



# Novel Psychoactive Substances

## *Legal Highs*

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Consultant Toxicologist

NPIS Edinburgh



**EdinClinTox**  
Edinburgh Clinical Toxicology



**National Poisons  
Information Service**

# What am I going to cover?

- National Poisons Information Service
- Novel Psychoactive Substances
  - History, classification, clinical features
- Management

# National Poisons Information Service

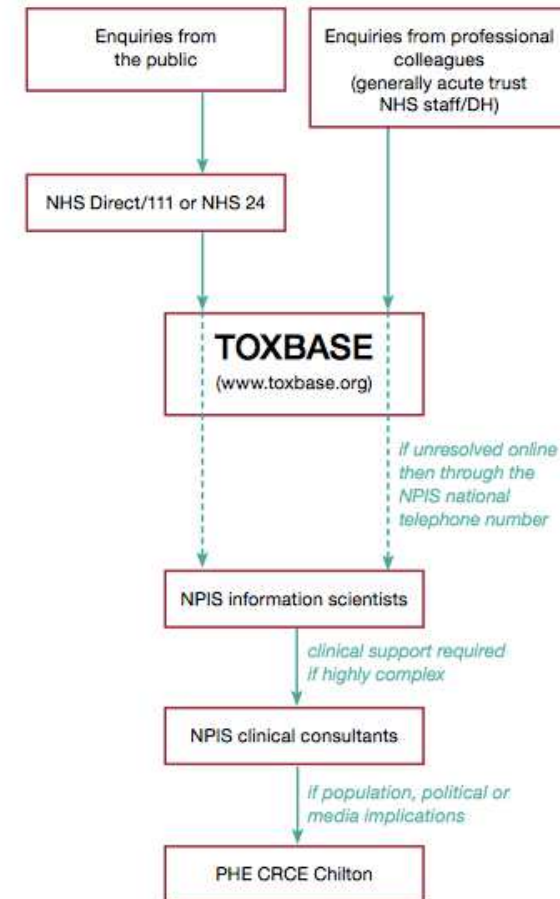


FIGURE 2.1 How poisons enquiries are answered

# TOXBASE® app

for iPhone, iPad and Android

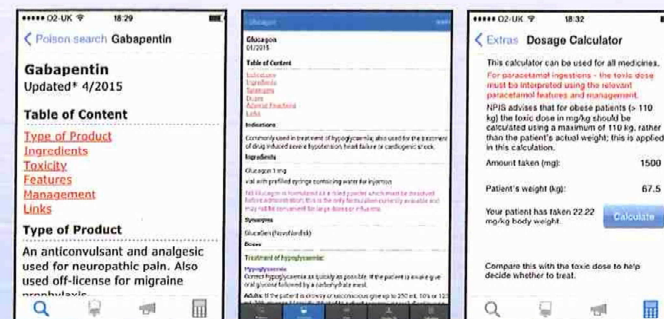
TOXBASE® is the clinical toxicology database of the UK National Poisons Information Service, providing advice on the features and management of poisoning with thousands of products and substances.

TOXBASE® on the internet is currently available to UK NHS users and by annual subscription to healthcare units outside of the UK.

The TOXBASE® app offers, for the first time, access to TOXBASE® for individual healthcare professionals working in and outside of the UK.

No internet connection required to search the database.

Regular updates ensure users always have the latest guidance.



The TOXBASE® app is currently being redeveloped  
and is due to be **re-launched** in summer 2015.

To receive notification when the app becomes  
available please email [mail@toxbase.org](mailto:mail@toxbase.org)

Now Free  
for  
NHS/PHE  
users

# NPIS Consultant Referrals

**TABLE 3.7 Agents commonly involved in NPIS consultant referrals in 2013/14**

Rank	Agent	Number of referrals
1	Paracetamol (including 86 co-codamol)	520
2	Drugs of misuse	246
3	Drug/substance (unknown)	154
4=	Antifreeze/ethylene glycol/methanol	91
4=	Iron	91
6	Amitriptyline	78
7=	Digoxin	77
7=	Ibuprofen	77
9	Aspirin/salicylate	73
10	Amlodipine	64
11	Citalopram	62
12=	Bites and stings	61
12=	Quetiapine	61

## Legal high deaths increase sharply in a year

Fifty-two people died after taking drugs such as Spice and mephedrone last year in England and Wales, up from 29



By Chris Clements | 2 Jul 2013 00:01

## Family left heartbroken as 25-year-old son is killed by cocktail of lethal legal highs

13 August 2013 Last updated at 11:27



## Devon teenagers in hospital 'after taking legal highs'

HOME » NEWS » UK NEWS » CRIME

## 'Legal high' deaths soar to highest number on record

The number of deaths from drugs known as "legal highs", such as miaow miaow, reached the highest number ever recorded last year.





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## News

GOT A STORY? EMAIL : [TALKBACK@THE-SUN.CO.UK](mailto:TALKBACK@THE-SUN.CO.UK)

# Legal drug teen ripped his scrotum off



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# Bury Times

# FIVE PUT IN HOSPITAL BY LEGAL HIGH

These results suggest a mechanism by which the influence of the following factors may be







Am. J. Ph.]

7

[December, 1903]

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## HEROIN—HYDROCHLORIDE

is pre-eminently adapted for the manufacture of cough elixirs, cough balsams, cough drops, cough lozenges, and cough medicines of any kind. Price in 1 oz. packages, \$4.85 per ounce; less in larger quantities. The efficient dose being very small (1-48 to 1-24 gr.), it is

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## COUGH MEDICINE WITH A "KICK"

**PERTH, Fri.**—Girls of 13 and 14 years of age at a metropolitan school had been drinking bottles of a patent cough mixture containing heroin to give them "a lift."

Senator Agnes Robertson said this today.

She also had heard, she said, of other teenagers in West Australia experimenting with the effects of crushed aspirin tablets in a certain brand of aerated water.

## THE BEST HAIR DRESSING COCAINE

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*Cocaine is now put up in two sizes. 50¢ and \$1.00*

*Beware!* Young and Old—People in All Walks of Life!

This may be handed you by the friendly stranger. It contains the Killer Drug "Marihuana"—a powerful narcotic in which lurks **Murder! Insanity! Death!**

### WARNING!

Dope peddlers are shrewd! They may put some of this drug in the or in the tobacco cigarette.

WRITE FOR DETAILED INFORMATION, ENCLAVING 10 CENTS IN POSTAGE—MAILING FIRST

**Address: THE INTER-STATE NARCOTIC ASSOCIATION**  
(Incorporated in the State of Illinois)  
**Chicago, Illinois, U. S. A.**

53 W. Jackson Blvd.

**COCAINE TOOTHACHE DROPS**  
Instantaneous Cure!  
PRICE 15 CENTS.  
Prepared by the  
**LLOYD MANUFACTURING CO.**  
219 HUDSON AVE., ALBANY, N. Y.  
For sale by all Druggists.  
(Registered March 1885.) See other side.

# Novel psychoactive substances

- Substances which produce the same, or similar, effects to traditional drugs
- Not controlled under the Misuse of Drugs Act
- Illegal to supply, sell or advertise for “human consumption”
- Research chemicals, bath salts, plant food, pond cleaner







The legal high "Burst" was bought at a newsagent on Musselburgh Hight Street.

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	Armageddon 3g Herbal Incense Blend	GBP20.00	<a href="#">Details</a>		Pink Pantherz (1g) Capsule Research Chemical	GBP6.50	<a href="#">Details</a>
	Back In Stock - White MM 1 Gram Research Chemical Powder	GBP20.00	<a href="#">Details</a>				
	Black Mamba (3 gram) Herbal Incense Blend	GBP20.00	<a href="#">Details</a>		Columbiana (1g) Research Chemical Powder	GBP20.00	<a href="#">Details</a>
	Brand New! Paradox 1g Herbal Incense 3 Gram	GBP20.00	<a href="#">Details</a>		Chocolate Scented Layer Research Chemical Incense Blend 3g	GBP20.00	<a href="#">Details</a>
	Charly Sheen 1 Gram Research Chemical	GBP20.00	<a href="#">Details</a>		Pink Pantherz (1g) Capsule Research Chemical	GBP6.50	<a href="#">Details</a>

# Simpler times



Sedatives



Stimulants



Hallucinogens



# Simpler times



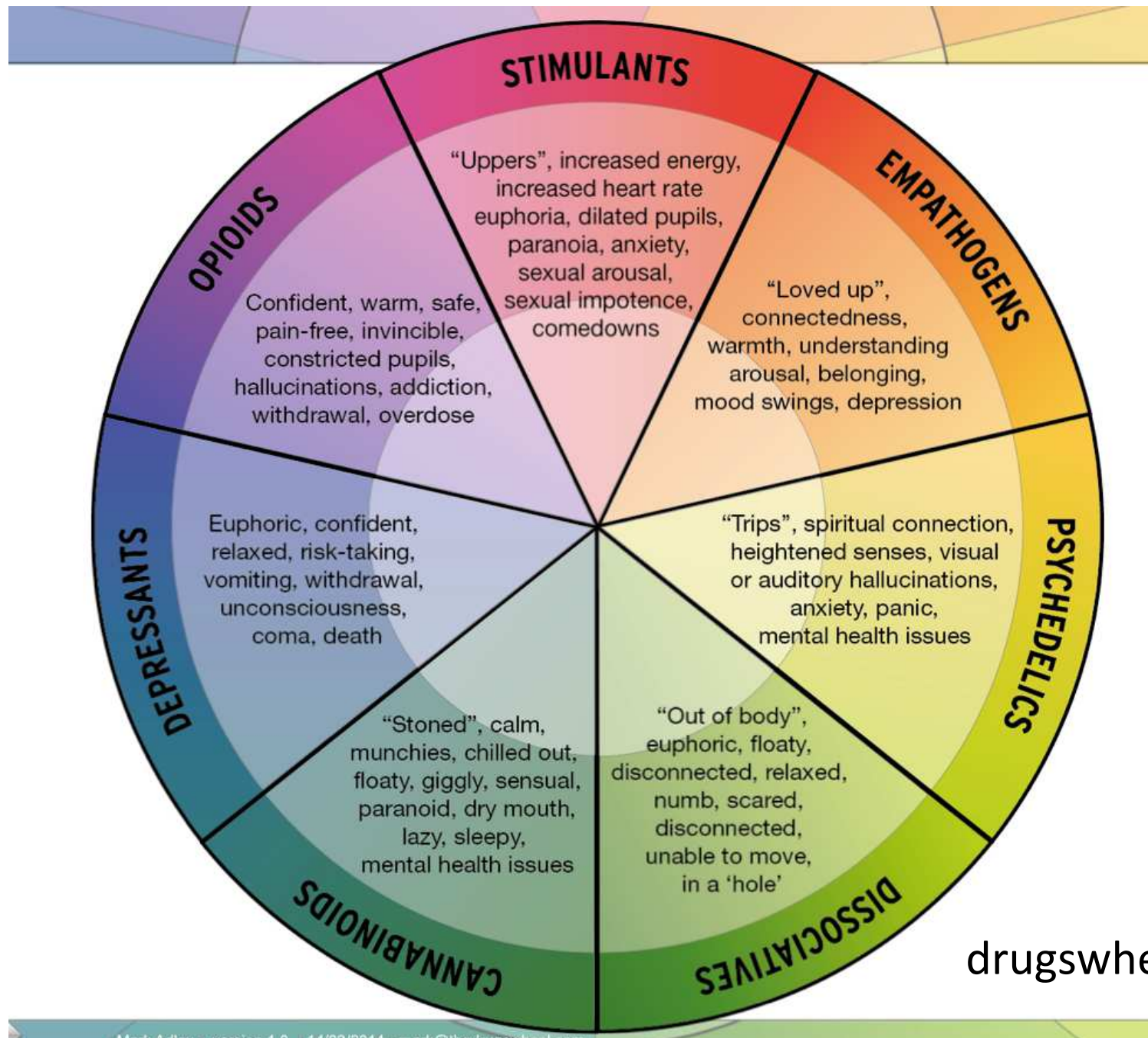
Poppy



Coca plant

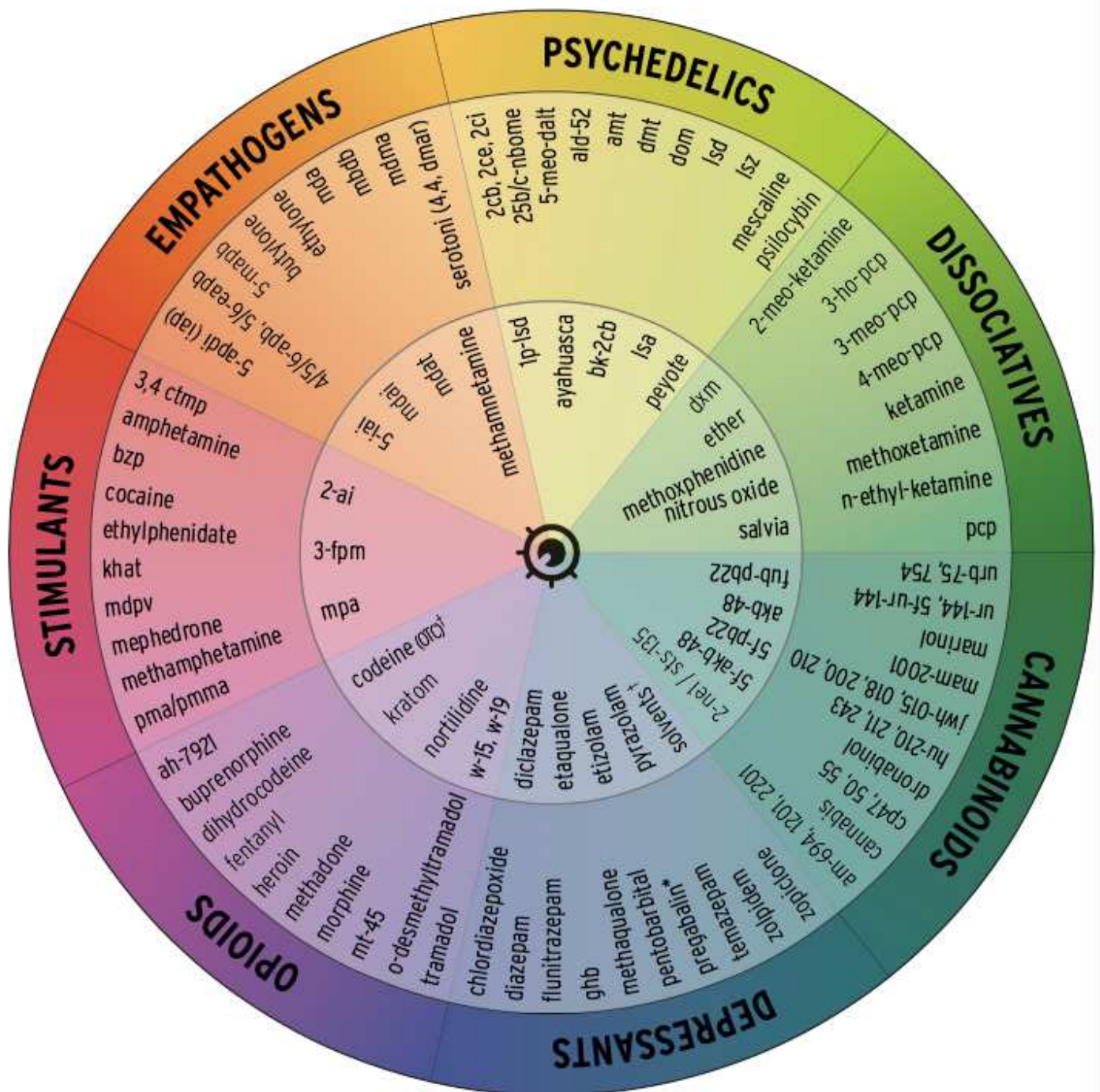


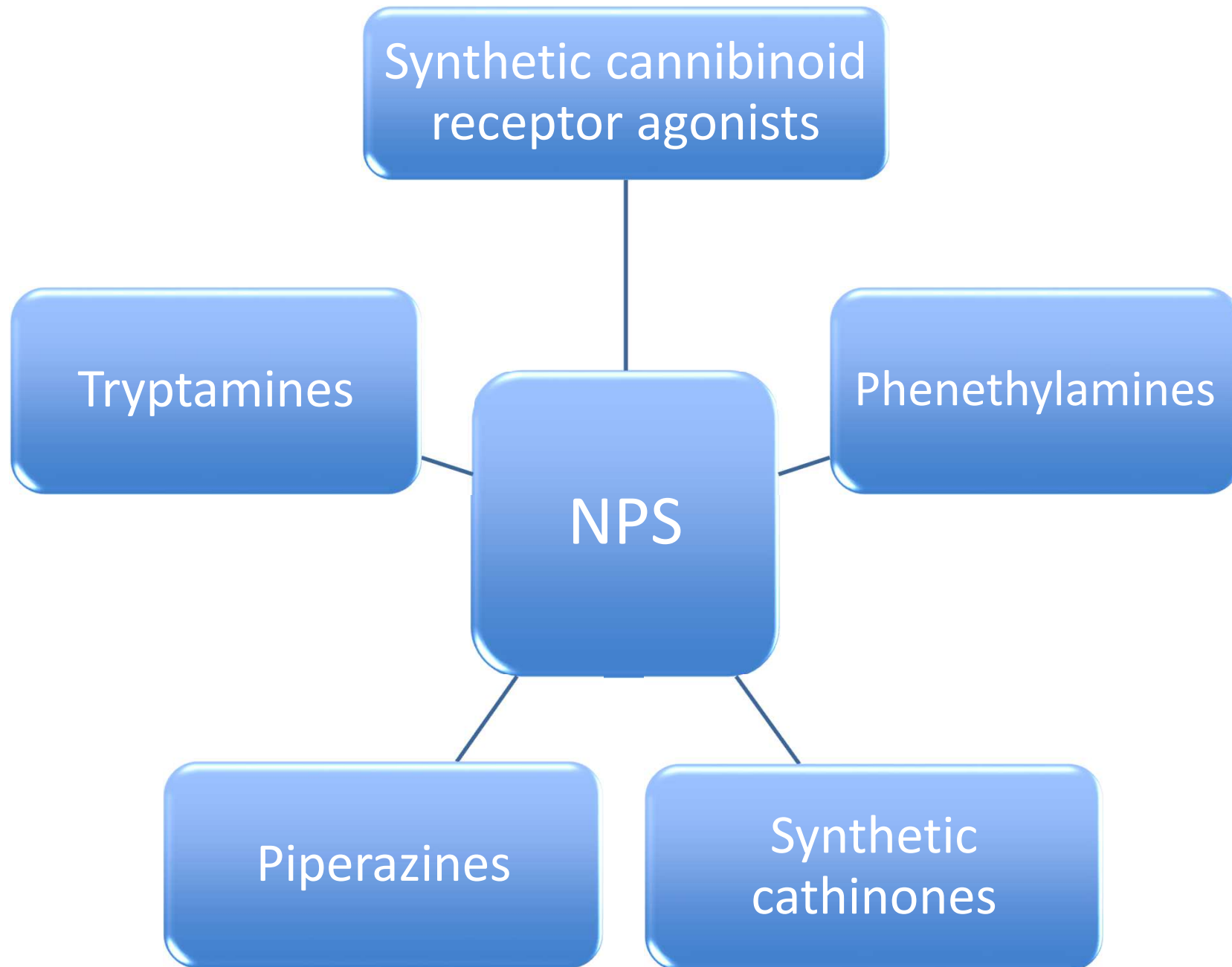
Mushrooms



drugswheel.com







# Cannabis

- Tetrahydrocannabinol (THC) is found in the leaves and flowering tops
- Commonly smoked/ingested but may be injected
- British Crime Survey (2009/10)
  - 30% people had used cannabis
  - 6% in the last year
  - 3% in the last month
- Rarely see in hospital

# Synthetic cannabinoid receptor agonists

- Usually available as a powder, smoked or ingested
  - *Spice, Bliss, Annihilation, Bonzai, K2, Magic Gold*
- Higher affinity for cannabinoid receptor than THC
- Toxicity much more severe than cannabis
  - Agitation, tremor, confusion, hallucinations, psychosis
  - Tachycardia, chest pain, palpitations
  - Acute kidney injury, convulsions

# Phenethylamines

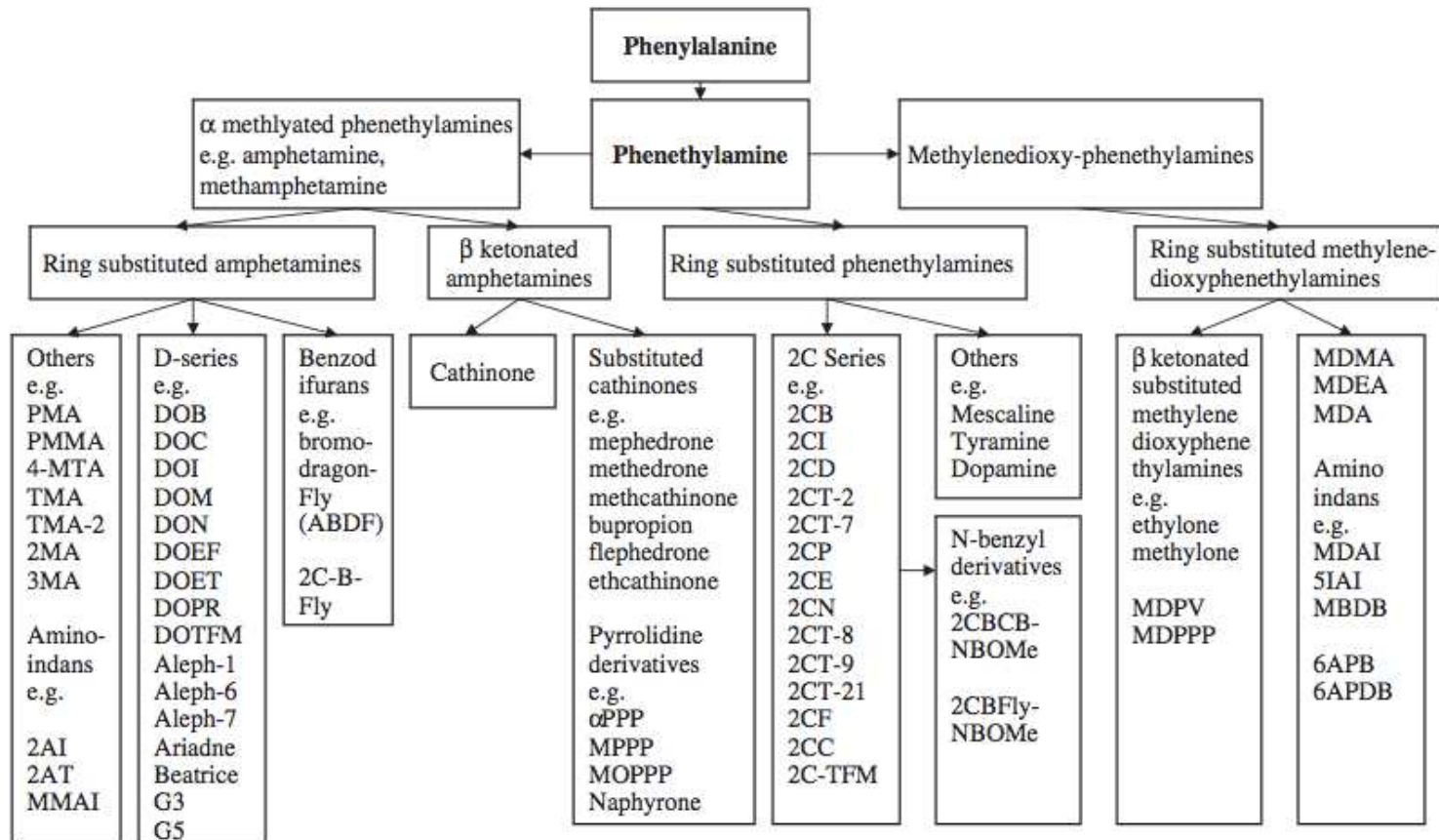
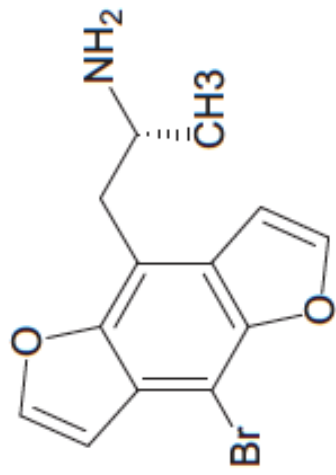
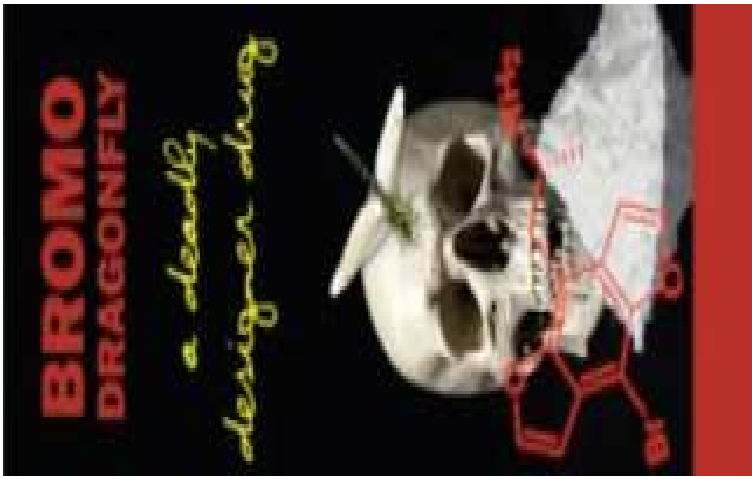


Fig. 4. Classification of the phenethylamines.

# Phenethylamines

- Often sold as pills or powder as 'ecstasy'
- Desired effects: euphoria, alertness, intensify emotions
- Adverse effects
  - Sweating, confusion, anxiety, hallucinations, convulsions
  - Chest pain, arrhythmias, MI, vasoconstriction
  - Hyperthermia, serotonin syndrome
  - Metabolic disturbance, renal failure
- Poor prognostic signs
  - hyperthermia                      coma
  - persistent convulsions              focal neurological signs



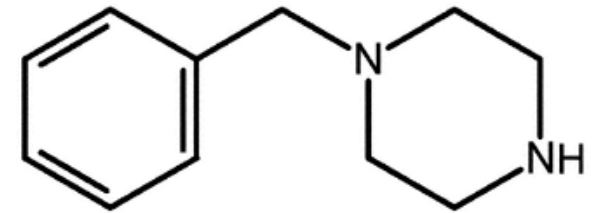


# Synthetic cathinones



- Cathinone is the active ingredient in the leaves of *Khat*
- Closely related to phenethylamines (e.g. amphetamine)
  - Similar toxicity with stimulant features but considered less potent
  - Some (e.g. methyldone) originally patented as therapeutic agents
- Mephedrone emerged in 2007
  - *m-cat, miaow miaow, meph, drone*
  - Sold as powder or as 'ecstasy' pills
  - Ingested, injected, snorted, ingesting wrapped powder (bombing)

# Piperazines



- 1-benzylpiperazine (BZP) best known
- Developed as potential antidepressant
- Emerged in NZ in 1990s as 'legal' alternative to MDMA
- First use in Europe in 1999
- Serotonergic, dopaminergic, noradrenergic effects
- Toxic effects similar to amphetamines & sympathomimetics
- Onset may be delayed up to 2 hours

# Tryptamines

- Derived from the amino acid tryptophan
- Primarily hallucinogenic clinical features
- Natural tryptamine neurotransmitters (serotonin, melatonin)
- Synthetic medicinal tryptamines (sumatriptan)
- Natural tryptamines with hallucinogenic properties
  - Psilocybin in ‘magic mushrooms’
  - 5-hydroxy-dimethyltryptamine (5-HO-DMT) from *Bufo sp.* toads

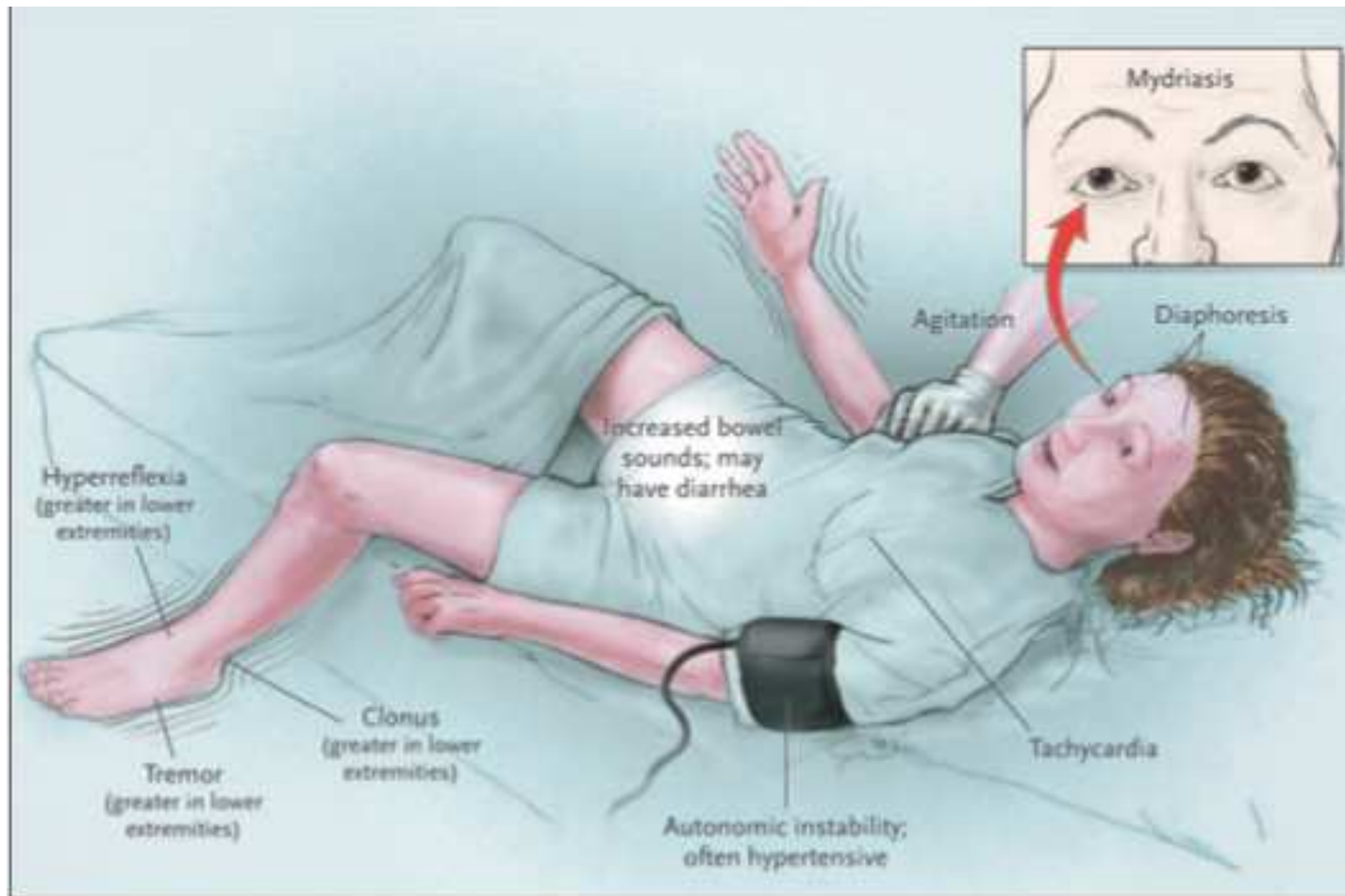


# Management summary

- Removal of precipitating drugs (including prescribed)
- Think serotonin syndrome – temperature/clonus
- Watch U&Es and CK
- Control hyperthermia/agitation
  - Benzodiazepines and active cooling
  - (Cyproheptadine, chlorpromazine)
- Treat complications

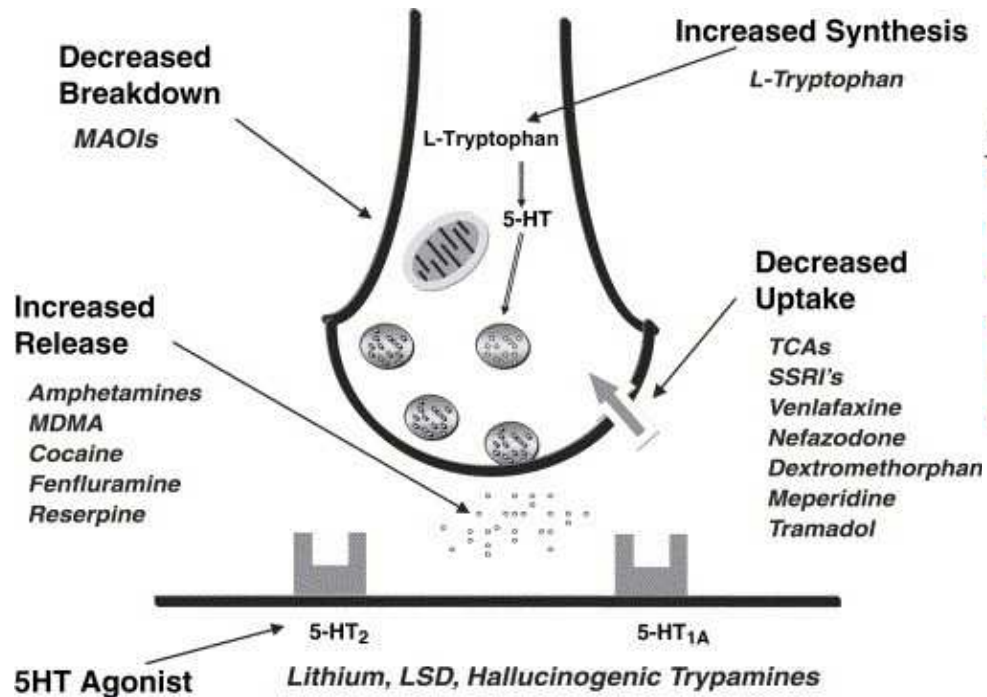


# Serotonin toxicity



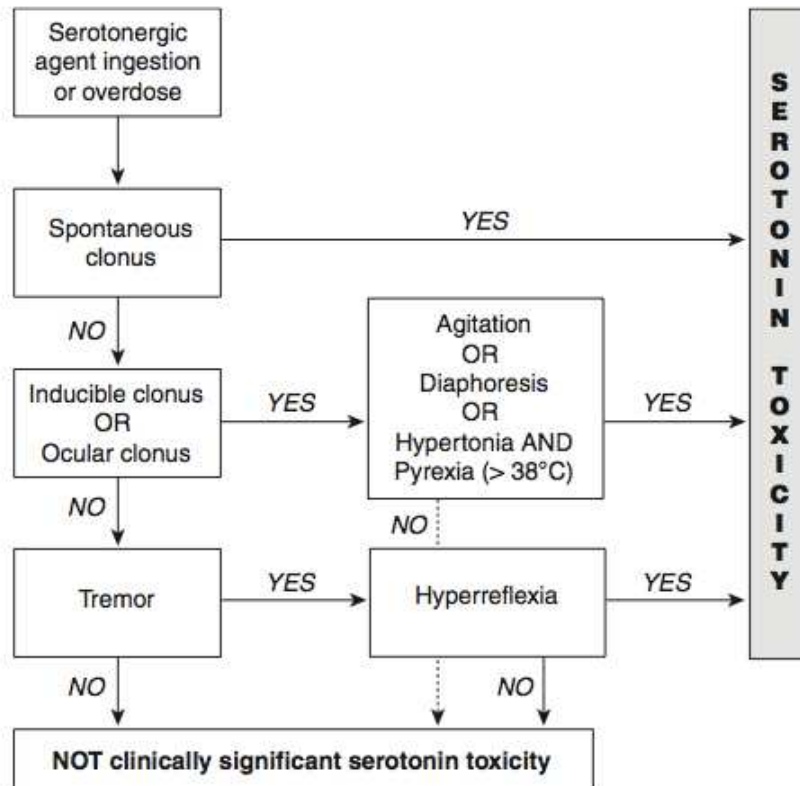
*Boyer NEJM 2005*

# SEROTONIN SYNDROME



Neuromuscular effects	Autonomic effects	Mental state changes
<ul style="list-style-type: none"> <li>• Hyperreflexia</li> <li>• Clonus</li> <li>• Myoclonus</li> <li>• Shivering</li> <li>• Tremor</li> <li>• Hypertonia/rigidity</li> </ul>	<ul style="list-style-type: none"> <li>• Hyperthermia: mild, &lt; 38.5° C; severe <math>\geq</math> 38.5° C</li> <li>• Tachycardia</li> <li>• Diaphoresis</li> <li>• Flushing</li> <li>• Mydriasis</li> </ul>	<ul style="list-style-type: none"> <li>• Agitation</li> <li>• Hypomania</li> <li>• Anxiety</li> <li>• Confusion</li> </ul>

# SEROTONIN SYNDROME



Differential diagnosis	Distinguishing features
Neuroleptic malignant syndrome	Absence of neuromuscular excitation;* and presence of bradykinesia, lead-pipe rigidity, and extrapyramidal features
Non-convulsive seizures	Electroencephalogram features, and response to benzodiazepines
Acute baclofen withdrawal	History of intrathecal baclofen pump, and response to baclofen
CNS infection — encephalitis, meningitis	Absence of neuromuscular excitation*
Anticholinergic delirium	Absence of neuromuscular excitation,* bowel sounds absent, and dry skin
Sympathomimetic toxicity	Absence of neuromuscular excitation*
Malignant hyperthermia	Anaesthetic exposure, and absence of neuromuscular excitation*

\* Hyperreflexia, clonus and myoclonus.

# Management of serotonin toxicity

- Removal of precipitating drugs
- Control hyperthermia
- Control agitation
- Specific treatments for serotonin syndrome

**Your access to BURST, Blue  
and Blue Stuff has changed.**



**You can no longer buy ethylphenidate legally.**

Ethylphenidate, and four similar compounds, will be controlled substances as of midnight on Friday 10 April.

This means it will be illegal to make or sell ethylphenidate based drugs, but not illegal to possess ethylphenidate.

Please take care not to binge on your current supply.

## **HOW IS THIS GOING TO AFFECT YOU?**

### **If you continue to use ethylphenidate based substances:**

- As the compounds are illegal you may not be able to buy from your usual source
- Other dealers may start selling ethylphenidate
- Do you know what it is mixed with?
- Do you know how strong it is?
- Try not to inject – you can swallow (bomb) it
- If you inject, use clean works every time
- Get help if you or a friend feel unwell.

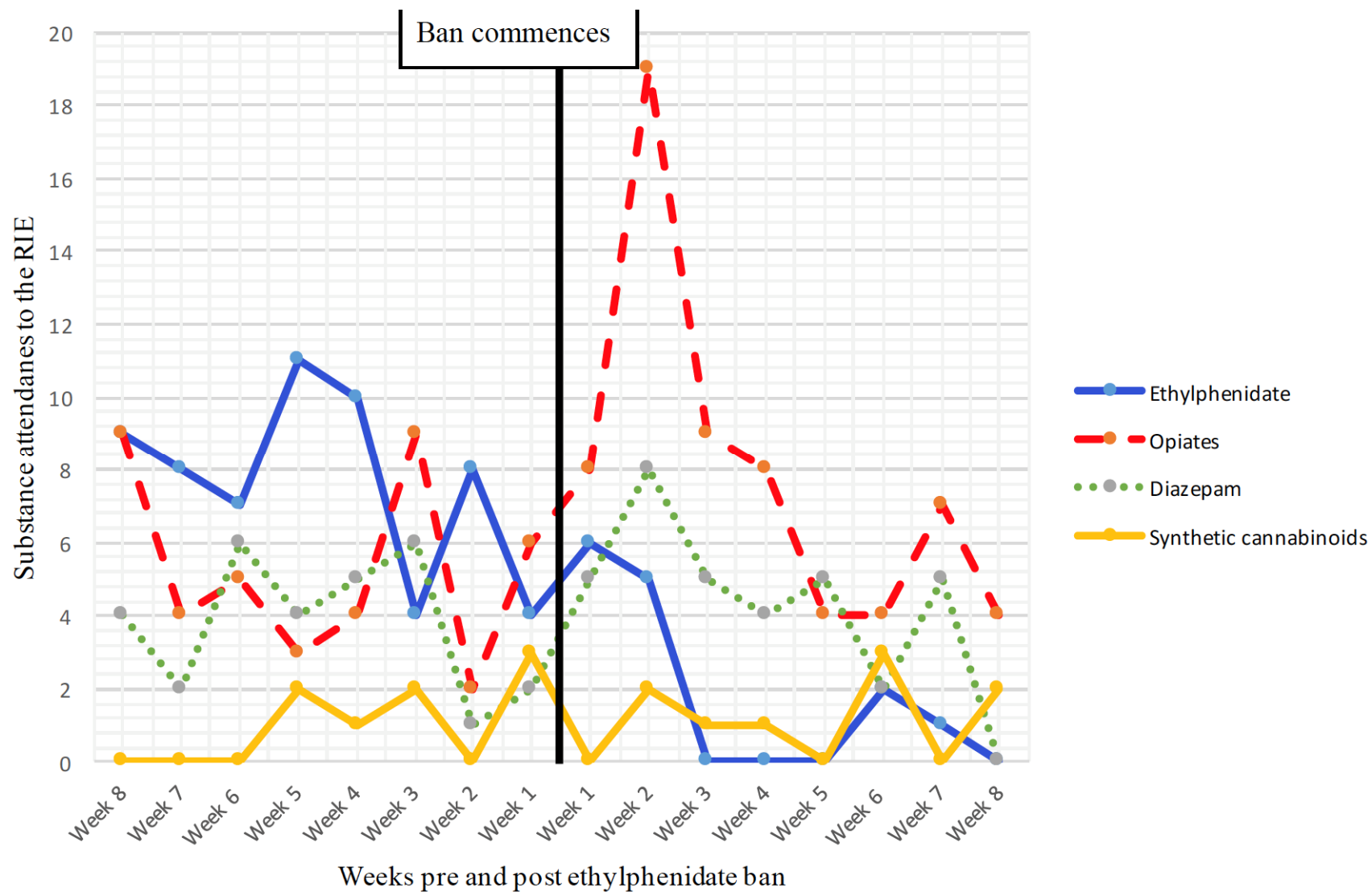
### **If you go back to using heroin, instead of ethylphenidate based substances:**

- Your tolerance is likely to have dropped
- Try not to take the same dose you used to
- Your body might not be able to deal with heroin in the same way
- Try not to inject
- If you inject, use clean works every time
- Do you or a friend have naloxone near by?
- Get help if you or a friend feel unwell.

### **If you start using heroin:**

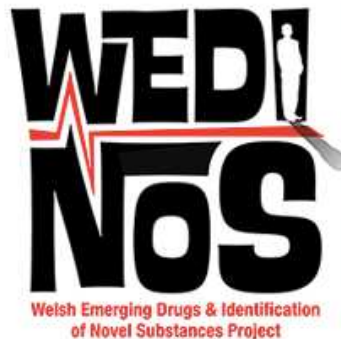
- Take a small dose first – you don't know how your body is going to react
- Preparing heroin is different from preparing ethylphenidate based drugs
- You will still use clean works every time and filter every time
- But, you need to use Vit C/Citric to dissolve the drug and you need to heat it
- Do you or a friend have naloxone near by?
- Get help if you or a friend feel unwell.

## Effect of change of legal status on presentations to Royal Infirmary of Edinburgh with ethylphenidate toxicity





# Testing samples



- Home
- Sample Testing
- Sample Results
- Substance Information
- Harm Reduction Advice
- Newsletter
- Register for Updates
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## WELCOME

'Legal highs, club drugs, designer drugs, new psychoactives...'  
Drug markets are changing.  
It can be hard to get accurate information and stay safe.  
WEDINOS tests substances to give individual users and others rapid and accurate information to reduce harms.

### COLLECTING, TESTING, INFORMING

#### Sample Testing

Click here to complete a Substance Sample & Effect Record form.

#### Sample Results

Find your sample results here and results of other WEDINOS tests.

#### Substance Information

Click here for more information on a range of substances.

#### EWS Alerts

Identified in Poland: 3-(2,4-dimethylphenyl)-2-methylquinazolin-4(3H)-one (methylmethaqualone) belongs to the quinazoline class of drugs and is the methyl analogue of methaqualone, which is reported as exhibiting sedative-hypnotic, anticonvulsant and anxiolytic properties via action on the GABA-A receptor

#### News

29/09/14 - Black Mamba & Pandoras Box:: Over the last two weeks seven individuals from the Cardiff area have been hospitalised following consumption of the 'herbal incense blends' "Black Mamba" and "Pandora's Box". Previous laboratory investigations have found many of these herbal incense blends to contain synthetic cannabinoids. It is very important from a Public Health perspective that any individuals using or considering use are aware of the dangers with synthetic cannabinoids. Anyone experiencing problems both physical and psychological are encouraged to cease use and seek help from health professional as soon as possible

#### Tweets

Follow

### Sample 000030072

Date Received: 21/04/2015  
Postcode: NP23  
Purchase Intent: Legal High Cannabis  
Package Label: Johnny Bush  
Sample Colour: Green  
Sample Form: Plant Matter  
Consumption Method: Smoked  
Self-Reported Effects: Relaxed  
Sample Upon Analysis (Major): Cannabis, Heroin, Noscapine, Paracetamol, Caffeine  
Sample Upon Analysis (Minor):



[Click to Enlarge](#)

### Sample 000036331

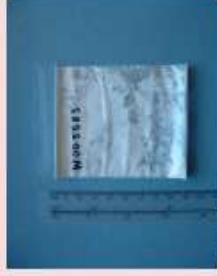
Date Received: 29/04/2015  
Postcode: CF35  
Purchase Intent: Not Stated  
Package Label: Not Stated  
Sample Colour: White  
Sample Form: Powder  
Consumption Method: Not Stated  
Self-Reported Effects: Not Stated  
Sample Upon Analysis (Major): Paracetamol  
Sample Upon Analysis (Minor):



[Click to Enlarge](#)

### Sample W003583

Date Received: 17/04/2015  
Postcode: TF10  
Purchase Intent: Speed  
Package Label: Not Stated  
Sample Colour: White  
Sample Form: Powder  
Consumption Method: Not Stated  
Self-Reported Effects: Not Stated  
Sample Upon Analysis (Major): Salbutamol  
Sample Upon Analysis (Minor):



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### Sample W003491

Date Received: 07/04/2015  
Postcode: SE20  
Purchase Intent: Go Galne  
Package Label: Not Stated  
Sample Colour: White  
Sample Form: Powder  
Consumption Method: Not Stated  
Self-Reported Effects: Not Stated  
Sample Upon Analysis (Major): Methiopropamine, Lidocaine, Ethylphenidate  
Sample Upon Analysis (Minor):



[Click to Enlarge](#)

30 Nov  
2016

QMRI building  
Royal Infirmary of  
Edinburgh campus

# EDINBURGH

Clinical Toxicology

## edinburgh case-based update in severe poisoning

8.45 am

Registration & Coffee

CHAIR: Dr Euan Sandilands

9.15 am

Welcome & introduction

Dr Euan Sandilands, Consultant Toxicologist, NPIS Edinburgh/NHS Lothian

9.25 am

**Paracetamol poisoning**

Dr James Dear, Consultant Toxicologist, NPIS Edinburgh/NHS Lothian

10.10 am

**Compulsory treatment in the general hospital: a practical guide**

Dr Roger Smyth, Consultant Liaison Psychiatrist/NHS Lothian

10.55 am

Coffee

CHAIR: Dr Arvind Veiraiiah

11.10 am

**Toxic alcohol poisoning**

Dr Knut Erik Hovda, Consultant Toxicologist, Norwegian CBRNe Centre of Medicine, Oslo University Hospital

12 noon

**Novel psychoactive substances and other recreational drugs**

Professor Michael Eddleston, Professor of Clinical Toxicology, University of Edinburgh/NPIS Edinburgh

12.45 pm

Lunch

CHAIR: Dr James Dear

1.30 pm

**Toxic ECGs – it's all about the QRS and QT**

Dr Arvind Veiraiiah, Consultant Toxicologist, NPIS Edinburgh/NHS Lothian

2.15 pm

**The hypotensive tox patient**

Dr Euan Sandilands, Consultant Toxicologist, NPIS Edinburgh/NHS Lothian

3 pm

Coffee

3.15 pm

**Paediatric poisoning**

Dr Mark Anderson, Consultant Paediatrician, Great Northern Children's Hospital, Newcastle upon Tyne

4.05 pm

**Ask the expert ...**

The panel will discuss toxicology cases from delegates

4.50 pm – 5 pm

Feedback & Close



EdinClinTox  
Edinburgh Clinical Toxicology

'Edinburgh Case-based Update in Severe Poisoning' has been approved by the Federation of the Royal Colleges of Physicians of the United Kingdom for 6 category 1 (external) CPD credit(s).