

A D D I C T I O N T R E A T M E N T

Forum

THE QUARTERLY NEWSLETTER OF ADDICTION TREATMENT FOR CLINICAL HEALTH CARE PROFESSIONALS

Brainstorms:

Exploring the Body, Mind & Soul of Addiction

Essays by Stewart B. Leavitt, PhD, Editor



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Part 1: Vol. 8, No. 3, Summer 1999

The Blind Men & The Elephant

As the old fable goes, six blind men came upon an elephant.

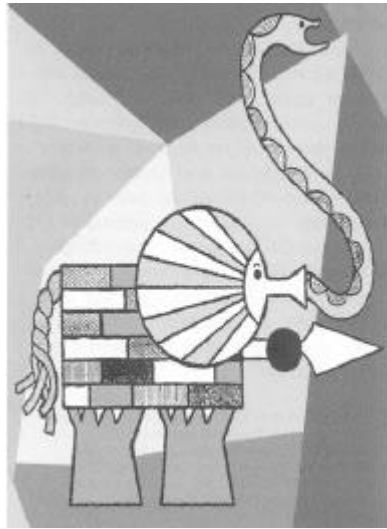
Approaching the elephant's massive side, the first blind man proclaimed the beast to be a wall. ♦ The second man, feeling the tusk, said the animal was more like a spear. ♦ Then, the third took the squirming trunk in his hands and declared the elephant was certainly a snake. ♦ The fourth blind man reached out a hand and felt about the knee; "This beast is a tree!" he shouted. ♦ The fifth man touched the ear and argued the elephant was nothing but a fan.

♦ The last man, seizing the slender swinging tail, scoffed the elephant was just a rope.

These wise men disputed long and hard, each in his own opinion. And though each was partly right, they all were in the wrong.

The Beast of Addiction

And so it seems today, as scientists, therapists, clinicians, theologians, politicians, policy makers, law enforcers, and the public at large each have their respective perspectives on the beast called "drug addiction." The fable reminds us that current views of addiction are often built upon quite different experiences, leading to dissimilar conclusions acting as barriers to a common understanding.



Psychiatrist Joseph Dubey notes: "There are more theories about why we use drugs than there are drugs. We avoid reality, abandon morality, suppress hunger pains or other unpleasantness, or turn away from God. We sell drugs out of greed or for upward mobility. Drugs cause brain damage, cancer, personality change, constipation, incite police corruption and political upheaval. We make drugs illegal in order to protect children or to support the underworld markets. Every theory grinds the axe of its proponent." [1]

Science Versus Ideology

To sober-minded citizens, the pervasiveness of drugs, alcohol, and cigarettes in society is a source of much angst and consternation. Drugs become imbued with powers of good or evil: they can be life-sustaining in the case of antibiotics or ruinous as with cocaine or heroin.

It is easy to forget that good and evil are not attributes of drug molecules. In the hands of the wise, poison can be medicine; in the hands of fools, medicine can become poison. [1]

But, why would people *choose* to take potentially harmful drugs?

Alan Leshner, PhD, director of the National Institute on Drug Abuse (NIDA), boils-down the answer to two reasons: *to feel good* (sensation seeking); and, then, *to feel better* (self-medicating). He acknowledges that there are over 70

risk factors for substance abuse and addiction, and the person moves quickly from a voluntary decision to use drugs to a state of compulsive behavior motivated by craving. "It's as if a switch has been flipped on and there is now a brain disease." [2]

However, Leshner concedes that accepting addiction as a chronic, relapsing disease of the brain is still a new concept for the general public, for many policy makers, and even for many health care professionals "It is time to replace ideology with science. If we understand addiction as a prototypical psychological illness, with critical biological, behavioral, and social-context components, our treatment strategies must include biological, behavioral, and social-context elements." [3]

Theories on the causes and treatment of drug addiction have risen and fallen in prominence for as long as the ancient problem has plagued mankind. Yet, in many ways, addiction remains an enigma, and many Western nations are just now increasing investments in research directed at understanding, treating, and preventing addiction.

Defining Addiction

Diagnostic criteria defining drug abuse and dependence have evolved and changed over time, leaving some confusion in their wake. At least 39 diagnostic approaches had been defined for alcoholism alone prior to 1940. [4] Since then, the terms *use*, *abuse*, *dependence*, and *addiction* have been variously applied to the self-administration of myriad mind-altering (psychotropic or psychoactive) substances.

Today, researchers, clinicians, treatment programs, and insurance companies in the U.S. usually rely on the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* from the American Psychiatric Association, published in 1994. [5] The World Health Organization published a comparable manual in 1992: *International Classification of Diseases (ICD-10)*.

In DSM-IV, *substance dependence* includes physiological aspects — withdrawal (abstinence syndrome) and tolerance (more drug required for desired effect) — plus behavioral components: a) compulsive drug seeking and use; b) loss of control over such use; c) continued use even in the face of negative health and social consequences. In all, there are 7 criteria and a person only has to meet 3 to be defined as substance dependent. Dependence is subtyped as being with or without the physiological features of withdrawal/tolerance. [5,6]

Addiction is sometimes colloquially used interchangeably with drug dependence. However, addiction (and alcoholism) most aptly applies to the subtype of someone having drug dependence *including* physiological features of drug withdrawal and/or tolerance.[6]

This distinguishes medical patients — who might naturally become physiologically dependent on certain drugs (eg, some analgesics) but do not exhibit uncontrolled, compulsive drug-related behaviors — from drug-addicted persons.[6]

Substance abuse pertains only to criteria signifying problematic or hazardous use of drugs, without compulsive use, loss of control, tolerance, or withdrawal.[6] Just where or when a person might cross an imaginary line from abuse into dependency may be difficult to identify in some cases.

Integration of Biology/Behavior

Leshner writes, “I would argue that it actually does not matter what physical symptoms occur, only whether the drug causes compulsive drug use without medical purpose and in the face of negative consequences.”[7] He proposes that scientific advances over the past 20 years have shown that drug addiction is a chronic, relapsing disease resulting from the prolonged effects of drugs on the brain. The brains of addicts are different.[3]

However, in qualifying his perspective, Leshner concedes that addiction is more than just a brain disease; rather it occurs in environmental, historical, and physiological contexts affecting the way drug use interacts with the brain. Biological and behavioral concepts are not separable in Leshner’s opinion, “The notion of mind-body dualism is a thing of the past.”[7]

The Body on Drugs

The role of the brain in addiction has been a source of enlightening discoveries tempered by shifting opinions. Experts believe that all addictive drugs have common effects, directly or indirectly, via reward pathways deep within the brain. Activation of this system keeps users taking drugs, and the addicted brain becomes remarkably different from normal, as manifested by changes in metabolism, receptor availability, gene expression, and responsiveness to environmental cues.[3]

The brain neurotransmitter dopamine, discovered in 1957, has been pursued as the “master molecule” of addiction, partly because all addictive substances seem to cause surges of this chemical in the brain’s reward center, the nucleus accumbens. Now, new research suggests that dopamine may not be the brain’s chief “feel good” chemical after all; that it is only one of several messengers playing a role in the pleasure process.[8]

Glutamate may have a greater influence than dopamine. Brain structures relying on this neurotransmitter contribute to learning experiences that seem to play an important part in developing drug cravings elicited by external cues — thus, “teaching the brain to take drugs.”[9]

From a “Darwinian medicine” perspective, looking at how the brain has evolved, researchers Randolph Nesse and Kent Berridge believe serotonin and norepinephrine also play pivotal roles in behavior-conditioned responses to

drugs. They claim there always will be a “mismatch between our bodies and our modern environment our brains are not designed to cope with pure drugs, video games, and snack foods it’s not surprising at all that people use drugs. In fact its quite remarkable that more people don’t.”[10]

The Mind Over Chemistry

Just where the brain leaves off and the mind (cognition) takes command is a matter of some contention.

One researcher proposes, “To the brain, an addictive drug is an evil tutor. Its lesson: The brain should want more of the drug and should direct the body to get it — whatever the costs.”[9] However, according to neuroscientist Michael Gazzaniga, “The mere taking of drugs ... does not mean that the user is on the slippery slope to doom; most people eventually walk away from the hedonistic pleasures of illicit drugs.”[11]

Gazzaniga believes cognition is central to the problem — education, alternative choices, and competing temptations play roles in seeking casual reinforcement from drugs versus lapsing into chronic use. “Fixing body chemistry does not fix these cognitive patterns and beliefs.” And once addicted, abstinence from drugs alone is not a complete solution.[11]

The Interacting Soul

Considering the prominence of spirituality in the human experience, many in the addiction field believe treatment professionals have not granted spiritual issues the attention warranted in clinical practice. Yet, throughout medicine, there is increased interest in how the realm of the soul interacts with body and mind in the management of and recovery from various illness.

Author Aldous Huxley warns in his book on drugs and man, *The Doors of Perception*, that a principle appetite of the human soul is to transcend itself. And when by means of good works, worship, or spiritual exercises people fail, they may resort to psychotropic drugs as “religion’s chemical surrogates.”

Further Brainstorming

The addiction treatment field has come a long way, and the vistas of addiction science seem limitless. However, psychiatrist Peter Kramer offers this humbling message in *Listening to Prozac*: “If the human brain were simple enough to completely understand, we would be too simple to understand it.”

Still, an ancient adage beckons, “Our reach must exceed our grasp, or what’s a heaven for?”

And so, we embark on this series of explorations called “Brainstorms” — having the dual meaning of clever ideas (of which the field abounds) and disturbances of the mind (emblematic of the addiction process). Upcoming topics include: the neurobiology of drug craving and relapse, self-medication hypotheses of addictive behaviors, spiritual pathways to recovery, and much more.

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Part 2: Vol. 8, No. 4, Fall 1999

Self-Medication Pathways of Addiction

*We drank for joy and became miserable;
We drank for exhilaration and became depressed;
We drank for friendship and became enemies;
We drank to diminish our problems and saw them multiply.*
— excerpt from “Positively Negative,” anonymous

One of the most intuitively appealing theories underlying substance abuse and addiction is the “Self-medication Hypothesis.” Proposed over a decade ago by Khantzian, this concept suggests that preferred drugs of abuse are not chosen randomly or purely circumstantially. Rather, “Individuals discover that the specific actions or effects of each class of drugs relieve or change a range of painful affect states.”[1]

In clinical practice, patients frequently implicate self-medication as a motive for addictive behaviors and this may be a fruitful area of discussion in treatment.[2] A self-medication perspective also may help in developing psychosocial and/or pharmacological treatment plans better tailored to individual patient needs.

Reaching for Normal

Khantzian noted that there is an interaction between the psychopharmacologic action of an individual’s drug of “choice” or “commitment” and the dominant tormenting feelings with which the person is struggling.[3] For example, a heroin addict may prefer the muting action of heroin on disturbing affects of rage or aggression. Whereas, cocaine may appeal to another person’s need for relieving stress associated with depression.

Dubey has asserted that drug addicts are not so much after a “high” as just trying to reach ground level — to feel “normal.”[4] Or, some might say, to be “comfortable” in their lives.

Khantzian stresses that the self-medication hypothesis is not intended to substitute for other theories explaining the etiology of substance-related disorders: eg, neurochemical, sociocultural, or biogenetic. Rather, it can complement other perspectives.[3]

Controlling Emotions

According to Khantzian, persons with substance use disorders suffer intensely with their emotions; either feeling too much, or feeling little or not at all. They may experiment with various classes of drugs to discover those that are most compelling because the substances help ameliorate, relieve, or change those tormenting and extreme emotional states.[3]

Addictions seem to take on lives of their own and persons who abuse drugs — suffering as they do the agonies of withdrawal, unwanted side effects, risks of overdose, personal deterioration and shame, etc — are willing to accept such distress in exchange for whatever momentary relief they experience with their drug of choice. Khantzian believes patients “actively and often knowingly perpetuate their suffering when they continue to use drugs or when they relapse after periods of abstinence.”[3]

He proposes that, rather than attempting to relieve suffering, people often abuse substances to control their feelings, especially when those affects are confusing or beyond their control. The motive here shifts from relief of suffering to controlling it, even if the results are repeatedly distressing.[3]

Effects & Affects

Various drugs offer selective psychological effects that patients seemingly choose with almost a physician’s attention to medicating specific troublesome affective symptoms. These have been variously described in the literature, as summarized in Table 1.

The table shows that each substance class produces certain psychological effects used to self-medicate disturbing symptoms. There is some cross-over in the effects and symptoms that each substance self-medicates. As one example, both opioids and marijuana may have calming effects that help in dealing with symptoms of anger.

The symptoms self-medicated might also be characterized as being generally “negative” or “positive.” *Positive symptoms* reflect an *excess of functioning* beyond what might be considered normal, such as rage or aggression. *Negative symptoms* refer to characteristics reflecting a *lessening of normal functioning*, such as inattention and disaffection.[3,5]

As **Table 1** on the next page indicates, opioids and marijuana would mostly modify positive symptoms. Alcohol and stimulants would be used most often to self-medicate negative symptoms.

| TABLE 1 | | |
|------------------------------------|--|--|
| SUBSTANCE | PSYCHOLOGICAL EFFECTS | SYMPTOMS SELF-MEDICATED |
| “Positive” Affects/Symptoms | | |
| Opioids | Produce sense of well-being [2]; tranquilization [6]; attenuation or “normalizing” influence [3] | Internal disorganization, rage, intolerable aggression [2,3]; relief of pain, anger, insomnia, hunger, depression [6] |
| Marijuana | Calming effect [14]; relaxing [10] | Mood swings, temper outbursts, irritable aggression [14]; anger [10] |
| “Negative” Affects/Symptoms | | |
| Stimulants (including cocaine) | Modulate energy state, relieve stress [2]; increase interest and excitement [10]; euphoria [5]; <i>paradoxical</i> calming effects [3] | Lack of attentive focus [10]; unbearable boredom, depression, frustration, low self-esteem, inattention, <i>paradoxical</i> hypomania or hyperactivity [2,3] |
| Alcohol | Disinhibition [2]; tranquilization [6]; “ego solvent”[3] | Intolerance for closeness or self-assertion [2]; alexithymia (disaffection) [2,3]; isolation, emptiness [3]; guilt, tension [6]; shame [10] |

Paradoxical Effects

There are certain paradoxes to consider. Among them, the calming effect of the stimulant cocaine in self-medicating hypomania or hyperactivity does not fit the typical profile of stimulants used for overcoming negative symptoms of *lessened* functionality.

Furthermore, there is often a boomerang effect whereby abused substances cause an exaggeration of those very emotions the person seeks to medicate. For example, as stated in the beginning of this article, the person may drink alcohol to overcome sadness and end up depressed. Indeed, Valliant has noted that despite its alleged desired effects, alcohol is a poor choice because it can interfere with sleep, make depression worse, and do little to improve anxiety.[6]

Also, as Khantzian suggests, the adverse effects of any particular drug may lead to polydrug addiction. For example, the tranquilizing effects of opioids may be used as an antidote to the more typical stimulating effects of cocaine.[3]

Causes & Consequences

Concerns have been expressed that the self-medication concept “ensnares the clinician and the patient in a potentially unhealthy justification of addiction.”[7] Khantzian concedes that early in treatment the patient may use self-medication reasoning to deny, explain, or rationalize addiction. However, as abstinence and trust are established, a better understanding of why a particular drug is so compelling can be uncovered, helping to counter patients’ prior rationalizations for drug use.[3]

Some authorities also question whether substance abuse/dependence is a cause or consequence of psychiatric disorders. Dual diagnosis is common in this population: roughly three quarters of men and two-thirds of women with a diagnosis of substance dependency also have another psychiatric diagnosis.[8]

Yet, Khantzian argues that, “it is not so much a psychiatric condition that one self-medicates, but a wide range of subjective symptoms and states of distress that may or may not be associated with a psychiatric disorder.”[3] When dis-

ressing symptoms do not meet threshold criteria for psychiatric illness, they may still engender considerable psychological pain and subjective suffering motivating substance abuse.

“[S]ubjective states of distress (not necessarily psychiatric disorders) are the important operatives that govern self-medication,” Khantzian writes.[3] Many individuals find various drugs to be very useful tools in treating their psychological pain, possibly because they are more sensitive to the pain in the first place. “[T]he centrality of human suffering, in both its intense and subtle varieties, [is] a powerful governing influence in the pursuit of, reliance on, and relapse to one’s drug of choice.”

Perspectives on Psychiatric Disorders

Several psychiatric disorders have been discussed in the literature from self-medication perspectives:

Depression — Drug dependency and depression may be associated with alterations in many of the same neurotransmitter systems, particularly those in limbic-related brain structures. It remains unclear whether drug abuse leads to abnormalities mediating depression, or the two disorders are independent expressions of the same preexisting neurobiological abnormalities. However, self-medication may play an important role in either drug-induced or non-drug-induced depression.[9]

Research by Weiss and colleagues found that most hospitalized drug abusers took drugs in response to depressive symptoms and experienced mood elevation regardless of the chosen substances.[10] Many people gravitate to cocaine because it energizes and at least temporarily boosts self-esteem to overcome depression.[11] One author observed, “Cocaine is a formidable mood elevator and acts immediately, as opposed to the two to four weeks of most antidepressants.”[12]

Schizophrenia — Khantzian asserts that the heavy reliance on drugs and alcohol in patients with schizophrenia reflects their discoveries that those substances offer tempo-

rary relief from distress and suffering associated with negative affect symptoms.[3]

More than 40% of schizophrenic patients may abuse cocaine. There is some evidence that acute pharmacological actions of cocaine on endogenous reward centers generate euphoria, mainly through stimulation of central dopamine pathways. Psychostimulants and atypical neuroleptics have been proposed as decreasing negative symptoms of schizophrenia and resulting in decreased cocaine use among patients who are self-medicating.[5]

PTSD (posttraumatic stress disorder) — There is a high risk of substance dependency as patients with PTSD find that psychotropic drugs provide powerful short-term antidotes to the positive symptoms (eg, rage, panic, anxiety) or negative symptoms (eg, anergia, anhedonia, affective flattening) prevailing at any time.[3]

Khantzian observed that drug preference is influenced by whatever distressing emotional symptoms predominate for the individual patient. For example, opioids help calm rage, moderate doses of alcohol reverse psychic numbing or feelings of estrangement, high doses of alcohol dampen emotional flooding, and cocaine is used to offset anhedonia or deactivation.[3]

ADHD (attention deficit hyperactivity disorder) — has been frequently reported among substance abusers, especially cocaine users, who may be self-medicating. For example, cocaine, as a CNS stimulant with properties similar to Ritalin®, may be used by adults with ADHD to alleviate impulsive/hyperactive states.[13,14] Such adult patients are often misdiagnosed as having manic-depressive disorder.[13]

Restructuring Defenses

The self-medication model of addiction remains conceptual, awaiting a more significant body of supportive empirical research, and there are some who have questioned its validity for incorporation into treatment practice. Vaillant stresses, “To understand the natural history of addiction, we must track more than drug use.”[6] Khantzian seems to agree by noting, “Longitudinal studies... which detail family interaction patterns, tolerance/expression of emotions, and behavioral adjustment... seem promising [for testing the hypothesis].”[3]

Still, Khantzian maintains that appreciating the subjective symptoms of distress that substance abusers self-medicate can help guide clinicians and counselors in matching patients to appropriate psychosocial and psychopharmacological treatments.[3] However, clinicians must overcome all-or-none thinking about medications, such as never using benzodiazepines with recovering alcoholics, or prohibiting the use of psychoactive substances for treating psychoactive-

substance abusers. For example, stimulants may be helpful in persons with ADHD abusing cocaine.

In the final analysis, as Khantzian suggests, human suffering and behavioral difficulties are important governing influences in people’s lives making their use of, dependence on, and relapse to addictive substances compelling.[3] At the very least, those persons require a restructuring of personal defense systems to cope with psychological pain and anguish that are natural parts of everyday life.

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Part 3: Vol. 9, No. 1, Winter 2000

The Hijacked Brain

Addictive psychotropic substances sometimes appear to take on lives of their own, capable of “stealing-away” the brain and altering it irreversibly. Since the human brain is command central of all perceptions, thoughts, feelings, and actions, understanding addiction requires some knowledge of brain structure, function, and chemistry.

More Cells Than Milky Way Stars

The brain’s fundamental functional unit is the *neuron*, a cell with the sole purpose of conveying information both electrically and chemically. There are billions of neurons in the brain – more cells than there are stars in the Milky Way.[1]

It is believed that at birth a person possesses all the neurons he/she will ever have, unlike most other body cells that can divide and replenish themselves throughout life. Furthermore, as many as 200,000 brain cells normally die *each* day.[1] The implication is that the even more extreme neuronal degeneration and/or changes in cell structure brought about by substance abuse can never be repaired.

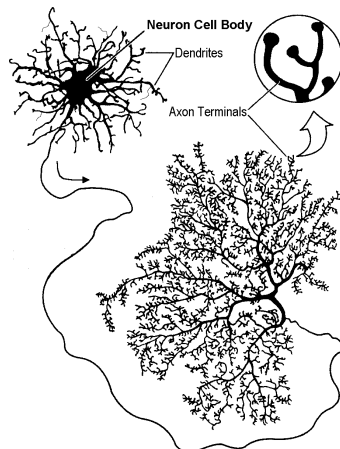
Yet, brain cells do possess remarkable abilities to rebuild and repair themselves; a capability called “plasticity.” For example, each of the 20 billion neurons in the brain’s cerebral cortex – the outer rind of the brain where higher intelligence and personality reside – may have up to 10,000 connections with other neurons. Plasticity allows these cells to constantly sprout new connections facilitating learning and memory. If this process runs amok, some researchers believe a misdirected or faulty repair mechanism can result in disturbances of mental function, as happens with Alzheimer’s disease[2] and, possibly, with long-term drug abuse.

In an exciting new discovery, scientists at Princeton University found that thousands of freshly hatched neurons arrive each day in the cerebral cortex. Although the research was in monkeys, it challenges the long-standing belief that adults never generate new brain cells. It also may lead to new approaches for revitalizing memory and learning or for restoring dysfunctional neuronal processes wrought by addiction.[3]

Carrying the Message

A typical neuron consists of a cell body (containing a nucleus with the cell’s genetic information), a large number of short-branched filaments, *dendrites*, and one longer fiber, the *axon*. At the end of the axon are additional filaments sprouting like tree branches that connect with the dendrites of other neurons.[4] **See figure.**

Inputs to nerve cells are usually via dendrites; axons carry



output signals. These signals (called “action potentials”) surge along axons at up to 200 miles per hour.[1]

Signals are carried in the form of electrical impulses within neurons. However, when signals are sent from one neuron to another, they must typically bridge a gap, or *synapse*, from one cell membrane to another. At the synapse, the electrical signal within the neuron is converted to a chemical signal.

To do this, the terminal ends of axons contain chemicals called *neurotransmitters*. Impulses in the axon cause the release of neurotransmitters, which float cross the synapse and adhere to special receptors on the outer surfaces of nearby neurons or dendrites.

There are about 50 to 100 different neurotransmitters in the human body, each interacting with one or many receptors. To date, 35 types of receptors for neurotransmitters have been identified,[5] at which processes occur that alter the actions of receiving neurons.

The actions of neurotransmitters are complex. Some of these chemicals excite the receiving neuron, some inhibit the cell’s responsiveness, others have modifying effects to selectively increase or decrease the cell’s response – called neuromodulation.[1,4]

After a neurotransmitter is taken-up by the receiving neuron’s receptors, a cascade of biochemical reactions may involve secondary or even tertiary chemical messengers. In this way, profound physiological and structural changes can be produced in a neuron that can last from seconds to days, or even longer. This phenomenon, occurring in millions or billions of affected neurons may produce striking changes in perceptions, memory, behavior, or even personality.

Following the release of a neurotransmitter into the synaptic space it must be “mopped up” to stop the reaction and allow fresh chemicals to exert effects. Usually, it is rapidly taken back into the axon terminals (a process called “reuptake”) by proteins called *transporters*. However, certain drugs block transporter function, causing transmitters to remain longer in the synaptic cleft and trigger physiological and/or psychological changes.[1]

Evil Tutors

A great deal of attention has been focused on synapses and their neurochemical schemes because most of what the brain does is by synaptic interactions. Many mental disorders (eg, depression, anxiety, schizophrenia) may result from impaired synaptic mechanisms. Psychoactive drugs – including, drugs of abuse or dependency – either increase neurotransmitter release, stimulate receptors, hinder reuptake of neurotransmitters, or inhibit enzymes that would otherwise break down the transmitters.[1,5]

According to researcher Avram Goldstein, all addictive drugs share a common characteristic in that they interact with receptors for some endogenous (ie, naturally produced within the body) neurotransmitter.[6] The many endogenous

neurotransmitters discovered thus far fall into one of four chemical classes: acetylcholine, amino acids, monoamines, and neuropeptides.[1] See Table 1 below.

| Natural Transmitter | Selected Associated Effects | Interacting Psychotropic Drugs |
|---|---|---|
| Acetylcholine | Learning, motor functions | Nicotine (at nicotinic sites) |
| Amino Acids Glutamate GABA | Excitatory responses, memory, learning Anxiety/relaxation, coordination, intoxication | Ethyl alcohol (ethanol) Barbiturates, benzodiazepines, ethanol |
| Monoamines Dopamine Norepinephrine Serotonin | Pleasure/reward, craving, mental illness Stress, arousal, learning, sleep Sleep, craving, mood regulation, anxiolysis | Cocaine, amphetamines, ethanol Cocaine, amphetamines Ethanol, MDMA, hallucinogens |
| Neuropeptides Enkephalins Beta-Endorphins | Pain responses, learning, eating Pain sensitivity, euphoria, pleasurable effects | Heroin, morphine, other opioids Heroin, morphine, other opioids, ethanol |

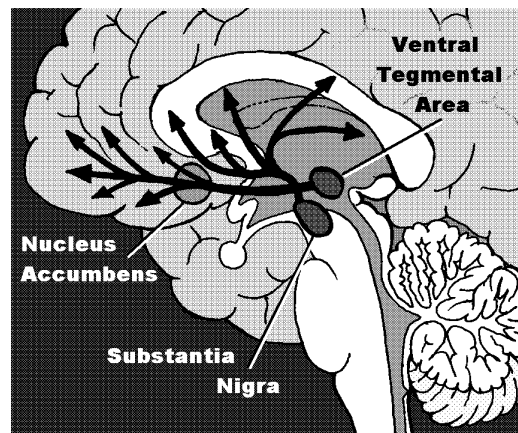
Evidence from both animal and human research suggests that commonly abused psychotropic drugs may deceive the brain, sometimes mimicking endogenous neurotransmitters, to over-stimulate or block natural processes involved in the brain's reinforcement and reward systems. A danger is that the effects of abused substances can become more powerfully rewarding than the body's inborn reinforcers. Like an evil tutor, the lesson of an addictive drug is that the brain should want *more* of it – whatever the costs.[4,7]

Unrestrained Reward

It is believed that reinforcement and reward are associated with a drug's capacity to increase levels of the neurotransmitter *dopamine* in critical brain areas, particularly the nucleus accumbens (NAc). This mass of neurons lies along bundles of fibers called the mesolimbic dopamine system deep within the brain. It arises from the midbrain's ventral tegmental area and substantia nigra and courses into the prefrontal cortex and striatum, respectively. Colloquially, this system is known as the "reward pathway." [1,4,8-10] See figure at right.

Most addictive substances – eg, opioids, cocaine, amphetamine, ethanol – appear to increase extracellular dopamine levels in the reward pathway, although the process can be indirect.[1,4,7,8] For example, exogenous opioids like heroin circuitously influence neurons within the reward pathway to release excess dopamine.

Dopamine neurons are normally held in check by other (inhibitory) neurons. In turn, endorphin, an endogenous neuromodulator, helps control the extent of this inhibition. A burst of endorphin slows the inhibition – allowing the floodgate to open a bit, so to speak – and extra dopamine is released. This is how naturally occurring opioid peptides – enkephalins and endorphins – act to produce feelings of satisfaction, good moods, and other intrinsic rewards.[11,12]



Heroin mimics endorphin interacting at mu-opioid receptors, overriding the natural control mechanisms and provoking a flood of excessive, euphoria-producing dopamine. The addicting power of heroin is considered due to severe overstimulation of the mesolimbic reward pathway, bringing about adaptive changes in neurons leading to withdrawal and craving in its absence that perpetuate drug use.[11,12] Whereas, addicts initially may take heroin to feel good, they end up taking it to avoid feeling bad.

In a figurative sense, psychotropic substances of abuse appear to "hijack" the brain's natural reward system and alter certain aspects of its function.[10] As NIDA chief Alan Leshner has so often emphasized, the brains of addicts become different.[13]

It should be noted that opioids used in addiction treatment – ie, methadone and LAAM – have different pharmacokinetic properties from heroin. These agents occupy mu-opioid receptors in a steady, stable state, allowing a normalization of dopamine function contrasting sharply with the repeatedly excessive "highs" and "lows" of heroin – they are not merely heroin substitutes.[6,12]

Beyond Dopamine

Whether or not the neurochemical disturbances of a "hijacked brain" ever can be rehabilitated to completely normal function remains a treatment conundrum. As Goldstein has noted, merely detoxifying addicts from a drug dependent state is relatively easy; therefore, addiction should be easy to cure.[6] However, it has long been recognized that many addicts return to destructive drug use even after long-standing abstinence that should have normalized brain chemistry.

One author has proposed that understanding the entire milieu of addiction requires venturing into the realm of human cognitions – personal attitudes, beliefs, and goals – that play vital roles in drug abuse.[14] It also has been suggested

that psychological counseling can actually alter brain chemistry, possibly restoring more normal functioning, and that there lies the merit in combining psychotherapy with pharmacotherapy in treatment.[1]

A guiding principle of modern neuropharmacology is to mimic, amplify, block, or reduce the availability of certain neurotransmitters believed as critical in the disorder being treated. Unfortunately, there appears to be no one-to-one matching of a *single* neurotransmitter system to a particular addiction,[15] and it seems unlikely that a single pharmacotherapeutic agent will “cure” addiction.

However, there have been some noteworthy successes in the pharmacologic treatment of addiction. For example, methadone and naltrexone have demonstrated efficacy in treating (yet, not curing) opioid and alcohol dependency, respectively.

Furthermore, new research suggests that dopamine may not be the “master molecule”[10] of addiction or, at least, not the only one. While bursts of dopamine triggered by drugs may attract the brain’s attention, modifications in glutamate signaling appear to produce more lasting changes in the brain fostering compulsive drug-seeking.[7] Other studies propose that, although dopamine may play an early central role in feelings of satisfaction or euphoria, another chemical – possibly serotonin – could be the major messenger of continuous reward. In fact, dopamine may be only a neural harbinger of reward *expectation*, rather than reward itself.[16]

As science uncovers further intricacies of brain function, especially involving synaptic mechanisms and neurochemistry, more targeted and effective pharmacologic agents will undoubtedly be developed. And, if the brain can truly rejuvenate itself with fresh neurons and synaptic connections as new research implies, an understanding of how to harness and direct this plasticity may open entirely new frontiers of addiction treatment.

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Part 4: Vol. 9, No. 2, Spring 2000
Spiritual Roads to Recovery

*“As it is not proper to cure the eyes without the head, nor the head without the body,
so neither is it proper to cure the body without the soul.” – Socrates*

“Came to believe that a Power greater than ourselves could restore us to sanity.” – Step Two

The concept of spirituality may be the greatest stumbling block for practitioners and patients alike in the course of addiction treatment. The importance of the human soul on the road to recovery challenges scientific validation, contravenes clinical practice protocols, and conjures a moralistic specter of religion.

However, addictionologist John Chappel has proposed that addiction medicine cannot ignore spiritual issues. “If former patients are asked about the factors leading to long-term recovery from alcohol or other drug addictions, a large number mention spiritual experiences...”[1]

Yet, there remain two crucial questions: Does spirituality have a legitimate place in addiction medicine? Does belief in a higher power play a critical role in recovery?

Reborn Interest

Chappel observed that, in general, health care professionals have not afforded spiritual issues in clinical practice the attention warranted by the prominence of these beliefs in human experience.[1] Polls consistently show that about 95% of people in the U.S. believe in God or a higher power,[2] although only 50% regularly attend religious services or pray.[3] Yet, 75% of Americans believe prayer for a loved one can speed recovery from illness.[2]

Surveys also have noted that 50% to 65% of patients would want their physicians to pray with them. However, roughly 70% said their doctors never discussed religious beliefs.[2,4]

Medical training, even psychiatry, has typically ignored spiritual issues, preferring to focus on biopsychosocial models of health and illness.[1] Most health care professionals simply do not know how to integrate spirituality with medical practice.[4]

Fortunately, throughout medicine, there is increased interest in how the realm of the spirit interacts with body and mind in the management of and recovery from various illness. The number of medical schools offering programs in spirituality and medicine soared from just 3 in 1993 to 63 in 1999.[5]

The 13,000-member Christian Medical & Dental Society seeks to change medical practice by recognizing that patients’ attitudes toward spirituality have great impact on their health. Other organizations also blend religion and medicine: eg, Catholic Medical Association, Islamic Medical Association, and the American Physicians Fellowship for Medicine (Jewish).[4]

Little Ado About Religion

There are many misunderstandings of spirituality. Chappel noted that it simply may be defined as the relationship between an individual and a transcendent or higher being or

force in the universe.[1] Booth described spirituality as “an inner attitude that emphasizes energy, creative choice, and a powerful force for living.”[6]

Spirituality does not necessarily require or involve religious affiliation. Mahoney and Graci observed that many persons consider themselves spiritual but not religious.[7]

Spirituality is the backbone of recovery in 12-step programs such as Alcoholics Anonymous (AA). Founded in 1935 by two alcoholics, a stockbroker (Bill Wilson) and a physician (Bob Smith), AA quickly evolved philosophically from the religion-based Oxford Movement; retaining many of the Movement’s fundamental principles but emphasizing spiritual conversion involving “deflation at depth” and surrender to a higher power as leading to recovery.[8]

AA remains strictly unaffiliated with any religious sect or denomination, yet, misperceptions persist. For example, Galanter compared AA’s climate of shared beliefs and group cohesiveness to religious cults.[9] Others also have compared AA to a cult or religion, further saying that it goes against scientific research and denies personal self-efficacy.[10]

In actuality, shortly after AA’s founding, Bill Wilson recognized that a religious approach did not work – that most addicts, for various reasons, have fundamental difficulties accepting formal religion. Wilson shifted the focus to each member’s unique experience with a higher power as it is *personally understood*. [8,11]

Pragmatic AA members like to say, “Religion is for people who are afraid of going to hell; spirituality is for those of us who have already been there.” Or, as one put it, “People go to church to save their souls; I came into AA to save my ass.”[8]

Still, there are more similarities with nonsectarian religion in AA than members readily concede; and, there is much more freedom of personal belief in AA than outsiders perceive.[8]

Offshoot Groups

The AA spiritual principles of recovery have been adopted by other mutual-help organizations in dealing with various addictions: eg, Cocaine Anonymous, Narcotics Anonymous, Methadone Anonymous, Nicotine Anonymous, and others.[8] Chappel stressed that, “The Twelve Step approach to spiritual experience is one that specialists in addiction medicine should understand, clinically support and communicate to their colleagues who care for alcohol- and other drug-addicted patients.”[1]

In the interest of fair balance, it should be noted that certain groups derived from or related to AA have adopted clearly religious contexts: eg, JACS (Jewish), CALIX (Catholic), Alcoholics Victorious (Christian), and others.

There also are distinct alternatives to the 12-step program approach that do not encompass spiritual principles: eg, SMART (Self-Management And Recovery Training) Recovery, SOS (Secular Organizations for Sobriety); Rational Recovery, and more.[12]

Spiritual Qualities

For the addict, intolerance, grandiosity, anxiety, impulsiveness, isolationism, and defiance all boil to the surface of daily life as dishonesty, fear, egocentricity, and resentment. Spirituality serves as an antidote – the recovering addict “lets go” of being “general manager of the universe” and surrenders to the direction of an all powerful spiritual force.[13] Step 2 of 12-step programs promises that belief in a higher power can restore sanity; ie, “soundness of mind.”[11]

The vital spiritual experiences of persons in recovery lead to emotional displacements and rearrangements; hence, a completely new set of ideas, emotions, and attitudes appear to dominate. Once the person lays aside prejudice and expresses a willingness to believe in a higher power, the change process begins.[14]

For the recovering addict, spirituality bestows a “lifestyle transplant” and a revitalizing release from social isolation – of feeling like a stranger in a strange land.[8,13] Themes commonly mentioned in association with spiritual enlightenment are: inner strength, honesty, humility, charity, compassion, forgiveness, connectedness, hope, meaning, purpose, gratitude, and love.[1,7]

The Science of Faith

Spirituality’s role in modern medicine, and addiction treatment, has been controversial. Anyone can pray; what matters clinically are results.

Scientific studies have demonstrated that spiritual faith and prayer can be helpful in preventing and treating illness, recovering from surgery, reducing hypertension, minimizing pain, improving quality of life, and even prolonging life.[3,15-18] Persons with strong spiritual faith are likely to overcome depression 70% faster and live longer than their nonspiritual peers.[5,19]

Two randomized, controlled clinical trials have even demonstrated benefits of *other peoples’ prayers* on behalf of patients who were unaware that they were recipients of such appeals – called “intercessory prayer” or “distant healing.” In the first study, critically ill patients receiving intercessory prayers had significantly fewer [$P < 0.0001$] cases of congestive heart failure, heart attacks, and pneumonia.[20] In a recent investigation, patients in a coronary care unit receiving intercessory prayers had significantly better [$P < 0.04$] overall clinical outcomes.[21]

Unfortunately, a pilot study of the effects of intercessory prayer on 40 recovering alcoholics reported no clinical benefits. And, patients who *knew* that a friend or family member was praying for them drank more than other patients in the same program. However, patients who themselves prayed exhibited less drinking during early months of recovery.[22] Apparently, when it comes to addiction recovery, benefitting from the power of prayer is an “inside job” that only the patient can bring about.

Research by Carter examined recovering addicts and found a direct relationship between spiritual practices and long-term recovery.[23] Another study observed that the risk for alcoholism is 60% higher among drinkers with no religious affiliation.[24] Separate studies including more than 700 adolescents found that religion was the single most significant factor in reducing alcohol, cocaine, and other drug abuse.[25,26]

Humphreys has proposed that treatment professionals can greatly influence patients’ affiliations with 12-step groups, producing results comparable to cognitive behavioral therapy and even somewhat more effective in promoting abstinence.[27] One study found that patients attending at least one 12-step meeting per week achieved nearly 80% greater abstinence from drugs and alcohol than those participating less frequently or not at all. The researchers concluded that 12-step programs are a useful and inexpensive aftercare resource, helping many patients maintain long-term abstinence.[28]

Nevertheless, some authorities remain skeptical about the benefits of spirituality in medicine. Richard Sloan and colleagues at Columbia University have faulted many of the research studies on methodological grounds. They commented: “Even in the best studies, the evidence of an association between religion, spirituality, and health is weak and inconsistent. It is premature to promote faith and religion as adjunctive medical treatments.”[29]

Rocky Road

In the final analysis, the validation of spiritual faith may begin and end on one’s knees – and in one’s heart – rather than by science. Medicine still remains intellectually entrenched in empiricism and there have been arguments against the inclusion of spiritual issues in addiction treatment.

However, it may be intellectually arrogant to presume that spirituality has no legitimate place in recovery programs. The experiences of countless recovering alcoholics and other drug-dependent persons cannot be ignored.

Social prohibitions make discussions of spirituality in therapeutic consultations difficult. Whereas, peer-led 12-step groups, by valuing each member’s experience, strength, and hope – and eschewing criticism of each other – create forums where people can openly discuss spiritual beliefs.

Sulmasy suggests that health care professionals can better prepare themselves to meet the spiritual needs of patients by deepening their own spiritual lives. They should intensify their own commitments to spiritual beliefs and begin “to talk with each other about spiritual issues that arise in the practice of medicine.”[30]

There is great potential for spirituality to strengthen traditional addiction medicine. However, it must be recognized that the spiritual road to recovery is never ending. And, it is forever under construction.

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Where to Get Info...

Internet links to the Web sites of 12-step, religious, and secular groups mentioned in this article, and many more, may be found at www.onlinerecovery.org/index.html.
Access checked May 2000.

Part 5: Vol. 9, No. 3, Summer 2000

Addiction and the Duress of Stress

“It is not I who become addicted, it is my body.” -Jean Cocteau

The pioneering work of Hans Selye, MD, PhD, initiated in the 1930s, set the stage for present understandings of stress and its role in mental and physical illness.[1] Many common diseases are largely due to errors in the adaptive response to stress and, in this sense, drug addiction might also be viewed as an illness of maladaptation.

Stress is a double-edged sword. Cutting one way, there is *distress* – harmful or unpleasant experiences. Swinging the other way, there is *eustress* – euphoric or pleasurable events. Either way, stress spawns biological changes in the brain and body.[1]

Selye observed that stress is a response of the person to any demand; both distress and eustress produce virtually the same responses causing wear and tear. These changes also appear intimately connected to alcohol and other drug (AOD) abuse, dependency, and relapse. The nervous systems and hormonal mechanisms in chronic AOD users appear different, more sensitively tuned to the environmental and emotional stresses of life. Whether they become that way as a result of chronic substance abuse, are hypersensitive to begin with, or a bit of both, is an area of continued exploration.[2]

HPA Hormones

The body reacts to stress by secreting 2 types of chemical messengers: neurotransmitters in brain cells and hormones in the blood.

Stress hormones are normally released in small amounts throughout the day, but their levels increase dramatically when the person perceives an event as stressful. Then, hormones surge throughout the body to energizing a variety of metabolic functions in preparation for action, like fighting or fleeing. Powerful emotions – aggression or anxiety – also are triggered to help drive the response.[3]

This stress-hormone response engages the hypothalamic-pituitary-adrenal (HPA) axis.[1,4] (See diagram.)

1. Hormonal response begins in the hypothalamus – a small gland at the base of the brain serving as a principal regulatory center for body functions – where *corticotropin-releasing factor (CRF)* is excreted into the bloodstream.[3,5]

2. CRF travels via blood vessels to the pituitary gland, a pea-sized structure attached by a short stalk below the hypothalamus gland. In the anterior (forward) portion of the pituitary, CRF stimulates the release of *adrenocorticotropic hormone (ACTH)*.[3,5]

3. ACTH, in turn, travels in the bloodstream from the pituitary to the 2 adre-

nal glands, one perched atop each kidney. The outer portions of the adrenals (cortex) are stimulated by ACTH to release still other hormones, such as glucocorticoids. *Cortisol*, the most potent glucocorticoid in humans, travels through the body as an adaptation to external stress.[3-6] For example, cortisol increases blood sugar (glucose) and breaks down proteins and fats to help mobilize energy.[5] In the presence of severe stress, cortisol levels may increase up to 10-fold.[7]

Cortisol also provides a “negative feedback system.” If the stressor is mild, when cortisol reaches the hypothalamus it inhibits further excess release of CRF, restoring ACTH and cortisol to normal levels. During intense stress, signals in the brain for more CRF release override inhibitory mechanisms and the stress reaction continues.[3]

Endogenous Opioids

The stress-adaptation cycle is complex, stimulated by chemicals in addition to CRF and ACTH, and inhibited by more than cortisol. Among the chemicals that help modulate stress are endogenous opioid peptides – small protein molecules that are neurotransmitters chemically similar to opioid drugs like heroin and morphine. The most potent of these is β -endorphin, produced in the hypothalamus and in the pituitary and affecting several brain centers (see diagram).[3-5]

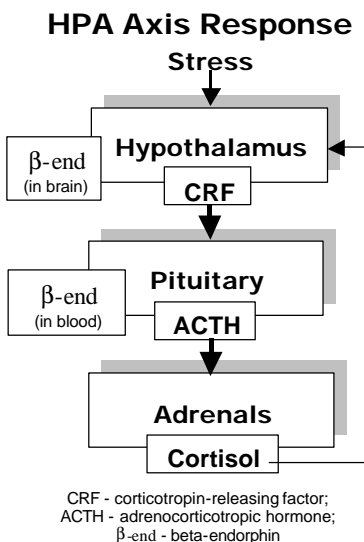
The increased release of β -endorphin may induce a calming, relaxing effect that ameliorates reactions to stress.[5] Meanwhile, excess cortisol levels tend to antagonize (ie, inhibit) β -endorphin and other endogenous opioids.[4] Thus, cortisol and β -endorphin function as part of an internal control cycle; first as a response to stress and then as a negative feedback mechanism helping moderate the stress response. However, chronic AOD administration disrupts this normal reaction to stress.

Anomalies of Addiction

For example, in addicts taking heroin, there is a *diminished* rise in ACTH levels in response to stress compared to normal nonaddicts. However, during periods of opioid abstinence, ACTH response *increases* twice as high as normal (see graph on next page).[8]

The hormonal underreaction to stress in addicts actively taking opioids is due to inhibition of the stress system by the excess of opioid peptides in the brain. Those who are opioid-free have hypersensitive stress responses (overreaction) resulting from periods of cyclic drug withdrawal.[3,8]

The overreaction is sort of a rebound effect. Because most opioid-effects last



only 4 to 6 hours, withdrawal is experienced 3 or 4 times a day. The constant switching on and off of the stress response system leads to enduring hypersensitivity – stress chemicals surge at the slightest environmental or emotional provocation. Often, this triggers unpleasant sensations driving the person to take more opioid drugs[3] or to relapse even after prolonged periods of abstinence.[9]

In contrast to this, Kreek and others have noted that former opioid abusers maintained on methadone exhibit more normal levels of HPA hormones within the first several months of treatment. Although methadone acts at the same brain sites as other opioids, it is much longer acting and, with proper dosing, the person will not be experiencing the stress of cyclic withdrawal that would otherwise sensitize the stress-response system.[3,8]

A Rat's Life

Laboratory studies using rats have greatly contributed to understanding the interactions between stress and AOD addiction, although there are physiologic differences in these animals as compared to humans.[2] To induce stress, the creatures have had their tails pinched and paws electric-shocked, they have been starved and restrained, and subjected to social isolation or aggression.[6]

Ongoing rat research has demonstrated that stress may be intimately involved in drug craving and relapse. The 2 most important events in relapse after both long or brief drug-free periods are re-exposure to the drug itself, which activates pleasure pathways in the brain, and exposure to acute stress that stimulates HPA hormones.[10] Some research has found that relapse is of higher intensity when induced by stress than by priming infusions of drug.[6]

It was also found that repeated stress can induce long-lasting neurobiological changes creating a drug-prone state. Repeated stress appears to produce elevated levels of dopamine in the nucleus accumbens, a key component of the reward pathway in the brain.[6,11] Other experiments demonstrated that glucocorticoids, such as cortisol, may increase the activity of dopamine-producing neurons in the brain's reward pathway.[5]

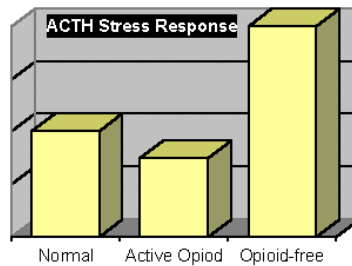
Thus, stressful experiences stimulate the dopaminergic reward pathway. And, in the absence of stress, there is a withdrawal reaction that motivates drug seeking to maintain activity of the hormonal and neuronal systems providing reward effects.[5]

“Stressed-out” by Drugs

Stress control requires that the pituitary and adrenal glands produce and store a reserve of their hormones to rapidly respond to stimulation. Chronic AOD use may disrupt the usual pattern of adrenal hormone secretion, creating periods of deficiency or excess.[4]

Tennant and colleagues suggested that many clinical conditions in addicts – fatigue, depression, edema, diabetes, and obesity – are probably related to abnormal adrenal function. And, higher plasma cortisol levels found in opioid addicts

during evening hours may produce withdrawal, anxiety, dysphoria, and insomnia.[4]



Via unabated hormonal stress responses, the HPA systems of addicts might become “stressed-out.” Indeed, Tennant et al. commented on the lack of adrenal hormone reserves in the majority of heroin and cocaine addicts.[4] This might reinforce drug-seeking as an innate maladaptive attempt to restore hormonal balance and relieve stress.

Addiction Phenotype

Stress research has helped explain how the neurobiological status of an individual plays an important role influencing drug taking and vulnerability to dependency. Innate reactions to life experiences may induce an addiction-prone phenotype (ie, personal characteristics determined by the interplay of environment and genetics).[5,6]

Potential genetic influences have been supported by experiments in rats, in which certain animals inherently show a higher level of dopamine release in response to drugs and a longer glucocorticoid secretion in response to stress. And, this higher dopaminergic activity seems to be dependent on glucocorticoid release. Thus, stress may both facilitate and perpetuate AOD dependency, and this also supports the idea that addiction is not merely an “iatrogenic disease” – ie, induced simply by taking too much drug too often.[6]

Treatment Implications

Tennant and colleagues recommended a stress screening for all patients. Then, counseling efforts to help patients reduce stress might enhance neurobiological function and improve treatment outcomes, although this has not been specifically tested via research.[4]

Patients might also be placed on a nutritional regimen including a high-protein diet and vitamin supplements. This is to provide amino acids needed for the body to produce peptides found in HPA hormones. Although this makes intuitive sense, there is no scientific data yet to confirm benefits of the approach.[4]

Based upon available evidence, the HPA axis also could be a focus for new pharmacotherapies.[6] Scientists have explored a class of compounds called CRF-antagonists that block the action of corticotropin-releasing factor. Laboratory research in rats found that these agents block stress-induced relapse to drug seeking, and it is believed that these compounds may one day be useful in treating relapse to a variety of drugs, including heroin, cocaine, and nicotine.[3,12]

In sum, the stress response in chronic AOD users is a genuine neurobiological phenomenon different from that in normal persons. Addicts may react differently to stress to begin with and/or their stress-response systems may be altered as a result of substance abuse. Such altered responses may persist for quite some time, perhaps indefinitely, and stressful situations may trigger craving possibly leading to relapse in efforts to self-medicate either distress or eustress.

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Part 6: Vol. 9, No. 4, Fall 2000

The Shifting Sands of Opioid Addiction & Treatment

Every form of addiction is bad, no matter whether the narcotic be morphine or idealism. – Carl Jung, 1963

The wise know that foolish legislation is a rope of sand, which perishes in the twisting. – Ralph Waldo Emerson, 1844

Throughout history and in most societies drugs of some sort have been used to alter consciousness. It has been suggested that, of all the mistakes repeated time and again, the most serious fallacy is trying to free society of drugs via legislation and regulation.[1] Such acts may reflect American society's frustration with past failings of medical science and, consequently, there has been unprecedented control over the medical treatment of opioid addiction in particular for nearly a century. Opioid addiction and treatment perspectives have changed like shifting sands.

Iatrogenic Addiction

During the 19th century, physicians faced with a host of ineffective nostrums to treat diseases about which little was known turned to palliative substances. Opium was one of the most widely prescribed substances in the medical pharmacopeia in the United States, followed by oral preparations of morphine (synthesized from opium in 1815) and laudanum (a tincture of alcohol and opium).[2]

Such prescriptions frequently resulted in iatrogenic addiction (ie, induced by medical treatment). Older white women from the middle and upper socioeconomic classes constituted about two-thirds of persons addicted to opioids. Another medically-addicted group consisted of Civil War veterans who had been treated for pain. Opioid addiction in these persons was viewed as an unfortunate medical condition eliciting tolerance and empathy.[3]

Smoking of opium was primarily common among Chinese immigrants, in whom a weak will and immoral behavior were considered the basis of continued addiction. Opium smokers became stigmatized and faced restrictive legislation, which drove up the price of opium but did little to stem its use.[2,4]

Narcotic Dilemma

Soon, the door was opened to a new generation of addicts as waves of young European immigrants arrived and crowded into tenements. Adoption of the hypodermic needle (invented in the mid-1800s), and the synthesis of heroin from morphine in 1898, exacerbated the situation.[2]

Use of opium, heroin, and cocaine (grouped together as "narcotics"), along with burgeoning drug-related crime, were of concern to social, religious, and political leaders during the early 20th century. The stigma once foisted upon Chinese opium smokers was transferred to new groups of addicts, and chronic addiction to narcotics was attributed to a moral degeneracy that would destroy American social values.[2]

Distorted Legislation

Passage of the Harrison Narcotics Act in 1914 marked a turning point in policies and attitudes regarding narcotics in America. Superficially, it was an effort to generate revenue

and exercise control over the flow of narcotics. It did not impose punishments on drug users or appear to deter medical practitioners from treating addicts with opioids.[4]

However, this legislation became distorted as government agencies adopted the position that addiction was not a disease and addicts were not legitimate patients requiring narcotics for maintenance purposes. Medical practitioners and clinics dispensing opioid medications for drug withdrawal or maintenance purposes were vilified. Through a series of revised interpretations of the Harrison Act and legal decisions, clinics were shuttered and thousands of physicians were arraigned on narcotics charges, with many serving penitentiary sentences.[3,4]

A pivotal swing in the other direction involved a Supreme Court decision in 1925, which recognized drug addiction as being a disease and drug addicts as proper subjects for medical treatment.[4]

However, Payte has observed [4] that this decision was too little and too late. There was residual fear among physicians of becoming involved in addiction treatment and little motivation to do so. The medical profession rapidly faded from the addiction treatment picture and would remain absent for decades.

After World War II, the Boggs Bill of 1951, the Narcotic Drug Control Act of 1956, and many other laws were efforts to accelerate arrests, convictions, and harsher penalties for anyone involved with narcotics.[4] This occurred at a time when there was a mass migration of African-Americans from southern cities to the north and immigration of Hispanics from outside the U.S. These groups moved into tenements vacated by European immigrants and inherited the preexisting problems of drug trafficking and narcotics addiction.[3]

Scientific Vacuum

Government actions, reflecting public sentiments, may have been driven at least in part by failures of medical science to deal with addiction.

Herman Joseph has observed [2] that medical knowledge and technology were simply not available during the first half of the 20th century to test hypotheses confirming or negating the premise that narcotic addiction was a physical disease or had a physiologic basis at all. Consequently, psychological theories of addiction filled the vacuum and addicts were stigmatized as having addictive character disorders or psychopathic personalities.

Opioid Maintenance

By the 1960s, the heroin epidemic was rampant and a new generation of middle-class addicts had emerged. The time was ripe for reconsideration of medical treatments for addiction, particularly pharmacologic maintenance, even though such approaches had been resisted by policymakers

and the medical establishment was still cowering from their earlier reproaches.[4]

Breakthroughs in neuroscience research beginning in the 1950s helped change the direction of addiction treatment. Meticulous observations of derangements in physiologic functioning wrought by substances of abuse and the neuropharmacologic properties of the drugs themselves were used to challenge purely psychological theories.

It was in this atmosphere, in 1963, that Vincent Dole, MD, was awarded a research grant to begin his work on what would become methadone maintenance treatment (MMT). Although this therapy proved successful and effective, it was under the scrutiny and control of federal authorities from the outset.

In the late 1960s, federal officials and treatment providers saw methadone as a quick fix for reducing demand for heroin and its associated problems. MMT programs expanded rapidly, the media called methadone a “Cinderella drug” and a “magic bullet,”[5] and policymakers viewed it as a panacea that could cure addiction.[6] Expectations were unrealistically high and methadone may have been oversold.

Policymakers persisted in stressing abstinence as the treatment goal of MMT rather than rehabilitation, which might require indefinite maintenance just as for any other chronic disease.

In the 1970s, as public funding of MMT programs waned, private entrepreneurs interested more in monetary profit than patient welfare moved in and quality of care deteriorated. MMT took on a patina of disrepute that would take several decades to fade away.

During the 1980s and 90s, political and ideological agendas still ruled MMT. For the most part, the mainstream medical community remained wary of this practice specialty in which federal regulations dictated who could be treated, how much medication could be prescribed, and for how long.

Rational Outlooks

Eventually, in the late 1990s, the federal Office of National Drug Control Policy (ONDCP) acknowledged that the regulations governing MMT “reflect the political and social climate of [earlier times] rather than rigorous study.” Furthermore, ONDCP conceded that there often were attempts to accomplish via federal regulation matters that should have relied more on medical discretion.[7]

A consensus panel convened by the National Institutes of Health concurred that, “However well intended the [government] regulations were when written... they are no longer helpful,” and, “we know of no other area where the federal government intrudes so deeply and coercively into the practice of medicine.”[8]

Most recently, the House of Representatives approved a bill [9] allowing “qualified” physicians to dispense schedule III, IV, or V narcotic drugs to patients for opioid maintenance treatment or medically supervised withdrawal. It represents the first time since passage of the Harrison Narcotics Act that general practitioners would be allowed to treat an opioid-dependent patient with a narcotic, provided the drug has been approved for such use by the FDA. This

appears tantamount to congressional approval for the widespread practice of addiction medicine... albeit, still with certain strings attached.

Persistent Demagoguery

To this day, however, a segment of public opinion opposes the use of methadone for treating opioid addiction and another segment is ambivalent to its use. Periodically, municipal,[10] state,[11] and federal [12] initiatives have been enacted or proposed to thwart access to methadone treatment by all who might benefit.

For example, in 1998, New York City Mayor Rudolph Giuliani proclaimed that drug addicts should learn to recover without the help of medication and he lobbied to eliminate MMT programs.[10] A year later, U.S. Senator John McCain introduced “The Addiction Free Treatment Act of 1999.” The bill would have limited methadone maintenance to 6 months and immediately terminated treatment for any patient testing positive for an illegal substance. The text of the legislation stated that methadone “results in the transfer of addiction from one narcotic to another” and that the government should adopt a zero-tolerance, nonpharmacologic policy to achieve “independence from drug addiction.”[12]

Neither proposed action became law; however, the underlying attitudes and convictions attest to the persistence of old ideologies. Even the debate over the extent to which addiction is a medical disease versus a moral failure remains unsettled.[13]

Difficult Challenge

The problem has not been so much in addictive substances themselves as in people. Perceptions of *who* is addicted have influenced attitudes toward addiction and its treatment.[3] From compassionate support for the iatrogenically-addicted victims of the 19th century there has been a paradigm shift toward the criminalization and stigmatization of addicts and their substances of abuse. Even more insidious, these outlooks, fueled by legislation, negatively affected the practice of addiction medicine.

Times have not changed that much. The NIH consensus panel conceded in 1997 that “Many people believe that addiction is self-induced or a failure of will and also believe that efforts to treat it will inevitably fail. Vigorous and effective leadership is needed to inform the public that addiction is a medical disorder that can be effectively treated with significant benefits for the patient and society.”[8]

The challenge before addiction medicine today has never been more difficult, or of more critical importance.

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Part 7: Vol. 10, No. 1, Winter 2001

The Hijacked Brain Revisited

Notes from the ASAM Review Course in Addiction Medicine

Part 3 of this series [1] observed that psychotropic substances of abuse and dependency appear to “hijack” the brain’s natural reward system and alter certain aspects of its neurobiological function. This concept was further explored at the American Society of Addiction Medicine’s (ASAM) Review Course in Addiction Medicine, October 2000, in Chicago, IL. More than 18 distinguished speakers and 425 attendees participated in the Course as preparation for the certification exam in addiction medicine. This article focuses on several of the presentations and the associated reference materials.

The Power of SPAM

Carlton Erickson, PhD –of the University of Texas College of Pharmacy, Austin, TX – observed that until relatively recently the field of addiction treatment and prevention drifted aimlessly due to insufficient research evidence. There also has been much misinformation about the pharmacology of addicting drugs.

Persisting negative attitudes have adversely affected the quality of patient care, as well as funding for prevention, education, and research in addiction. Erickson portrayed these negative influences as “SPAM” – Stigma, Prejudice, And Misunderstanding. Among other detriments, SPAM leads to a bias against certain treatment options, disparagement of patients, and lack of insurance coverage.

He said that the picture is rapidly changing, based on neuroscience research indicating that the brain’s “reward/reinforcement pathway” (also called the medial fore-brain bundle or MFB) is affected by all addictions. Addiction is not necessarily inherent in a particular drug itself; rather, individual factors of genetics, environment, and chronic drug use play pivotal roles in *susceptible* persons.

Pirating Reward

Eliot Gardner, PhD – Senior Research Scientist at NIDA’s Intramural Research Program, Washington, DC – observed how one might perceive human vulnerability to chemical addictions as an accident of nature. He has written,[2] for example, that the poppy and coca plants quite unintentionally produce alkaloid chemicals (morphine and cocaine) capable of “pirating” the reward pathways of the brain. Alcohol, a byproduct of natural fermentation, acts similarly, as does practically every other addicting substance.

The circuitry of the reward pathway serves a presumptive evolutionary function by motivating survival behaviors, such as food seeking and eating, mating, and parenting. Unfortunately, the same circuits that are biochemically activated by natural rewards are also stimulated by addicting substances.

Both Gardner and Erickson stressed that a hallmark of drug addiction is impaired control over the compulsion to use drugs and the inability to abstain. This is probably caused by a dysfunction of the MFB, and several compo-

nents of this structure deep within the brain may be affected: ventral tegmental area, lateral hypothalamus, nucleus accumbens, and amygdala.

Of special importance is the concept that, since these sites of addicting drug action are deep within the brain, and *not* in the cerebral cortex, the thinking part of the brain, *addictions are not primarily under conscious control*. That is, *addictive behaviors are not problems of weak willpower, poor judgment, or moral indigence*.

Inherent Dysfunctions

According to Erickson, some of the neurotransmitters thought to be involved in addiction include: dopamine, serotonin, endorphins, gamma-aminobutyric acid (GABA), glutamate, and acetylcholine. Addiction is essentially a brain chemistry disease and addicting drugs “match” a neurotransmitter system that is not normal.

Gardner observed that different addictive chemicals enter the brain’s reward circuitry at different sites and affect it by different neuropharmacologic mechanisms. However, *all addicting drugs have in common that they enhance (directly or indirectly) the function of dopamine in the MFB reward pathway*. The different effects between and within drug classes reflect different MFB centers that are being pirated and the degree to which a given drug can impact normal functioning of the circuitry.

He further proposed that vulnerability to drug addiction may correlate with a dysfunctional *hypodopaminergic* state within the reward pathway. People with innately lower dopamine levels get a greater “kick” from euphoria-producing substances than persons with normal dopaminergic tone. In fact, psychostimulants actually may provoke unpleasant dysphoria in “normal” persons, motivating drug avoidance.

Erickson similarly suggested that when an addictive substance stimulates brain chemicals it may fulfill an inherent functional deficit in the neurotransmitter system of susceptible persons. It’s as if their brains respond, “You’re exactly what I’ve been waiting for all my life.”

Getting “Straight”

Stress and post-drug-use dysphoria are triggers for relapse to drug-taking in both laboratory animals and humans, Gardner explained. Exposure to *any* psychotropic drug (known as “cross-priming”) and environmental cues (people, places, things) also play crucial roles.

With chronic use of certain drugs, like opioids, the post-use dysphoria comes to dominate hedonic tone (ie, the state of well-being or normalcy) of the brain’s reward circuits. Under these circumstances, Gardner has written, [2] the addicted person no longer uses drugs to get a “rush” or “high,” but simply to get back to a perception of “normal” (or to get “straight” in street parlance).

Erickson suggested that a goal of addiction treatment is to normalize neurotransmitter function in the proper brain area. The success of methadone maintenance is evidence that

some people require pharmacotherapy to overcome an abnormal neurotransmitter system.

He has written that the emotional, interactive, sometimes stressful process of recovery via multidimensional behavioral therapy programs and/or 12-step groups also may be associated with at least temporary changes in brain chemistry. And such changes may eventually engender a decreased need for the addictive substance.[3]

Physical Dependence

Gardner emphasized that the brain circuits producing rewarding effects of addictive drugs are *entirely separate* from those engendering physical dependency (and subsequent abstinence syndrome or withdrawal). Some drugs, such as cocaine, are intensely addicting while producing no physical dependence.

Furthermore, research has clearly demonstrated that drug-taking behavior cannot be explained simply in terms of the ability of addicting drugs to ameliorate the withdrawal discomfort associated with abstinence. That is, *withdrawal effects do not account for the phenomenon of addiction*.

Withdrawal can be basically conceived of as a physiological “rebound” effect, Gardner stated. If chronic drug administration and/or intoxication causes one bodily effect, withdrawal from the drug will typically cause an opposite effect.

For example, opioids may produce constipation, whereas opioid withdrawal produces diarrhea. Withdrawal from sleep medications (sedative-hypnotics) often produces insomnia.

Unpleasant withdrawal effects can be quickly abolished by more drug taking. However, the importance of physical dependence in drug addiction should not be overstated, Gardner cautioned, and explanations of continued drug taking predicated on tolerance, physical dependence, and/or avoidance of withdrawal symptoms are inadequate.

Multidiagnoses Typical

Focusing on psychiatric issues, James David, MD – Associate Professor of Clinical Psychiatry, Albert Einstein College of Medicine, Bronx, NY – stressed that multiple diagnoses are the rule, rather than the exception, for patients coming into treatment.

At the least, most patients use multiple addicting substances and each is worthy of a diagnosis. However, he claimed, this rule holds true even in the uncommon case of a patient only using one addictive substance.

Individual diagnoses associated with a class of substances may include intoxication delirium, withdrawal, dementia, mood or anxiety disorders, sleep disorder, sexual dysfunction, and other maladies. These diagnoses were updated by the American Psychiatric Association in its DSM-IV-Text Revision, fall 2000.[4]

Among other benefits of multidiagnoses, David asserted that patient progress or deterioration during treatment can be seen when a fuller list of “syndromes” are tracked. It also helps some patients to understand that their dysphoric mood, sexual dysfunction, or insomnia are among well-known disorders associated with the particular drug(s) they are abusing.

A more broadly and behaviorally defined set of criteria for addiction are now in force, independent of the concepts of “tolerance” and “withdrawal.” A patient can be given a diagnosis of substance dependence (DSM-IV does not use the term “addiction”) with neither tolerance nor withdrawal in the clinical picture. Key markers of dependence are *unsuccessful attempts to reduce drug/alcohol use*, along with incurring the *repeated consequences* of such use, whether they are legal, financial, health, family, job, or school related.

Role of Cognition

A major unresolved question is how neocortical input (from the thinking or cognitive part of the brain) might come into play in addiction and recovery. Gardner posited, as did Erickson, that during active addiction more primitive brain centers (ie, the MFB reward pathway) dominate and drug taking becomes involuntary or not under conscious control.

In this regard, Gardner has acknowledged early 19th century descriptions of drug addictions as impulse control disorders: “Voluntary control is profoundly impaired. The patient is compelled to perform acts which are dictated neither by his reason nor his emotions – acts of which his conscience disapproves of, but over which he no longer has willful control...”[5]

Along similar lines, Erickson wondered whether addictions might be considered obsessive-compulsive disorders (OCD). That is, those afflicted think about the substance or behavior all the time (obsession) and end up repeatedly taking the drug or behaving uncontrollably (compulsion).

David observed that OCD occurs at 2 to 3 times more often in alcoholics and other drug dependent persons than in the general population. The notion of addiction being related to OCD might open new doors for therapeutic strategies.

Overcoming Hurdles

A series of seemingly insurmountable neurobiological hurdles appear to be erected in the path of drug-dependent persons wishing to stay abstinent. What is the solution?

Gardner has written [5] that there are surprisingly few clearly effective pharmacotherapies for drug addiction, including: methadone and LAAM maintenance for opioid addiction (with buprenorphine pending approval), naltrexone for alcoholism, and nicotine substitution therapy and bupropion for tobacco dependence. Strategies based on psychotherapy, group therapy, behavior modification, economic incentives, and aversion deconditioning (eg, disulfiram) have proved limited.

He further acknowledged that some persons still argue against the concept of addiction as a disease. Others claim drug and alcohol addictions have high spontaneous recovery rates and short durations; that drug abstinence and recovery may occur due to individual maturation and/or is under purely voluntary control.

Although the many presentations at the ASAM Course eloquently refuted those notions as erroneous and contradicted by science, such voices of dissent do persist. These will be the subject of the next article in this “Brainstorms” series.

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Part 8: Vol. 10, No. 2, Spring 2001
The Voices of Dissent

“Though dissenters seem to question everything in sight, they are actually bundles of dusty answers and never conceived a new question.” - Eric Hoffer

Despite all that medical science has uncovered about the nature of substance dependence, Eliot Gardner, PhD – senior research scientist at NIDA’s Intramural Research Program, Washington, DC – observes that some authorities still argue against the concept of addiction as a disease. Others claim drug and alcohol addictions are under purely voluntary control and many people can abstain at will or naturally grow out of their addictions.[1]

These claims may breed prejudice and stigma surrounding addiction and its treatment, and clinicians, counselors, and patients need to be aware of them. While not endorsing such viewpoints, this article presents some of those voices of dissent.

No Pain, No Gain

Behavioral healthcare consultant, Harold Sloves, comments, “Some government leaders, public health officials, members of the medical community, and the public at large frequently conceive of drug or alcohol dependence as a self-inflicted disease of the will or moral flaw.”[2]

Particularly concerning methadone maintenance therapy, Sloves proposes that science still needs to overcome the social stigma and negative perceptions of addiction. There are many who regard methadone maintenance “as an ineffective narcotic substitution and believe that a drug-free state is the only valid treatment goal. There seems to be something of a ‘no pain, no gain’ viewpoint at work here.”

Part of the problem, according to Sloves, is that substance abuse treatment has historically emphasized a psychosocial model, rather than a medical one. The antidote to this has been advances of the past two decades in documenting the neurobiology of opioid dependence. “Whatever social conditions might lead to opiate exposure,” he writes, “opiate dependence is in fact a brain-related disorder, with the requisite characteristics of a medical illness that can be treated. Furthermore, the safety and efficacy of narcotic agonist (methadone) maintenance treatment has been unequivocally established.”

Yet, those advances of science often seem ignored.

Addiction a Way of Life

Possibly the most prolific and vocal critic of the addiction-as-disease concept has been Stanton Peele, a social psychologist who taught organizational behavior at Harvard Business School and, more recently, entered the practice of law.[3]

Peele has published 7 addiction-related books, beginning with *Love and Addiction* in 1975. He is adamant that addiction is not a disease and does not believe that any drug is inherently addictive.

He concedes that addiction is all in the mind, but claims it has nothing to do with neurobiological functioning – it cannot be defined biologically, and has nothing to do with brain chemistry.[4]

“People become addicted to a wide range of involvements” in addition to drugs, he asserts.[4] “Anything we do can be addictive or not addictive,” His concept embraces a wide range of addictions to other people, pets, sex, gambling, shopping, eating, psychotherapy, and even education (the “PhD syndrome”).

“Addiction is not an aberration from our way of life,” Peele proposes. “Addiction *is* our way of life.”[4]

In fact, he argues, because people become addicted to so many things in life “*proves* that addiction is not *caused* by chemical or biological forces and it is not a special disease state.” He claims that the problem with disease theories of science is that “they avoid the work of understanding *why* people drink and smoke in favor of simply declaring these activities to be addictions, as in the statement ‘he drinks so much because he’s an alcoholic.’”[5]

Peele further asserts that drug withdrawal symptoms are a function of social settings that nurture their expression. The addict’s response to withdrawal – the agony, the intense craving – is a cultural creation fostered by “inflammatory literature” such as Nelson Algren’s book *The Man With The Golden Arm*. [4]

Peele states that “Addiction is nothing more than a way of coping with life, of attaining feelings and rewards people feel they cannot achieve in any other way.”[6] People become addicted to drugs, as well as other experiences, because they like the psychoactive effects, the way it changes their sensations, the experience itself. For example, when cocaine produces a feeling of exhilaration it is the *feeling* to which the person becomes addicted. “No other explanation – about supposed chemical bondings or inbred biological deficiencies – is required,” he claims.[5]

Peele rejects the notion of people saddled indefinitely with addictive lifestyles or personalities. “This can never account for the fact that so many people – most people – *outgrow* their addictions.”[5] This “maturing out” or natural remission from addiction is central to much of Peele’s arguments.

Those who do not outgrow their addiction have succumbed to self-fulfilling prophecies of disease, he believes. “[T]he readier people are to decide that their behavior is a symptom of an irreversible addictive disease, the more readily they fall into a disease state.”[5]

Philosophically, Peele argues that “[a]ddiction is caused by environmental factors – more common in our time than any other – which are destructive of the wholeness of the individual.”[4] “As such, addiction is no more a treatable medical problem than is unemployment....” The remedy for addiction, he proposes, is for people to have the resources, values, and environments necessary for living productive lives.[6]

The Power of Choice

In a recent book, psychologist Jeffery Schaler echoes the sentiments of Peele and others by proclaiming in the title *Addiction is a Choice*.^[7] He argues that society has erred by caving-in to the AA vision that addiction is a disease, that addicts cannot help themselves, and that they need a Higher Power to be saved.

Schaler proposes that rather than being a disease, drug addiction is a scapegoated behavior, a victim of bad science and misguided policy, incorrectly identified as a physical or mental illness. People use drugs, he argues, as a way of avoiding and coping with certain existential experiences.

However, drug addicts do not want to do what's necessary to change their experience, he says. Drug use and addiction have less to do with what drugs do to the body than with the motivations and choices behind drug taking.

Like other voices of dissent, such as Peele, Schaler draws primarily upon a chorus of like-minded authors – Thomas Szasz, John Stuart Mill, Malcolm X, and others – rather than scientific research to support his speculative intellectual arguments.

Medicinal Manipulation

Others also contend that the disease model of mental illness and addiction prevails despite a lack of supporting scientific evidence. Psychologist Les Ruthven observes, “The [disease model] is very appealing because it gives society hope that a simple chemical is the answer to a variety of complex clinical problems... such as alcohol abuse, suicide, and violence.”^[8]

Addiction as disease, Ruthven laments, suggests to patients that their behaviors and symptoms are beyond their control. The concept reduces complex situations to simple solutions – ie, taking pills to adjust brain chemistry. To many psychologists, he says, the notion of manipulating brain chemistry as a solution for mental disorders is at best naïve.

Ruthven suspects that many persons are being overdiagnosed with certain disorders because physicians believe there are effective medications to treat them. This, he believes, has happened with ADD or ADHD and bipolar disorder. “We have no pill for hysteria or for any other personality disorders and, as a result, they are underdiagnosed and the core problems of these patients are being neglected,” he claims.

He observes that psychiatric treatment today focuses on medication and manipulation of medication when the patient is doing poorly. And, while psychiatry has been moving more toward a disease model, general medicine is moving in

the opposite direction of a holistic model addressing the whole person in order to improve health outcomes.

Enticing Webs

By his own admission, Peele is an outsider who developed his views without actually working in the addiction field. His writings favor references to history and the musings of social philosophers, rather than scientific clinical studies. For Peele, it appears addiction is in the mind, rather than in brain chemistry, and it is the human intellect that harbors the solutions.

Unfortunately, experience over the years has demonstrated that intelligence is not a particularly potent tool for personal recovery. An addict is no more likely to simply think his/her way into sobriety than the “Just say ‘no’” slogan of the 1980s could stem the rising tide of substance abuse in the first place.

In Schaler's perspective, people have the right to make their own choices, including destroying themselves with drugs. A civilized society has no right to coerce people into any kind of treatment program against their will, he believes.

The scholarly arguments of dissenting voices may spin enticing webs for some. Such activist ideologies also may sell books by rehashing old questions; however, they do nothing to help the thousands of addicts right now shivering on street corners as they anxiously await their drug dealers. While wailing about insufficient science in the addiction treatment and mental health fields, the voices of dissent do nothing to advance scientific knowledge. Their proclamations are a reminder that it is relatively easy to criticize or raise doubts; it is much more painstaking to arrive at valid and workable answers.

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