Drug After Effects and Traffic Safety

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The relevance of alcohol and other drugs to traffic safety has been studied from many perspectives and a great deal of information has come to light. The emphasis, however, has been on the presence of drugs in the body and their consequent influence on behavior related to driving. If we are to understand the total picture regarding drugs and traffic safety, we must consider the after effects, that is, the effects on behavior which persist after the drug has been eliminated from the body.

The offset of alcohol effects have been studied to some degree and no one would be surprised to find that the presence of frank convulsions, hallucinations, and other dramatic manifestations of alcohol withdrawal syndrome would impair driving. However, the occurrence of this phenomenon is relatively rare. What is important, though, are the effects which are not as salient but which are nonetheless disruptive to driving skills. In today's world where drug taking (whether it be coffee, cigarettes, barbiturates, marijuana or alcohol) and driving are an everyday occurrence, there is a pressing need to examine more closely these subtle 'hangover' effects.

For example, studies have shown (8, 10, 14, 20) that even after a single exposure to alcohol there are important decrements in performance which can be seen 12 to 18 hours later when the blood alcohol level is zero. Similar studies (12, 23) have investigated the effect of alcohol on REM sleep which, in turn, can be shown to impair concentration, induce anxiety and detrimentally affect the vestibular-ocular reflex (6, 7).

Other drugs such as sedative-hypnotics, tranquilizers and marijuana (21, 24) have been shown to cause similar sleep disturbances to varying degrees. This rather indirect after-effect of drugs poses a real danger in terms of traffic safety. It is increasingly common for physicians to warn their patients if these drugs are prescribed, and for the manufacturers of over-the-counter drug preparations to warn the user of the possible detrimental effects regarding the operation of machinery, including automobiles. The warning about potential offset effects is very rarely given.

The hallucinogens present another important potential disturbance that outlasts the presence of the drugs. There is reliable documentation of the so-called flashback phenomenon for LSD (13, 19) and to a lesser extent, marijuana (1, 11). Whether this recurrence of some of the characteristic drug effects is explained by conditioning paradigms or physiological mechanisms is not important. With the widespread use of

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marijuana there are definite implications here concerning traffic safety. The flashback phenomenon is probably so rare as to be largely academic, though it might be useful in explaining certain traffic accidents which otherwise seem inexplicable.

The ingestion of nicotine in cigarettes and caffeine in assorted beverages has been shown to produce tolerance and dependence (2, 4, 9, 10). Termination of the use of these compounds, whether for health or other reasons, produces physiological and psychological disturbances. In this regard, most people can look to their own experience. The disturbance of mood, autonomic and motor function that you see or have experienced are real and detrimental to traffic safety (18).

There is another class of offset effect which is very important. A small and certainly controversial body of data is accumulating which indicates that chronic exposure to drugs may produce permanent or semi-permanent brain damage. We are all aware of the varieties of brain syndromes associated with the chronic use of alcohol. These disorders may involve gross damage with brain atrophy or more subtle damage with confusion and loss of memory as the key symptoms. In any case, these phenomena are certainly detrimental to driving.

Opiates have recently been shown to be involved in cell destruction in a deep nucleus of the brain, the globus pallidus (15). The globus pallidus plays a role in autonomic activity and motor function.

The phenothiazines, long used effectively in the management of some mental disorders, produce some motor dysfunction. This was believed to be annoying while present, but completely reversible upon termination of medication. Recently, however, a motor disorder — tardive dyskinesia — has been shown to develop and persist after medication has been stopped (5).

Cannabis has also been implicated in brain damage with protracted use (3). If these data stand up, then cannabis users will probably be the second largest of the drug-induced brain damage group. Stimulants have been shown to produce deterioration of the brain's blood vessels (16, 17). Here again are definite implications for traffic safety.

Industrial exposure to chemicals and metals is another area of potential hazard (22). The recent lead exposure publicity in Toronto makes us more aware of the potential dangers to workers and neighbouring residents alike. The long-term effects of industrial toxicity are equally implicated when one considers driving skills. Up until this time there has been very little direct investigation of the effects of industrial toxicity on skills related to driving, but there seems to be a growing awareness of the need for such research.

In summary, drugs may be said to produce three main disturbances which persist after the drug has disappeared.

1) The withdrawal phenomenon which varies from chemically important to barely detectable by sophisticated technology.

2) After effects exemplified by the LSD and marijuana flashbacks.

3) More permanent brain damage which varies in intensity from the dramatic brain shrinkage produced by alcohol to the "amotivational syndrome" said to be produced by cannabis. This category includes the insidious effects of environmental and industrial chemicals as well.

Even though it is difficult to research this field with respect to the absolute involvement in vehicular safety of the absence of various drugs, there are some steps which can be considered, given the data accumulated to date.

The consequences of the withdrawal effects of drugs can be partly countered by an educational program for clinicians, manufacturers, and the public as to the
potential risks. It is to be hoped that this will result in an awareness that the period of risk in drug use extends beyond the duration of drugs in the body and that behavior should be governed accordingly.

The third class of drug after-effects requires some consideration with respect to automobile licensing practices. Currently in Canada a driving license, once issued, is renewable without testing for one's adult life. As the data accumulate, thought should be given as to whether the chronic drug or alcohol user, even if he becomes abstinent, should be denied the right to drive at all or at least have that right restricted in some way.

REFERENCES


