

Control of 1-benzylpiperazine (BZP) and related compounds

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Advisory Council on the Misuse of Drugs

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Rt Hon Jacqui Smith MP Home Office 2 Marsham Street London SW1P 4DF

10th September 2008

Dear Home Secretary,

On 8th March 2008 the European Council responded to concerns over the misuse of the stimulant 1-benzylpiperazine (BZP) by subjecting it to 'control measures and criminal provisions' across the EU Member States. The Advisory Council on the Misuse of Drugs (ACMD) has considered the misuse of BZP and related compounds and I am pleased to enclose the ACMD's report and advice.

The ACMD recommends that BZP is brought under control of the Misuse of Drugs Act 1971. In addition, the ACMD recognises a group of substituted piperazines (of which BZP is one) which are, or have the potential to be, misused. The ACMD therefore recommends that these substances should be brought under the control of the Misuse of Drugs Act 1971 by means of a generic definition.

Data from seizures by the forensic science providers indicate that several of the substituted 1-phenyl and 1-benzyl piperazines are also being misused; some appear to mimic or potentiate the effects of MDMA ('ecstasy'). A generic definition would legislate for compounds that may otherwise need to be controlled separately, and would bring the UK into line with other countries that already control a number of substituted piperazines.

The ACMD recognises the potential legitimate use of substances that would be covered by this generic definition and has identified options to mitigate against the impact of control for legitimate use. The ACMD considers that the harms and misuse of BZP and substituted piperazines (identified in Annex 4) are commensurate with Class C, under schedule 2, part III, of the Misuse of Drugs Act (1971); and should be scheduled under Schedule I of the Misuse of Drugs Regulations (2001) (having no recognised medicinal use).

Yours sincerely,

Professor Sir Michael Rawlins FMedSci Chairman

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ACMD recommendation

The ACMD recommends that 1-benzylpiperazine (BZP) is brought under control of the Misuse of Drugs Act 1971. In addition, the ACMD recognises a group of substituted piperazines identified in Annex 4 (of which BZP is one) which are, or have the potential to be, misused. The ACMD therefore recommends that these substances should be brought under the control of the Misuse of Drugs Act 1971 by means of a generic definition (see paragraph 7.7).

The ACMD considers that the harms and misuse of BZP and substituted piperazines (identified in Annex 4) are commensurate with Class C, under Schedule 2, part III, of the Misuse of Drugs Act (1971); and should be scheduled under Schedule I of the Misuse of Drugs Regulations (2001) (having no recognised medicinal use).

1. Background

- 1.1 The Advisory Council on the Misuse of Drugs (ACMD) is established under the Misuse of Drugs Act (1971). The ACMD's terms of reference and current membership are shown in Annexes 1 and 2, respectively.
- 1.2 The stimulant drug 1-benzylpiperazine (BZP) was initially brought to the ACMD Technical Committee's attention in April 2006 when the Committee considered its chemistry and pharmacology.
- 1.3 In 2007, the European Council proposed to make BZP subject to control measures across EU member states. The decision was based on the results of a risk-assessment report on BZP prepared by Europol and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). This report, submitted to the European Council on 31st May 2007, considered the health and social risks of the drug alongside data on international trafficking and connections to organised crime.
- 1.4 On the 23rd August 2007, the ACMD wrote to the Home Office, at its request, to provide advice for informing the UK's position on BZP at EU negotiations (Annex 3). After reviewing the EMCDDA risk assessment, the ACMD supported the Commission's proposal to make BZP subject to control measures under UK law.
- 1.5 On 8th March 2008, the European Council responded to concerns over the illicit misuse of BZP by subjecting it to 'control measures and criminal provisions' across the EU Member States. Under the terms of the 2005 Council Decision¹, Member States of the European Union have one year in which to implement appropriate controls on BZP under their domestic legislation and in accordance with the provisions of the 1971 United Nations Convention on Psychotropic Substances.

The European Council decision states that: "due to its stimulant properties, risk to health, the lack of medical benefits and following the precautionary principle, there is a need to control BZP', through measures 'appropriate to the relatively low risks of the substance".

- 1.6 The EMCDDA press release of 3rd March 2008 concluded that BZP had no established or acknowledged medical value and there was no known licensed medicinal products containing the substance in the EU.
- 1.7 On 20 March 2007, the Medicines and Healthcare products Regulatory Agency (MHRA) issued a notice that sale of products containing BZP was illegal and that vendors and producers could face prosecution (under the Medicines Act 1968)². Since that time, the MHRA has

² 'Benzylpiperazine (PEP) pills are dangerous and illegal', MHRA Press Release, 20 March 2007

¹ Council Decision 2005/387/JHA on information exchange, risk assessment and control of new psychoactive substances

investigated over 30 suppliers in the UK, some of which are being prosecuted, while others have been issued with formal cautions or advice.

- 1.8 The ACMD was asked, by the Home Office, to undertake an assessment of BZP to consider classification and scheduling under the Misuse of Drugs Act (1971) and the Misuse of Drugs Regulations (2001). Neither BZP nor any related substituted piperazine are currently classified under the Misuse of Drugs Act (1971).
- 1.9 This report presents the ACMD's consideration of BZP and related compounds.

2. Introduction

- 2.1 BZP is a recreational stimulant, which gained popularity in some countries in the early 2000's as a legal alternative to amphetamine, methylamphetamine, and 3, 4-methylenedioxy-*N*-methylamphetamine (MDMA ecstasy). BZP is a central nervous system (CNS) stimulant with about 10% of the potency of d-amphetamine.
- 2.2 Following reports of the misuse of BZP from a number of European countries, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) carried out a risk assessment in mid-2007. The risk assessment report³, compiled by the scientific committee of EMCDDA, concluded that there was a need to control BZP. This conclusion was based on a more detailed review of BZP (the 'Technical Annexes')⁴. The latter will be published by EMCDDA as part of the risk assessment monograph series⁵ in 2008.

3. Pharmacology and harms to the individual

3.1 BZP is a synthetic product. It is normally manufactured from piperazine, a substance that has been used for many years as an antihelminthic drug in the treatment of intestinal round worm infestations. Piperazine itself has no psychoactive properties. BZP was never developed as a potential antihelminthic drug, despite widespread statements to this effect in the scientific literature. Other myths

7

³ Risk Assessment Report of a new psychoactive substance: 1-benzylpiperazine (BZP) in accordance with Article 6 of Council Decision 2005/387/JHA on information exchange, risk assessment and control of new psychoactive substances; https://ednd-cma.emcdda.europa.eu/assets/upload/Risk_Assessment_Report_BZP.pdf

⁴ L A King and S Elliott, Risk Assessment: 1-Benzylpiperazine (BZP): Draft Technical Annexes A-D (22 August 2007)

⁵ http://www.emcdda.europa.eu/

- surrounding BZP include suggestions that it is of herbal origin and that it 'contains' piperazine.
- 3.2 BZP was investigated by the Burroughs Wellcome Company as a potential antidepressant drug. This work was abandoned in the early 1970's when it was found that BZP was a central nervous system (CNS) stimulant with similar properties to amphetamine.
- 3.3 A typical dose of BZP is about 100mg. Animal studies found that BZP can substitute for cocaine and amphetamine in self administration and discrimination studies⁶. There are limited human data on the misuse and dependence potential. The studies that exist, suggest a similarity to amphetamine. Clinical reports from patients who have consumed BZP suggest an association with *grand mal* seizures, even in those without any previous history of seizures. However, this finding is based on a very small number of cases. Users have reported a range of adverse reactions such as vomiting, headache, palpitations, poor appetite, stomach pains/nausea, anxiety, insomnia, strange thoughts, mood swings, confusion, irritability and tremors. Some of these occurred in the 'comedown' period, and some persisted for 24 hours after use⁶.
- 3.4 BZP has been found in post mortem samples, however, the extent to which BZP was implicated in the deaths is not known; in all cases other drugs or other circumstances were involved.
- 3.5 In October 2007, the Technical Committee conducted its own risk assessment of BZP based on a 9 point matrix⁷ (physical harms, dependence and societal harms). The assessment placed BZP at the lower end with other, less harmful, substances.

4. Societal harms

4.1 There is no direct evidence for any significant social harms (including acquisitive crime and anti social behaviour) being related to BZP use (see also 3.5 above).

5. Use of BZP and other substituted piperazines

5.1 BZP has no recognized legitimate medical or other commercial use; however, it can be used as a synthetic intermediate, for example for

⁶ Risk Assessment Report of a new psychoactive substance: 1-benzylpiperazine (BZP) in accordance with Article 6 of Council Decision 2005/387/JHA on information exchange, risk assessment and control of new psychoactive substances; https://ednd-cma.emcdda.europa.eu/assets/upload/Risk Assessment Report BZP.pdf

⁷ Nutt D, et al, 2007- Development of a rational scale to assess the harm of drugs of potential misuse. *The Lancet*. Volume 369: page 1047-1053

the production of pharmaceuticals. The only substances listed in Annex 4 that the ACMD have found to have legitimate uses are 1(3-chlorophenyl) piperazine (mCPP) and 1-(3-chlorophenyl)-4-(3-chloropropyl)-piperazine (CPCPP). The former is used as a probe of serotonin receptors in experimental neuropharmacology and as the precursor in the synthesis of several anti-depressant drugs (e.g. trazodone). CPCPP is a precursor used in the manufacture of the antidepressant drug nefazodone. Should mCPP and CPCPP become controlled drugs by virtue of a generic definition then two options exist: either issue a licence to those using them for scientific/industrial purposes or draft specific exclusions in the definition. The Association of the British Pharmaceutical Industry (ABPI) asked their members regarding use, but indicated that they did not have notification from any of their users of these compounds (mCPP or CPCPP).

5.2 On 20 March 2007, the Medicines and Healthcare products Regulatory Agency (MHRA) issued a notice that sale of products containing BZP was illegal and that vendors and producers could face prosecution (under the Medicines Act 1968)⁸. The MHRA note that 'BZP is not a licensed medicine in the UK and that it has no established therapeutic use. However, BZP fits the definition of a medicinal product set out in Article 1 of 2001/83/EC as it has marked pharmacological effects in humans and as such, requires a Marketing Authorisation (Product Licence) to be placed on the UK market⁹.

6. Seizures

6.1 Illicitly-produced BZP usually occurs as either tablets or capsules, but loose powders are also found.

6.2 Tablets and other illicit products containing BZP or other substituted piperazines first appeared in UK police drug seizures in early 2006. Since then the number of seizures has steadily increased. The Forensic Science Service currently examines around 400 cases in a quarterly period. The most commonly reported substances have been mCPP, BZP, 1,4-dibenzylpiperazine (DBZP) and 1-(3 trifluoromethylphenyl)piperazine (TFMPP) often in various combinations and also in combination with other drugs such as 3,4-methylenedioxy-*N*-methylamphetamine (MDMA – 'ecstasy') and amphetamine. During the period 2006-2007 there was a corresponding

⁸ 'Benzylpiperazine (PEP) pills are dangerous and illegal', MHRA Press Release, 20 March 2007

⁹ The sale, supply and advertisement of any unlicensed medicine contravenes the requirements of medicines legislation and consequently selling, supplying or offering for sale products containing BZP is unlawful.

Offences under the Medicines Act 1968 (and regulations made under it) are criminal and MHRA investigate identified illegal activity involving medicines and where appropriate, bring a prosecution through the criminal courts.'

decrease in seizures containing only MDMA, suggesting that the 'piperazine group' of drugs are being used as substitutes for MDMA.

7. Options for control

- 7.1 On April 1st 2008, the New Zealand Government placed BZP and five related substances (mCPP, TFMPP, pFPP, MeOPP and BZMP) into Class C of their Misuse of Drugs Act. In addition to the listed substances they also included the isomers of these substances whenever the existence of such isomers is possible within the specific chemical designation. In four Member States Belgium, Denmark, Greece and Malta BZP is already subjected to control measures and criminal penalties as provided under their legislation by virtue of their obligations under the 1961 or 1971 UN Conventions¹⁰. In Sweden, Spain and the Netherlands BZP is controlled under other legislation. Eight countries in the EU control mCPP (Belgium, Cyprus, Denmark, Germany, Hungary, Lithuania, Malta and Slovakia), whilst control in Bulgaria is pending.
- 7.3 BZP is one of several substituted piperazines, misuse of which has been reported in the UK and elsewhere in the EU in recent years. The misuse of one of these, 1(3-chlorophenyl) piperazine (mCPP), has been even more widespread than BZP¹¹. The ACMD Technical Committee discussed a brief report¹² on mCPP on 3rd November 2005. No risk assessment on mCPP was carried out at EU level because this substance was used to manufacture a number of active pharmaceutical ingredients (API) within the EU; it was therefore excluded from consideration under the terms of the 2005 Council Decision. However, mCPP has become the most widely encountered 'new psychoactive substance' since the EU monitoring process started in 1997. By 2006, it was estimated that almost 10% of illicit tablets sold in the EU, as part of the illicit 'ecstasy' market, contained mCPP¹⁰.
- 7.4 The 11 most commonly-reported substituted piperazines can be divided into the 1-phenyl series and the 1-benzyl series; their structures are shown in Annex 4. Whereas BZP is a stimulant with properties similar to those of amphetamine, the others have a more complex pharmacology; some appear to mimic or potentiate the effects of MDMA ('ecstasy').

¹⁰ Risk Assessment Report of a new psychoactive substance: 1-benzylpiperazine (BZP) in accordance with Article 6 of Council Decision 2005/387/JHA on information exchange, risk assessment and control of new psychoactive substances; https://ednd-cma.emcdda.europa.eu/assets/upload/Risk_Assessment_Report_BZP.pdf

¹¹ Europol–EMCDDA Active Monitoring Report on a new psychoactive substance: 1-(3-chlorophenyl)piperazine (mCPP) https://ednd-cma.emcdda.europa.eu/assets/upload/Final_Europol-EMCDDA Active Monitoring Report mCPP 290307.pdf

EMCDDA_Active_Monitoring_Report_mCPP_290307.pdf

12 L A King, 1-(3-Chlorophenyl)piperazine (mCPP): A new psychoactive drug of abuse in Europe (25 October 2005).

7.5 The ACMD considered two options for UK control;

Option one: BZP is controlled under Class C (in the same Class as GHB, Ketamine and tranquilizers), Schedule 2, of the Misuse of Drugs Act 1971 and under schedule I of the Misuse of Drugs Regulations.

Option two: BZP and a group of substituted piperazines (identified in Annex 4) are controlled under Class C, Schedule 2, of the Misuse of Drugs Act 1971 and under Schedule I of the Misuse of Drugs Regulations.

7.6 Although the UK is only required to implement controls on BZP, the ACMD recommend that a group of substituted piperazines should be brought under generic control (that would include BZP). Generic control would bring the UK into line with other countries that already control a number of substituted piperazines (paragraph 7.2) and would legislate for compounds that may otherwise have to be controlled separately e.g. mCPP, DBZP and TFMPP (see paragraph 7.3 for reported misuse).

7.7 The proposed definition is:

"1-benzylpiperazine and any compound structurally derived from 1-benzylpiperazine or 1-phenylpiperazine by substitution in the aromatic ring to any extent with alkyl, alkoxy, alkylenedioxy, halide or haloalkyl substituents, whether or not substituted at the second nitrogen atom of the piperazine ring with alkyl, benzyl, haloalkyl, or phenyl substituents."

- 7.8 Many examples exist within the Misuse of Drugs Act (1971) of generic definitions based on substitution patterns (phenethylamines, tryptamines, anabolic steroids etc.). Since their first introduction in 1977, these definitions have been extremely successful; the ACMD are not aware of any forensic-chemical or other legal problems that have arisen and nor have the controls impeded drug development in the pharmaceutical industry ¹³. In some of the generically-defined groups, the structural definitions subsume substances from more than one pharmacological group, as well as substances that may have no pharmacological activity at all.
- 7.9 The above definition captures the substances listed in Annex 4. However, it is essential that the definition does not inadvertently subsume an API, a number of which are based on substituted piperazines. The most closely related group of API derived from piperazine include cyclizine (1-diphenylmethyl-4-methylpiperazine) and

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¹³ L.A.King, *The Misuse of Drugs Act: A Guide for Forensic Scientists,* Royal Society of Chemistry, London (2003)

its many derivatives¹⁴. None of these, nor more distantly-related substances (e.g. diethylcarbamazine, vanoxerine and trazodone) fall within the definition (paragraph 7.7). A structure search of the Merck Index (12th Edition, 1996) revealed no other contentious structures.

8. Conclusions and recommendations

- 8.1 The European Council has subjected BZP to 'control measures and criminal provisions' across the EU Member States. The UK is therefore obliged to implement appropriate controls on BZP under the Misuse of Drugs Act 1971.
- 8.2 The ACMD recommends that BZP is brought under control of the Misuse of Drugs Act 1971.
- 8.3 Data from seizures by the forensic service providers indicate that several of the substituted 1-phenyl and 1-benzyl piperazines identified in this report (Annex 4) are being misused and some appear to mimic or potentiate the effects of MDMA ('ecstasy'). The ACMD therefore recommends that these substances should be brought under the control of the Misuse of Drugs Act 1971 by means of a generic definition (that would include BZP see paragraph 7.7).
- 8.4 The ACMD considers that the harms and misuse of BZP and substituted piperazines (identified in Annex 4) are commensurate with Class C, under Schedule 2, part III, of the Misuse of Drugs Act (1971); and should be scheduled under Schedule I of the Misuse of Drugs Regulations (2001) (having no recognised medicinal use).

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¹⁴ The cyclizine group includes, *inter alia*, meclizine, chlorcyclizine, flunarizine, lomerizine and cetrizine.

Annex 1. ACMD Terms of Reference

"It shall be the duty of the Advisory Council to keep under review the situation in the United Kingdom with respect to drugs which are being or appear to them likely to be misused and of which the misuse is having or appears to them capable of having harmful effects sufficient to constitute a social problem, and to give to any one or more of the Ministers, where either Council consider it expedient to do so or they are consulted by the Minister or Ministers in question, advice on measures (whether or not involving alteration of the law) which in the opinion of the Council ought to be taken for preventing the misuse of such drugs or dealing with social problems connected with their misuse, and in particular on measures which in the opinion of the Council, ought to be taken:

- a) for restricting the availability of such drugs or supervising the arrangements for their supply;
- b) for enabling persons affected by the misuse of such drugs to obtain proper advice, and for securing the provision of proper facilities and services for the treatment, rehabilitation and after-care of such persons;
- c) for promoting co-operation between the various professional and community services which in the opinion of the Council have a part to play in dealing with social problems connected with the misuse of drugs;
- d) for educating the public (and in particular the young) in the dangers of misusing such drugs and for giving publicity to those dangers; and
- e) for promoting research into, or otherwise obtaining information about, any matter which in the opinion of the Council is of relevance for the purpose of preventing the misuse of such drugs or dealing with any social problem connected with their misuse".

A further duty is placed on the Council by the Act to consider any matter relating to drug dependence or the misuse of drugs which may be referred to them by any one of the Ministers concerned, and in particular to consider and advise the Home Secretary on any communication which he refers to the Council which relates to the control of a dangerous or otherwise harmful drug and which is made to Her Majesty's Government by any organisation or authority established by treaty, convention or other agreement or arrangement to which Her Majesty's Government is a party.

Annex 2. ACMD current membership

Professor Sir Michael Rawlins Chair, National Institute for Health

and Clinical Excellence
Briefings Manager, National

Dr Dima Abdulrahim Briefings Manager, Nation Treatment Agency

Lord Victor Adebowale Chief Executive, Turning Point

Mr Martin Barnes Chief Executive, Drugscope

Dr Margaret Birtwistle Specialist General Practitioner,

Senior Tutor – Education and Training Unit, St George's Hospital and Forensic Medical Examiner

Commander Simon Bray Commander, Metropolitan Police

Professor Simon Campbell Scientific Consultant

Mr Eric Carlin Chief Executive, Mentor UK

Ms Carmel Clancy Principal Lecturer in Mental Health

and Addiction,

Middlesex University

Professor Ilana Crome Professor of Addiction Psychiatry,

Keele University Medical School

Ms Robyn Doran Mental health nurse and Director of

Operations, North-West London

Mental Health Trust

Dr Clare Gerada General Practitioner, London, and

Primary Care Lead for Drug Misuse,

Royal College of General

Practitioners

Mr Patrick Hargreaves Adviser for drugs and alcohol,

Durham County Council Education

Department

Ms Caroline Healy National adviser for the

commissioning of mental health services for children in secure settings, Department of Health Reader in Public Health and

Dr Matthew Hickman Reader in Public Health and

Epidemiology,

Department of Social Medicine,

University of Bristol

Professor Leslie Iversen Professor of Pharmacology, Oxford

University

Dr Leslie King Former Head of Drugs Intelligence

Unit, Forensic Science Service

Professor Michael Lewis Professor of Oral Medicine, Cardiff

University

Mr David Liddell Director, Scottish Drugs Forum

Dr John Marsden Research Psychologist, Institute of

Psychiatry

Mr Peter Martin Independent consultant in substance

misuse

Professor David Nutt Director of Psychopharmacology Unit,

Bristol University

Mr Trevor Pearce Director of Enforcement, Serious

Organised Crime Agency

District Judge Justin Philips District Judge, drugs court

Mr Richard Phillips Independent consultant in substance

misuse

Dr Ian Ragan Pharmaceutical industry consultant

DCC Howard Roberts Deputy Chief Constable,

Nottinghamshire Police

Dr Mary Rowlands Consultant psychiatrist in substance

misuse, Exeter

Dr Polly Taylor Veterinary surgeon, Cambridgeshire

Ms Monique Tomlinson Freelance consultant in drugs misuse

Mrs Marion Walker Pharmacist, Berkshire Healthcare

NHS Foundation Trust

Mr Arthur Wing Assistant Chief Officer, Sussex

Probation Area

Annex 3. ACMD letter to the Home Office (23rd August 2007) regarding BZP.

ACMD

Advisory Council on the Misuse of Drugs

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James Marmion, 6th Floor, Seacole Building 2 Marsham Street London SW1P 4DF

23rd August 2007

Dear James,

The Advisory Council on the Misuse of Drugs' Technical Committee discussed BZP in November 2006 and March 2007. Although the ACMD were not formally asked by the Home Office to consider the substance I am pleased to provide the following advice to assist in informing the UK's position at the Horizontal Drugs Group on the 5th September 2007.

The Technical Committee considered a number of publications relating to BZP from New Zealand where the misuse of BZP is problematic. The Technical Committee has not convened, as yet, a dedicated working group on this issue. Such a group may be convened after a decision, at European level, has been made.

After reviewing the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) risk assessment the ACMD supports the Commission's proposal to make BZP subject to control measures under UK Law. The Home Office should bear in mind that control measures should be appropriate to the relatively low risks of this substance, but overall the position is proportional and in line with the Technical Committee's thinking.

If the decision to classify BZP is taken at European level then the ACMD will offer further advice on classification under the MDA 1971.

If however, the decision is taken not to control BZP at the European level the ACMD will be willing to offer further advice relating to the UK position and harm reduction measures.

The ACMD look forward to being updated on the Commission's position in the near future

Yours sincerely,

Professor Sir Michael Rawlins Chairman

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Annex 4. Substituted piperazines (1-pheny and 1-benzyl) that would be subsumed under the proposed generic definition (paragraph 7.7).

$$R^1$$
 $N - R^3$ R^2

The general structure of a substituted phenylpiperazine

Table 1 Phenylpiperazines

Name (acronym)	R ¹	R ²	R ³
1-(3-Chlorophenyl)piperazine (mCPP)	Н	CI	Н
1-(4-Chlorophenyl)piperazine (pCPP)	CI	Η	Н
1-(4-Fluorophenyl)piperazine (pFPP)	F	Н	Н
1-(3-Trifluoromethylphenyl) piperazine (TFMPP)	Н	CF ₃	П
1-(3-Methylphenyl) piperazine (mMPP)	Н	CH₃	П
1-(4-Methylphenyl) piperazine (pMPP)	CH ₃	H	П
1-(4-Methoxyphenyl) piperazine (pMeOPP)	CH ₃ O	Н	Н
1-(3-Chlorophenyl)-4-(3-chloropropyl)piperazine	Н	CI	CH ₂ CH ₂ -
(CPCPP)			CH ₂ CI

$$CH_2$$
 N
 R^4

The general structure of a substituted benzylpiperazine

Table 2 Benzylpiperazines

Name (acronym)	R⁴
1-Benzylpiperazine (BZP)	Н
1,4-Dibenzylpiperazine (DBZP)	C ₆ H ₅ -CH ₂
1-Benzyl-4-methylpiperazine (BZMP)	CH ₃