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Arthur H. Garrison
Delaware Criminal Justice Council

Drug Treatment Programs:
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Arthur H. Garrison

Drug use in the United States has been cited for the growth in American prisons over the past decade. Heroin, once considered a drug to be avoided and scorned, has had resurgence in use by middle-class youth and white-collar professionals due to the increased purity of the drug and the lack of need to use needles for ingestion. Naltrexone has been used as a method of helping heroin addicts to end their drug dependency, but such programs have limitations in their use and effectiveness. This paper is drawn from an evaluation of a drug treatment program in Wilmington, Delaware. The goal of this paper is to review the factors that lead to successful drug treatment and the limitations on the success of drug treatment that the judiciary should consider when sentencing drug addicts.

More than 13 million Americans used an illicit drug at least once in 1998, and 977,000 Americans classified themselves as hardcore heroin users in 1999.[1] The growth of increased drug use has impacted the criminal justice system. "In 1997, over one third of prison commitments involved drug offenses, compared to only 7% in 1980. In 1980, about half of all commitments were for violent offenses; by 1997, only about one third were."[2] In 1999 Americans spent an estimated $63.2 billion for cocaine, heroin, methamphetamine, and other illicit drugs.[3] The impact of this increased drug use can be seen in the fact that the number of Americans incarcerated (prison only) reached more than one million (1,078,542) in 1995 for the first time in U.S. history.[4] According to the Bureau of Justice Statistics, the percentage of prisoners in federal prison incarcerated for dugs increased from 57.9% of the total population in 1991 to 62.6% in 1997 and the percentage of drug offenders in state prisons decreased from 21.3% of the total population in 1991 to 20.7% in 1997.[5]

"The majority of heroin users are still older, chronic users who inject the drug. At the same time, the number of new, young users who snort or smoke the drug continues to rise."[6] According to the DEA, the "typical heroin user today consumes more heroin than a typical user did just a decade ago, which is not surprising given the higher purity currently available at the street level."[7] Historically heroin is taken intravenously, subcutaneously (under the skin), or intramuscularly[8] but due to the high level of purity (as high as 98%), it can be snorted or smoked. The purity of the heroin now makes heroin snorting possible, and makes heroin more "appealing to new users because it eliminates both the fear of acquiring syringe-borne diseases . . . and the historical stigma attached to intravenous heroin use."[9]

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Footnotes

1. OFF. OF NAT'L DRUG CONTROL POLICY, NATIONAL DRUG CONTROL STRATEGY 2000 ANNUAL REPORT (2000) at 115–116. Seventy-four million Americans have tried an illicit drug at least once in their lifetime; 2.4 million have tried heroin at least once, 22.1 million have tried cocaine at least once, and 4.6 million have used crack at least once. OFF. OF NAT'L DRUG CONTROL POLICY, DATA SNAPSHOT–DRUG ABUSE IN AMERICA 1998 (1998) at 32-33. In 1999, 1,254,577 Americans were in federal and state prisons. OFF. OF NAT'L. DRUG CONTROL POLICY (March 2001), *infra* note 2 at 1.
2. OFF. OF JUSTICE PROGRAMS, U.S. DEP'T OF JUSTICE, CRIME AND JUSTICE ATLAS 2001 UPDATE (2001) at 5. The Office of National Drug Control Policy recently reported the following:

   > In 1999, approximately 6.3 million adults—3.1% of the Nation's adult population—were under correctional supervision (that is, incarceration, probation or parole). Drug offenders accounted for 21% (236,800) of the State prison population in 1998, up from 6% (19,000) in 1980, and 59% (55,984) of the Federal prison population in 1998, up from 25% (4,749) in 1980. Also, in 1998, an estimated 26% (152,000) of all inmates under local supervision were incarcerated for drug offenses. This increase in the drug offender prison population mirrors the steady increase in arrests for drug offenses.

   OFF. OF NAT'L DRUG CONTROL POLICY, DRUG TREATMENT IN THE CRIMINAL JUSTICE SYSTEM FACT SHEET (March 2001) at 1.
3. OFF. OF NAT'L DRUG CONTROL POLICY, *supra* note 1, at 114.
4. BUREAU OF JUSTICE STATISTICS, SOURCEBOOK OF CRIMINAL JUSTICE STATISTICS 1999 (2000) at 484.
5. Id. at 513. See also NELS ERICSON, SUBSTANCE ABUSE: THE NATIONS'S NUMBER ONE HEALTH PROBLEM.(OJJDP Fact—Sheet #17) (May 2001).
6. OFF. OF NAT'L DRUG CONTROL POLICY, PULSE CHECK: NATIONAL TRENDS IN DRUG ABUSE (Summer 1998), at *i*.
7. DRUG ENFORCEMENT ADMIN. & THE NAT'L GUARD, DRUGS OF ABUSE (1997) at 13.
8. *Id.*
9. *Id.* The DEA estimated that purity levels of heroin in 1981 were 7%, and in 1998 the average purity rate was 41 % nationwide. Estaban Parra, *infra* note 18. The ingestion of heroin either by smoking or snorting has increased from 55% in 1994 to 71% in 1997. OFF. OF NAT'L DRUG CONTROL POLICY, *supra* note 6 at 30.

In Newark, Delaware, the purity of heroin has been found to range from 20% to 90%.[10] The New Castle County Police have reported that purity levels have been found to be as high as 97% in Dover, Delaware.[11] According to the Office of National Drug Control Policy, Newark, Delaware sources report that there has been a "'definite increase in teenage users'. . . dealers, some from nearby Philadelphia, are making a clear attempt to establish a new market. For example, by encouraging young females to begin use, dealers hope to attract older male users. In that area, users start at around 13, and the source reports that there are 'chronic' users aged 15 - 17."[12] It has recently been reported that between 1993 and 1995, 88% of new heroin users were between the ages of 12 to 25 years old.[13] The "average age of addicts seeking treatment is getting younger. In 1993, only 17.2 percent of heroin addicts who reported for treatment were 24 or younger. By 1997, the percentage had climbed to 31.7 percent."[14] The number of people who are treated for heroin addiction in Delaware has increased from 336 in 1991 to 1,767 in 1997, an increase of 426%.[15] The impact of the increase in heroin usage can be seen in the number of heroin-related deaths. Deaths related to heroin have increased from 14 in 1991, to 29 in 1997.[16] The national average of heroin purity is 35%.[17] The average purity level for heroin in Delaware is 85%.[18]

In an effort to deal with the growing heroin use problem in Delaware, SODAT-Delaware, Inc., received more than $1,650,000 over a three-year period (1995–1997) to implement an intensive outpatient therapy program (SNAP), which uses the blocking medication naltrexone to assist heroin addicts in their attempts to discontinue the use of heroin and other drugs and to promote pro-social behavior with no new criminal arrest.

[B]etween 1993 and 1995, 88% of new heroin users were between the ages of 18 to 25 years old.

A BRIEF REVIEW ON THE USE OF HEROIN AND NALTREXONE

Heroin is a semi-synthetic derivative of opium prepared from morphine.[19] Heroin was first introduced into medicine in 1898 and was used as a pain medication until the addictive nature of opioids in general was found.[20] Heroin is classified as a narcotic due to its ability to produce mood and behavior changes, potential for dependence and tolerance following continued use, and derivation from opium.[21] In 1914 the Harrison Act was passed, which is "interpreted as excluding the provision of opioids to addicts as a legitimate medical use."[22] Although the use of opiates was illegal, "heroin addiction persisted and its prevalence rose following World War II [and by] the early 1960's [many recommended] remedicalizing heroin distribution as a way to reduce crime associated with heroin addiction."[23]

With the increase of heroin addiction in the U.S. Military during the Vietnam War and in society as a whole, federal funds were expended for both research and treatment of heroin addicts.[24] Over the past 30 years, various techniques have

10. Off. of Nat'l Drug Control Policy, *supra* note 6 at 4.
11. New Castle County Police Heroin Alert Task Force, "Heroin: The New Serial Killer That Is Stalking Our Children," presentation made on Sept. 26, 1998.
12. *Supra* note 6 at 3. "The hub of the area heroin trade [is in] the Kensington section of Philadelphia. That's where many Delaware addicts go to get [their heroin]. Through the first 10 months of 1998 [there were] 716 arrests for heroin" of which 30 were people from Delaware. Tom Feeney & Esteban Parra (1998). *Hooked on Heroin: Police Sound the Alarm*, Sunday News Journal, Nov. 29. 1998, at A1.
13. New Castle County Police Heroin Alert Task Force, *supra* note 11.
14. Feeney & Parra, *supra* note 12.
15. *Id.* at A1.
16. *Id.*
17. Drug Enforcement Admin. & The Nat'l Guard, *supra* note 7 at 13.
18. New Castle County Heroin Alert Task Force, *supra* note 11. DEA investigations have discovered that heroin sold in Dover and Kent County originates in New York City. The heroin market in the U.S. is dominated by two sources, Columbia and Mexico. Columbian heroin is dominant along the east coast in cities like Boston, New York City, Newark, N.J., and Philadelphia. Columbian heroin averages at almost 68% pure, but the Columbian heroin in Dover has been found in the high 90% range. The heroin purity rate in Dover has been found to be higher than in Philadelphia, which is about 80%. The combination of the high purity rate of heroin in Delaware and the low cost is blamed for the increase of heroin use in suburban areas in Delaware. Estaban Parra, *Purity Is Part of the Local Problem,* Sunday News Journal, Jan. 21, 1999, at A7. The dividing line between South American (high purity white) and Mexican (lower purity "black tar") heroin is the Mississippi River. Office of Nat'l Drug Control Policy, *supra* note 2 at 31.
19. Stedman's Medical Dictionary (25th ed.1990). Harold Kaplan & Benjamin Sadock, Comprehensive Textbook of Psychiatry (6th ed. 1995). Joseph Ternes & Charles O'Brien, *The Opioids: Abuse Liability and Treatment for Dependence*, *in* Addiction Potential of Abused Drugs and Drug Classes (Barry Stimmel ed., 1990)
20. Kaplan & Sadock, *supra* note 19 at 844.
21. *Id.* "Heroin crosses the blood-brain barrier more rapidly than morphine and produces greater euphoric effects when given in equal doses. Once in the brain, heroin is hydrolyzed to morphine almost immediately." *Id.* at 31. Both heroin and morphine are derivatives of opium and as such are considered opiates.

    Opiates attach to the opioid receptors of the brain and produce similar euphoric and pleasure reactions to natural occurring pain suppressants in the brain (endorphins and enkephalins) which also attach to the opioid receptors of the brain. Substance Abuse and Mental Health Services Admin. (SAMSHA), Naltrexone and Alcoholism Treatment: Treatment Improvement Protocol (TIP) (1998), series #28 at 28. Both endogenous opioids (endorphins and enkephalins) and exogenous opiates (heroin and morphine) act as neurotransmitters that transfer information through the nervous system. In the case of opioid neurotransmitters, the information is pain relief and pleasure responses. See *infra* note 32 for discussion on the cycle of addiction theory.
22. Kaplan & Sadock, *supra* note 19 at 844.
23. *Id.*
24. *Id.* See also, *infra* note 25, and Robert Greenstein et al., *Methadone and Naltrexone in the Treatment of Heroin Dependence*, 7 Psychiatric Clinics of North America, 671 (1984).

Early studies and theoretical use of naltrexone proposed that naltrexone would be effective in dealing with impulsive and compulsive heroin use in addicts who are in treatment.

been developed to treat heroin addicts. One of the treatment methods developed over the past 25 years involves the use of long-acting opioid antagonists for heroin addicts.[25] Antagonist treatment methods differ from substitution (maintenance) treatment programs in that the antagonist programs use medication to eliminate an addiction. Substitution treatment methods use one drug, methadone, for example, as a replacement for another drug, heroin. The SNAP program was an antagonist treatment program that used the opioid antagonist naltrexone, which "blocks or reverses the physiologic and psychological effects of opioids by binding opiate receptors" in the brain.[26]

Naltrexone "prevents or reverses opioid effects [and] will precipitate abstinence . . . in narcotic addiction."[27] The use of naltrexone is based on "the assumption that classically conditioned withdrawal symptoms and operantly reinforced drug seeking behaviors contribute to high relapse"[28] in heroin addicts.

> Theoretically, by blocking the euphoric effects of opioids, treatment with antagonists would lead to the extinction of operantly reinforced drug seeking; by preventing the reestablishment of physical dependence, treatment with antagonists also leads to the eventual extinction of conditioned withdrawal phenomena. Recently, . . . empirical and laboratory observations [show] patients taking naltrexone experience less craving in the presence of opioid-related cues, presumably because, on a cognitive basis, they are aware that they are unable to experience the opioid effects.[29]

Early studies and theoretical use of naltrexone proposed that naltrexone would be effective in dealing with impulsive and compulsive heroin use in addicts who are in treatment.[30] Early researchers of heroin addiction recognized that recovering heroin addicts could recidivate and develop full addiction due to impulsive heroin use by environmental stimuli. The stimuli could be an interaction between the recovering addict and a friend, whom the addict had a history of heroin use with, or being in a neighborhood in which heroin is used. The stimulus causes a craving for the heroin that could cause readdiction. Goldstein explained that "naltrexone can protect against impulsive use and can prevent the consequences of impulsive use. The protective medication, [the naltrexone], is taken at a time when motivation [to end the addiction] is high, then later, if circumstances arise that would typically lead to use the agonist drug [heroin], there is a strong reason to avoid that behavior" because the subject knows the heroin will not have any effect.[31] Naltrexone can also aid in the reduction of compulsive addiction. The cognitive knowledge that the use of the heroin will

25. Kaplan & Sadock, *supra* note 19 at 844. For a review of early research on naltrexone in heroin addiction, see Richard Resenick et al., *Narcotic Antagonists in the Treatment of Opioid Dependence: Review and Commentary*, 20 COMPREHENSIVE PSYCHIATRY, 116 (1979). See also, DEMETRIOS JULIUS & PIERRE RENAULT, NARCOTIC ANTAGONISTS: NALTREXONE (National Institute on Drug Abuse Research Monograph # 9, 1976),which encompasses 25 articles on naltrexone treatment studies for the first half of the 1970s that were funded by the National Institute on Drug Abuse, U.S. Department of Health, Education, and Welfare.
26. Robert Greenstein et al., *supra* note 24 at 675; Joseph Ternes & Charles O'Brien, *supra* note 17 at 43. See also, Vis Navartnam et al., *Determination of Naltrexone Dosage for Narcotic Antagonist Blockade in Detoxified Asian Addicts,* 34 DRUG AND ALCOHOL DEPENDENCE, 231 (1994), which found naltrexone to be effective in blocking the physiological and psychological effects of heroin for at least 48 and 72 hours, respectively. Opioid antagonists like naltrexone "block opioid receptors and reverse the effects of endogenous opioid peptides as well as exogenous opiates [and it is theorized that] these agents may prevent the reinforcing effects" of consumption of heroin. SAMHSA, *supra* note 21 at 32.
27. DRUG FACTS AND COMPARISONS (1998) at 3579. See also, Joseph Volpicelli, *Naltrexone and the Treatment of Alcohol Dependence*, 18 ALCOHOL HEALTH & RES. WORLD: JOURNAL NAT'L INST. ON ALCOHOL ABUSE AND ALCOHOLISM 272 (1994).
28. Kaplan & Sadock, *supra* note 19 at 857. See, Abraham Wikler, *Dynamics of Drug Dependence: Implications of a Conditioning Theory for Research and Treatment*, 28 ARCHIVES OF GENERAL PSYCHIATRY 611 (1973), and Wikler, *Conditioning Factors in Opiate Addiction and Relapse*, in NARCOTICS (Daniel Wilder and Gene Kassenbaum eds., 1965) at 85 for early work on the use of narcotic antagonists for treating heroin addiction. See also, Karen Allen, *Essential Concepts of Addiction for General Nursing Practice,* 33 NURSING CLINICS OF NORTH AMERICA 1.
29. Kaplan & Sadock, *supra* note 19 at 857. See also, Charles O'Brien et al., *Use of Naltrexone to Extinguish Opioid-Conditioned Responses*, 45 J. CLINICAL PSYCHIATRY 53.
30. See Avram Goldstein, *Naltrexone in the Management of Heroin Addiction: Critique of the Rationale,* in NARCOTIC ANTAGONISTS: NALTREXONE (National Institute on Drug Abuse Research Monograph # 9) (Demtrios Julius & Pierre Renault eds., 1976) 158, 159. See also, Richard Resinick, et al., *supra* note 25, and Richard Resnick & Elaine Schuyten-Resnick, *A Point of View Concerning Treatment Approaches with Narcotic Antagonists, in* NARCOTIC ANTAGONISTS: NALTREXONE 84 (1976).
31. Avram Goldstein, *supra* note 30 at 159. "Relapse to heroin use in abstinent ex-addicts is rarely cogitated and planned in advance. Conditioned abstinence ('craving') can be elicited by accidental encounters with active addicts . . . or other major stress." *Id.* On the issue of behavior, Goldstein noted that humans have the ability to "anticipate consequences and to modify our behavior accordingly. In this connection, the observation that naltrexone can diminish 'craving' is entirely understandable, since 'craving' is generally elicited by the possibility of obtaining a drug rather than by its unavailability. It follows from this analysis that naltrexone can only work if the patient understands how it works and believes that it will work." *Id.* at 159–160. Goldstein also asserted that because the patient knows that the naltrexone will block the affects of heroin and thus taking the drug will be futile, "it is not surprising that many subjects taking naltrexone may not use

not have an effect reduces the obsessing over the craving for the heroin. Thus naltrexone will assist the addict in developing behavior re-enforcers to resist the thoughts and desires for the drug, in turn reducing compulsive addictive behavior.

Although use of naltrexone has been found to block the effects of heroin, one of the biggest problems in heroin addiction[32] treatment, along with heroin detoxification of addicts, is low compliance in taking the naltrexone by the addicts and their high dropout rate.[33] Kaplan and Sadock noted that in one study, "the dropout rate was quite high: 25 percent of subjects who started treatment dropped out within two weeks; 94 percent stopped by nine months."[34] In a study in Israel, the average retention rate for program participants was 56.3 days.[35] Out of a total of 32 patients, 58 percent completed the program.[36] Forty percent of the patients dropped out of the program within two weeks, and 60% of the patients who dropped out did so within the remaining ten weeks of the program.[37]

PROGRAM THEORY DESCRIPTION

The SNAP program was based on the theory that the heroin addict (once detoxification is completed) will be assisted in ending his or her heroin addiction if medication was provided that blocked the effects of the heroin. The heroin-blocking medication provided was naltrexone. Naltrexone is an orally administered medication, which prevents the uptake and effects of opioid compounds. Thus, when taking this medication, any person who uses heroin by any route will not experience any effects whatsoever. The naltrexone protocol was used in conjunction with intensive outpatient therapy and therapeutic case management services.

The general focus of the SNAP treatment was on client stabilization, maintenance of a drug-free and crime-free lifestyle, a recovery-oriented support network, and relapse prevention education. The SNAP program was designed to provide a four-phase treatment strategy for heroin addicts over a 12-to-18-month period.

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METHODOLOGY

Between October 7, 1993, and July 22, 1998, the SNAP program provided 73 participants naltrexone as part of their treatment for heroin addiction. Data was collected from the case files of all 73 participants, which included basic demographic information (age, gender, race), employment status, history of

heroin to test and verify the protection." *Id.* at 159. For research showing that heroin addicts will test the blocking ability of naltrexone, see *infra* note 40. For a study looking at impulsive heroin addicts and self-control, see Gregory Madden et al., *Impulsive and Self-Control Choices in Opioid-Dependent Patients and Non-Drug-Using Control Participants: Drug and Monetary Rewards,* 5 EXPERIMENTS IN CLINICAL PSYCHOPHARMACOLOGY 256 (1997). For a study looking at compulsive use of heroin and the opioid receptors and naltrexone, see Jane Stewart, *Conditioned and Unconditioned Drug Effects in Relapse to Opiate and Stimulant Drug Self-Administration,* PROGRESS IN NEUROPSYCHOPHARMACOLOGY & BIOLOGICAL PSYCHIATRY 591 (1983).

32. In the development of the cycle of addiction, the intake of heroin leads to an increase in opioid receptor activity. "Once opioid receptor activity has been primed, more [heroin] is needed to ensure continued opioid receptor activity. Therefore, a cycle may ensue during which the desire to increase or recapture feelings of pleasure or euphoria is translated into cravings for [the heroin]. The loss of control that follows the initial consumption of a reinforcing agent [the heroin] may provide the root mechanism for . . . addictive behavior." SAMHSA, *supra* note 19 at 31–32. Thus the use of heroin can have a "priming" for additional use. The use of heroin, even a small amount, can effect a release of endorphins (which produce feelings of pleasure), which in turn increase the desire for more heroin, which in turn produce more release of endorphins. Addiction research has found "that opiates can have an effect equal to that of having an appetizer before dinner. A small dose of a substance that effects the opiate receptor sites can increase the drive to consume more of the same." The first ingestion of the heroin increases the motivation to have another. Alfred Turner, *Naltrexone: The Magic Bullet for Alcoholism* (1995), available at www.enteract.com/~alturner/neltrexo.html. "This appetizer or priming effect provides good reason to look at opiate receptor blocking pharmacological agents in the battle to reduce relapse in early recovery." *Id.* See also, D. Colin Drummond. *Theories of Drug Craving, Ancient and Modern,* 96 ADDICTION 33 (2000). For a discussion on opiate receptor sites within the brain, see Roy Wise, *Opiate Reward: Sites and Substrates*, 13 NEUROSCIENCE AND BIOBEHAVIORAL REVIEW, Summer-Fall 1989, 129, and Jane Stewart, *supra* note 31.

33. High dropout rates can be partially explained by the nature of addiction. As noted in footnotes 21 and 32, the consumption of heroin produces a pleasurable experience that can be stronger than natural pleasurable experiences. The experience in turn produces chemical reinforcers to the use of heroin. The reduction or stopping of the behavior (heroin use) produces the chemical reinforcers in the brain, which in turn produce craving for the behavior (heroin use). The craving in turn produces the continuation of the behavior (heroin use). Negative reinforcement and addiction are achieved. Treatment programs using naltrexone block the pleasure reaction of opiates and opioids in the brain. But the psychological desire for the heroin and the resulting pleasure from using the drug causes the person to stop taking the naltrexone in order to have the heroin have its desired effect. It is here that treatment modalities like cognitive therapy and group therapy can have an effect, for therapy addresses the emotional need for the heroin and how to resist the need.
34. Kaplan & Sadock, *supra* note 19 at 857. See also, Emi Shufman et al., *The Efficacy of Naltrexone in Preventing Reabuse of Heroin after Detoxification*, 35 SOCIETY OF BIOLOGICAL PSYCHIATRY 935 (1994).
35. Emi Shufman et al., *supra* note 34 at 939. "In this study, 75% of the patients stayed in the program after 1 month, and 58% completed the 3 months treatment period." *Id.*at 942.
36. *Id.* at 942.
37. *Id.* at 939.

The majority of SNAP patients did not test positive for drugs while in the program.

drug abuse, and drug use after the first ingestion of naltrexone.

SUMMARY OF FINDINGS

The majority of SNAP participants were single-male African-Americans. The median age of SNAP participants was 31 years old. Almost all of the participants had prior drug histories. The majority, 81%, began drug use before the age of 18. The main two introduction drugs were alcohol and marijuana. More than 70% of SNAP participants used at least one of these drugs as the first drug in their drug use histories. The median age for first drug use was 15, and 14 years old was the mode.

The majority of SNAP patients did not test positive for drugs while in the program. More than 75% of the participants remained drug free. But there was not a corresponding result in successful treatment by SNAP participants. The majority of SNAP participants did not successfully complete the program. While the majority of participants did not use drugs, only 13% successfully completed the treatment. These results may suggest that drug treatment success may not be related to remaining drug free during treatment. The majority of participants who entered the SNAP program did so unemployed (52%). At time of discharge, the majority of participants were employed (57.5%).

Previous drug treatment histories did not provide an increased chance of successful completion in the SNAP program. Of the 71 SNAP participants who had prior drug treatment histories, 84.5% failed to successfully complete treatment. As would be expected, the longer participants remained in the program the higher the rate of program success. Out of the ten participants who succeeded in treatment, nine remained in the program longer than six months. Conversely, 60.7% of those who failed to complete treatment remained in the program less than six months. The median length of time SNAP participants remained in the program was almost five months.

Being married did not prove to be a positive factor in successful treatment. Participants who were married and successfully completed treatment accounted for only 6.7% of the married SNAP population. Those participants who were single and successfully completed treatment accounted for 15.8% of the single SNAP population. Those who were married and failed to complete treatment accounted for 93.3% of the married SNAP population. Those participants who were single and failed to complete treatment accounted for 80.7% of the single SNAP population. Thus, a higher percentage of those who were single successfully completed treatment than those who were married, and a higher percentage of those who failed treatment were married than those who failed and were single. The data may suggest that there may be an inverse relationship between successful completion and being married. An alternative theory could be that these married addicts had unstable marriages or were married to addicts. If so, these negative relationships could be decreasing the opportunity for the SNAP participants to take advantage of the program and successfully complete treatment.

Being employed was associated with program success. Those participants who were employed and successfully completed treatment accounted for 21% of the employed SNAP population. Those participants who were unemployed and successfully completed treatment accounted for 3.4% of the total unemployed SNAP population. Those who were employed and failed to successfully complete treatment accounted for 76% of the employed SNAP population. Those participants who were unemployed and failed to complete treatment accounted for 93% of the unemployed SNAP population. Thus, a higher percentage of those who were employed successfully completed treatment than those who were unemployed, and a higher percentage of those who failed treatment were unemployed than those who failed and were employed.

The majority of the SNAP patients started to use drugs in their early teen years. Longer periods spent using drugs were associated with failure to complete treatment successfully.

The SNAP program achieved a 75% negative test for drug use and 13.7% treatment success rate. A review of the literature shows that success rates in naltrexone treatment programs for heroin addicts can range from 12% to 20%.[38] For example, O'Brien and Greenstein[39] note in their study that only 12% of those who began treatment remained in the program beyond six months. In a study conducted by Tennant and his colleagues, only 16% of the program participants completed the program successfully. D'Ippoliti and his colleagues conducted a study on treatment retention in Italy and found that after one year, the retention rate among 1,503 heroin users using naltrexone was 18%.[40] Some of the results of the SNAP program showed better

38. *See* Michael Stark & Barbara Campbell, *Personality, Drug Use, and Early Attrition from Substance Abuse Treatment,* 14 AM. J. DRUG & ALCOHOL ABUSE 475 (1988); Charles O'Brien et al., *Clinical Experience with Naltrexone*, 2 AM. J. DRUG & ALCOHOL ABUSE 365 (1975); Steven Sideroff et al., *Craving in Heroin Addicts Maintained on the Opiate Antagonist Naltrexone,* 5 AM. J. DRUG & ALCOHOL ABUSE 415 (1978); Richard Greenstein et al., *Naltrexone: A Short-Term Treatment for Opiate Dependence,* 8 AM. J. DRUG & ALCOHOL ABUSE 291 (1981); Len Derogatic & Nick Melisaratos, *The Brief Symptom Inventory: An Introductory Report*, 13 PSYCHOL. MEDICINE 595 (1983); Richard Greenstein et al., *Naltrexone: A Clinical Perspective,* 45 J. OF CLINICAL PSYCHIATRY, Sept. 1984, 25; Herbert Kleber & Thomas R. Kosten, *Naltrexone Induction: Psychological and Pharmacological Strategies,* 45 J. OF CLINICAL PSYCHIATRY, Sept. 1984, 29; Forest Tennant et al., *Clinical Experience with Naltrexone in Suburban Opioid Addicts,* 45 J. OF CLINICAL PSYCHIATRY, Sept. 1984, 42; Miguel Gutierrez et al., *Retention Rates in Two Naltrexone Programmes for Heroin Addicts in Victoria, Spain*, 10 EUR. PSYCHIATRY 183.

39. Charles O'Brien & Richard Greenstein, *Treatment Approaches: Opiate Antagonists,* in SUBSTANCE ABUSE: CLINICAL PROBLEMS & PERSPECTIVES (Joyce Lowenson & Pedro Ruizeds, 1981) 403.

40. Forest Tennant et al., *supra* note 36; Daniella D'Ippoliti et al., *Retention in Treatment of Heroin Users in Italy: The Role of Treatment Type and of Methadone Maintenance Dosage*, 52 DRUG & ALCOHOL DEPENDENCE 167 (1998). See also, George W. Joe et al., *Recidivism Among Opioid Addicts After Drug Treatment: An Analysis by Race and Tenure in Treatment,* 9 AM. J. DRUG & ALCOHOL ABUSE, 371 (1982-83).

results than some of the work in the literature. The research literature suggests that patients in a naltrexone program will "test naltrexone's opiate blockade at least once during treatment."[41] The results of this program show that the patient on naltrexone may not test the blocking effect of the drug. The large majority of patients, 75%, did not test positive for any drugs during their participation in the program.

The program achieved other measures of drug treatment success noted in the literature, including employment status change and post-program arrest history. The majority of SNAP program participants left the program employed, regardless of their discharge status. Those who were employed at time of discharge had a higher rate of successful treatment than those who were not employed. Additionally, the percentage of those who were employed and who failed the treatment program was less than those who were unemployed and failed the treatment program.

Other observations about drug addiction in the literature were confirmed, specifically that "softer" drugs serve as an introduction to "harder" drugs and that drug use starts in the early years of adolescence. Alcohol and marijuana proved to be the two introduction drugs to the SNAP patients. Heroin proved to be a distant third. Drug use of SNAP participants began in their teen years. A majority of the SNAP patients were between 13 and 18 when they first began using drugs. These results support the general belief that drug use begins in the early years of the addict's life, and if a person can remain drug free through these early years the chances of becoming an addict decrease.

POLICY IMPLICATIONS FOR THE JUDICIARY ON THE DESIGN AND UTILITY OF DRUG TREATMENT PROGRAMS

I. The judiciary should assess what type of addict is before the bench before ordering the addict to a drug treatment program. If the case involves a non-professional, high-addiction-level, street addict, the likelihood of successful completion ranges between a low of 12% to a high of 20%. The court should review the type of drug treatment programs that are available and make sure that the program is designed to handle the type of addict the court is dealing with.

There are different types of heroin addicts with different expectancy rates of successful treatment completion.

There are different types of heroin addicts with different expectancy rates of successful treatment completion.[42] Treatment programs are more successful with addicts who have a stable family structure; are married to a nonaddicted mate; are highly motivated to stop using heroin; have good jobs; have minimal antisocial behavior; have low drug craving/addiction; or have high professional, social, or economic status.[43] Programs with addicts who use heroin as a "self-medication" have a higher rate of program discontinuation or failure.[44]

II. Assessment of success of drug treatment programs should be made using multiple measures, including abstinence rates, improvement in employment status, success in therapy treatment, reaching of social goals, positive behavior changes, and the level of involvement in criminal activity, rather than on retention rates alone. The court should not assume that failure to complete the program is analogous to failure.

41. Robert Greenstein et al., *supra* note 24 at 677. See also, Robert Greenstein et al., *supra* note 38 at 27. See *supra* note 31 to the contrary.
42. See, Jonathan Rabinowitz, et al., *Compliance to Naltrexone Treatment After Ultra-Rapid Opiate Detoxification: An Open Label Naturalistic Study*, 47 DRUG & ALCOHOL DEPENDENCE, Aug. 1997, at 77; Domingos Neto et al., *Sequential Combined Treatment of Heroin Addicted Patients in Portugal with Naltrexone and Family Therapy,* 3 EUR. ADDICTION RES., July 1997, at 138; Philip Robson & Margaret Bruce, *A Comparison of "Visible" and "Invisible" Users of Amphetamine, Cocaine and Heroin: Two Distinct Populations*, 92 ADDICTION, 1729 (1997); Michael Gossop et al., *Severity of Dependence and Route of Administration of Heroin, Cocaine and Amphetamines*, 87 BRIT. J. ADDICTION, 1527 (1992); and Arnold Washton et al., *Successful Use of Naltrexone in Addicted Physicians and Business Executives,* 4 ADVANCES IN ALCOHOL AND SUBSTANCE ABUSE 89 (1984). See also, *infra* note 41. For the assertion that there is a distinction between compulsive/addictive users of heroin and nonaddictive, long-term moderate users of heroin see, Wayne M. Harding, *Controlled Opiate Use: Fact or Artifact?,* 3 ADVANCES IN ALCOHOL & SUBSTANCE ABUSE, Fall-Winter 1983, at 105.
43. See, Augusta Roth et al., *Naltrexone Plus Group Therapy for Treatment of Opiate-Abusing Health Care Professionals*, 14 J. SUBSTANCE ABUSE TREATMENT, 19 (1997); Walter Ling & Donald Wesson, *Naltrexone Treatment for Addicted Health Care Professionals: A Collaborative Private Practice Experience*, 9 J. CLINICAL PSYCHIATRY, Sept. 1984, at 46; Arnold Washton et al., *Naltrexone in Addicted Business Executives and Physicians*, 9 J. CLINICAL PSYCHIATRY, Sept. 1984, at 39; John Gonzalez & Rex Brogden, *Naltrexone: A Review of Its Pharmacodynamic and Pharmacokinetic Properties and Therapeutic Efficacy in the Management of Opioid Dependence*, 35 DRUGS, Mar. 1988, at 192; Richard Resnick et al., *supra* note 23. See also, OFF. NAT'L DRUG CONTROL POLICY, WHITE PAPER: TREATMENT PROTOCOL EFFECTIVENESS STUDY (1996); A. Thomas McLellan, *Patient Characteristics Associated with Outcome*, in RESEARCH ON TREATMENT OF NARCOTIC ADDICTION 500 (James Cooper ed., 1983).
44. See, Richard Resnick et al., *supra* note 25. See also, Richard Resnick et al., *A Cyclazocine Typology in Opiate Dependence,* 126 AM. J. PSYCHIATRY, 1256; Richard Resnick & Arnold Washton, *Clinical Outcome with Naltrexone: Predictor Variables and Follow-up Status in Detoxified Heroin Addicts,* 311 ANNALS NEW YORK ACAD. SCI., 241 (1978).

Research on program treatment dropouts . . . notes that treatment programs work with patients who are future oriented, have a positive motivation to change, and are at a stage in their addiction when preparation for change is achieved.

High dropout rates are "the rule for all drug treatment modalities as for treatment of other psychological problems."[45] While the "retention rate" has been the most used and widespread criterion for success, this criterion alone is unreliable for assessing the success of a treatment program or the individual client in treatment because it does not take into account changes in the behavior and lifestyle of the individual.[46]

One of the limitations to the retention rate criteria is that it does not take into account the factor of self-selection.[47] Use of retention rates as a determination of success is vulnerable to selection bias because those who successfully stay in a treatment program do so because the program expels them or they choose to remain in the program. Thus, the "success" or "failure" of the program based on retention is artificially inflated or deflated by those who are removed from the program either by the participants' choice or by the program. Selection bias produces an outcome, i.e., success or failure that can be explained as function of individual differences among the patients and not the treatment program.

Although, the "single most important predictor of success [is] the length of stay in treatment,"[48] "the so-called retention rate . . . simply measures the length of time an addict stays in a program,"[49] not the change in the addict due to the program. It has also been noted that retention rates can be associated with factors outside of the program, including environmental support for drug addiction, personality characteristics of the addict, employment status, status and health of the addicts' family, psychological status of the addict, criminal history,[50] the readiness of the addict to change,[51] and multiple drug use history.

III. Research shows that more than 80% of the clients in a drug treatment program drop out from the program during a first attempt at drug treatment. The court should determine if the addict is at a point in his or her addiction that allows for successful treatment.

Research on program treatment dropouts as well as theory on behavior change notes that treatment programs work with patients who are future oriented,[52] have a positive motivation to change,[53] and are at a stage in their addiction when preparation for change[54] is achieved. The future-oriented addict has

45. George DeLeon & Nancy Jainchill, *Circumstances, Motivation, Readiness and Suitability as Correlates of Treatment Tenure*, 18 J. PSYCHOACTIVE DRUGS, 203 (1986).

    It has been asserted that treatment programs are destined for failure because they don't consider the multifaceted factors of why the treatment is being offered, the difference between treatment and therapy, why an addict is seeking treatment, who is offering the treatment, and why the addict has an addiction. Additionally, the lack of specific and meaningful goal setting for the individual addict, the lack of specific diagnosis of the individual addict, the confusion of goals to help the addict become an effective patient with goals to make the patient a better citizen by improving his or her lifestyle, and confusing different theories of therapy and treatment modalities all help to create program design problems that lead to failure. See, Stanley Einstein, *Factors Initiating/Affecting the Treatment of Drug Use and the Drug User,* 15 INT'L J. ADDICTIONS 773 (1980).
46. Nachman Ben-Yehuda, *Success and Failure in Rehabilitation: The Case of Methadone Maintenance*, 9 AM. J. COMMUNITY PSYCHOL., 83 (1981). It has also been observed that since treatment programs generally are not evaluated using random selection of patients and control groups and established baseline measurements and have reliability and validity limitations, the fact of high attrition rates should not be the sole assessment of success. William Berg, *Evaluation of Community-Based Drug Abuse Treatment Programs: A Review of the Literature,* in THE ADDICTIVE PROCESS: EFFECTIVE SOCIAL WORK APPROACHES 81 (E. Freeman ed., 1992).
47. William Berg, *supra* note 46 at 84.
48. *Id.*
48. Nachman Ben-Yehuda, *supra* note 46 at 85.
50. *Id.* at 86.
51. George DeLeon & Nancy Jainchill, *supra* note 45. For two theories on the readiness to change and its impact on behavior change see, James Prochaska et al., *The Transtheoretical Model of Behavior Change*, in THE HANDBOOK OF HEALTH BEHAVIOR CHANGE 59 (Sally Shumaker et al. ed., 2nd ed., 1998), and Neil Grunberg et al., *Biological Obstacles to Adoption and Maintenance of Health-Promoting Behaviors*, in THE HANDBOOK OF HEALTH BEHAVIOR CHANGE 269 (Sally Shumaker et al. ed., 2nd ed., 1998).
52. Nachman Ben-Yehuda, *supra* note 46. The future-oriented individual looks to the future and makes plans to make his or her life better in the future. Decisions are meant to generate change as supposed to a past-oriented person who lives from moment to moment, who is resistant to change or unwilling to take account of behavior and make decisions that produce benefits in the future. *Id.* at 88, 97. "Future-oriented patients apparently benefit most from their therapeutic experience in [drug treatment] programs." *Id.* at 97. This classification as either past or future oriented can be helpful in the designing and the selection of clients for a potential drug treatment program. "Upon admission . . . patients could be classified . . . as to the behavior expected of them while [in] the program. This information could potentially help clinical and administrative personnel working with drug-abuse to better deal with their patients, construct differential treatment plans for them, and assess success more meaningfully." *Id.* at 97.
53. George DeLeon & Nancy Jainchill, *supra* note 45. A positive motivation is " a desire to forge a new lifestyle; a belief that one can be successful and have the good things in life; or a desire for personal growth, to be a better person . . . as well as to have healthier relationships." *Id.* at 203.
54. James Prochaska et al., *supra* note 51. In the preparation stage "people are intending to take action in the immediate future, usually measured as during the next month. These individuals have a plan of action. . . . These are the people we should recruit for . . . action-oriented programs." *Id* at 61.

decided to make a change and end his or her addiction. The addict is positively motivated because the change is self-desired—*the addict wants* a better life. The addict is prepared to change and demonstrates this preparation by the formation of a plan to end the addiction. The addict enters the program having decided to enter a treatment program with the desire and expectation to successfully complete it, as compared to entering the program to avoid incarceration.

If the program is servicing addicts who have not reached the point of having a future-oriented, positively motivated, prepared mental state to make a change in their lives (i.e., end their heroin addiction) success rates will be low regardless of the value of the program.

IV. The presence of psychological dysfunction on potential clients can affect retention and successful completion rates. The court should determine whether the treatment modality can accommodate clients who have psychological problems. Treatment programs need to be designed to address the individual addict and quality-of-life issues that the addict is experiencing, along with the addiction to the drug itself.

Many of those who enter drug treatment programs have moderate to severe mental illness.[55] More significant is the fact that only about half of those addicts who have a mental illness receive treatment for the mental illness and the drug addiction together.[56] The presence of mental illness and dropout rates have been shown to be associated.[57] Research has also found that mental illness can affect the ability to function and how drugs impact the individual.[58] Programs that address both drug addiction and mental illness should design treatment modalities to take into account the importance of the client's quality of life. Recent research has noted that the patients' quality of life (family support, employment, positive self-image, etc.) can predict successful treatment independent of other factors, including the psychiatric status of the client.[59]

Many of those who enter drug treatment programs have moderate to severe mental illness.

V. Drug addiction is not a problem in which the addiction to a specific drug is the only focus of attention. Drug addiction is usually one member of a family of issues within the life of the addict.

The nature of addiction has been described as a state in which the addict (1) has a persistent regular use of a drug; (2) attempts to stop such use leads to significant and painful withdrawal symptoms; (3) continues to use the addictive drug despite damaging physical or psychological problems, or both; (4) engages in compulsive drug-seeking behavior; and (5) needs a constant increasing level of dosage of the drug to get "high."[60]

Treatment programs should implement program modalities in the light of recent research that has observed that (1) drug use occurs within a broader family of social and psychological problems, (2) cognitive-behavioral abilities are fundamentally psychological in nature, (3) the motivation to change is a cognitive-behavioral process, and (4) the skills and the relationship between the client and the individual counselor has an impact on final outcome.[61]

VI. The court should consider if the drug treatment program design encompasses the biochemical as well as the cognitive-behavioral aspects of addiction when designing drug addiction treatment modalities.

Virtually "all drugs . . . have common effects, either directly or indirectly, on a single pathway deep within the brain."[62] In

55. Peggy el-Mallakh, *Treatment Models for Clients with Co-Occurring Addictive and Mental Disorders,* 12 ARCHIVES PSYCHIATRIC NURSING, Apr. 1998, at 71.
56. *Id.*
57. H. Lawrence Ross et al., *Retention in Substance Abuse Treatment: Role of Psychiatric Symptom Severity,* 6 AM. J. ADDICTION 293 (1997).
58. Jennifer Tidey et al., *Psychiatric Symptom Severity in Cocaine-Dependent Outpatients: Demographics, Drug Use Characteristics and Treatment Outcome,* 50 DRUG & ALCOHOL DEPENDENCE, Mar. 1998, at 9.
59. Joan Russo et al., *Psychiatric Status, Quality of Life, and Level of Care as Predictors of Outcomes of Acute Inpatient Treatment,* 48 PSYCHIATRIC SERVICE 1427 (1997). For research on addressing the emotional and spiritual factors that can affect heroin treatment success or failure see Karen Miotto et al., *Overdose, Suicide Attempts and Death Among a Cohort of Naltrexone-Treated Opioid Addicts,* 45 DRUG & ALCOHOL DEPENDENCE Apr. 1997, at 131, and Leslie Green, et al., *Stories of Spiritual Awakening: The Nature of Spirituality in Recovery*, 15 J. SUBSTANCE ABUSE TREATMENT, 325.
60. Rao Rapaka & Heinz Sorer, *Introduction*, in DISCOVERY OF NOVEL OPIOID MEDICATIONS (Nat'l. Inst. on Drug Abuse Res. Monograph # 147) (Roa Rapaka & Heinz Sorer eds., 1995), at v.
61. William Miller & Sandra Brown, *Why Psychologists Should Treat Alcohol and Drug Problems,* 52 AM. PSYCHOL. 1269 (1997). James Inciardi explains:

    > drug abuse as overdetermined behavior. That is, physical dependence is secondary to the wide range of influences that instigate and regulate drug-taking and drug seeking behaviors. In the vast majority of drug offenders, there are cognitive problems; psychological dysfunction is common; thinking may be unrealistic or disorganized; values are misshapen, and frequently, there are deficits in education and employment skills. [D]rug use is a response to a series of social and psychological disturbances.

    James Inciardi, "Drug Treatment in Prisons," presentation at the Summit on U.S. Drug Policy, U.S. House of Representatives, Committee on the Judiciary, Washington, D.C. (May 7, 1993), at 3–4. See also, Robert Hooper et al., *Treatment Techniques in Corrections-Based Therapeutic Communities*, 73 PRISON J., Sept./Dec., 1993, at 290.
62. Alan Leshner, *Addiction Is a Brain Disease, and It Matters,* 278 SCIENCE, Oct. 1997, at 45, 46.

The use of naltrexone addresses the results of heroin use due to impulsive and compulsive behavior.

regard to the effect of heroin on the brain, research has found that heroin focuses on the opioid receptors of the brain. As previously noted[63] the pleasure from opiates "can be more powerfully rewarding than that produced by natural reinforcers."[64] This assessment is significant in the study of how and why drug addiction is developed and maintained through positive and negative reinforcement.

In studies dealing with positive and negative reinforcement, it is believed that if pleasure responses can be secured artificially a person will choose the artificial stimulation even over natural positive stimulation such as food or sex.

> [The] process in which a pleasure-inducing action becomes repetitive is called positive reinforcement. Conversely, abrupt discontinuation of alcohol, opiates, and other psychoactive drugs following chronic use . . . results in discomfort and craving. The motivation to use a substance in order to avoid discomfort is called negative reinforcement. Positive reinforcement is believed to be controlled by various neurotransmitter systems, whereas negative reinforcement is believed to be the result of adaptations produced by chronic use within the same neurotransmitter systems.[65]

The use of heroin creates both positive and negative reinforcement through its processing within the brain. The heroin acts as an exogenous opiate within the brain and acts as a neurotransmitter for pleasure within the brain. The heroin produces a stronger pleasure reaction than endogenous opioids (endorphins and enkephalins).

The chronic use of exogenous opiates within the pleasure-seeking system drives the need for the exogenous opiates, and the opioid receptors are now only stimulated by the exogenous opiates, rather than by natural pleasure stimuli. "Natural reinforcers such as food, drink, and sex [which] activate [pleasure] pathways in the brain [are replaced by the exogenous opiates] as surrogates of the natural reinforcers."[66] It is also believed that the use of these opiates and the negative reinforcement they produce (the need for the opiates to avoid pain due to lack of presence of the opiate) are aided by other natural occurring neurotransmitters in the brain, such as dopamine and serotonin. Dopamine produces immediate feelings of pleasure and elation that reinforce certain behaviors, such as eating or sex, and motivates repetition of these activities.[67] Dopamine is believed to be produced with the use of opiates. "Serotonin is associated with the reinforcing effects of many abused drugs through its mood regulating and anxiety reducing effects. Low levels of serotonin are associated with depression and anxiety."[68] The lack of stimulation by opioid receptors is believed to be a cause for low levels of dopamine and serotonin. The lack of these two chemicals is thought to produce depression, which in turn produces the craving for the heroin to relieve feelings of depression and to restore feeling pleasure or at least feeling "normal."

The cycle of addiction and compulsive and impulsive drug use is compounded by biochemical change within the brain[69] and cognitive-behavioral cues. The cycle of addiction is started by positive reinforcement and then driven by negative reinforcement. Heroin produces a strong pleasure effect, and cognitively, the user decides to use the drug again to receive the same pleasurable effect. The opioid receptors of the brain become addicted to the presence of the heroin and then require the heroin stimulation continuously. Here is where negative reinforcement takes control. The user no longer takes the heroin to feel pleasure, but to feel "normal." The purpose in taking the heroin is to avoid painful sensations not to enjoy pleasurable sensations. During drug treatment the addict will desire to take heroin on two levels. Impulsive use will occur due to cues in the environment or by memories of taking the drug. The addict takes the drug *almost* without thinking about the consequences. Compulsive (craving) drug use occurs due to the addict obsessing over the pleasure gained by the drug. The addict thinks about the drug, and the thoughts drive the addicts to relapse.

The use of naltrexone addresses the results of heroin use due to impulsive and compulsive behavior.[70] But the issue treatment programs need to contend with is the cognitive behavior of addicts in that they decide that life without heroin is not desirable and simply choose to stop taking the naltrexone so that they can enjoy the pleasure of the heroin. The treatment therapy must create new cognitive pathways within the brain to allow for controlling the cravings[71] for the heroin and new behavior patterns to deal with the social factors of their lives. Since human beings have the ability to cognitively choose to do or not do something, drug treatment programs need to focus on how the individual addict handles life stres-

63. See, *supra* notes 21, 31–33.
64. SHAMSHA, *supra* note 21 at 27.
65. *Id.*
66. *Id.*
67. *Id.* at 28. See also, Robert Swift, *Medications and Alcohol Craving*, 23 ALCOHOL RES. & HEALTH: J. NAT'L. INST. ALCOHOL ABUSE & ALCOHOLISM, 207 (1999). See also *infra* notes 69 and 71 for studies dealing with craving and the biochemical dynamics of drug addiction.
68. SHAMSHA, *supra* note 21 at 27. See also, *infra* notes 69 and 71.
69. See *Neuroscience: Pathways of Addiction,* 21 ALCOHOL HEALTH & RES. WORLD: J. NAT'L INST. ALCOHOL ABUSE & ALCOHOLISM (1997) for a series of articles on the biochemistry of addiction.
70. See, *supra* notes 27–32 and accompanying text.
71. For general discussion on craving and drug use see, Raymond Anton, *What Is Craving? Models and Implication for Treatment*, 23 ALCOHOL HEALTH & RES. WORLD: J. NAT'L INST. ALCOHOL ABUSE & ALCOHOLISM, 165 (1999); Stephen Tiffany, *Cognitive Concepts of Craving*, 23 ALCOHOL HEALTH & RES. WORLD: J. NAT'L INST. ALCOHOL ABUSE & ALCOHOLISM, 215 (1999); and Mary Jo Breiner et al., *Approaching Avoidance: A Step Essential to the Understanding of Craving*, 23 ALCOHOL HEALTH & RES. WORLD: J. NAT'L INST. ALCOHOL ABUSE & ALCOHOLISM 197 (1999).

sors and train the addict to resort to socially positive alternatives to reduce stress, rather than resort to the use of heroin.

VII. The biochemical and cognitive-behavioral aspects of drug addiction present the criminal justice system with political as well as social policy issues. The criminal justice system needs to contend with the implications of the fact that drug addicts have altered brain chemistry, while maintaining its inherent purpose of focusing on individual accountability and responsibility. Conversely, drug treatment designers and drug addiction scientists must contend with the fact that personal responsibility and accountability will always be a demand of policy makers and the public regardless of the science of addiction.

Research on addiction shows that prolonged drug use "causes pervasive changes in the brain [and] the addicted brain is distinctly different from the non addicted brain" and this fact leads to the conclusion that on a general policy level "the addicted individual must be dealt with as if he or she is in a different brain state."[72] In other words, treat drug addicts as those whose minds have been "altered fundamentally by drugs."[73] Although the literature is settled on the fact that addiction causes changes in the brain, there is some debate on the cause of addiction. For example, O'Brien defined addiction as acts of "a chronic disease produced by thousands of exposures to drugs. Each drug taking episode activates specific brain structures, leaving a memory trace that persists long after the drug has disappeared from the body."[74] Goodman explains that addiction is not formed by repeated use of a drug, but develops through a combination of environmental and genetic characteristics.[75]

Although the literature is settled on the fact that addiction causes changes in the brain, there is some debate on the cause of addiction.

Heyman, while agreeing, "changes in brain function alter voluntary behavior," notes that *addiction is still a behavior* of which social and economic costs can persuade addicts to end their addiction.[76] Heyman asserts that there are two types of addicts, those who take drugs voluntarily and those who do so involuntarily. The former can be persuaded cognitively but the latter will "not be persuaded by costs and incentives to stop using them."[77] O'Brien asserts that three factors should be kept in mind when considering addiction and how to deal with

72. Alan Leshner, *supra* note 62 at 46. See also, George Koob et al., *Neuroscience of Addiction*, 21 NEURON 467 (1998). Some recent research has asserted that addiction can be traced to genetics, see Thomas Kosten, *Addiction as a Brain Disease,* 155 AM. J. PSYCHIATRY 711 (1997).
73. Alan Leshner, *supra* note 62 at 46.
74. Charles O'Brien, *Progress in the Science of Addiction,* 154 AM. J. PSYCHIATRY 1195, 1195 (1997). O'Brien asserted that

    > Drug exposures . . . paired with environmental cues (persons, places, things) . . . acquire the ability to activate the same or complementary brain circuits even in the absence of the drug. *Id.* Drug-related cues alone have [been shown to produce] increases in limbic blood flow in formerly dependent cocaine users . . . . Drug cues have also produced increases in the metabolism of specific brain areas. *Id.* at 1196.

    This explains why addiction is considered to be a chronic disease. Although the use of drugs has ended, pathways and brain chemistry have been altered so as to produce the effects of the "disease" although the agent causing the disease is no longer present. Although this chemical analysis may be true, the choice of whether to indulge in an impulse or compulsive need (chemically created or not) is not destroyed. One still chooses to indulge a desire and one chooses to frequent an area that provides those cues of addiction.
75. Aviel Goodman, *Science of Addiction* (Letter to the Editor), 155 AM. J. PSYCHIATRY 1642, 1642 (1998). Goodman goes on to say the following:

    > I would describe addiction as a chronic condition that develops through a process that involves complex interactions over time between genetic and environmental factors. More specifically, I would propose that two sets of determinants are involved in the development of an addictive disorder: 1) those that concern underlying neurobiological abnormalities that are shared by all addictive disorders and 2) those that relate to the selection of a particular substance as the one that is preferred for addictive use. I would add that each set includes both genetic and environmental factors. Environmental factors in the development of the underlying neurobiological abnormalities include deficiencies in the child's caregiving environment during the first years of life, when the maturing brain is most sensitive to external influences and depends on particular qualities of interchange with the caregiving environment for healthy development. Genetic factors in selection include genetically based variations in 1) the sensitivity of the reward system to different substances, 2) the body's sensitivity to immediate aversive consequences of using a substance (such as flushing or standing ataxia after ingestion of alcohol), and 3) the intensity of the individual's sensitivity to various painful effects [which are] associated with . . . negative reinforcement.

    See, Bruce Lawford et al., *The D(2) Dopamine Receptor A (1) allele and Opioid Dependence: Association with Heroin Use and Response to Methadone Treatment,* 96 AM. J. MED. GENETICS: NEUROPSYCHIATRIC GENETICS 592 (2000), for research showing that heroin addicts that have a certain type of dopamine receptor are more likely to drop out or fail a methadone treatment program than those without this variation. The research noted that there were significantly more heroin addicts with this variation (TaqI A(1) allele of the D(2) dopamine receptor) in a group of addicts that had poor treatment outcomes compared to those who had successful treatment outcomes. The researchers also found that 19% of the heroin addicts had this variation compared to 4.6% of a control group of people free from drug and alcohol use and free from a family history of alcohol and drug use.
76. Gene Heyman, *On the Science of Substance Abuse* (Editorial), 278 SCIENCE, 15 (1997).
77. *Id.* at 15.

[T]he judiciary should make sure that a proposed drug treatment program modality includes personal responsibility and behavior modification as one of the tools to address drug addiction.

addicts: (1) the availability of the drug and its cost and purity; (2) the genetic predisposition of the addict; and (3) the applicable social and environmental pressures on the addict to continue or stop drug use.[78]

Although neuroscientists are convinced that addiction is a biological issue involving brain damage, "the more common view is that drug addicts are weak . . . unwilling to lead moral lives and to control their behavior and gratifications."[79] Although the point of drug addiction and personal responsibility for addiction has been belittled in some of the literature, there is value in the common belief that human beings think and thus can control their behavior. The ability to be responsible for an addiction accompanies the power to end addiction. The mere fact that one has damaged his or her brain and formed neuropathways for certain stimuli does not mean that the ability to choose has been destroyed. The fact that human beings have the ability to think, learn (form new neuropathways), and choose between behaviors seems to be acknowledged as an afterthought by some of the literature on addiction. The political (used here to mean philosophical) view that behavior is a cognitively controlled activity that is at least equal in the cause and maintenance of addictive behavior needs to be considered by treatment program designers and neuroscientists. Those who make political policy may not be aware or care about the science of addiction, especially if the idea of personal responsibility is not reflected in theories of addiction. For example, Congress has recently restricted social security payments and other social benefits from those who have drug addictions.[80] Similarly, the judiciary should make sure that a proposed drug treatment program modality includes personal responsibility and behavior modification as one of the tools to address drug addiction.

Both the science of addiction and personal responsibility add to the understanding of addiction and addiction treatment. Moral responsibility aside, drug addiction brings serious and chronic physical and social consequences.[81] As noted by Heyman, three factors should be kept in mind when trying to understand addiction: "[1] drug use in addicts can be altered by the proper arrangements of costs and benefits, [2] addictive drugs reduce options but do not eliminate choice, and [3] the biology of addiction is the biology of voluntary behavior."[82]

Arthur H. Garrison is the criminal justice planning coordinator for research and program evaluation at the Delaware Criminal Justice Council. He is a member of the Society of Police and Criminal Psychology. Garrison has published articles in various journals, including the New England Journal on Criminal and Civil Confinement, Journal of Police and Criminal Psychology, Police Studies, Issues in Child Abuse Accusations, American Journal of Trial Advocacy, *and* Juvenile and Family Court Journal. *Garrison received his B.S. (1990) from Kutztown University of Pennsylvania and his M.S. (1995) from West Chester University of Pennsylvania.*

78. Charles O'Brien, *Dr. O'Brien Replies* (Letter to the Editor in Response to Dr. Goodman), 155 AM. J. PSYCHIATRY 1642 (1998). See Goodman, *supra* note 75.
79. Alan Leshner, *supra* note 62 at 45.
80. See, Carole Gresenz et al., *Supplemental Security Income (SSI), Disability Insurance (DI) and Substance Abusers,* 34 COMMUNITY MENTAL HEALTH J. 337 (1998).
81. For studies on long-term affects of heroin use see, Yih-Ing Hser et al., *A 33-Year Follow-Up of Narcotics Addicts,* 58 ARCHIVES GEN. PSYCHOL. 503 (2001). See also, Yih-Ing Hser et al., *A 24-Year Follow-Up of California Narcotics Addicts,* 50 ARCHIVES GEN. PSYCHOL. 577 (1993); Edna Oppenheimer & Gerry Stimson, *Seven-Year Follow-Up of Heroin Addicts: Life Histories Summarized,* 9 DRUG & ALCOHOL DEPENDENCE 153 (1982); and DWAYNE SIMPSON & B. SAUL SELLS, OPIOID ADDICTION AND TREATMENT: A 12 YEAR FOLLOW-UP (1990).
82. Gene Heyman, *supra* note 76 at 16.