MEDICAL PRACTICE

Contemporary Themes

Knowledge and experience of young people of drug abuse 1969-84

J D WRIGHT, L PEARL

Abstract

An anonymous questionnaire survey of the knowledge and experience of drug abuse among fourth year pupils in three Wolverhampton secondary schools in 1969, 1974, 1979, and 1984 showed familiarity with the names of drugs but considerable ignorance and misunderstanding about how the drugs were taken and their dangers. The proportion of pupils who knew someone taking illicit drugs almost doubled over the period from 15% in 1969 to 28% in 1984, and the proportion of those who had been offered illicit drugs almost trebled, from 5% in 1969 to 14% in 1984. Television remained the most important source of information about drugs. Peer group and social pressures continued to be the most important reason for starting to take drugs.

The results of this study endorse the need for continued evaluation of programmes of education about drugs. Such programmes must be part of a wider programme of health and social education, define clear goals, and be sensitive to culture, locality, and ability.

Introduction

"The misuse of drugs is one of the most worrying problems facing our society today," stated the government's report *Tackling drug misuse*.¹ The worsening problem in Britain, as emphasised in several reports,^{2,4} is reflected in Wolverhampton, where the number of

known opiate addicts increased from three in 1969 to 55 in July 1985.

In Wolverhampton young people's knowledge and experience of drugs has been monitored by surveys every five years since 1969. The surveys were carried out to determine what young people in Wolverhampton knew about drugs, so that a realistic programme of health education could be planned. The follow up surveys in 1974 and 1979 reported appreciable changes in the knowledge and experience of the young people surveyed.^{5,6}

Methods

To preserve consistency and permit valid comparisons the format of the questionnaire used in the 1984 survey was the same as that used in the three previous ones.^{5,6} The survey was carried out among 540 boys and girls of mixed ability in the fourth year of three Wolverhampton schools, one in a socially deprived area, one in a more affluent area, and the third between the two others. The questionnaire included open ended and ticked replies. The pupils had no prior knowledge of the survey, and the staff were excluded throughout.

Whereas many surveys ask the respondents directly if they have ever taken drugs, in 1969 the indirect questions "Do you personally know anyone taking drugs?" and "Have you ever been offered drugs?" were thought more likely to produce reliable answers.

Results

Roughly similar proportions (93% in 1969, 86% in 1974, 92% in 1979, and 94% in 1984) answered the question "What drugs taken by addicts do you know?" (Hereafter, whenever comparisons are made in the text the percentages will be listed in the year order 1969, 1974, 1979, and 1984.) Table I shows how the frequency with which drugs were mentioned changed over the 15 years. Solvents were mentioned for the first time in 1979 and phencyclidine for the first time in 1984.

Wolverhampton Health Authority, Community Health Services, Wolverhampton WV2 4DB

J D WRIGHT, MB, FFCM, specialist in community medicine

Wolverhampton Polytechnic, Wolverhampton

L PEARL, BSC, DPHIL, principal lecturer in statistics

Correspondence to: Dr Wright.

TABLE I—Number (%) of young people who mentioned each drug when asked what drugs taken by addicts they knew

	1969	1974	1979	1984
Total No in sample	471	523	648	540
No (%) who replied	439 (93)	450 (86)	598 (92)	509 (94)
Drugs known:				
Cannabis	425 (98)	380 (84)	448 (75)	399 (78)
Opiates	391 (91)	314 (70)	495 (83)	393 (77)
Cocaine	61 (15)	(86) (19)	299 (50)	303 (60)
Solvents	0	0	50 (8)	104 (20)
Lysergide	351 (87)	219 (49)	190 (32)	47 (9)
Barbiturates	4 (1)	35 (8)	57 (10)	26 (5)
Phencyclidine	0	0	0	12 (2)
Amphetamines	196 (44)	65 (14)	46 (8)	10 (2)

Although almost three quarters of the sample in 1984 answered the question "What dangers do you know of each of these drugs?" there was still considerable ignorance and misunderstanding of the effects of the drugs. Table II shows the dangers of five of the drugs mentioned. In 1984 considerably fewer pupils than in previous years mentioned dangers of amphetamines and barbiturates. Very little was known of the dangers of phencyclidine. Table II also gives the percentages of pupils who correctly specified how the drugs they had mentioned were taken.

Almost the whole sample (97%, 99%, 99%, and 99%) answered the question "Do you personally know anyone taking drugs?" The percentage of positive replies was 15%, 23%, 21%, and 28%, respectively. The increase was significant between 1969 and 1974 ($p<0.005$) and between 1979 and 1984 ($p<0.005$). Again, almost the whole sample (98%, 98%, 99%, and 99%) answered the question "Have you ever been offered drugs?" The percentages of positive replies were 5%, 10%, 10%, and 14%, the increase between 1979 and 1984 being significant ($p<0.05$). Table III shows the drugs offered to the respondents or people they knew, and table IV shows the places where the drugs were offered. There was a good response to the question "Why do you think young people take these drugs?"; table V summarises the pupils' replies.

Almost the whole sample (98%, 99%, 99%, and 94%) replied to the question "Where did you first hear about drugs?" The questionnaires were completed before the pupils had received any formal health education on the subject. Over the 15 years television remained the predominant source of information (75%, 73%, 71%, and 82%) but newspapers became less important as a source (45%, 28%, 23%, and 28%). Other sources mentioned in 1984 were (in order of rank) parents 12%, friends 12%, talk in school 8%, radio 6%, and books 5%.

Preliminary cross analyses yielded a mixture of obvious and unexpected results. The socioeconomic differences between the three schools were reflected in the pupils' replies when asked what drugs they knew that were taken by addicts. There were no

significant differences, however, between the three schools in pupils' replies when asked whether they personally knew anyone who took drugs or whether they themselves had ever been offered drugs. A breakdown of the total sample by the replies to these two questions in turn showed obvious differences between pupils—for example, those who reported knowing someone taking drugs gave the names of more drugs in answer to the first question (roughly one more, $p<0.001$).

Discussion

These results should be interpreted in the context of social, legal, and medical changes over the 15 years. Coverage of drug taking by the mass media has also changed, from the hysterical headlines of the late 1960s to a more low key approach in the 1970s and, finally, to a greater coverage, particularly in the local press (Institute for the Study of Drug Dependence, personal communication, 1985), in the early 1980s, initially about solvents and recently about opiates.

KNOWLEDGE AND EXPERIENCE OF DRUG TAKING

Table I clearly shows an interesting trend, with cannabis (the most widely taken illicit drug) being the drug most commonly mentioned in 1984, though less so than in the late 1960s. In view of media coverage it is surprising that in 1984 heroin was mentioned by only 77%, whereas cocaine showed a significant increase, being mentioned by 15% in 1969 and 60% in 1984. Of those who mentioned dangers of drugs, only 31% mentioned that opiates could kill and 16% that they could cause addiction or dependence (table II). More and reasonably accurate information was given about cocaine in 1984 than in previous years. Solvent abuse among schoolchildren has increased throughout the country since 1970 and in Wolverhampton since the late 1970s.^{7,8} This is reflected by the fact that solvents, first mentioned by 8% in 1979, were the fourth most commonly mentioned drug (by 20%) in 1984. Over these five years knowledge about the dangers of solvents increased. The decline in the proportion of children who mentioned lysergide (LSD), from 87% in 1969 to 9% in 1984, clearly reflects the reduced availability of and publicity about this drug. Amphetamines, popular with rock musicians and other cult figures in the 1960s, were mentioned by 44% in 1969 but by only 2% in 1984, though there is recent evidence of illicit amphetamines again becoming available. Information about the dangers of amphetamines and barbiturates was even more limited in 1984 than in previous years. A striking and disturbing development in 1984 was the mention for the first time (by 2%) of phencyclidine (PCP, "angel dust"). This drug, which causes a combination of hallucinations and analgesia, is evoking concern in America.

TABLE II—Number (%) of young people who mentioned various dangers of drugs that they had cited in reply to first question (see table I)

	Cannabis				Opiates				Lysergide				Cocaine				Solvents	
	1969	1974	1979	1984	1969	1974	1979	1984	1969	1974	1979	1984	1969	1974	1979	1984	1979	1984
No who had cited the drug	425	380	448	399	391	314	495	393	351	219	190	47	61	86	299	303	50	104
No (%) who knew dangers*:																		
Can kill	60 (14)	64 (17)	81 (18)	80 (20)	90 (23)	80 (25)	171 (35)	124 (31)	42 (12)	27 (12)	54 (28)	4 (9)		5 (6)	67 (22)	77 (25)	13 (26)	20 (19)
Can cause mental illness, hallucinations	42 (10)	59 (16)	44 (10)	24 (6)	31 (8)	48 (15)	36 (7)	20 (5)	73 (21)	50 (23)	36 (19)	10 (21)		6 (7)	15 (5)	20 (7)	6 (12)	6 (6)
Causes addiction, dependence		47 (12)	31 (7)	44 (11)	25 (6)	53 (17)	57 (12)	62 (16)	7 (2)	19 (9)	5 (3)	9 (19)		7 (8)	14 (5)	36 (12)		6 (6)
Can cause drowsiness, coma, dreaminess	17 (4)	52 (14)	56 (12)	67 (17)	12 (3)	28 (9)	49 (10)	46 (12)	10 (3)	16 (7)	12 (6)	3 (6)		10 (12)	25 (8)	31 (10)	5 (10)	15 (14)
Leads to stronger drugs	9 (2)	3 (1)	3 (1)	3 (1)		1 (0.3)		1 (0.2)		2 (1)								
Other	16 (4)	46 (12)	70 (16)	28 (7)	6 (2)	38 (12)	10 (2)	36 (9)	9 (3)	19 (9)	10 (5)	12 (25)		8 (9)	22 (7)	20 (7)	19 (20)	51 (49)
No (%) who answered correctly when asked how the drugs were taken†	325 (76)	309 (81)	368 (82)	329 (82)	188 (48)	207 (66)	392 (79)	305 (78)	154 (44)	83 (38)	61 (32)	26 (55)		47 (55)	169 (57)	149 (49)	9 (18)	82 (79)

*Number (%) who replied to the question asking about the dangers of the drugs: 238 (51%) in 1969, 331 (63%) in 1974, 519 (80%) in 1979, and 387 (72%) in 1984.

†Number (%) who replied to the question asking how the drugs were taken: 439 (93%) in 1969, 437 (86%) in 1974, 597 (92%) in 1979, and 509 (94%) in 1984.

Over the 15 years the proportion of pupils who knew correctly how most of the drugs were taken increased (table II)—for example, those who knew how solvents were taken increased from 18% in 1979 to 79% in 1984.

Between 1969 and 1984 the proportion of pupils who knew someone taking drugs almost doubled (from 15% to 28%) and the proportion who had been offered drugs almost trebled (from 5% to 14%). Consequently, a greater proportion of these young people

Although only a small proportion of children stated where drugs were offered, the replies reflect the increasing importance over the years of the street as a source of drugs and the decreasing importance of parties and coffee bars (table IV). In 1984, under the category "other," 10% of children specifically stated friends as a source of drugs. These replies, taken in conjunction with the others, support the view that those who start to take drugs are first offered them by people they know rather than strangers.¹⁵

TABLE III—Drugs taken by people known to respondents and offered to respondents themselves. (Figures are numbers (%) of respondents)

	Drugs taken by others				Drugs offered to respondents themselves			
	1969	1974	1979	1984	1969	1974	1979	1984
Cannabis	6 (25)	29 (81)	71 (76)	85 (56)	6 (55)	13 (56)	36 (82)	34 (45)
Solvents			1 (1)	29 (19)			2 (5)	15 (20)
Opiates	7 (28)	4 (14)	12 (13)	12 (8)		4 (17)	3 (7)	4 (5)
Barbiturates		2 (6)	2 (2)	10 (7)		1 (4)	2 (5)	3 (5)
Cocaine			1 (1)	5 (3)			1 (2)	3 (4)
Amphetamines	16 (64)	11 (13)	12 (13)	2 (1)	6 (55)	5 (22)	6 (14)	3 (4)
Lysergide	2 (8)	6 (17)	3 (3)	3 (2)		1 (4)		2 (3)
No (%) who replied positively or negatively	24 (5)	37 (7)	97 (15)	151 (28)	9 (2)	21 (4)	45 (7)	76 (14)

TABLE IV—Places at which drugs were offered to people known to respondents and respondents themselves. (Figures are numbers (%) of respondents)

	Drugs taken by others				Drugs offered to respondents themselves			
	1969	1974	1979	1984	1969	1974	1979	1984
Street		10 (12)	27 (26)	35 (23)	3 (14)	11 (32)	21 (43)	35 (46)
Party	17 (34)	21 (25)	32 (31)	31 (21)	9 (41)	16 (47)	12 (24)	17 (22)
School	6 (12)	10 (12)	14 (13)	12 (8)	6 (27)	6 (18)	8 (16)	10 (13)
Disco		4 (5)	29 (28)	9 (6)		3 (9)	23 (47)	11 (15)
Public house	7 (14)	10 (12)	19 (18)	20 (20)		3 (9)	4 (8)	2 (3)
Coffee-bar	16 (32)	5 (6)	5 (5)	2 (1)		2 (6)	1 (2)	
No (%) who replied positively or negatively	52 (11)	84 (16)	104 (16)	151 (28)	24 (5)	37 (7)	52 (8)	76 (14)

TABLE V—Reasons given for why young people take drugs. (Figures are numbers (%) of respondents)

	1969	1974	1979	1984
To feel big, show off, look grown up	123 (29)	145 (30)	214 (34)	235 (47)
Because friends do, trendy	163 (39)	122 (25)	116 (19)	127 (25)
For kicks, for fun, to feel good	90 (21)	106 (22)	136 (22)	52 (10)
To calm nerves	0 (0)	53 (11)	133 (21)	47 (9)
To escape problems, reality	81 (19)	98 (20)	86 (14)	41 (8)
For the experience, out of curiosity, sensation	134 (32)	61 (13)	78 (13)	36 (7)
To relieve boredom, depression	24 (6)	85 (18)	111 (18)	30 (6)
No (%) who replied	425 (90)	480 (92)	621 (96)	505 (94)

seem at risk of being involved in taking drugs. Surveys recording those who have ever used drugs also show an increasing prevalence—for example, the proportion was found to be 5% in a survey by the Office of Population Censuses and Surveys in 1969, 9% by Dorn and Thompson in 1973, and 15.2% of boys and 10.7% of girls by Plant *et al* in 1979-80.⁹⁻¹¹ Trend surveys in America, however, notably that of Johnston *et al* between 1975 and 1983,¹² show a decline in the use illicit drugs since 1980; this trend was also found by Miller *et al* in a survey of 12-17 year olds.¹³ It is to be hoped that it will soon be seen in this country.

Among the drugs mentioned by those who knew someone taking drugs and those who had been offered drugs the most commonly mentioned in 1969 and 1974 were amphetamines, cannabis, and opiates, and in 1984 cannabis and solvents (table IV). These findings are similar to those of other studies over the years.^{9 10 14}

REASONS FOR DRUG TAKING AND SOURCES OF INFORMATION ABOUT DRUGS

As in the previous survey⁶ "to feel big, show off, look grown up" (mentioned by 47%) and "because friends do, trendy" (mentioned by 25%) were the most commonly mentioned reasons for taking drugs in 1984 (table V). The pupils saw social and group pressures as influencing their decision to start taking drugs. As Kandel stated, "peer influences play a crucial role in the process of involvement in marijuana and other illicit drugs,"¹⁶ and other studies of abuse of illicit drugs and solvents support this view.^{1 8 17-19} Taking drugs "to feel big, show off, look grown up" also suggests that pupils were seeking to boost their self esteem, a view supported by other reports.^{1 16 20} Taking drugs "for kicks, for fun," "for the experience," and "to calm nerves" were seen as less important reasons in

1984 than in previous years. Fewer pupils (only 6%) mentioned "boredom" in 1984. Several pupils, however, mentioned unemployment as a reason for the first time in 1984.

The consensus view as to why people take drugs, stated in the prevention report of the Advisory Council on the Misuse of Drugs, is that there is "no single cause, or consistent pattern of multiple causes, [that has] been identified"²⁰; this view has been endorsed by other reports.^{1 19 21}

Over the 15 years television remained the most commonly mentioned source of information, with newspapers ranking second. These results are important in view of the correlation between publicity in the mass media and an interest in and contact with drugs, as was seen with cannabis in the late 1960s and solvents in the late 1970s. A recent report stated, "some irresponsible publicity may have adverse effects and even result in experimentation."²⁰ As phencyclidine is unknown in Wolverhampton the 2% who mentioned it presumably heard about it from the mass media. There is concern about the role of the media, one aspect being that such communication is a one way process.^{22 23} Although there is a positive role, editors and producers have a clear and important responsibility regarding what they publish about drugs.

Parents, mentioned by only 12% of respondents, generally feel ignorant and at a disadvantage in discussing drugs with their children. Leaflets issued recently by the Department of Health and Social Security may help to meet parents' needs. Equipping parents to meet the stresses and demands of teenagers may help to counteract the feeling that many young people have that their parents and the community do not care. Within the community education about drugs is essential for parents, professionals, and pupils. Each area should have a coordinated policy for tackling drug misuse, a vital element of which should be regular training for teachers and other professionals.

In relation to young people, however, as Moskowitz states, "whereas there is a burgeoning literature about the obstacles to educational innovation, there is little consensus as to appropriate solutions."²⁴ Some authors even fear that education about drugs may be counterproductive.^{20 25} The corollary of this view would be to do nothing. As this survey shows, however, circumstances in which there is inadequate knowledge and increasing contact with drugs leave young people ill equipped to resist the social and group pressures that they recognise as being the main factors in starting to take drugs. Some useful work has been undertaken—for example, by the Teachers' Advisory Council on Alcohol and Drug Education and the Institute for the Study of Drug Dependence^{26 27}—in producing teaching packs, which include discussion of life skills and facts about drugs, but careful monitoring and continuing evaluation of such programmes are vital.

In summary, based on our research and experience and on other studies, we would endorse the following points:

- the "facts alone" approach is not effective^{19 25 28}
- the "shock horror" approach has no lasting effect and may be harmful^{20 25 29}
- there must be careful selection of the target audience^{16 23 29 30}
- goals must be clearly identified^{23 25 29}
- the source of information must be credible^{23 25 31}
- drug education must be part of a wider programme of health and social education^{15 20}
- such a programme must aim to enhance self esteem and life skills and must be sensitive to locality, ability, and culture.

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Copies of the questionnaire used in the study are available from Dr Wright.

References

- 1 Home Office. *Tackling drug misuse: a summary of the government's strategy*. London: HMSO, 1984.
- 2 Home Office. *Record year for customs heroin seizures and drug arrests*. London: Home Office, 1985: 1-4. (Press notice No 969.)
- 3 Home Office. *Statistics of the misuse of drugs in the United Kingdom, 1984*. London: HMSO, 1985. (Statistical bulletin No 23.)

- 4 Department of Health and Social Security. *Drug misuse prevalence and service provision—a report on surveys and plans in English national health service regions*. London: DHSS, 1985.
- 5 Wright JD. Knowledge and experience of young people regarding drug abuse between 1969 and 1974. *Med Sci Law* 1976;16:252-63.
- 6 Wright JD, Pearl L. Knowledge and experience of young people regarding drug abuse between 1969 and 1979. *Br Med J* 1981;282:793-6.
- 7 Black D. Misuse of solvents. *Health Trends* 1982;14:27-8.
- 8 O'Connor DJ. Research report: glue sniffing and the abuse of solvents by schoolchildren and adolescents. *Durham and Newcastle Research Review* 1983;10:50.
- 9 Office of Population Censuses and Surveys. *Public attitudes to drug-taking*. London: HMSO, 1973.
- 10 Dorn N, Thompson A. *A comparison of 1973 and 1974 levels of mid-teenage experimentation with illegal drugs in some schools in England*. London: Institute for the Study of Drug Dependence, 1975.
- 11 Plant MA, Peck DF, Stuart R. The correlates of serious alcohol-related consequences and illicit drug use amongst a cohort of Scottish teenagers. *Br J Addict* 1984;79:197-200.
- 12 Johnston LD, O'Malley PM, Bachman JG. *Drugs and American high school students 1975-83*. Rockville, Maryland: National Institute on Drug Abuse, 1984.
- 13 Miller DM, Cisin IH, Gardner-Keaton H, et al. *National survey on drug abuse: main findings 1982*. Rockville, Maryland: National Institute on Drug Abuse, 1983.
- 14 Wiener RST. *Drugs and schoolchildren*. London: Longman, 1970.
- 15 Dorn N. Social analyses of drugs in health education and the media. In: Busch C, Edwards SG, eds. *Drug problems in Britain*. London: Academic Press, 1981:281.
- 16 Kandel DB. Epidemiological and psychological perspectives and adolescent drug use. *J Am Acad Child Psychiatry* 1982;21:328-47.
- 17 Fish F, Wells DWP, Bindeman S, Bunney JE, Jordan MM. Prevalence of drug misuse among young people in Glasgow 1970-72. *Br J Addict* 1974;69:345-56.
- 18 Dorn N, Thompson A. *Evaluation of drug education*. London: Institute for the Study of Drug Dependence, 1974.
- 19 Plant MA. Drugtaking and prevention: the implications of research for social policy. *Br J Addict* 1980;75:245-54.
- 20 Home Office. *Prevention—report of the advisory council on the misuse of drugs*. London: HMSO, 1984.
- 21 Plant MA. What aetiologies? In: Busch C, Edwards SG, eds. *Drug problems in Britain*. London: Academic Press, 1981:245.
- 22 Anonymous. Media campaigns may be worse than a waste of money [Editorial]. *Br Med J* 1985;290:416.
- 23 Dembo R, Miran M, Babst DV, Schmeidler J. The believability of the media as sources of information on drugs. *Int J Addict* 1977;12:959-69.
- 24 Moskowitz JM. Preventing adolescent substance abuse through drug education. In: Glynn TJ, Leukefeld CG, Ludford JP, eds. *Preventing adolescent drug abuse—intervention strategies*. Rockville, Maryland: National Institute of Drug Abuse 1983:47.
- 25 Kinder BN, Pape NE, Walfish S. Drug and alcohol education programs: a review of outcome studies. *Int J Addict* 1980;15:1035-54.
- 26 Teachers' Advisory Council for Alcohol and Drug Education. *Free to choose—an approach to drug education*. Manchester: TACADE, 1981.
- 27 Institute for the Study of Drug Dependence. *Drugs demystified training pack*. 2nd ed. London: Institute for the Study of Drug Dependence, 1985.
- 28 Schaps E, DiBartolo R, Moskowitz J, Palley CS, Churgin S. A review of 127 drug abuse prevention program evaluations. *Journal of Drug Issues* 1981;11:17-43.
- 29 Bandy P, President PA. Recent literature on drug abuse prevention and mass media: focusing on youth, parents, women and the elderly. *Journal of Drug Education* 1983;13:255-71.
- 30 Rose G. Sick individuals and sick populations. *Int J Epidemiol* 1985;14:32-8.
- 31 Dembo R, Schmeidler J, Lipton DS, et al. A survey of students' awareness of and attitudes toward drug abuse prevention programs in New York State, winter 1974/75. *Int J Addict* 1979;14: 311-28.

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Is barbecued food carcinogenic?

The day has long since past when it was reasonable to postulate that most of the things we eat are "non-carcinogenic" and just a few avoidable things, such as barbecued steaks, are "carcinogenic." The question as posed is thus outdated. If the questioner means "Is there epidemiological evidence of a direct association between the eating of barbecued food and increased cancer risk in man?" then the answer is firmly "No." If he means "Does the process of barbecuing food result in the formation of mutagens which *might* increase cancer risk in man?" then the answer is "Yes." But if the questioner is asking "Am I likely to reduce my 25% chance of developing one or other form of cancer during my lifetime by avoiding barbecued food?" then he should read the important 1983 article entitled "Dietary carcinogens and anticarcinogens: oxygen radicals and degenerative disease" by Bruce Ames.¹ The number and variety of mutagens and animal carcinogens in uncooked foodstuffs of plant origin are legion. In the light of the facts reviewed by Ames and even of reports of the production of potent mutagens from food proteins during cooking,^{2 3} I, personally, would not turn down an invitation to a barbecue party for reasons of fear of increased cancer risk. (NB The fear of developing food poisoning if the food was not adequately cooked or pneumonia from exposure to British summer weather during the party, or both, would give me much greater pause for thought.)—FRANCIS J C ROE, independent consultant in toxicology and cancer research, London.

- 1 Ames BN. Dietary carcinogens and anticarcinogens: oxygen radicals and degenerative disease. *Science* 1983;221:1256-64.
- 2 Sugimura T, Nagao M. The use of mutagenicity to evaluate carcinogenic hazards in our daily lives. In: Heddle JA, ed. *Mutagenicity: new horizons in genetic toxicology*. New York: Academic Press, 1982:73-88.
- 3 Bjeldanes LF, Morris MM, Felton JS, et al. Mutagens from the cooking of food. II. Survey by Ames/Salmonella test of mutagen formulation in the major protein-rich foods of the American diet. *Food Chemical Toxicology* 1982;20:357-63.