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AMELIORATION OF STRESS IN CHEMICAL DEPENDENCY DETOXIFICATION BY TRANSCRANIAL ELECTROSTIMULATION

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SUMMARY

Stress — in the form of the psychic distress and aggression traditionally experienced as a substantial part of the withdrawal syndrome — is a major obstacle to the successful detoxification and rehabilitation of the chemical dependant. Transcranial electrostimulation, a detoxification modality applied for a maximum of 10 days, and 'cranial electrostimulation' (known as CES), a treatment adjunct, significantly ameliorate these affective components resulting in a lowered drop-out rate and enhancing the patient's ability to benefit from relapse-prevention modalities. Electrostimulation has been demonstrated as efficacious in both inpatient and outpatient settings; and, used appropriately, has no unwanted side-effects. The work of the authors in relevant animal and clinical studies over the past 20 years is summarized in the light of general electrostimulation research, and their recent clinical investigations described. Various representative psychological assessments are reported. The confusion and controversy arising from the embryonic nature of the electrical criteria integral to electrostimulation applications is considered to be the greatest single obstacle to controlled and replicable research.

KEY WORDS—Transcranial electrostimulation, NeuroElectric Therapy (NET), detoxification, stress, affective disorders, relapse.

Techniques utilized in the field of chemical dependency (CD) treatment to combat withdrawal stress are traditionally either a pharmacological or a psychotherapeutic approach. The former consists primarily of anxiolytic and/or antidepressant medication; the latter is based upon staff support systems, group interaction and peer pressure.

However, neither of these conventional techniques significantly ameliorates the psychic distress of the withdrawal syndrome (WS) from drugs or alcohol. At best they would appear only to modify the worst of the symptoms in the short term,[1] and are even less effective in dealing with the chronic withdrawal syndrome (CWS). For the physician to prescribe psychoactive medication as a means of coping with this stress seems particularly counterproductive to the goal of liberating the chemical dependant from dependence on chemicals as a coping strategy.[2] Furthermore, the physiological risks inherent in CD medication intervention — side-effects, cross-potentiation, overdosage, toxicity, dependency — are well documented.

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APPLICATIONS OF TRANSCRANIAL ELECTROSTIMULATION

It is now becoming accepted in western medical circles that the use of cranial electrostimulation (CES, by FDA classification) can achieve significant results in the treatment of affective disorders.[3,4]

S is usually a single frequency of 100 Hz sine-e with a varying duty cycle and a maximum out of 1 mA (although some manufacturers are using the terminology CES for stimulators viding different parameters of current). In its ginal form (which includes all references in this cle), it has been shown to be effective in reducing iety, depression and insomnia, and useful as a apeutic adjunct to standard detoxification dalities.

lowever, in this innovative field of medical treat-it, there is another application — for the sake clarity described herein under the generic orella of transcranial electrostimulation (ES) — ch has been seriously investigated in the former iet Union and Europe since the 1930s. Its utili-on in the field of CD detoxification as Neuro-ctric Therapy (NET),[5] transcranial electric itment (TET)[6] and the Limoge technique ES)[7,8] have all emerged from in-depth research Britain, Russia and France respectively, both nimals and humans, into the clinical effects of rge and complex range of current parameters. se techniques differ from CES in that they are oxification modalities in themselves, most often traindicating use of supportive or replacement rmacology. They have the treatment objective providing both physiological and psychological ef and stability, using one or more differing fre-ncies as dictated by the individual substance substances of addiction.

Of the other electrostimulation applications fre-ntly mentioned in clinical and scientific reports, nscutaneous electric nerve stimulation (TENS), pular in the USA for pain control, generally uti-s larger amounts of current in a simple delivery plication, and is prohibited by FDA for transcra-l application. The techniques of electro-acu-ncture (EA), on the body or the ear, and that electromagnetic fields (EMF) are very different plications of electromedicine to transcranial elec-stimulation, and outside the scope of this report. The mechanism of ES effect is increasingly per-ved in accelerated neurotransmitter activity as esult of ES. For example, this was demonstrated 13 non-pain patients with cerebrospinal fluid SF) fistulae who were given TENS through trans-taneous electrodes and whose CSF showed a sig-icant rise in β-endorphin, maximum at 45 nutes.[9] Grinenko and Lebedev in Russia orted similar increases in plasma β-endorphin alcoholic patients treated by TET[6] (Fig. 1). In 91, Han and Terenius confirmed a related effect in human CSF, and also established that different frequencies of electric signal selectively released either metenkephalin or dynorphin A.[10]

Electromedicine is a precision technique, and only correct application can bring about the notable clinical results reported — in CD treatment, rapid and substantial reduction of psychic distress and aggression, and a low drop-out rate (DOR). The application of highly specific pulse frequencies of current, in particular, is vital to obtaining predictable, replicable clinical results and research data.[11] The importance of this component of the current criteria is increasingly emphasized throughout the literature on ES.[12–16]

NeuroElectric Therapy (NET)

The NET technique, contrasted with that of TET and TCES, delivers, via a computerized, battery-operated microprocessor, current of multiple frequencies specific to each commonly abused substance and combination of substances of addiction.[17] The multiple-frequency programmes, precisely timed and integrated over each treatment period, are the most complex and researched facet of NET. Again unlike TET, which applies o three 40-minute sessions daily, NET gives nuous, 24-hour stimulation in response to the vary-ing symptomatologies of the substance under treatment. The NET application arose out of the increasing prevalence of polysubstance addiction, and is designed to counter withdrawal insomnia, craving, anxiety, depression and aggression as well as withdrawal symptomatology. The frequencies differ with each group of psychoactive chemicals, and sometimes even within the same group.

Like the Russian and French techniques, it is a rapid detoxification tool designed for short-term use under the supervision of a physician. Individual threshold of current perception ranges from 0.6 to 4.6 mA, presumably due to variations in the individual's skin and bone resistance; it is interesting, although not yet fully understood, that in most patients the threshold of perception gradually becomes lower during the course of treatment, on average to one-third of the initial output. Small electrodes (1.5 × 1 cm) are taped above the mastoid process, close to the pinna. Treatment is equally effective supraliminally or subliminally.

The waveform is biphasic, charge-balanced, asymmetrical. Polarity of electrode placement is dictated by the patient's dominant hemisphere, a procedure based on 20 years of clinical experience.

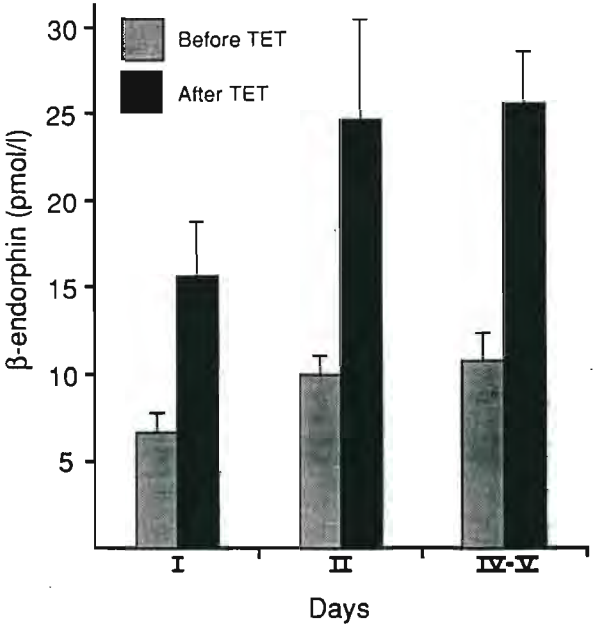


Fig. 1—Patients in the acute stage of the alcohol withdrawal syndrome (AWS) given TET at the optimum frequency of 77.5 Hz for 40 minutes once daily ($N = 28$). Plasma β-endorphin was measured in pmol/l. Adapted from data in Grinenko *et al.*[6] Difference (Student's test) in the obtained data significance before and after TET on the same day; day 1 $p < 0.01$; day 2 $p < 0.001$; day 4–5 $p < 0.001$. Note that the baseline level of β-endorphin continues to rise during the 5 days of treatment

Three separate rat studies have shown that to obtain significant diminution of withdrawal in opioid addiction, the positive electrode must be attached to the right ear.[18–20]

All three methods of ES application are commenced with the patient in withdrawal. The authors' clinical experience has shown that maximum efficacy of stimulation is ensured when the brain's receptors are as empty as possible of exogenous material, as judged by the severity of withdrawal signs (though the French TCES sometimes combines stimulation with supportive pharmacology). For example, with heroin patients stimulation is not commenced until 12–15 hours after the last dose. There are variations in techniques,[21] but under these regimes patients dependent upon alcohol can be offered a 5–10-day treatment; heroin or cocaine dependants 7 days; and methadone, tranquillizer and polysubstance dependants a maximum 10-day detoxification. Nicotine detoxification requires only 3–4 days. Outpatient detoxifications occur within the same treatment schedules, supported by involvement of family and significant others and by adept management techniques.

One of the most striking effects of NET has been the diminution of the postacute withdrawal syndrome (PAWS), which often lasts for many months after drug abuse has ceased.[22] PAWS is particularly persistent in the case of methadone and tranquillizers, leaving subjects with feelings of weakness, apathy, tiredness, social withdrawal and dysphoria — almost a low-grade chronic depressive state.[2]

le 1—The effect of NET on the plasma cortisol (ng/ml) of rats subjected to restraining stress. One animal eliminated as it suffered an intercurrent illness during the experiment. The plasma cortisol levels were significantly er ($p < 0.001$ by unpaired Student's *t*-test) in the NET-treated rats, suggesting that ES had an ameliorating ct on the stress-inducing procedure the animals experienced

NET	Cortisol	Mean ± SD	Sham treated	Cortisol	Mean ± SD
1	56		1	134	
2	101		2	170	
3	100		3	145	
4	30		4	178	
5	94		5	185	
6	39	70 ± 32	—	—	162 ± 22

traindications/safety

ES as applied in NET, TET and TCES has no own adverse side-effects. However, until present earch has been completed, ES should not be en in pregnancy (presently under investigation the University of Texas in Dallas), psychoses, lepsy and with 'on-demand' pacemakers. Care ould be taken to ensure that the electrodes are ced precisely, and never over the carotid sinus.

imal model research

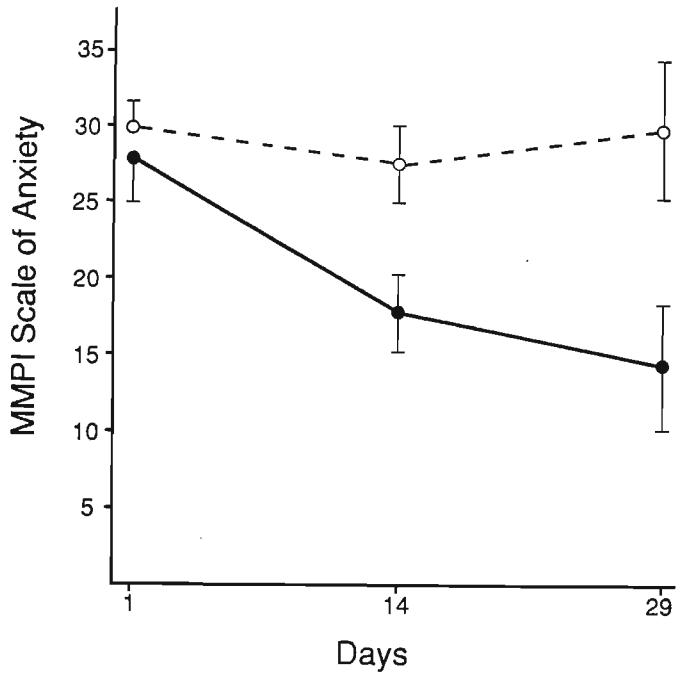
In our studies at the Marie Curie Research Institute in England, rats were enclosed in restraint ges, a stressful situation. All the rats had a surgical clip attached to each ear and leads connected each clip. Half the rats were also connected to NET stimulator and given a small current of / at 100 Hz. Plasma cortisol levels, a physiological indicator of stress, were reduced to an average ng/ml in the stimulated animals, but remained an average 162 ng/ml in the unstimulated[23] (Table

Table 2—Serum corticosterone levels (ng/ml) in hexobarbital-anaesthetized female rats receiving NET at frequencies of either 10 or 500 Hz. Results represent the mean ± SD for individual assays on six animals in each group. Rats receiving ES at 10 Hz had significantly lower ($p < 0.002$) and those stimulated at 500 Hz significantly higher ($p < 0.025$) serum cortisol levels than the sham treated controls. Nevertheless, both ES treated groups had a significant decrease in sleeping time, by 34 per cent in the 10 Hz group and by 29 per cent in the 500 Hz group, compared to the sham group. In a similar experiment, the difference was $p < 0.001$ for 10 Hz treated and $p < 0.001$ for 500 Hz compared to sham treated (unpaired Student's *t*-test); all other frequ s tested, ranging from 1 Hz to 1000 Hz, showed a less response[26]

Group	Sleeping time (min)	% decrease in sleeping time	Corticosterone level in plasma
Sham	95 ± 18	—	91 ± 16
10 Hz	63 ± 2	34	48 ± 18
500 Hz	67 ± 13	29	130 ± 35

On the other hand, some drugs such as methane used chronically produce lowered levels of th ACTH and plasma cortisol,[24,25] and the reversal of this condition is beneficial. Table 2 shows w the cortisol levels can be manipulated by alter the frequency of the signal at the appropriate ges of detoxification. A low frequency may be en for stress or a high frequency for depression, ile holding the detoxification effects at optimum el,[26] a very significant finding in the overall ndling of the treatment regime. However, it ould be noted that unmodulated frequencies ove 150 Hz, used for longer than 1 hour, can oduce agitation, disorientation or even hallucitions in humans if incorrectly applied. It is for is reason, among others, that NET units are now fully preprogrammed and computerized to deliver specific signals at specific times for specific durations.

The above animal experiments confirmed the clinical observations that stress can be reduced by NET. Increased levels of tryptophan and hydroxyindole acetic acid, precursor and metabolite of serotonin (5HT), in certain brain areas of rats could be interpreted as indicating increased synthesis of 5HT as a result of NET.[27] This suggestion is supported by more recent work carried out in the University of Texas concerning serotonin involvement, when it was demonstrated that analgesia induced in rats by transcranial ES could be diminished or increased by injections of drugs which either inhibited or promoted 5HT synthesis.[28]



ig. 2—Twenty volunteer alcoholic patients in St Petersburg, Russia, with affective disorders, who had been abstinent ır not less than 3–4 weeks, so their symptoms were *not* acute withdrawals. No drugs were given either to the ctive or the placebo group in this double-blind study of TET given once daily for 4 weeks. Adapted from Krupitsky *al.*[29] Anxiety was measured by Taylor's anxiety scale of MMPI. Active treatment (——) and placebo (– – –) roup. There is a significant diminution in anxiety, measured on days 1, 14 and 29 of treatment by active TET. he control group showed no improvement. In the active group, the difference between day 1 and days 14 or) was significant at $p < 0.01$, the difference between active and placebo groups at $p < 0.05$ (Students's *t*-test)

CLINICAL INVESTIGATIONS

rupitsky *et al.* (1991) stressed the importance of ecific pulse frequency (hertz) in achieving desired inical results for the treatment of affective disturances in alcoholic patients. In a double-blind udy, TET at 77.5 Hz only was shown to be an effecve method of diminishing anxiety and depression ı alcoholism. The clinical improvements were companied by changes in the metabolism of ABA and monoamines, but not beta-endorphin, probably due to the fact that all the patients had been abstinent for not less than 3–4 weeks. MMPI, Zung and Spielberger assessments were also made and confirmed the clinical observations, both in the active and placebo groups[29] (Fig. 2).

The Russian scientists stated in the discussion section: 'As the decreasing of MAO-B activity in blood platelets, and also GABA level in blood has been shown to be connected with the development of affective disturbances, our results can be considered as further evidence of the positive effect

TET on the clinically psychological state of alcolic patients with affective disturbances.'

In most investigations into the treatment of xiety and depression by CES, active stimulation s shown substantial effect over sham and/or conl groups, as assessed by a wide range of psychoical tests.[30–32] Absence of full details of electrical rent criteria and techniques of application utid was most probably responsible for some of conflicting findings. This lacuna throughout the le-ranging field of electromedicine, and its implitions, has been analysed and discussed in a 1993 icle by the authors.[21]

Shealy *et al.* showed that striking alterations in -hour serotonin output (as measured by HIAA) uld be achieved with transcranial ES, using uare waves of 15 000 Hz carrier and asymmetrical Hz as modulator.[33] In 1986 Han demonstrated at electroacupuncture (EA) is capable of accelerng the synthesis and release of serotonin (5HT) d norepinephrine in the CNS.[34] These findings e significant because low levels of serotonin are sociated with depression, suicidal behaviour and sessive compulsive disorder.[35] In a clinical trial, an found EA as effective as amitriptyline (Elavil a tricyclic antidepressant) in reducing depressive mptomatology (−55 per cent vs −52 per cent) it with none of the unwanted side-effects of the ug.

Jarzembski investigated CES and substance use in 1985, and found CES effective for acute xiety, chronic or 'trait' anxiety states, depression d insomnia. He also found no indication that ES was either addictive or habit-forming.[36]

Schmitt *et al.*'s 1986 randomized, double-blind udy investigated CES or sham CES in 40 alcoholic d/or polydrug dependants, given one 30-minute eatment daily for 15 days. An additional 20 tients served as standard controls. Patients were sessed using the Profile of Moods States (POMS), stitute for Personality and Ability Testing nxiety (IPAT) and State/Trait Anxiety Index TAI) scales. The CES-treated patients showed gnificantly greater improvement on all measures an did either control group. Further, no placebo fect was found on any of their measures. The udy concluded that CES is a clinically significant ldition to the treatment regime for that patient opulation.[3]

Despite these and other positive scientific and inical findings, there are few universally agreed ocedures for ES investigations.[21] Vigorous search is required to establish the significance of the large number of variables underlying this innovative and clinically flexible modality: primarily, the narrow 'windows' of current criteria involved in different detoxifications and their underlying scientific basis; and the significance of output levels, particularly that of microcurrent or subliminal levels, given that there is so much variance from individual to individual in the level required to achieve a therapeutic clinical response. Until the import of these factors is more firmly established, double-blinded investigations in particular into this modality will be severely handicapped and the resulting controversy undiminished.

An effectively double-blinded study of NET, whose results highlighted the difficulties in clinically investigating ES while these scientific imponderables remain unsolved, has just been published from Philadelphia.[37] In order to overcome the obstacle of supraliminal/subliminal blinding, an acceptable device was developed by means of advanced technology and tested on non-addicts and addicts. This allowed treatment to be given and controlled at an individualized level of current which was below the level of sensation. (The French, in their double-blind investigation, did not have this problem because there is never ar rent sensation with their particular stimulatc

The five addicts treated actively in the preliminary pilot study in Philadelphia, all at subliminal current level, experienced a successful detoxification after abrupt withdrawal from heroin or methadone, and without the administration of any replacement or supportive drugs. However, the full study demonstrated treatment efficacy in both 'placebo' (set at 0.2 mA) and active groups, with high patient compliance and low drop-out in both groups in spite of clinical differences. Future blinded studies will use dummy leads in order to have zero current in the placebo group. A brief report by one of the authors on the inconsistent clinical impact on a standard microcurrent output is described elsewhere.[21]

Present and recent studies

A 1992 study of CES in a Washington, DC, outpatient clinic has been conducted to investigate outpatient withdrawal of methadone maintenance patients in a CES efficacy trial (as a preliminary to a rapid NET detoxification study). Informed consent patients received one 40-minute CES treatment daily combined with counselling, in a 6-week abstinence objective programme. (Dr J. Hoffman,

Table 3—Preliminary report on pilot study of outpatient detoxification of methadone maintenance patients receiving one 40-minute session of CES daily, 5 days a week, for 6 weeks. Gradual methadone reduction from 20mg to zero during initial 3 weeks. The program psychologist administered the Beck Depression Inventory, the Hamilton Anxiety Scale, a sleep problems inventory and several specific questions related to their detoxification. Three patients had reached zero dose of methadone at the time of the report ($N = 11$)

	Significant improvement		Minimal or no change		Symptoms worsened	
	N	%	*N*	%	*N*	%
Withdrawal symptoms	7	64	2	18	2	18
Anxiety	7	64	3	27	1	9
Depression	7	64	4	36	0	0
Insomnia/sleep problems	3	27	7	64	1	9
Confidence in successful detox	8	73	3	27	0	0

personal communication) (Table 3). Anxiety and depression, in particular, were ameliorated. Also demonstrated was a willingness to enter into the treatment programme, and perhaps most significant of all, a willingness to persist in treatment with abstinence as the treatment objective. The pilot study further showed that methadone reduction schedules were more effective when tailored to the individual response achieved by the CES intervention, rather than standardized.

These preliminary results reflected well, despite different clinical setting (outpatient vs inpatient) and a different opioid of addiction (methadone vs heroin), the results achieved by Mikhail and Gomez using the same 100 Hz frequency for the active group of patients. Their widely debated 1978 study compared CES with methadone detoxification for heroin addicts. Both active and placebo groups in the study were also offered methadone, with the third, control group being given the standard methadone withdrawal treatment. Anxiety, as assessed by the Hamilton and Taylor Manifest Anxiety Scales, was markedly reduced; and drug intake (of prescribed methadone), by the end of treatment, was zero in 10 patients out of 14 and reduced by more than 80 per cent in another three. Drop-out was one patient from 14 in the active treatment group. Anxiety levels and methadone dose levels in the sham treatment and methadone treatment control groups remained high.[38]

In a brief pilot study in St Petersburg, Russia, conducted by two of the authors (E. Krupitsky and L. Patterson), two Russian heroin addicts were detoxified by NET, with informed consent. No medication was given (Table 4).

Patient A. A 29-year-old, married, male, businessman, with a moderate to severe intravenous (I/V) heroin habit. Addicted for 2 years, with previous severe I/V ephidrone habit (the most common drug of abuse in Russia). NET commenced 16 hours after last dose was taken.

Table 4—Assessments of affective disturbances in patients A and B, treated by NET in St Petersburg, Russia. *The clinical assessments used were Handelsman *et al.*'s two new rating scales for opiate withdrawal[39] as adapted into Russian by Dr. E. M. Krupitsky. O/A, on admission; O/D, on discharge. The improvements achieved under NET reflect similar responses reported from other countries. The relatively high anxiety/depression ratings assessed prior to discharge may reflect the present absence of postdetoxification support networks in Russia

	Patient A		Patient B	
	O/A	O/D	O/A	O/D
Clinical Data Objective*	20	1	17	1
Clinical Data Subjective*	43	3	34	5
Spielberger Trait Anxiety	64	25	58	41
Spielberger State Anxiety	49	38	60	60
Zung Depression Scale	42	29	48	43
Days of NET treatment		6		6

Patient B. A 22-year-old, married, female, hairdresser. Small to moderate I/V heroin habit. Addicted for 1 year. NET commenced 13 hours after last dose was taken.

The clinical results achieved, despite sociocultural differences, biochemical differences (especially in heroin) and different forms of psychotherapeutic intervention, showed distinct similarity to clinical results of NET detoxification in the USA and Europe. Similar physiological and psychological responses were noted in alcohol

oxification in Russia[6,29] despite differing ES niques used in St Petersburg in the past.
Computer analysed EEGs were also carried out he two Russian patients and there was a signifitly similar pattern in both patients over the three es assessments (before, during — with stimula- disconnected — and just after detoxification) pite substantial differences in the clinical onse of the two addicts. This brief pilot study icated in a preliminary way universal EEG vity as a pattern of change in opiate detoxifica- under NET (Table 5).

le 5—EEG changes in the two heroin addicted ents, A and B, as measured before, during (with sti- ator removed for the test period) and immediately r completing a 6-day detoxification by NET. EEG puter assisted analysis was carried out and EEG er spectrum was calculated by rapid Fourier analysis. decrease in beta-wave activity, indicative of de- sed mental activity and stress, and the increase in ha-wave activity, indicative of rest and meditation, reflected in the physiological and psychological provements measured over the treatment period. This firmed earlier findings by Cox and Heath[40]

	Effect of NET
ta	1–4 Hz No change
ta	4–8 Hz Small increase
ha 1	8–10 Hz Marked increase
ha 2	10–13 Hz Considerable increase
a 1	13–20 Hz Decrease
a 2	20–30 Hz Decrease

n 'Computer EEG in the discovery of antipressants', Itil argues: '... one can postulate that gs with similar CEEG profiles produce similar ebral biochemical changes. Since the "shape" a CEEG profile is closely related to the type therapeutic effect of a compound, one could ther hypothesize that these biochemical changes closely related to the therapeutic action of the g."[41] Likewise, it is speculated, based on our ef Russian studies, that such patterns may reflect chemical changes induced by NET.

lapse prevention

Postdetoxification, the CES stimulator can be lized in the home environment as a relapse pretative through stress management.[30] After tial instruction no supervision is required for S, and thus control of treatment can be rapidly returned to the patient. Only current output is adjusted by the user.

Follow-up

The reported safety of ES, used correctly, underlies its value as a uniquely flexible therapeutic tool. Potential risks, such as high output levels, prolonged use of high frequencies and stimulators designed with minimal consideration for clinical effect, have been identified by serious scientists and clinicians. Unfortunately, the long-term consequences of the ES modality have rarely been reported. However, analysis of Patterson *et al.*'s 7-year follow-up of 186 inpatients 1–8 years after NET detoxification from a wide range of addictive substances demonstrated both safety and significant beneficial effects.[42]

In a 1-year research study which was included in the 7-year follow-up, 95 per cent of 102 consecutive patients claimed to be free of craving and 75 per cent to be free of anxiety by the tenth day of NET (Fig. 3). No anxiolytics, antidepressants or antiwithdrawal drugs were given. The DOR was 1.6 per cent over 7 years — a rate that remains approximately the same 12 years later.

Daily amounts of substances used rangec n 300 mg prescribed heroin to 10 g street heroin; cocaine 0.5–10 g; methadone (injectable or oral) 40–800 mg; various narcotic or psychotropic drugs up to 70 tablets daily (all drugs were discontinued immediately prior to commencing NET). Thirty per cent had used an addictive substance daily for 2–4 years; 40 per cent for 5–10 years; 15 per cent for 11–20 years. Sixty per cent were under 30 years of age.

In the 7-year follow-up, 80 per cent of the 93 patients traced were drug free and 78 per cent alcohol free. Seventy-five per cent reported improved sleep, and 87 per cent improved health. Sixty-eight per cent never or rarely felt craving, and only 15 per cent occasionally. Twenty-three per cent had briefly made alcohol a substitute dependence but none were dependent on alcohol at the time of receiving the questionnaires (mainly multiple outcome variables).

DISCUSSION

For both the chemical dependant and the physician, the anxiety, aggression and general dysphoria traditionally experienced as a substantial part of

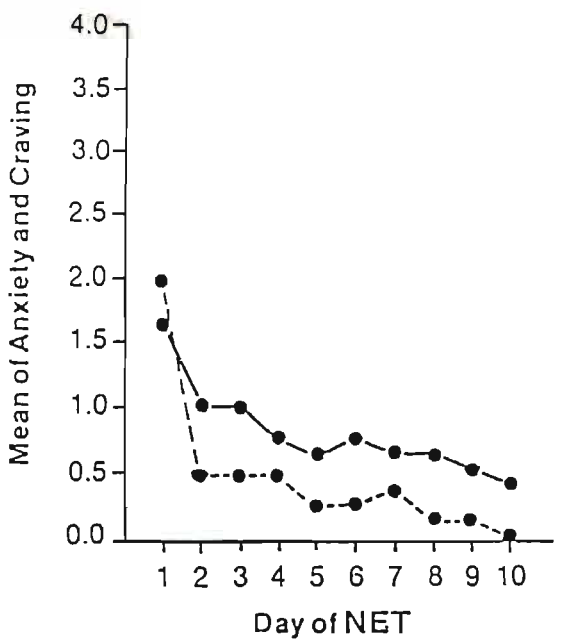


Fig. 3—Mean of daily means for each subject for anxiety (——) and craving (–·–) in 102 *consecutive* patients treated by NET for addiction to heroin, methadone, synthetic opioids, barbiturates, sedatives, tranquillizers, cocaine, amphetamines, hallucinogens, alcohol and nicotine.[42] Most patients were abusing two or more substances simultaneously. Recordings were made four times daily for days 1–5 and twice daily for days 6–10. In each condition 4 represents the maximum of the symptom and 0 the least

the WS is a major obstacle to a successful treatment outcome. Energies and intervention skills are sidetracked to deal with these symptoms of chemical dependency instead of being focused on the critical underlying issues. Correct application of frequency-specific ES, influencing the neuromediatory mechanisms involved in addiction and affective disorders, has been established to result in a significant amelioration of this stress, allowing energies and skills to be concentrated on areas of greatest need. This ability has been demonstrated in differing medical and social contexts, and with different cultural groups within Europe, the USA and Russia. The principal benefits emerging from these and other clinical results are threefold.

First is the rapidity of effect of treatment. All successful clinical applications report this therapeutic effect (Figs 2 and 3, and Table 4). The benefits offered to both patient and physician by this rapid therapeutic effect, combined with an abstinence objective, are obvious and manifold — including its cost-effectiveness. The amelioration of depression within such a brief period of time is particularly significant when contrasted with the initial 3–6-week period before antidepressant medication begins to show effect.

The rapid results achieved under ES conform to the accepted wisdom that treatment outcome is dependent on treatment completion. The short but intense treatment period of 5–10 days, however,

tradicts the maxim that time in treatment is also itical factor in successful treatment outcome. ived benefit would seem to be a more important able than mere time in treatment, substantiated the low relapse rates found postdetoxification er NET. (Additionally, of the drug and alcohol patients at follow-up, 42 per cent had not ived any structured rehabilitation following the lays of treatment.)

econdly, the modality demonstrates that medion is no longer an essential aspect to a humane oxification from opioids, tranquillizers, stimus or alcohol. All the described ES techniques nonstrate substantial reduction in withdrawal ress. The majority of patients treated with NET erience withdrawal relief of between 50 and 75 cent of the assessed symptomatology; a minorexperience relief of between 75 and 95 per cent. wever, even at 50 per cent relief, ES negates necessity to implement medication — anxioc, antidepressive, hypnotic, anticonvulsant or iwithdrawal. Further, the mental and emotional ity promoted by a non-medication treatment losophy provides greater opportunity for the ient to derive benefit from relapse prevention dalities. The same philosophy discourages ance on psychoactive chemicals as a coping ategy.

Thirdly, the unexpectedly low drop-out rates nd when the ES modalities are utilized[21] would m to suggest that the psychological distress erienced in detoxification is far more pivotal a poor treatment outcome than is generally ieved. CES-supported treatments in particular gest that when this distress is substantially amecated, treatment outcome is significantly anced even in the presence of physical discomt. The degree of withdrawal relief experienced versally under ES is substantial enough to main in treatment an unprecedented percentage of ients, many of them polysubstance addicts, who uld otherwise be expected to drop out of treatnt. Standard treatment methodologies in the K, USA and Australia report drop-out rates of ween 35 and 90 per cent.

The discharge assessments would seem to con n that dealing with the underlying psychological ues early in treatment, in a manner that is both pportive and confrontative,[43,44] is an essential erequisite to a positive treatment outcome. hatever initial emotional distress is experienced a consequence of confronting these painful issues n also be successfully ameliorated within the short treatment period with the majority of patients. A new, positive and hopeful attitude towards life is frequently observed, and recorded by the end of most treatments — possibly derived from normalization of endorphin, serotonin, dopamine and monoamine levels.[6,9]

Finally, the authors emphasize that optimum clinical results are usually achieved only when ES is used in conjunction with family therapy, drug counselling and relapse prevention modalities. The quality of the intervention by the therapist is considered to be of major importance.

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