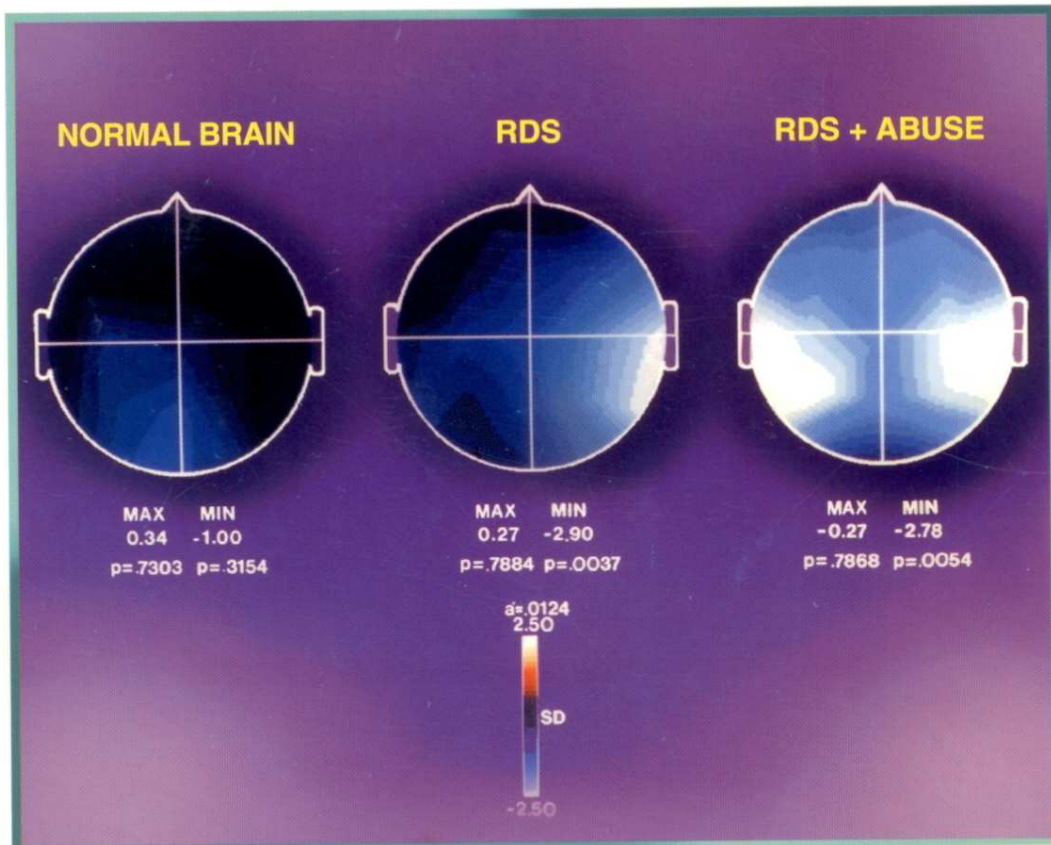


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**REWARD DEFICIENCY SYNDROME: A BIOGENETIC MODEL FOR THE DIAGNOSIS AND
TREATMENT OF IMPULSIVE, ADDICTIVE AND COMPULSIVE BEHAVIORS**

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JOURNAL OF PSYCHOACTIVE DRUGS

A BRIEF HISTORY

In the summer of 1967 a new periodical appeared "to compile and disseminate objective information relative to the various types of drugs used in the Haight-Ashbury subculture." Conceived and edited by David E. Smith, M.D., the *Journal of Psychedelic Drugs*, which began as a house organ for the Haight-Ashbury Free Medical Clinic of San Francisco, found its geographical focus rapidly expanding as the use of psychedelics and other psychoactive drugs (especially LSD and marijuana) spread throughout the nation and around the world. The *Journal's* topical focus shifted also, reflecting the replacement of the Haight-Ashbury district's hippie subculture and its use of psychedelic drugs with a scene predominated by high-dose intravenous amphetamine users, who either burned out or turned to the use of other drugs, such as barbiturates and heroin, in an effort to ameliorate the speedy effects of the stimulants. Similar patterns of drug abuse began to appear in other urban centers as well. Hundreds of free clinics, hotlines and drug information/education centers emerged to provide this largely youthful population with confidential, credible and nonjudgmental services, which at that time were unavailable from traditional medical, social service, and mental health agencies.

The directors of the Student Association for the Study of Hallucinogens, Inc. (STASH) – a Wisconsin-based drug information resource center – approached Dr. Smith in June of 1970 with the idea of entering into a cooperative arrangement to publish the *Journal of Psychedelic Drugs* and to expand the periodical's distribution. It was agreed that, beginning with Volume 3, Number I (September 1970), the *Journal's* publication, subscription, and general business offices would be moved to STASH headquarters in Beloit, Wisconsin. The editorial responsibility for the *Journal's* content would alternate between the Haight-Ashbury Free Medical Clinic and STASH.

This collaboration led to the successful expansion of the *Journal* in 1974 (Volume 6) to a regular quarterly schedule and the establishment of a professional Editorial Review Board to provide peer assessment in the selection of articles. To mark this occasion and to further delineate the scope of the *Journal of Psychedelic Drugs*, the subtitle "A Multidisciplinary Forum for the Study of the Drug Culture" was adopted.

During the late 1970s the *Journal of Psychedelic Drugs* built an international reputation as a respected and authoritative periodical. This was corroborated by the inclusion of the *Journal* in the prestigious Index Medicus in 1979. In 1981 the *Journal* returned to its birthplace in the Haight-Ashbury district of San Francisco under the aegis of David E. Smith, M.D., Founder and Medical Director of the Haight-Ashbury Free Medical Clinics, and the continued editorship of E. Leif Zerkin, Cofounder and Codirector of STASH. At the same time, the *Journal's* title was changed to the *Journal of Psychoactive Drugs* to better reflect the broad scope of its contents. In 1982, Jeffrey H. Novey joined the editorial staff as coeditor. After a distinguished editorial tenure of more than twenty years, Leif Zerkin moved on to other pursuits and new challenges. In October 1991, the responsibilities of managing editor passed to Jeffrey Novey. In December 1991, Terry Chambers joined the *journal* staff and is currently associate editor. In September 1996, Jeffrey Novey left to pursue further academic achievements and Richard B. Seymour, a long-term contributor to the *Journal*, became managing editor.

Throughout its thirty year history, the *Journal of Psychoactive Drugs* has been on the leading edge of developments in the field of drug use, abuse, and treatment. It has consistently addressed the complex nature of substance use and abuse from a multidisciplinary perspective and has provided in-depth examination of a host of topics, including the disease concept of addiction, drug use and criminality, drug use and the elderly, drug use and sexual behavior, ethnographic drug research, the history of cocaine smoking, therapeutic communities, hallucinogens, stimulants, depressants, smokable drugs, drug dependence and the family, women and substance abuse, professional treatment and the 12-Step process, chemical dependence and AIDS, shamanism and altered states, dual diagnosis, psychotherapy/counseling, adverse effects of tobacco smoking, understanding and preventing relapse, substance abuse in the workplace, drug testing, methadone maintenance treatment, prescription drug issues, and culturally relevant substance abuse treatment. The *Journal* continues to serve both professionals and laypersons alike as an important multidisciplinary forum for critical thinking, analysis, innovation, and evolutionary development in the field of drug use, abuse, and treatment.

Reward Deficiency Syndrome: A Biogenetic Model for the Diagnosis and Treatment of Impulsive, Addictive, and Compulsive Behaviors

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Abstract – The dopaminergic system, and in particular the dopamine D2 receptor, has been implicated in reward mechanisms. The net effect of neurotransmitter interaction at the mesolimbic brain region induces "reward" when dopamine (DA) is released from the neuron at the nucleus accumbens and interacts with a dopamine D2 receptor. "The reward cascade" involves the release of serotonin, which in turn at the hypothalamus stimulates enkephalin, which in turn inhibits GABA at the substantia nigra, which in turn fine tunes the amount of DA released at the nucleus accumbens or "reward site." It is well known that under normal conditions in the reward site DA works to maintain our normal drives. In fact, DA has become to be known as the "pleasure molecule" and/or the "antistress molecule." When DA is released into the synapse, it stimulates a number a DA receptors (D1-D5) which results in increased feelings of well-being and stress reduction. A consensus of the literature suggests that when there is a dysfunction in the brain reward cascade, which could be caused by certain genetic variants (polygenic), especially in the DA system causing a hypodopaminergic trait, the brain of that person requires a DA fix to feel good. This trait leads to multiple drug-seeking behavior. This is so because alcohol, cocaine, heroin, marijuana, nicotine, and glucose all cause activation and neuronal release of brain DA, which could heal the abnormal cravings. Certainly after ten years of study we could say with confidence that carriers of the DAD2 receptor A1 allele have compromised D2 receptors. Therefore lack of D2 receptors causes individuals to have a high risk for multiple addictive, impulsive and compulsive behavioral propensities, such as severe alcoholism, cocaine, heroin, marijuana and nicotine use, glucose bingeing, pathological gambling, sex addiction, ADHD, Tourette's Syndrome, autism, chronic violence, posttraumatic stress disorder, schizoid/avoidant cluster, conduct disorder and antisocial behavior. In order to explain the breakdown of the reward cascade due to both multiple genes and environmental stimuli (pleiotropism) and resultant aberrant behaviors, Blum united this hypodopaminergic trait under the rubric of a reward deficiency syndrome.

Keywords-dopamine D2 gene, genetics, impulsive, addictive and compulsive behaviors, neurotransmitters, reward deficiency syndrome

A SUBLUXATION MODEL FOR REWARD DEFICIENCY SYNDROME BEHAVIORS

To date there are no published reports which support the potential use of chiropractic care for individuals suffering from substance use disorder or any other impulsive, addictive, or compulsive behavior. However, there is one report (Blanks, Schuster & Dobson 1997) on 2,819 subjects, which lead the authors to conclude that network care (chiropractic) increased well-being in the studied population. The data collected involved a self-rated wellness and quality of life survey. Nevertheless, our subsequent remarks should be taken with caution in terms of the clinical applicability of this technique to treating RDS behaviors.

It is appropriate to first discuss research that suggests the spine may be an anatomical extension of the limbic system. The limbic system is the site where feelings are mediated. These feelings are expressed through the reward cascade model as first proposed by Blum and Kozlowski (1990). We now know many naturally occurring brain and spinal cord substances play a role in both emotions and pain reduction, leading to an increased sense of wellbeing. In this regard, Pert and Diensfey (1988) and Lewis and colleagues (1981) suggested the limbic system should include not only the amygdala and hypothalamus, but also the dorsal horn of the spinal cord. In fact they point out that a number of neuropeptide receptors having psychophysiological effects can be found in the dorsal horn of the spinal cord. Burstein and Potrebic (1993) of the Department of Neuro-Biology at the Harvard Medical School provide evidence for direct projection of the spinal cord neurons to the amygdala and orbital cortex. Further, these authors suggest that these pathways play a role in neuronal circuits that enable somatosensory information, including pain, to effect autonomic, endocrine, and behavioral functions. Giesler, Katter & Dado (1994) found specific spinal pathways which project to the limbic system for nociceptive information, and these pathways seem to include the hypothalamus bilaterally.

In unpublished work conducted prior to the previously mentioned network study, Holder and Blum decided to test the hypothesis that chiropractic care goes beyond its known role in musculoskeletal disorders. This is based on the speculation that via adjustment of the spine, a subluxation free spine would facilitate an enhanced sense of well-being via limbic activation of dopamine release at the nucleus accumbens. We therefore carried out preliminary studies at the Exodus Treatment Center in Miami, Florida, where we incorporated chiropractic procedures (Torque Release Technique) to see if we could significantly affect psychological states, drug withdrawal, and patient retention rates in inpatient

SUD residents. The investigation was a randomized clinical trial, blinded and with a placebo control to mimic the subluxation-based chiropractic treatment. The study included 98 human subjects and consisted of three groups: a standard residential treatment group, a standard residential treatment group plus chiropractic adjustments, and a standard residential treatment plus placebo chiropractic adjustments. The results analyzed reveal that chiropractic adjustments are producing a significantly improved retention rate within a 30 day residential model compared to both the placebo and the standard groups, with a statistically significant improvement in anxiety and depression scores (based on a battery of seven psychological inventories) when compared to sham controls, as well as a significant reduction in nursing station visits compared to controls. While these results are intriguing and open to a number of possible interpretations, the study needs to be replicated by an independent laboratory before any conclusions can be drawn.