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Diphosphopyridine Nucleotide in the Prevention,
Diagnosis and Treatment of Drug Addiction

A Preliminary Report
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The author has successfully utilized diphosphopyridine nucleotide, in its oxidized form (hereafter abbreviated to DPN) in the prevention, alleviation and removal of the acute and chronic symptoms of drug addiction. The forms of addiction which have responded successfully in a dramatic manner to this coenzyme therapy by total, immediate and permanent discontinuance to-date are as follows: heroin, opium extract (Pantopon), morphine, dihydromorphine, meperidine, codeine, cocaine, amphetamines, barbiturates and tranquilizers.

The duration of addiction of the patients treated thus far varied from 2 to 28 years. The dosage the patients were taking varied in direct proportion to the adequacy of the supply but all exceeded accepted dosage. All had previously made sincere efforts to stop using the addictive drugs but had met with violent withdrawal symptoms and, therefore, had continued their use. A majority of the patients became addicted as a result of using drugs for the relief of pain. Some, however, started either for a 'lift' or to obtain rest.

Pharmacology and Physiology

The coenzyme DPN is distributed normally throughout the tissues of the body. The highest concentration is normally in the liver. Its main function is to act as a hydrogen carrier in anaerobic and aerobic oxidation and fermentation processes throughout the body.

It was first isolated in pure form by von Euler in 1936. *In vitro*, experiments have shown it to be important in the dehydrogenation of acetaldehyde, an important step in the metabolism of alcohol. The inhibition of respiration of rat brain cortex slices by low concentrations of acetaldehyde was shown to be abolished by addition of DPN.

Its action in opiate addiction is not known.

Technic. 500 to 1000 mg. of DPN is added to 300 cc. of normal aqueous saline and is administered slowly by intravenous drip, at the rate best tolerated by the patient. The rate of tolerance varied from 5 to 35 drops

per minute and averaged about 28 drops of solution per minute. The author recommends that the rate of 35 drops per minute should not be exceeded. Care should be taken when first starting the intravenous solution that this rate is not exceeded because, if properly administered, the patients have suffered no distress whatsoever. If the solution is administered too rapidly, the patients complain of headache and shortness of breath, which quickly disappear when the rate of flow is sharply curtailed. Then the rate can be increased slowly to the point of comfortable tolerance.

The author has previously reported the successful use of DPN in the treatment of acute and chronic alcoholism. In the administration of nearly 1000 Gm. to more than 100 patients there has been no toxic effect whatsoever; from the coenzyme DPN in its oxidized form, when administered at a speed tolerated by the patient.

The alcoholic patients were all treated on an in-patient basis, but the drug addicts have been treated as both in-patients and out-patients, depending upon the severity of their case. Currently, the following treatment schedule is being utilized: the patient receives 500 to 1000 mg. of the coenzyme, in the manner described, daily for 4 successive days. Once the coenzyme treatment is begun, no further use of narcotics, sedatives or tranquilizing drugs should be permitted. There is little to be gained by replacing one addictive drug with another, and in the author's experience, if the coenzyme is used frequently enough and in adequate dosage, such replacement is not necessary while achieving complete permanent withdrawal of the addictive drug. If any withdrawal symptoms persist after the 4 days, additional days of treatment can be given, but otherwise the injections are reduced to twice weekly for one month and then a maintenance dose of one injection twice monthly until the patient and the physician are satisfied that the addiction has completely disappeared.

The patient should be instructed that if any nervousness or other withdrawal symptoms recur, he should return immediately for further coenzyme therapy.

Results. Complete, immediate and permanent withdrawal of all addictive drugs has been achieved to date in this group of patients by means of this treatment. However, as in all therapies of addiction, several years' follow-up is necessary before final evaluation is possible.

The following case reports serve as illustrations of what is meant by the more difficult patients.

Case Reports

Case 1. This male, aged 52, was involved in a serious accident 28 years ago in which he sustained multiple and very severe permanent abdominal injuries. As a result of the multiple surgical procedures (32 in all) and the painful protracted period of convalescence, the patient became addicted to opium alkaloids. Before coenzyme therapy was instituted he was taking from 4 to 12 infections of opium extract daily, of maximum dosage with $\frac{1}{2}$ grain of codeine added, in order to control the severe bladder spasm and abdominal pain which everyone attributed to the patient's serious abdominal injuries. In addition to this, the patient was receiving prostigmin injections, a.m. and p.m., in order to overcome the serious bowel stasis and obstipation which were otherwise present. During the 28 years, the many attempts to reduce and withdraw the drug were met with such violent, severe and overwhelming withdrawal symptoms, that all hope had been abandoned by all parties concerned for achieving complete permanent withdrawal.

Following the institution of coenzyme therapy the patient rapidly improved and lost his craving for opium after the first treatment with DPN. The bladder pains disappeared and his urine output was doubled. His appetite rapidly improved, he had no nausea and slept exceptionally well. Regular bowel movements began without artificial stimulation and the prostigmin was discontinued.

The patient's general physical condition is greatly improved. He is completely free from any craving for opium and he sleeps well. And now, after 28 years, he is contemplating leaving the hospital and returning to his home.

Case 2. This man, aged 46, had been addicted to heroin for the past 5 years. Before starting coenzyme therapy,

he was taking a mixture of heroin and cocaine intravenously twice daily. Figure 1 shows the scarring which this irritating mixture produced in the veins of his upper extremities (not shown).

Frequent attempts to discontinue the use of the drugs produced the following withdrawal symptoms to a severe degree: sweating, nausea, diarrhea, cramping of the lower extremities, blurring of vision, severe vasomotor rhinitis (with sneezing spells which were marked in duration and severity), profound weakness, pounding heart, anorexia (so severe that food was nauseating), sleeplessness (in spite of a feeling of exhaustion), night sweats (so severe the bedding would be saturated), hot flashes followed by cold seats throughout the day, persistent 'lump' in his throat (sometimes assuming proportions of pharyngospasm), and severe anxiety, approaching panic, accompanied by deep and prolonged psychic depression. The patient stated that during periods of enforced abstinence from the drug all of the above symptoms persisted. They decreased only in the degree of intensity, but never sufficiently enough to enable the patient to discontinue the use of the drugs.

Since the first coenzyme treatment, the patient has been completely free from the craving for addictive drugs of any kind. He has received no opiates, sedatives or tranquilizers. His general health has improved remarkably and he describes his appetite as excellent and his bowel habits as regular. During the time he was taking the drug, he stated that it was frequently a week between bowel movements and these were only achieved with violent cathartics or enemas.

He is completely free from all craving, has returned to work and has an excellent attitude and outlook for the future.

Other addictions involving the use of Demerol, Dilaudid, codeine, barbiturates and tranquilizers responded in a very similar manner.

Discussion

The author is optimistic for several reasons about the use of the coenzyme, diphosphopyridine nucleotide, in the treatment of drug addiction. First, the treatment permits the complete, immediate and permanent withdrawal of addictive drugs without the patient experiencing the 'agony of withdrawal' previously described. Thus, the physician desiring to treat the addicted patient does not need to 'traffic' in addictive drugs as was previously

necessary with the gradual withdrawal technic. This removes the onus and possible stigma to the physician for helping these sick people.

This attitude of fear prompted Russo to write as follows: "There is no courage in the habit of outright refusal (on the part of the physician) to treat drug addicts. Some form of reeducation is due all doctors who feel they can turn on addicts and shoo them out of the office like unwanted animals. We owe it to the medical profession itself to bring this sad state of circumstances into clearer understanding and care, that these patients have at least an equal chance to get well as to get caught... At the present time there is no positive way to help in the hoped-for cure."

The coenzyme treatment makes available to the physician a 'positive way' to help in the hoped-for cure.

Another advantage is that because of the rapid manner in which the coenzyme removes the physiologic symptoms of addiction, the therapist can readily 'screen' out those patients suffering from gross personality or character disturbance, from the unfortunate individuals whose addiction followed protracted utilization of some drug for the relief of physical pain. It is sincerely hoped that such screening will help to clarify such positive statements as that made by Williams who writes "...emotional disorders are almost without exception the cause, or a major contributing factor, in drug dependence."

This certainly has not been the author's experience in the treatment and management of 11,000 alcohol addicts, where disturbed neuro-physiological response to alcohol has been shown to be the major cause in the vast majority of cases, with emotional disorders playing a secondary role. Additional evidence of this disturbed neurophysiology was demonstrated by electroencephalographic studies done in connection with coenzyme therapy. It is possible that such disturbed neuro-physiology could play the major role in drug addiction. If not, why the dramatic effect of the coenzyme? Time and objective analysis alone will tell. In any event, the author has found that the coenzyme, by removing the craving and the symptoms of withdrawal, greatly enhances the possibility of successful psychotherapy in those patients possessing personality or character disturbances. Finally, this type of treatment makes it possible for the estimated millions of addicts in the world today, to seek

help from their family physician and escape the underworld parasites who prey upon their misery by extracting from their victims from \$500.00 to \$1000.00 an ounce for the illegal drugs.

Conclusions

1. The author has successfully utilized diphosphopyridine nucleotide in the prevention, diagnosis and treatment of 104 cases of drug addiction.
2. Complete, immediate, total and permanent withdrawal can be achieved and maintained by proper administration and dosage of the medication.
3. Withdrawal is achieved with very few (and in some cases none) of the characteristic withdrawal symptoms, usually experienced with other treatments currently utilized.
4. Addictions treated in this series include: heroin, opium, morphine, meperidine, codeine, alcohol, methadone, cocaine, amphetamines, barbiturates and tranquilizers. Craving for the addictive drug, even heroin and opium, is completely removed.
5. Evidence strongly suggests that complete freedom from craving can be sustained by administration of the coenzyme at proper dosage and intervals, through a continuing program of management (as in diabetes).
6. The author believes the coenzyme will be a valuable adjunct in patients in whom some psychotherapy is needed, by removing the symptoms of physical addiction.
7. A remarkable improvement in the general physical condition, neurologic function, emotional and mental attitude of the patients treated thus far, has been noted.
8. No toxic reactions or side-effects from the diphosphopyridine nucleotide have been noted to-date, when administered in the proper dosage at the proper rate.
9. It should be thoroughly understood that the use of this coenzyme is in no way intended to enable addicts to continue use of the addicted drug. Rather, its use is aimed at restoring their health, removing the craving for the addictive drug and in assisting them in completely abstaining from their use.
10. Coenzyme therapy offers the family physician a practical way to treat drug addiction.

