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THE PHARMACOLOGY OF ADDICTING DRUGS

VINCENT DE PAUL LYNCH*

The jurist needs an acquaintance with scientific facts bearing on the extent of the responsibility and soundness of judgment of those who, under the permanent influence of narcotic drugs, come into collision with the civil or criminal law . . .

L. Lewin, 1924

Preface to *Phantastica*

ONE OF THE DIFFICULTIES encountered in a discussion of “narcotic” drugs concerns the terminology used in this regard. To a pharmacologist, the term narcotic can mean any substance which produces a sleep-like state. On the other hand, the term narcotic is used in a legal sense to describe drugs which are derivatives of opium, or synthetic opium alkaloid substitutes.¹ In the latter sense, the term implies that these drugs have addictive liability as well as specific pharmacologic properties.

The term addiction is also misleading. In ordinary usage, addiction—in a narrow context—implies habitual use of a (legal) narcotic drug. A broader definition asserts that addiction refers to habituation to any abnormal practice but especially to the abuse of drugs or alcohol. The pharmacologist recognizes drug addiction as something which can occur with any drug substance. However, the pharmacologist qualifies addiction as a state which involves a physiological as well as a psychological component. A drug is thus said to be addicting if: (1) the drug produces biochemical alteration leading to physiological dependence or need; (2) habituation is involved; and (3) abstinence from the drug produces a series of withdrawal symptoms of a physiological and psychological nature.

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¹ REGULATION No. 5, REGULATORY TAXES ON NARCOTIC DRUGS, TREASURY DEPARTMENT 39 (1959).

The classification of drugs which are recognized—in this context—as addicting is quite broad. Such a group would encompass sedatives, hypnotics, tranquilizers, and anti-tussive agents, non-specific central nervous system depressants, specific and non-specific central stimulants, psychic stimulants, agents used in the treatment of obesity, as well as analgesics of the opium variety. None of these drugs appear to possess any quality in common, except their ability to produce addiction. It is true, of course, that the foregoing are either central stimulants or depressants, but there are reports in the literature of addiction to other drugs with diverse properties.² With the evidence which is available, it is not possible to predict whether any drug will or will not have addicting properties. Initial claims of non-addictive liability are frequently subject to change. There are several famous and recent examples of the latter in the area of pharmaceutical manufacturing.

As in many other activities, the drugs which are misused by the addict have useful therapeutic qualities based on their pharmacological properties. The physician relies upon the analgesic to relieve pain, the hypnotic to induce sleep, and the sedative to calm the patient and produce some degree of drowsiness. The medical practitioner uses tranquilizers with the hope that they will depress the agitated or anxious patient, but still permit him to communicate and even carry out his normal activities. Many of us have relief afforded by the anti-tussive drug when we are afflicted by coughs of whatever origin. Even those drugs of a non-specific, depressant nature have rather specific appli-

cation. The surgeon utilizes anesthetics to perform major and minor miracles. The pharmacologist is interested in other non-specific depressants from the point of view of their toxicological properties. In a sense, our very economy depends upon the availability of these latter substances which would include gasoline, paint thinners, insecticides, and organic solvents of varied use. Regardless of their applicability, the latter cause central nervous system depression in addition to other toxic symptoms.

The use of central nervous system stimulants depends upon the site of their activity. Drugs which affect the cerebral cortex are capable of assisting cognate processes. Such compounds have been used to treat geriatric conditions, impaired memory, and to stimulate the depressed patient. They have been utilized in the treatment and management of mental retardation in children. Cortical stimulants also have the ability to allay sleep; many of us are aware of the effects of caffeine in a cup of coffee. In addition, the amphetamines have been investigated in the aerospace program for their ability to aid the astronauts in the performance of their duties.

Stimulants which affect the midbrain, the thalamus, and the hypothalamic regions have shown beneficial results in the treatment of some forms of cardiovascular disease. Agents which act in this region may also fall into the class of drugs known as "psychic energizers." The latter are used in the treatment of depression states.

Those stimulants which specifically affect the medullary regions are used to stimulate respiration. Depressed respiration, in turn, may be the result of ingestion or

² LEWIN, PHANTASTICA 31 (1964).

administration of specific or non-specific depressants.

Drugs may exhibit both stimulant and depressant properties. In some cases, as with the development of euphoria associated with alcohol, the initial stimulant effects are indirect. These agents are able to depress the "higher centers" with the result that the "lower centers" previously inhibited are liberated from the controlling effects of such higher cognate areas.

However, many drugs have a true stimulant activity. This is noted in some of the effects following the administration of morphine. Both people and animals exhibit an initial period of excitation. This may result in a feeling of well-being (euphoria) in some individuals, but it also frequently results in vomiting and diarrhea. The latter are caused by direct actions exerted on medullary chemoreceptor trigger zones. Ultimately, all drugs, whether they are stimulants or depressants, will produce respiratory depression when administered in sufficient dosage. If this depression is severe enough or prolonged enough, death is the result.

The pharmacological properties which make these compounds useful in therapy or medicine do not explain the addicting properties possessed in common by all of these drugs. And a listing of these drugs would be extensive. One report by the World Health Organization lists over sixty drugs which may be addicting.³

To explain addiction, we can only theorize that addicting drugs influence existing enzyme systems or initiate the de-

velopment of "new" enzyme systems. This might serve to explain why the addict shows such profound need for the drug once addiction is established. It is an accepted principle that once addiction occurs, the offending agent satisfies a primary biochemical need or deficiency. The addictant is of such a nature that it becomes a "nutritional" requirement, enabling the newly developed physiological activity to be carried on. There are other theories which explain both the addictive properties and tolerance developed towards various agents, but they tend to be unsatisfactory in their overall conclusions.⁴

The events leading up to the addictive state also require clarification. It has been proposed that narcotics addiction is exactly like chronic alcoholism, and consequently, workers in this area advance the opinion that, just as the alcoholic is regarded as a sick person, the narcotic addict should be regarded as a sick person. It may be that the addict is sick regardless of the source of addiction, but this writer tends to believe that chronic alcoholism and narcotic addiction should not be equilibrated in all aspects. Where the chronic alcoholic may find escape from the problems which confront him by turning to alcohol, the user of narcotic substances may become an addict for other reasons. Furthermore, the alcoholic *may*, because of some biological phenomenon, have an absolute requirement for alcohol before he even begins his imbibing. While this is only theoretical, it has been speculated that alcoholism may be a disease of genetic origin. This does not mean hereditary, but rather that alcoholism might be

³ BULLETIN ON NARCOTICS, ESTIMATED WORLD REQUIREMENTS OF NARCOTIC DRUGS IN 1962 47-48 (World Health Organization Pub. No. 14, 1962).

⁴ DULLS, PHARMACOLOGY IN MEDICINE 274-84 (3d ed. Depalma 1965).

explained on the basis of a genetically-induced biochemical abnormality. Recent medical research has proven that this is the case with several hitherto inexplicable disease syndromes (phenylketonuria, for example) and there may be justification for the same approach to alcoholism. After all, ethyl alcohol occurs in man and is utilized in normal metabolic processes. Consequently, it would not be too outlandish to project an increased need on the part of an individual to an inherent error in metabolism. Certainly, psychological factors must also be considered as having a causative role in many alcohol addicts.

It does not appear likely that narcotic addiction would yield to the same explanation. Not only are narcotics abnormal in man's metabolic processes, but it would seem unlikely that a single metabolic defect could be satisfied by so many diverse drug substances. The property of cross tolerance does occur with the narcotic addict who can satisfy his cravings with barbiturates when heroin is in short supply. Similarly, psychological urge may not explain all cases of narcotic addiction. It is not being cynical to point out that animals can become drug addicts without the necessity of seeking escape from reality or the problems and pressures of their existence.

It is suggested that the causes of drug addiction are manifold. The individual may become addicted as the result of a medical accident. Many unsuspecting persons in severe pain have been introduced to morphinism in this way. There are also instances where a person has been deliberately introduced to addiction either by a "pusher" who wants the business or

by a devotee who wants company in his misery. There are surely a few addicts who find surcease from worry and care in the drug-induced euphoric state; the alcoholic is in this group. But, it is the contention of this writer that the majority of addicts turn to addicting drugs and remain addicts *because they like it*. After he becomes an addict, it is admitted, this person is ill and addiction can be considered a disease entity.

From the pharmacologist's viewpoint, the problem of drug addiction has several facets. Initially, something should be done to prevent the problem from becoming greater than it is. The answer here may lie in the enforcement of existing laws concerning availability and distribution. This can be done if adequate forces are allotted to the extremely dedicated narcotic enforcement officials. Secondly, current addicts require treatment and rehabilitation. However, such programs have been carried on over the years with very little success. It is estimated that ninety per cent of the addicts who undergo treatment—whether voluntary or otherwise—relapse. It is probable that relapses of this type would not occur if drugs were unavailable, or if adequate post-cure supervision was maintained. Current proposals, which suggest setting up clinics where the addict will be able to obtain a legal supply of drugs, do nothing to solve the problem. In fact, they may serve as an impetus for increased addiction. While this may not be obvious (and this is being minimized by its proponents) similar experiments have been carried on throughout the world over the past fifty years with only negative results.⁵

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⁵ See generally KOLB, DRUG ADDICTION (1962).

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Legislation now being formulated suggests that a statewide rehabilitation program be established. This may take care of the current addict—if a well-defined treatment is provided and if after-treatment supervision is rigidly enforced. But, again, it will not deter new addicts if they are still permitted easy access to the source of their pleasure. Neither will it prevent the high relapse rate, if the addict is only using such a system to reduce his physiological requirement.⁶ In addition, as Mr. Leon Brill has aptly pointed out:

⁶ See *DRUG ADDICTION IN YOUTH* (Harms ed. 1962).

too much emphasis cannot be placed on . . . the establishment of small experimental units carefully designed to learn answers to a wide variety of questions regarding drug addiction as against large service units, which, while serving an important humane purpose, invariably fall subject to public recrimination because of their fairly total lack of success.⁷

Finally, a program of basic research should be encouraged in this area to determine the biochemical mechanisms of addiction. In this way it would be possible ultimately to develop a treatment for the disease and perhaps to develop drug substitutes which would not have these insidious addicting properties.

⁷ *Id.* at 191.