incoming signals from all sensory modalities (Krystal et al. 1994; Oye, Paulsen & Maurset 1992). Thus, a significant reduction of sensory transmission and activation of autonomous cortex-limbic interactions may be important underlying mechanisms of the psychedelic action of ketamine.

There are also some data that indicate that the interaction between the frontal cortex and the limbic system are particularly important for the action of ketamine on the brain. For example, it has been demonstrated in positron emission tomography (PET) studies that ketamine results in a specific hyperfrontal metabolic pattern in the human brain, associated with psychedelic experiences (hallucinations and ego-dissolution) (Vollenweider et al. 1994). Also, frontal lobotomy reduces the psychedelic response to phencyclidin (which is very similar to ketamine) in schizophrenic patients (Itil et al. 1967). Ketamine activates the interaction between brain structures associated with cognitive processing of information (frontal cortex) and structures involved in the processes of emotions, motivations, memory, and subconscious experiences and perceptions (limbic structures). Such enhanced interaction may be an important neurophysiological mechanism underlying the phenomenology of ketamine psychedelic experiences and the dramatic psychological changes caused by those experiences.

CONCLUSION

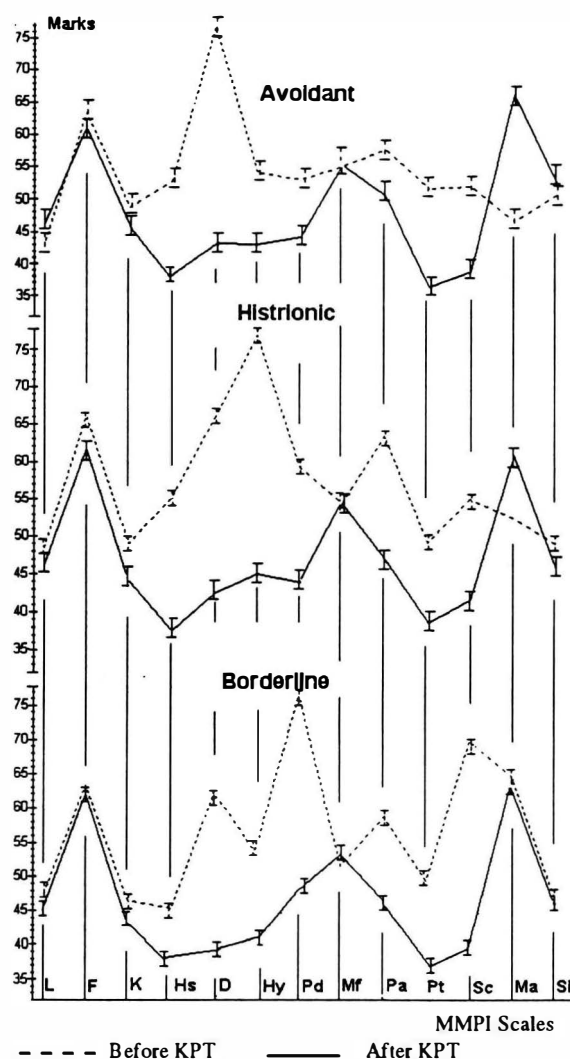
The authors began working with KPT in 1985. They have now treated more than 1,000 alcoholic patients with KPT without any complications, such as protracted psychoses, flashbacks, agitation, or ketamine abuse. KPT seems to be a safe and effective method of treatment of alcohol dependence. It seems to be an especially powerful tool in Russia, where there was no psychedelic revolution in the 1960's and almost nobody knows what "psychedelic" means or can even imagine that this drug can be used for recreation.

SEPARATE CLINICAL STUDIES OF KPT IN THE TREATMENT OF DRUG DEPENDENCE, PERSONALITY DISORDERS AND NEUROSES

Clinical Observations

The authors' clinical observations suggest that KPT might also be helpful for the treatment of other drug dependencies (heroin, ephedrine). In these cases, small doses of ketamine were injected repeatedly, which allowed the therapist to maintain a constant verbal relationship with the patient. It is important to be careful when applying KPT to

FIGURE 4
Personality Changes in Alcoholic Patients with Personality Disorders (MMPI Data)



drug addicts. However, the authors believe that in some drug-abusing patients KPT might induce the same psychotherapeutic effects that have been seen in alcoholics.

KPT turned out to be effective for the treatment of personality disorders in alcoholic patients (Ivanov et al. 1995). Sixty-four alcoholic patients with different personality disorders (avoidant, N=20; histrionic, N=21; borderline, N=23) were treated with KPT. Data of clinical (Bekhterev Psychoneurological Research Institute rating scales) and psychological studies (MMPI, Spielberger State-Trait Anxiety Scale, and Timothy Leary Test of Interpersonal Relationships) showed the differential efficacy of ketamine psychedelic psychotherapy in distinct groups of patients. KPT turned out to be very effective in patients with avoidant personality disorders, less effective

FIGURE 5
Semantic Space of the Mean Color Repertory Grid of Neurotic Patients

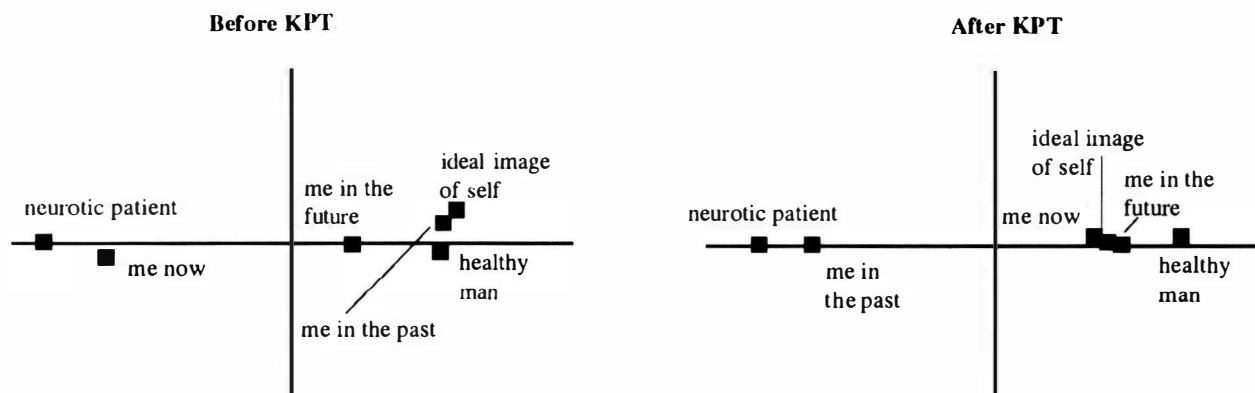
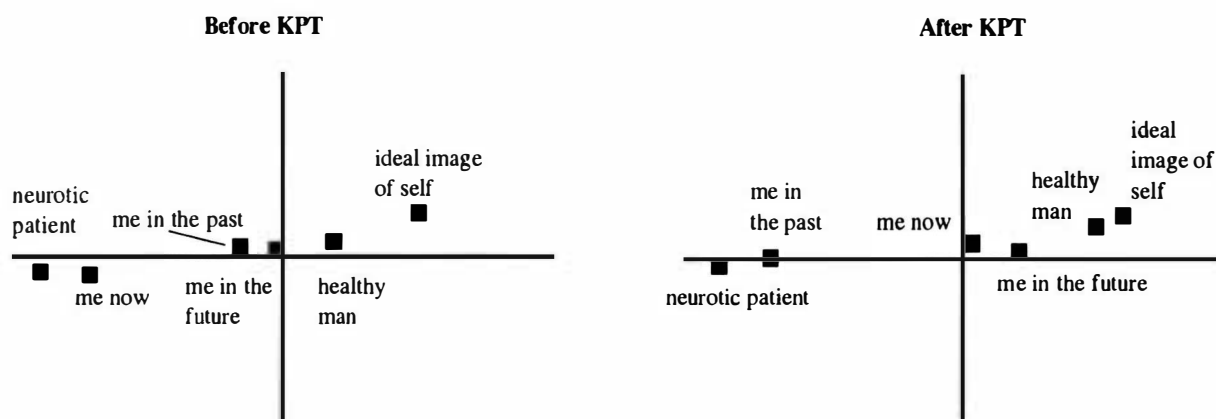


FIGURE 6
Semantic Space of the Mean Verbal Repertory Grid of Neurotic Patients



in patients with histrionic personality disorders and minimally effective in patients with borderline personality disorders. It should be noted that KPT positively influenced the personality characteristics assessed by MMPI in all groups of alcoholic patients with personality disorders (Figure 4).

The potential of KPT is not restricted to the treatment of addiction. According to data from the authors' pilot study (20 patients, seven male and 13 female), KPT is also quite effective in treating neurotic disorders. This research has demonstrated that the efficacy of KPT differed with various forms of neuroses: KPT turned out to be most effective in treating neurotic (reactive) depression and posttraumatic stress disorders, and least effective in treating obsessive-compulsive and phobic neuroses. Hysterical neurosis appeared to be most resistant to KPT.

Psychosemantic Fields of Patients with Neurotic Disorders

The authors carried out special research into the influence of KPT on the psychosemantic fields of 14 patients with neurotic disorders. Employed for this purpose was the technique of "assessment repertory grids" (Kelly matrices) (Fransella & Bannister 1977) as previously described but with substitutions of elements and constructs in the grids relevant to neurotics rather than alcoholics. All 14 neurotic patients were tested with verbal and color repertory grids before and after KPT. Then mean verbal repertory grid (MVRG) and mean color (nonverbal) repertory grid (MCRG) were calculated for all 14 patients together. Finally, four MVRG and MCRG (two before KPT and two after) were processed by the standard programs of repertory grid computer-assisted analysis (Fransella & Bannister

1977), and then semantic spaces of the personality were constructed (Figures 5 and 6).

The results of this research demonstrated that after KPT, the neurotic patients showed, in general, positive changes in the estimates of their individual selves. These changes concern both verbal and nonverbal estimates and suggest a reduction of neurotic symptoms (Figures 5 and 6). For example, before KPT in the semantic space of MCRG the image "me now" was far from the images "ideal image of self," "me in the past," "me in the future," and "healthy man," and close to the "neurotic patient" (Figure 5). At the same time such images as "ideal image of self," "me in the past," and "healthy man," were close to each other. This means that patients before KPT felt they were healthy in the past, not in the present. After KPT, the semantic space of the MCRG image "me in the past," was close to the image "neurotic patient," and these two images were far from the group of images "ideal image of self," "me in the future," "me now," and "healthy man" (the last four images were close to each other). Patients after KPT felt they were neurotic in the past, are healthy now and will be healthy in the future. Similar positive tendencies took place in MVRG after KPT (Figure 6). These data are evidence of significant positive changes after KPT both in verbal/conscious and nonverbal/unconscious (mostly emotional) perception by neurotic patients of their individual selves. It is possible to conclude that KPT positively transformed the self-concept of neurotic patients both at the level of verbal reflection and emotional perception.

APPENDIX 1: PATIENT SELF-REPORTS

The process by which therapeutic interventions during the KPT session induce therapeutic attitudes can best be illustrated by several self-reports from patients describing and interpreting their experiences. These self-reports were written down by the patients the day after the ketamine session, and then were discussed during the final group session, several days after the patients' ketamine experiences.

Patient P.Kh.: "I found myself inside a gigantic tunnel whose mouth reached a terrifying height, and there, on the top, was nothing. . . . A red capsule spiraled rapidly to the top along the surface of the tunnel. And I was in this capsule—or even this capsule was myself and it was me who was rushing towards nothing. But at the same time, I regarded myself in a detached spirit, as if I were split apart. . . . Abruptly, I found myself on the top of the tunnel. What I saw made me shudder with horror. A horrible, dark and cold abyss gaped in front of me. It was as if I were in an open space, infinite and impossible to perceive. Each cell of my body felt the horror of this abyss. One more turn and I would find myself in this obscurity and drop and drop endlessly. . . . Even after the procedure, when I remembered this, it made me feel uneasy. . . . But there was no other turn. Everything got mixed up, went round, and this whirl took me upward. . . . I felt that I was rushing at a high speed along some glass tunnel; through the

glass I could see somebody's face and somebody asked me if I would drink. I answered that no, I wouldn't. . . . I came to understand that this gaping abyss where I would be completely alone would be my fate, if I would not give up drinking."

Patient A.S.: "Sticky masses began to attack my body, to melt it. Fear invaded me. Everything around was in a whirl. One thing overlapped another. I felt the odor of alcohol. I felt excruciating aversion, fear, presentiment of death. Bright objects replaced one another at a crazy speed, everything went round, and I went round, too. It seemed to me that I would never get out of this nightmare; that I was slowly and painfully dying; that I, my entire self, would melt in this black mass, but my brain would go on working. That I would feel, think, not live, but suffer. . . . Some voice was talking about alcohol; I felt a strong aversion. . . . Everything I saw resulted from my hopeless life, my alcoholism. It was as if the trash accumulated in me during years and years went out of me during an hour. I do not want it to repeat; I am afraid of this nightmare. . . . I would never forget it. . . ."

Often the negative experiences and visions induced by KPT were immediately associated with alcohol. Patient V.Z.:

I lost myself. I felt bewilderment because I lost myself, my body. Then it was death. Death, a calm flight downward through dense gray-and-white clouds. And suddenly rebirth. At somebody's command I saw a series of terrifying pictures on a red background. They moved horizontally, picture by picture, independently of each other. They depicted the sad scenes of the alcoholic life. Filth, broken bottles, corpses, horrible faces, drunk grimaces. It was absolutely clear that this would be my future, the future of people like me (if we did not give up drinking). The desire to tell everybody as soon as possible where this would lead us was also horrible to feel. Fast movement by some strange vehicle, a kind of train. And here the disgusting smell of alcohol, then the oath of sobriety. Dissatisfaction. As if everything should be done some other way. People must know about my oath and hear it. . . .

A piece of cotton moistened in alcohol always induced in patients pronounced negative experiences and strong aversions. Patient G.G.: ". . . Everything around me started rotating. I felt weightless and cold. I heard the doctor's voice: 'Your fear is a result of vodka. It is vodka that has led you to the edge of the abyss.' And I felt the disgusting odor of vodka that constantly accompanied the whole procedure. . . ." Patient A.K.: "I got to feel the smell of vodka. The aversion was so strong that it would be impossible to describe it. . . ." Patient D.F.: "When I was allowed to smell a piece of cotton moistened in alcohol. . . . I felt a fear for myself, my future, children. I felt I would go crazy or die of vodka. . . ."

Often, the hallucinatory experiences of the patients concerned their relatives, their wives and children. Patient S.L.: "Then I was asked several tunes: 'Your daughter's name is Inna? Do you love her?' Then my daughter and I started flying over whitish-green rocks. There were strange creatures all around us. They were dreadful, vague. Again I was allowed to smell and taste vodka. My body fell to

pieces; one of its parts flew with my daughter and the creatures. So, I lost my daughter and found myself in blood. I was choking, spitting the blood out. Again I heard the voice; it told me that it all was due to vodka, that it was me who had let it be so. . . . I would not see my daughter, I lost her. . . ." Patient S. Ya., who was afraid of losing his family: "I saw my parents, wife and children. They didn't approach me, they passed by, paying no attention to me. . . ."

The psychedelic experiences often involved the psychotherapist who tried to help the patient to reach something desirable or get out of the nightmare. Patient A.K.: "I could see that the doctor helped me to get out of these flows. . . . Again, thinking of my family. Certitude that I would find my way to my people if I gave up drinking. . . ." For this reason, the patients attached great importance to the specific contact with the psychotherapist established during the procedure. Patient V.G.: "I remember the beginning of our talk with the doctor, when he asked me not to lose the contact with him. I've got such a feeling that the contact was there during the whole procedure and it was positive and favorable. . . ." Many patients mentioned that the words of the psychotherapist pronounced during KPT were somewhat unusual, and were very ponderable and significant. Some words differed from their usual sound, and induced a pronounced emotional reaction. Patient V.K.: "Most of all, I was annoyed by the word 'vodka,' more exactly, two letters 'dk.' A very inconvenient combination, this 'dk.' And just this combination almost physically tortured my consciousness"

It is of interest that the psychotherapist somehow helped the patients to go from the horrible visions of their hallucinatory experiences to clearer and calmer ones. Patient S.L.: "They made me smell alcohol; it induced aversion. I remember crying: 'I don't want it, I won't drink.' Then I began to dissolve in time and space; only my brain remained and it rushed about some narrow labyrinth. Bright flashes of light, dead ends, whenever you go. I felt a desire, an urge to get out of this space. . . . Then, something like blackout, stop, flash, and a door to a new world. . . . In the doorway, I saw a doctor and somebody else. . . ."

The patients' experiences induced by KPT were not always negative. Sometimes, they had a positive emotional coloring; moreover, they were often associated with the sober life. Patient V.Z.: "Fast flight somewhere downwards. And at once I was going by some vehicle to a new, rose-colored world. Calm movement; warm, bright yellow and pink colors. Pleasant feelings, interest, curiosity. It is probably that sober world where everything is all right, where there is no room but for smiles, calm movements and the joys of life." By the presentation of alcohol and appropriate verbal influence, the therapist could generally turn such positive emotional experiences into negative ones.

Patients of higher intellectual level and sensitivity generally had more vivid, colorful, diverse, and personality-relevant experiences, which profoundly

impressed them. The following are examples of such patients' reports:

Patient P.F.: "In my whole body music starts playing in synchrony with the switched-on tape-recorder. I've got an irresistible feeling of being carried away. I try to resist it with all my forces, but can't. It's as if a train disappears in the tunnel and you are flying after it into this black abyss and can't resist it. The music is deafening; your whole body obeys it. It is as if your body is pulsating in unison with the music. And you are flying in pitch-darkness, and at the same time you are hearing the doctor's voice telling you about aversion to alcohol, about the sober life and so on. Then, a flash of light. You are always moving and feel as if you are a ball among other balls rolling along a corridor lined with similar balls. Always dead ends, turns, flights and drops; turning into a cube with smoothed edges. The illumination and color of the corridor where you are rolling also changes. Or suddenly everything is ruined by a wave, and you are going with the wave along the corridor. Then, everything bumps into something. The splash reaches the sky and you become a brilliant white point flying in space. Then you burst into thousands of splashes, and again turns, nooks, flights and drops, but always in a rush and always ahead, ahead. . . . Abruptly, everything starts going round, becomes a small point. This point turns into a gold hair and the whole universe turns out to be hanging by it. You see it clearly. You are feeling the responsibility for everything alive and this depresses you. Then everything turns into silvery stars forming a dome, and you are one of the stars. Then the whole dome collapses and turns into one dot. A gold splash appears against the blue background. It turns into a flower. The flower opens and there, in the flower. I see my son, and somebody's voice is saying: 'That is most important.'"

Patient S.K.: "I felt that my legs did not move, and my body started stretching and falling down at a crazy speed. My consciousness concentrated at one point and became a part of the scene. I was flying to infinity along something like channels that interlaced and joined one another (everything was brightly colored: orange, red). Gradually, this crazy dance grew slower. I found myself in some closed space. At that moment an unconscious fear invaded me. Fear that I would never get out of this state—the state of being a part of something and not myself. The space where I was started filling with a solid foam. I was cornered. At the last moment, when I saw that I couldn't get away, that the space I occupied was the only free spot, I heard something splash and felt myself free. Everything around became understandable (I thought that it was impossible to live the way I had lived). My family came distinctly to my mind. . . . Now it was as if my consciousness was over the things that were under me. Everything below looked like some brown layers: as if a clot of brown dough scattered in the air and came down to the earth and covered it all over. It seemed to be my past life. Again, a strong fear overwhelmed me as I was pulled to this brown mess. All my self rose against it. I deeply desired to live, to live as everybody else, and never see this nightmare again. And my desire won. At this point, I felt as if I opened my eyes and regained my sight. I saw a window, a green tree and the blue sky. . . ."

Everything the patient had seen and felt in this case (as in all other cases) was discussed and interpreted by him with the help of the psychotherapist in order to work out and solidify the positive attitude towards a sober life.

Patient V.K.: "As soon as I had been brought to the state of unconsciousness, I started sliding in a curve of the vertical plane. The latter was distinct and represented a blue line against the clearly visible and illuminated background. The thought: somewhere there is point which is important for you, which you should not miss, since it is a matter of life or death. I slid for quite a long time, but I never met this point. Abruptly, I found myself in a cave on the top of a high granite rock. . . . The rock rose high above the ocean that exactly resembled the thinking ocean of [Stanislaus] Lem's 'Solaris.' The ocean was brownish-crimson, swirling, and looked like the upper parts of cumulus clouds, as seen from an airplane before the sunset. The cave had an entry which without any reason seemed black. The ocean was several hundred meters below the cave, and I could distinctly imagine that sooner or later I would fall down and it would swallow me up. I didn't feel my body, but in the cave some ellipse-shaped, orange concentrate of thoughts, my thoughts, was pulsating. The thoughts were: the universe is infinite in space and time; we are all mortal; the space, the ocean will always be, but thoughts will die and nonexistence will come. . . . I felt hopeless and was surprised only at one thing: why the thought to live persists, to live endlessly. Several scenes of my life passed before my eyes. They were from my childhood and youth, everything in sad, reddish-brown colors. Several times the thought, but not the body, appeared at the exit of the cave and I could understand that I was about to fall down into the ocean, but I would not fall down and again would return into the cave. And again hopelessness and the sense of doom. . . . All this went on for a very long time. . . . Gradually, I began to come back to reality. . . . It was not a dream and I didn't want to sleep; it was simply a desire to lie calmly. I was thinking of my experience and gloomily analyzing it. I also thought about the questions I had been asked during the procedure. . . . In my opinion, I had heard everything, about alcohol, the attitude towards it, its consequences and about 'the finale' and my feelings. . . . My general condition: perfect physical state, strangely depressed psychological state (without any reason), a desire to somehow analyze my past life, some dull ache at the thought about past years, and some sharpened homesickness. . . . The attitude towards alcohol or anything similar: fear, a vague fear of everything that could disturb my distinct and clear consciousness and return it to something like what I had previously experienced. Be it some drink or injection or pills, it made no difference. If only the sober state were not disturbed, not even a little. . . ."

Many patients, like V.K., stressed that KPT induced in them a pronounced negative attitude towards everything that could change their state of consciousness (be it alcohol or something else), and a desire to maintain this state of clear consciousness, sobriety, serenity and balance.

Some reports revealed the fact that, though the patients' experiences during their ketamine sessions were not immediately associated with their alcoholism problems, their experiences still catalyzed some changes in their attitudes towards their ego and the world, changes that might result in a sober life. For instance, the report of patient M.B. (courtesy Dr. O.V. Goncharov):

Now I know why both the head and the earth have the form of a ball. . . . The bends of the cerebral hemispheres look like mountains and rivers, basins and seas. There, inside me, are the zones of warmth and coldness, coolness (indifference?) and heat (passion?); and there are also (as in the cosmos) the zones of exhausted atmosphere. I felt it physically; I lived through it. I made a voyage around the world and, at the same time, rolled down the mountains of my own unconscious. Sometimes you feel at ease, but sometimes spaces suddenly fall down on you and you risk choking under their weight. The voyage, it is the insight into your ego; it is when you feel that you are the universe; it is the impossibility of turning away, of going away, because all this is you yourself and you are given nothing else. The voyage is, on the one hand, your confinement to yourself but, on the other hand, is a step into the cosmos which is in you yourself, whenever you find it paradoxical. If not the voyage, I would be always a can swollen with my own emotions, these aggressors eager to blow you and the whole world up.

During the voyage and especially during the recovery period, I got the feeling that the world was flexible, plastic, ready to interact. And it was only up to you what you would build of its soft materials responding to the glistening flow of your sensations.

The voyage, it is at once a dream and the reality. It is the work of feelings and intellect. You are astonished at your own mediocrity and narrow-mindedness and at the cosmos that is also inside you. You want to become different, spiritually richer, brighter, in order that your further voyage could bring you new impressions, could reveal new worlds. You'd like to penetrate further, deeper into yourself and the universe, to test yourself once again. . . .

Only after the voyage, you begin to discover with surprise that there are people who "know" everything as it is to be; you begin to be indulgent to those who will never know, to sympathize with them. You are learning to distinguish many things and get surprised at how you could live without this knowledge. . . . After some time, you are able to quietly enjoy the fact that you are, though a little, a bit different and that at any moment you can stop, look inside yourself and recall. . . .

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