

**ADVICE TO
THE EXPERT ADVISORY COMMITTEE ON DRUGS
ON:**

LSD (D-LYSERGIC ACID DIETHYLAMIDE)

August 2009

Prepared by the Ministry of Health

EXECUTIVE SUMMARY

At its meeting of 7 May 2009, the Expert Advisory Committee on Drugs discussed an overview of the different classes of hallucinogenic substances provided by the Secretariat. Following this discussion, the Committee requested that the Secretariat prepare a detailed assessment of the hallucinogen LSD.

The purpose of this paper is to provide the EACD with an assessment of LSD in accordance with section 4B(2) of the Misuse of Drugs Act so that the Committee can decide whether the current classification is appropriate or recommend an amendment to the classification.

- LSD (d-lysergic acid diethylamide) is a semi-synthetic hallucinogen.
- LSD is scheduled as a Class A controlled drug under the Misuse of Drugs Act 1975.
- Life-time use of LSD remains at around 8-9% but last year use has fallen from 3.9% in 1998 to 1.8% in 2006. Provisional results from the 2007 Alcohol and Drug Use Survey confirm this downward trend.
- 2,088 tickets of LSD were seized by Police and Customs during 2008.
- In 2008, there were 38 hospital admissions for hallucinogens, including LSD.
- The effects of LSD include physical and psychological changes, sensory distortion, and alterations in mood. Effects depend upon the dose, individual, expectation of the user, and environment.
- Harms include accidents, frightening sensory distortions, hallucinations, exacerbation of existing psychiatric conditions, and flash backs.
- LSD has been trialled and used in the treatment of personality disorders, affective disorders, alcohol dependence, and for anxiety associated with terminal illness.
- Fatalities associated with LSD ingestion are rare.
- There is no evidence that LSD is addictive.
- In the UN drug conventions, the USA and the UK, LSD is classified in the highest schedule.

SUBSTANCE IDENTIFICATION

Chemical Name(s)

International non proprietary name	(+) - Lysergide
Other non proprietary or trivial name	LSD, LSD-25
Chemical name	9,10-didehydro-N,N-diethyl-6-methylergoline-8beta-carboxamide

1. As listed in the First Schedule of the New Zealand Misuse of Drugs Act 1975.
 - Lysergic acid – essential precursor for manufacture of LSD
 - Lysergide - N,N-diethyllysergamide or lysergic acid diethylamide
2. LSD was first synthesised in 1938 by the Swiss chemist Albert Hofmann who was investigating the medicinal properties of ergot, a fungus that attacks rye. Ergot of rye is produced by the fungus *claviceps purpurea*.
3. Although ergot has led to mass poisonings over the centuries through contaminated grain and bread, the medicinal uses of ergot in midwifery have been referred to since the Middle Ages. Lysergic acid was isolated from ergot alkaloids in the early 1930s by W Jacobs and LC Craig at the Rockefeller Institute. In the late 1930s, Hofmann systematically reacted lysergic acid with different reagents and produced LSD-25. Initially Hofmann saw no medicinal use for LSD-25 until 1943 when he accidentally ingested LSD and experienced its psychedelic effects.
4. Research on the therapeutic uses of LSD began in the fifties. LSD also became widely used as a recreational substance during the sixties. LSD became a prohibited substance in the seventies and research was abandoned.
5. LSD is sold in the form of impregnated paper (blotters/trips), microdots, thin squares of gelatine (window panes), or impregnated on sugar cubes. Stamps or blotters are the common dose form. They are made by impregnating paper with a solution of LSD in alcohol. These papers are "trade marked" with various designs.

SIMILARITY TO KNOWN SUBSTANCES

6. LSD is a semi-synthetic hallucinogen and belongs to a class of indolealkylamines which are structurally similar to the neurotransmitter serotonin and act through the serotonin system¹. This class of hallucinogens also includes psilocybin, psilocin, bufotenine and dimethyltryptamine (DMT).

CURRENT CLASSIFICATION

7. LSD is currently classified within the New Zealand Misuse of Drugs Act 1975 as a First Schedule (Class A) controlled drug. The presumption for supply is two and a half milligrams or more of lysergide, or 25 or more flakes, tablets, capsules, or other drug forms each containing some quantity of lysergide.

PREVIOUS CONSIDERATION BY THE EACD

8. LSD was first considered by the EACD in 2003 when the Committee recommended no change to its classification. At this meeting, the EACD requested additional papers which subsequently led to a discussion about

¹ WHO, 2004.

anomalies in the scheduling of certain Class A substances. A further paper was requested by the EACD to compare LSD with methamphetamine.

9. In 2006, the EACD agreed that LSD does not appear to be as harmful as many other Class A drugs, especially methamphetamine. However, members also agreed that LSD is not alone in this respect and there are other anomalies in the classification of substances, probably for historical reasons. It was decided that there would be no recommendation to change the classification of LSD, however, the EACD agreed to investigate obligations under the UN Conventions and learn from the experiences of other jurisdictions about ways of classifying and controlling drugs.

OPTIONS

10. The options available to the EACD to consider in the assessment of LSD are:

- Status quo. If the EACD considers that LSD poses a very high risk of harm to individuals and society, then it is appropriate that LSD remains a Class A controlled drug.
- Change to the classification of LSD. If the EACD considers that LSD poses a high risk of harm then a recommendation to move LSD to Schedule II Class B would be appropriate. If the EACD considers that LSD poses a moderate risk of harm, then Schedule III Class C would be the appropriate classification.
- Change to the classification of LSD to a restricted substance. This would be an option to retain controls over the availability of LSD but allow regulated access and use.
- Request for further research or information from the Secretariat to consider at a future meeting of the EACD.

LIKELIHOOD OR EVIDENCE OF ABUSE

New Zealand prevalence data

11. It is evident that in spite of relatively high “ever used” rates for LSD, current use has been falling for several years. Provisional results from the 2007 Alcohol and Drug Use Survey confirm this with last year use of “LSD/DMT and other synthetic hallucinogens” at 1.2% (for 16-65 year olds).

NEW ZEALAND NATIONAL HOUSEHOLD DRUG USE SURVEYS ²				
LSD				
	1998	2001	2003	2006
Ever Tried	8.9%	9.7%	8.1%	8.5%
Last Year Used	3.9%	3.2%	1.9%	1.8%
Last Month Used	1.0%	0.5%	N/A	0.4%

² Wilkins et al, 2007.

12. The 2007 Illicit Drug Monitoring System (IDMS) reported that the availability of LSD varied from being "difficult/easy" with the frequent methamphetamine users being more likely to say that the availability of LSD had become "more difficult" in the past six months. Overall, the number of people who were using LSD was described to be about the same from 2006 to 2007, with the prices and strength of LSD reported to be "stable" and "stable/fluctuating" respectively. Of note is that the IDMS recognised that, while overall the number of people using seemed to be stable, there appeared to be some increase in use among those in the dance party community.
13. According to the NZ Police Arrestee Drug Abuse Monitoring (NZ-ADAM) 2007, of those who participated in the programme 52% self reported that they had ever used hallucinogens and of those 61% tried them under the age of 18. Only 7% had used hallucinogens in the month preceding arrest and 1% in the 48 hours preceding arrest. Compared to other substances, particularly alcohol, there were very low self reports of feelings of anger, dependence or impaired driving associated with hallucinogens³.
14. In 2008, ESR reported to the EACD an increase in LSD submissions and an increase in other novel/obscure hallucinogenic substances, including Bromo-LSD.

New Zealand arrest and interdiction data

15. The limited market of LSD in New Zealand appears to be supplied through international trafficking rather than domestic production and is characterised by peaks and troughs. The table below highlights seizures made by Police and Customs over the past four years⁴:

LSD	2005	2006	2007	2008⁵
Number of Seizures	40	69	41	36
Amount seized (tickets)	1,529	3,483	1,031	2,088

16. The National Drug Intelligence Bureau (NDIB) has noted that in 2006, in addition to smaller seizures, there were 3 significant seizures totalling 2155 tickets.
17. The current street price for a retail tab of LSD is approximately \$15-\$40; while a wholesale tab sells for around \$15-\$25.

Hospital Data

18. According to hospital admission data from 2007, there were 59 hallucinogen-related admissions, including LSD; 25 as the principal diagnosis and 34 as the secondary diagnosis. Eight of the admissions were for LSD poisoning and 20 for harmful use including five for dependence.
19. According to provisional data from 2008, there were a total of 38 hospital admissions for hallucinogens, including LSD; 16 as a principal diagnosis, and 22 as a secondary diagnosis.

³ NZ-ADAM, 2007.

⁴ NDIB. 2008.

⁵ provisional data provided by National Drug Intelligence Bureau.

International trends

20. According to the data from the 2008 EMCDDA Annual Report⁶, LSD use and trafficking is still considered marginal, although seizures in Europe are possibly suggestive of a revival in interest in the drug in the last few years. After a long-term downward trend dating back to the 1990s, both the number and the quantity of seizures increased from 2003 but might be declining again⁷. LSD retail prices (adjusted for inflation) have been slightly declining since 2001, and ranged in 2006 between EUR 5 and EUR 11 per unit in most European countries. Last year use in Europe ranges from 0.3 to 3%.
21. In Australia, according to a national study of injecting drug users, 72% reported having used hallucinogens at some stage in their life. However, recent use and frequency of use were low, with 9% reporting use in the six months prior to interview. The same study reported that LSD was the main hallucinogen used (67% of hallucinogen users or 6% of the entire sample)⁸. LSD detections at the Australian border remain a rarity - there have been a total of 28 detections since 1999. There were four Customs detections of LSD in 2006–07, one more than the previous year.

SPECIFIC EFFECTS OF LSD

22. LSD bears a structural resemblance to serotonin and is thought to act on the serotonin system, especially the 5-HT₂ and 5-HT_{2A} receptors. It is thought that the process by which LSD alters mood and perception is through the pontine (dorsal) raphe. This is where incoming sensory stimuli are filtered and it is believed that hallucinogens might interrupt the filtering and allow a surge of sensory data making the familiar seem novel.
23. LSD is normally ingested orally by placing a “ticket” or other dose unit on the tongue and absorbed through the mucous membrane. LSD can be mixed with liquids and consumed with food. It can also be absorbed through the skin or the eye. LSD cannot be ingested by smoking.
24. Approximately 30 to 60 minutes after ingestion the initial effects are felt. It may take up to 12 hours for the effects of the drug to wear off. The effects of an equivalent dose vary depending on the individual, the expectation of the user and the context of use.
25. The effects of LSD ingestion include the following:
- Somatic symptoms: dizziness, weakness, tremors, increased blood pressure, pulse rate, temperature and respiration. The pupils dilate and there is an increase in salivation.
 - Perceptual symptoms: distorted sensory perception affecting the sense of distance and time; there can be an increase in the perception of sound and colour, and less commonly synaesthesia.

⁶ EMCDDA, 2008.

⁷ This was provisional on data from the UK (the highest users in Europe) which was unavailable at the time of publication.

⁸ Illicit Drug Data Report 2006-07 http://www.crimecommission.gov.au/html/pg_iddr2006-07_revised.html

- Psychic symptoms: alterations in mood, tension, depersonalisation, dreamlike feelings and visual hallucinations. LSD can affect concepts of reality and a person's views of life and death⁹.

26. LSD is highly potent and measured in micrograms (one millionth of a gram). A gram weight of pure LSD is sufficient to contain the equivalent of 20,000 doses of 50 micrograms each. A dose unit of 20 micrograms is enough to produce detectable effects¹⁰. In the USA during the 1960s and early 1970s, LSD potency generally ranged from 100 to 200 micrograms per dose. Since the mid 1980s doses are generally between 20 to 80 micrograms.

RISKS TO PUBLIC HEALTH

27. LSD can distort the perception of time and space which makes driving a public health risk. LSD use has been linked with accidents from trying to fly, or other activities associated with impaired judgement. Ocular damage has been reported from staring at the sun¹¹.

28. Risks to the user depend on the dose of LSD, the environment in which the drug is used, and the personal circumstances of the user. Psychological complications include amnesia, frightening sensory distortions, hallucinations, and the exacerbation of pre-existing psychiatric conditions. There have been instances recorded of LSD users suffering periods of psychotic episodes following use of LSD¹². Early research about the risk of psychosis reported a rate of 0.8 per 1000 non-patient participants and a rate of 1.8 per 1000 patients undergoing psychotherapy¹³.

29. There is also the potential for flash backs which are a spontaneous and fragmentary recurrence of a previous LSD experience, and may occur weeks, months, or years after the last usage. These are generally not considered to be troubling or impairing. Less commonly people experience hallucinogen persisting perception disorder (HPPD) when the perceptual effects reminiscent of the acute LSD experience are clinically distressing or impair functioning¹⁴.

THERAPEUTIC VALUE

30. Although there was initial interest in the medicinal properties of LSD, research stalled in the seventies when the use of LSD was prohibited. By 1965, over 2000 papers had been published describing positive results from the use of hallucinogens, including LSD, for 40,000 patients with a variety of conditions¹⁵. Many of these studies have been criticised for their lack of empirical rigour and results based on anecdotal accounts rather than controlled studies¹⁶. Clinical research with LSD has the potential to be challenging owing to multiple factors which affect the effects of the substance on the user, including environment and expectation of the user¹⁷.

⁹ Nichols, 2004.

¹⁰ Laurie 1978

¹¹ Nichols, 2004.

¹² Laurie, 1978.

¹³ Johnson, Richards and Griffiths. 2008 citing Cohen 1960

¹⁴ Johnson, Richards and Griffiths. 2008.

¹⁵ Sessa. 2005.

¹⁶ Johnson, Richards & Griffiths. 2008. & Sessa. 2005.

¹⁷ Nichols, 2004.

31. LSD was used therapeutically during the 1950s as a psychiatric drug and as an experimental model for schizophrenia. LSD was used in psychotherapy in two types of treatment. The first was a psycholytic (“mind loosening”) psychotherapy involving taking low doses of LSD on an on-going basis. The second was a psychedelic therapy (“mind manifesting”) using preparatory sessions without LSD followed by an intense large-dose followed by further non-drug sessions to explore the meaning of the material that emerged¹⁸.
32. LSD has also been trialled in the treatment of alcoholism and other substance dependence and more recently in the treatment of personality disorders and affective disorders¹⁹. During the sixties, hallucinogens were trialled in the treatment of severe autism in children resulting in improved speech, greater emotional responsiveness and decreases in obsessive-compulsive behaviour²⁰.
33. During the sixties, research was conducted using LSD in the treatment of psychological suffering associated with cancer. Following treatment, patients reported a sense of peace with approaching death and an ability to discuss fears - effects which out-lasting the acute drug effects²¹. This research is currently being recreated in Switzerland for patients who have life-threatening illnesses and are experiencing associated anxiety. The End of Life study will evaluate LSD-assisted psychotherapy in twelve subjects with advanced-stage cancer and other life-threatening illnesses. This study will complement similar research using MDMA and psilocybin to treat cancer patients²².
34. A number of organisations including the Beckley Foundation, the Multidisciplinary Association for Psychedelic Studies (MAPS), the Heffter Research Institute and the Albert Hofmann Foundation fund, encourage and coordinate research into the medicinal use of hallucinogens, including LSD.

POTENTIAL TO CAUSE DEATH

35. The LD50²³ varies according to species from 0.1mg/kg in elephants to 46mg/kg in mice.
36. LSD’s potential to cause death is principally as a result of misadventure and suicide. Only a few cases of death related to the toxic effects of LSD have been reported internationally and may be related to over-activity of the adrenal gland²⁴. An effective dose of LSD is around 25-50 micrograms; the lethal dose in humans is approximately 14,000 micrograms²⁵.

ABILITY TO CREATE DEPENDENCE

37. There is no evidence that LSD is physically addictive or of withdrawal associated with LSD²⁶. Hallucinogens are not self-administered in monkeys²⁷. In common

¹⁸ Sessa. 2005.

¹⁹ Sessa. 2005.

²⁰ Sessa. 2008

²¹ Johnson, Richards & Griffiths. 2008.

²² <http://www.maps.org/research/>

²³ The LD50 is the **lethal dose in 50% of those who ingest this much.**

http://www.erowid.org/chemicals/lsd/lsd_dose.shtml

²⁴ Blaho et al 1997

²⁵ Julien, 2005.

²⁶ WHO, 2004

²⁷ Julien. 2005 & Johnson, Richards and Griffiths. 2008.

with other hallucinogens, the body quickly develops a tolerance to LSD, generally within three to six days of continued use. Further use of LSD will have little effect on the user until the tolerance has been reduced by abstinence for several days²⁸. Long-term chronic use is unusual and use is generally episodic²⁹.

INTERNATIONAL CLASSIFICATION AND EXPERIENCE IN OTHER JURISDICTIONS

United Nations Commission Scheduling

38. LSD is incorporated within Schedule I of the 1971 Convention on Psychotropic Substances, which includes drugs claimed to create a serious risk to public health, whose therapeutic value is not currently acknowledged.

USA

39. LSD is classified within Schedule I of the Federal Controlled Substances Act (CSA) 1970. Schedule I drugs are considered to have a high potential for abuse and to have no medical value.

UK

40. LSD is classified as a Class A controlled drug within the Misuse Use of Drugs Act 1971. The scheduling of hallucinogens, including LSD has been criticised as anachronistic by Nutt et al in their 2007 article in The Lancet. In their ranking of 20 drugs according to risk of harm, LSD was ranked at 14 out of 20 and less harmful than alcohol, tobacco, and cannabis.

²⁸ WHO. 2004.

²⁹ Nichols, 2004.

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