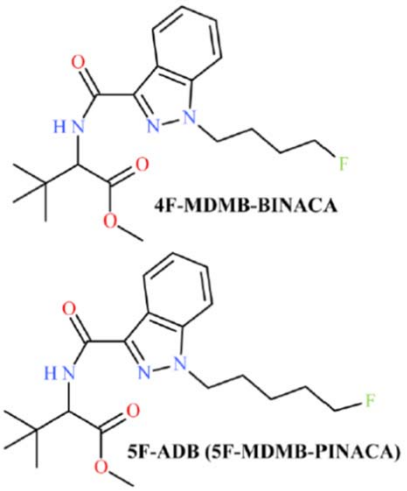
What do we know about synthetic cannabinoids?

A/Prof Raimondo Bruno

School of Medicine, UTAS

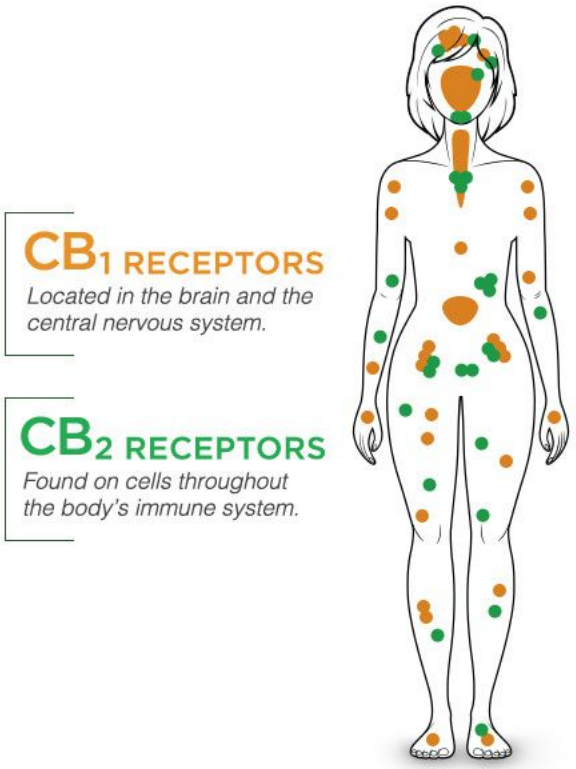
DRUG TRENDS

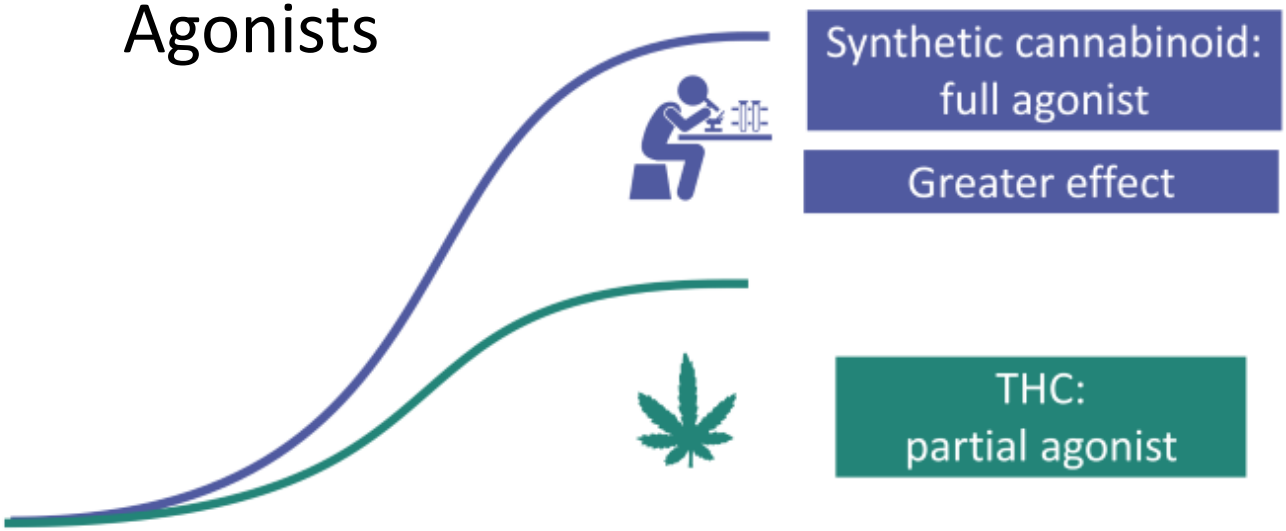
UTAS



What are they?

Synthetic Cannabinoid Receptor Agonists

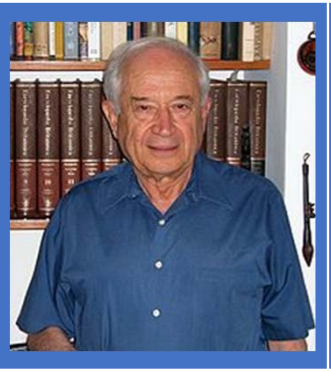
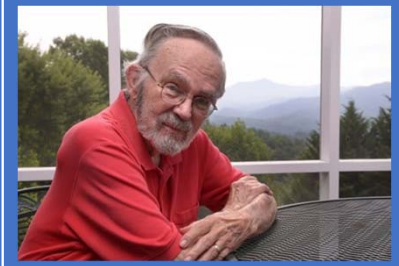
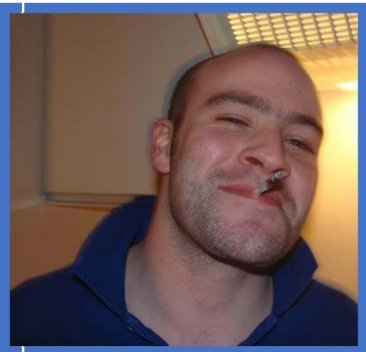




But!

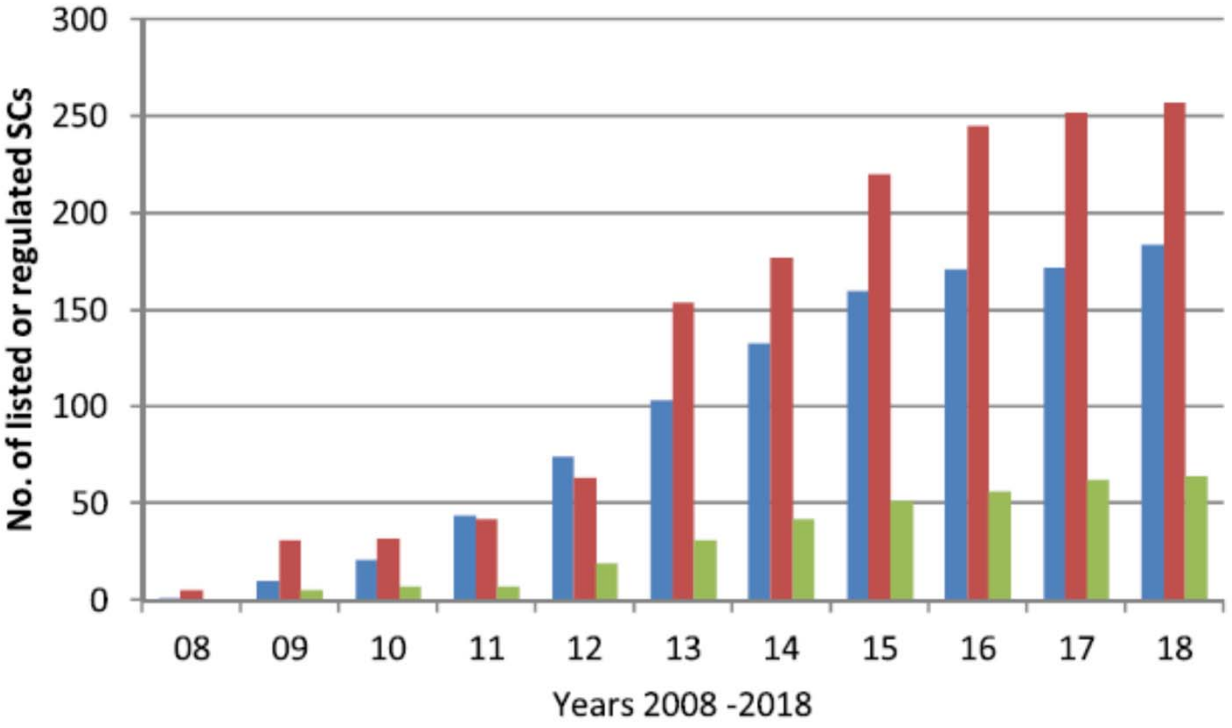
- Have different potency, quicker onset and different half lives
- May have additional biological actions
- Some have serotonergic agonist effects
- Some may have MAO Inhibitory effects & SERT reuptake inhibition

Where do they come from?
Hijacking of basic science

			Pfizer	
Raphael Mechoulam First to isolate THC (1964) "HU" Compounds (Hebrew University) HU-210 synthesised 1988	Alexandros Makriyannis Identified CB1 "AM Compounds" e.g. AM-2201	John W. Huffman NIDA scientist >470 substances "JWH" Compounds e.g. JWH-018 first synthesised 1995	Pfizer Analgesics dev. "CP" Compounds (Carl Pfizer) e.g. CP 47,497	Random guy from the internet Everything since then (e.g. 4F-MDMB-BINACA)

See for example isomerdesign.com

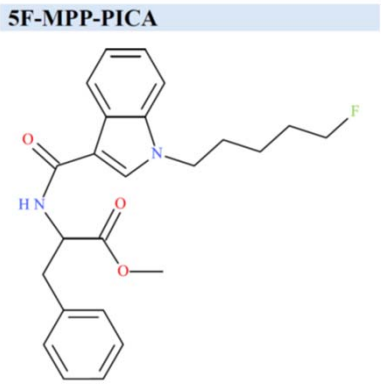
Can you keep up with the pace?



Red: reported by UNODC (United Nations Office on Drugs and Crime)
Blue: reported by EMCDDA (European Monitoring Centre for Drugs and Drug Addiction)

In 2019 ALREADY

- APP-BINACA
- 2F-QMPSB
- 5F-MPP-PICA

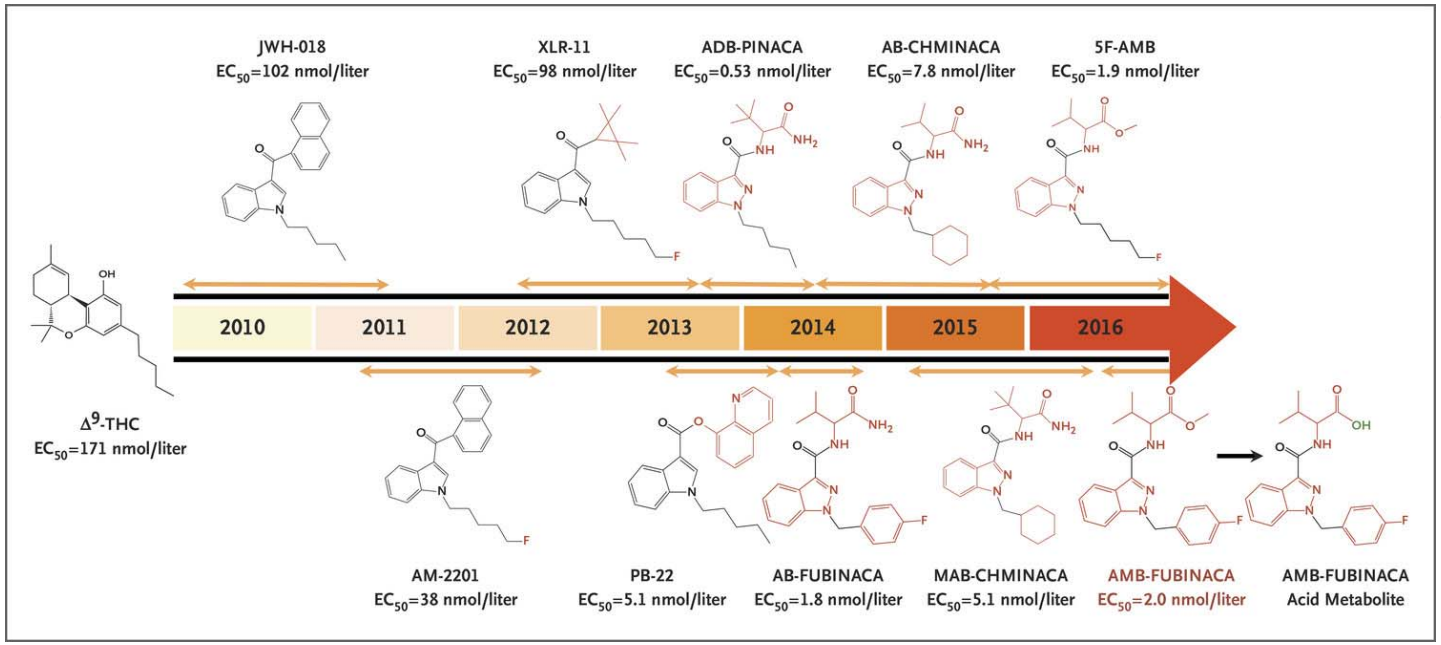


Identification and quantification of synthetic cannabinoids in 'spice-like' herbal mixtures: Update of the German situation in summer 2018

Ludger Ernst[a], Nico Langer[b], Aileen Bockelmann[c], Elaheh Salkhordeh[c], Till Beuerle[c,*]

First sold ~2004; first chemically verified ~2008

An ever more potent alphabet soup



~2010

~2014

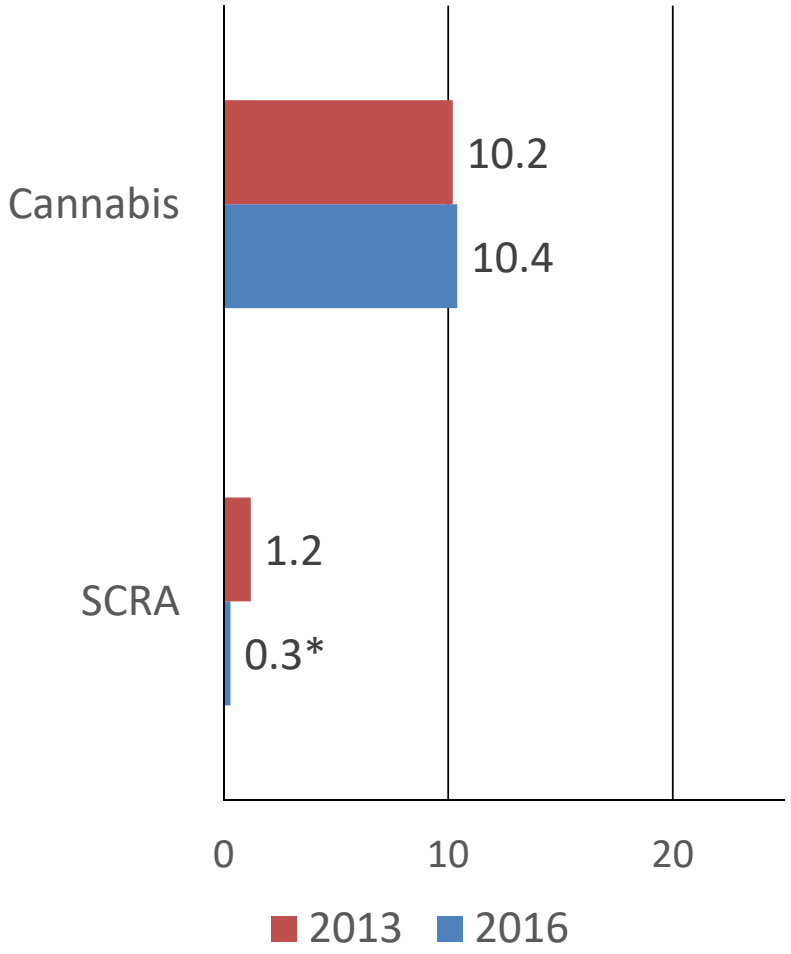
	CB1 affinity (Ki, nM)	CB2 affinity (Ki, nM)
THC	41	36
JWH-018	9	3
JWH-250	11	33
JWH-073	9	38
JWH-081	1	12
JWH-210	0.5	0.7
AM-2201*	1	3
JWH-122	0.7	1
UR-144	29	5
XLR-11*	24	2
AB-FUBINACA	0.36	??

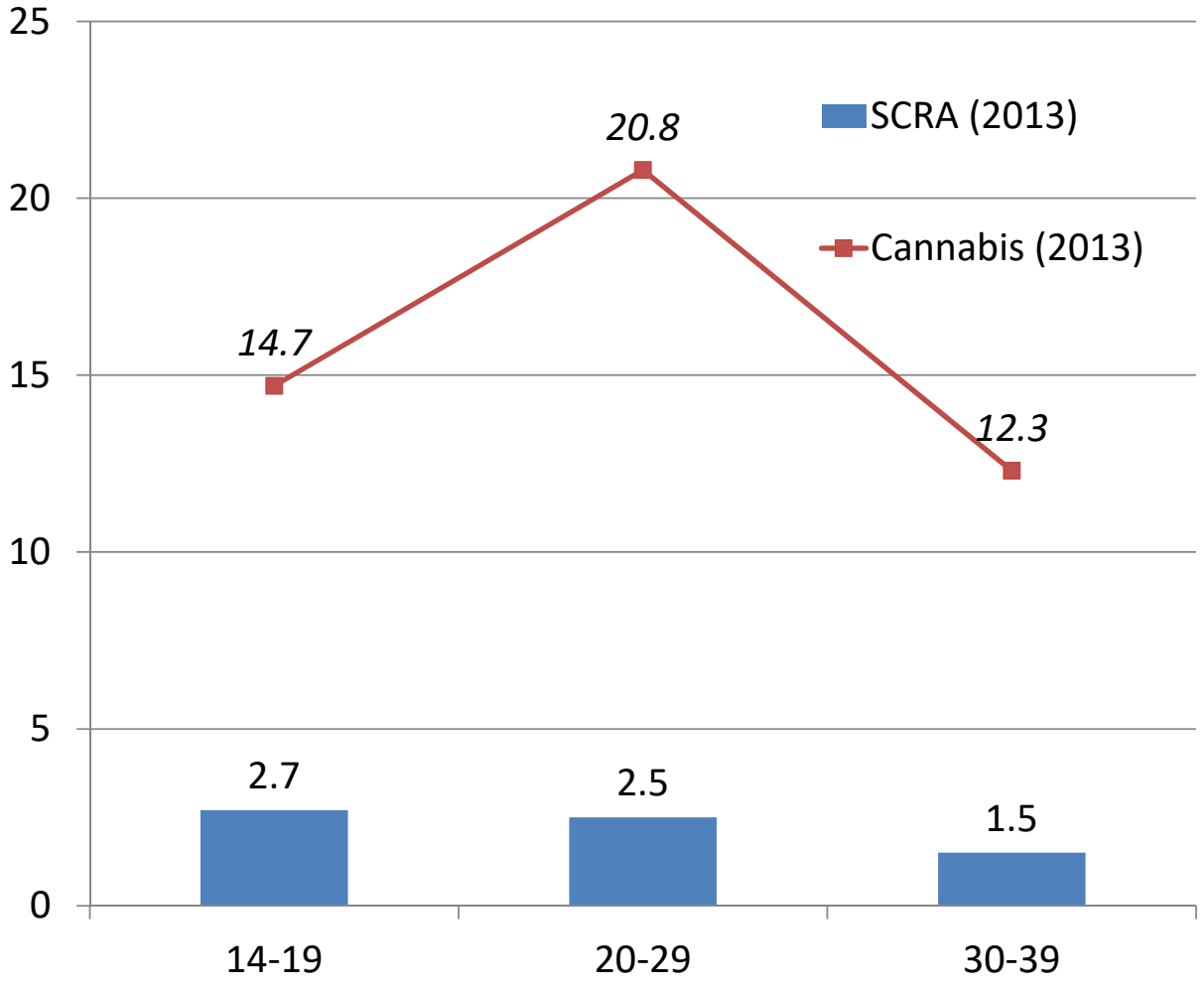
*AKI, -5F

Source: Gueney et al, 2014

Adams AJ et al. N Engl J Med 2017;376:235-242.

What do we know about prevalence of past year use in Australia?





Source: National Drug Strategy Household Survey

Illegal and *not-illegal**

- July 2011 → 8 SCRA placed on Schedule 9 (Prohibited Substances)
- May 2012 → SCRA n.e.c. included on S9 *("benzoylindoles, cyclohexylphenols, dibenzopyrans, naphthoylindoles, naphthylmethylindoles, naphthoylpyrroles, naphthylmethylindenes, phenylacetylindoles, and synthetic cannabinomimetics except when separately specified in these Schedules")*
- *Nov 2012 → Crimes Legislation Amendment transferred lists of illicit substances to criminal code to allow quick emergency determinations to be declared by the Minister and stay in place for up to 18 months*
- *February 2015 → Crimes Legislation Amendment (Psychoative Substances and Other Measures) Act:* ***It is an offence to import psychoactive substances****, with exemptions for food, tobacco, medicines and other therapeutic goods, agricultural products, veterinary products, industrial chemicals, plants/funghi, otherwise controlled drugs/plants, prohibited imports, or other substances as may be specified by legislators*
  - *A* ***psychoactive substance means any substance that, when a person consumes it, has the capacity to induce a psychoactive effect****. A psychoactive effect, in relation to a person, means:*
    - *(a) stimulation or depression of the person's central nervous system, resulting in hallucinations or in a significant disturbance in, or significant change to, motor function, thinking, behaviour, perception, awareness or mood; or*
    - *(b) causing a state of dependence, including physical or psychological addiction*

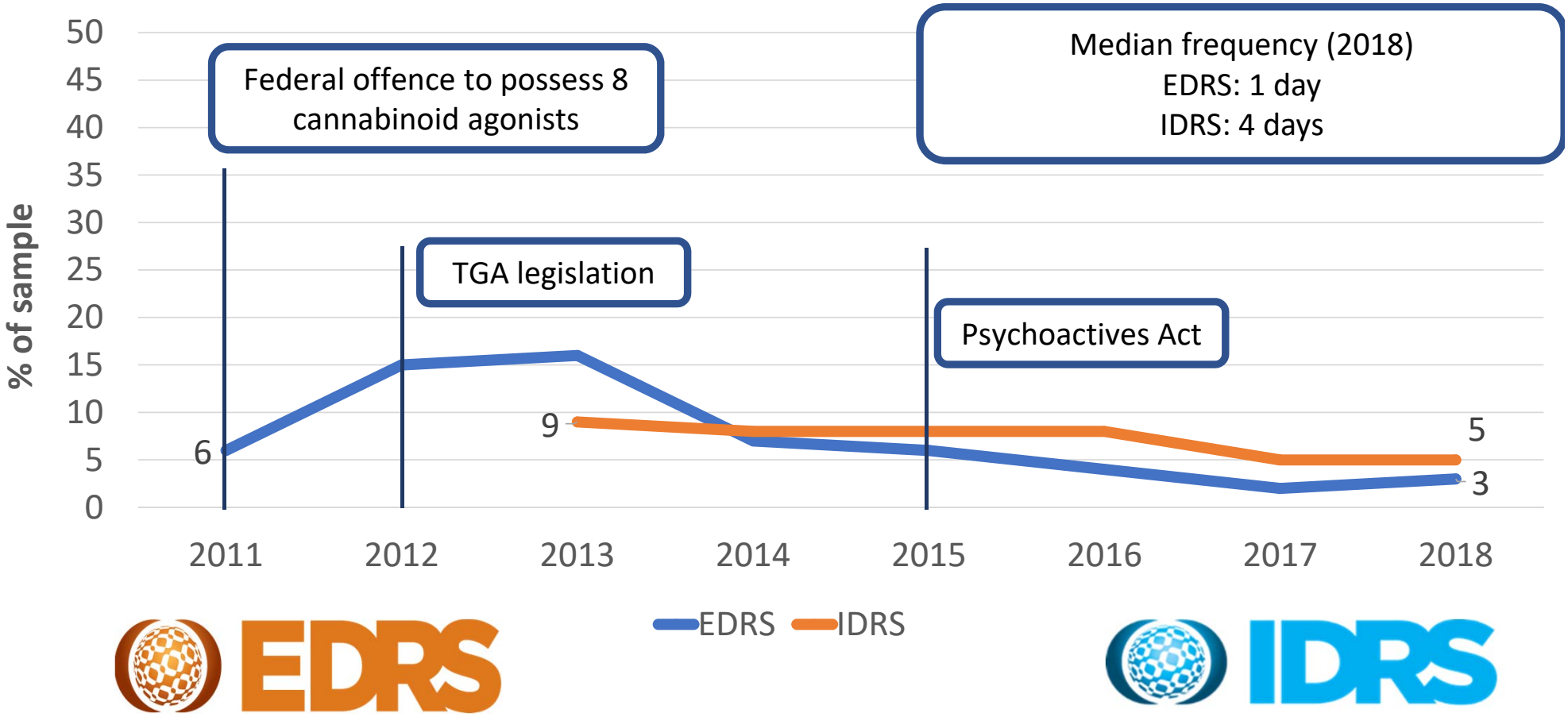
A critical examination of the definition of 'psychoactive effect' in Australian drug legislation☆

Monica J. Barratt[a,b,c,*], Kate Seear[d,b], Kari Lancaster[a]

The impact of Australian legislative changes on synthetic cannabinoid exposures reported to the New South Wales Poisons Information Centre

Rose Cairns[a,b,*], Jared A. Brown[a], Naren Gunja[a,c], Nicholas A. Buckley[a,b]

Past six month use of synthetic cannabis, 2011-2018



Note: EDRS – people who use psychostimulants; IDRS – people who inject drugs

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MRE Herbal Tea.

(2 Gram Pack)

★★★★★ (4)

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DETAILS

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Accessed 14/02/2019

SCRA Presentations

“Herbal Incense” “herbal tea”
SCRA sprayed on flammable plant material

Vape fluids

Black Mamba / Spice A4 sheet paper

Vendor	RobertPaulson (800) (4.84★)
Price	฿0.00972 (£52)
Ships to	Europe
Ships from	uk
Escrow	No

Product description

Black Mamba / Spice

Fully Laced Smokeable paper, no streaks no marks. Can be written on etc.

Impregnated on paper

Contents lists available at ScienceDirect

Forensic Science International

journal homepage: www.elsevier.com/locate/forsciint

Identification and quantification of synthetic cannabinoids in ‘spice-like’ herbal mixtures: Update of the German situation in summer 2018

Ludger Ernst[a], Nico Langer[b], Aileen Bockelmann[c], Elaheh Salkhordeh[c], Till Beuerle[c,*]

[a] Chemistry Department, Central NMR Laboratory, Technische Universität Braunschweig, Hagenring 30, 38106 Braunschweig, Germany
[b] Fraunhofer-Institute for Toxicology and Experimental Medicine (ITEM), Inhoffenstr. 7, 38124 Braunschweig, Germany
[c] Institute of Pharmaceutical Biology, Technische Universität Braunschweig, Mendelssohnstr. 1, 38106 Braunschweig, Germany

Forensic Science International 294 (2019) e25–e27

Contents lists available at ScienceDirect

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Short Communication

The unexpected identification of the cannabimimetic, 5F-ADB, and dextromethorphan in commercially available cannabidiol e-liquids

Justin L. Poklis[a,*], Haley A. Mulder[b], Michelle R. Peace[b]

[a] Virginia Commonwealth University, Department of Pharmacology & Toxicology, 410 North 12th Street, Room 754, Box 980613, Richmond, VA 23298-0613, USA
[b] Virginia Commonwealth University, Department of Forensic Science, 1015 Floyd Avenue, Room 2015, Richmond, VA 23284, USA

The Association for Clinical Biochemistry & Laboratory Medicine
Better Science, Better Testing, Better Care

Annals of Clinical Biochemistry
2018, Vol. 55(6) 673–678

DOI: 10.1177/0004563218767462
journals.sagepub.com/home/acb
SAGE

Analytical evidence to show letters impregnated with novel psychoactive substances are a means of getting drugs to inmates within the UK prison service

Loretta T Ford and Jonathan D Berg

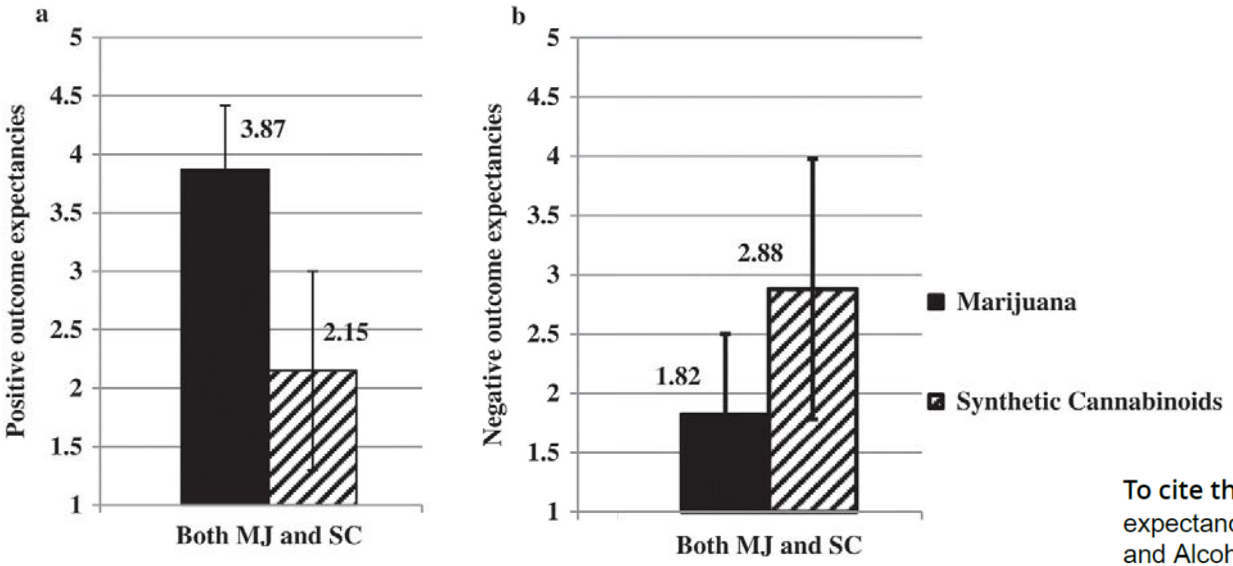
Table 2
Comparisons between synthetic and natural cannabis effects (self-rated from 1 to 10). N=956

Synthetic cannabis: A comparison of patterns of use and effect profile with natural cannabis in a large global sample

Adam R. Winstock[a,b,*], Monica J. Barratt[c]

Self-rated effect	Mean (*SD*)			Dependent samples *t*-test with effect size (Cohen's *d*)
	Synthetic	Natural	Difference	
Pleasurable effects when high	4.98 (2.49)	8.59 (1.70)	−3.61 (2.97)	$t(930) = -37.1, p < .001, d = -1.22$
Increase in appetite	3.79 (2.59)	6.89 (2.35)	−3.10 (2.92)	$t(858) = -31.1, p < .001, d = -1.06$
Sedation (sleepiness after use)	4.51 (2.57)	6.16 (2.05)	−1.65 (2.99)	$t(905) = -16.7, p < .001, d = -0.55$
Value for money	4.76 (3.00)	6.72 (2.27)	−1.96 (3.90)	$t(881) = -14.9, p < .001, d = -0.50$
Ability to function after use	5.47 (2.76)	6.85 (2.34)	−1.38 (3.10)	$t(884) = -13.3, p < .001, d = --0.45$
Impairment in memory	4.26 (2.78)	4.59 (2.42)	−0.33 (2.70)	$t(852) = -3.60, p < .001, d = -0.12$
Addictiveness	2.62 (2.51)	2.97 (2.42)	−0.36 (2.92)	$t(836) = -3.56, p < .001, d = -0.12$
Consistency of product	5.93 (3.17)	6.35 (2.36)	−0.42 (4.16)	$t(837) = -2.92, p < .01, d = -0.10$
Hangover effects	3.49 (2.80)	2.79 (2.31)	0.70 (3.16)	$t(854) = 6.45, p < .001, d = 0.22$
Paranoia	4.75 (3.11)	3.89 (2.43)	0.86 (3.24)	$t(889) = 7.91, p < .001, d = 0.27$
Harmful effects on lungs	5.79 (2.85)	4.19 (2.36)	1.60 (2.87)	$t(868) = 16.4, p < .001, d = 0.56$
Negative effects when high	4.80 (2.89)	2.80 (2.00)	2.00 (3.13)	$t(859) = 18.7, p < .001, d = 0.64$

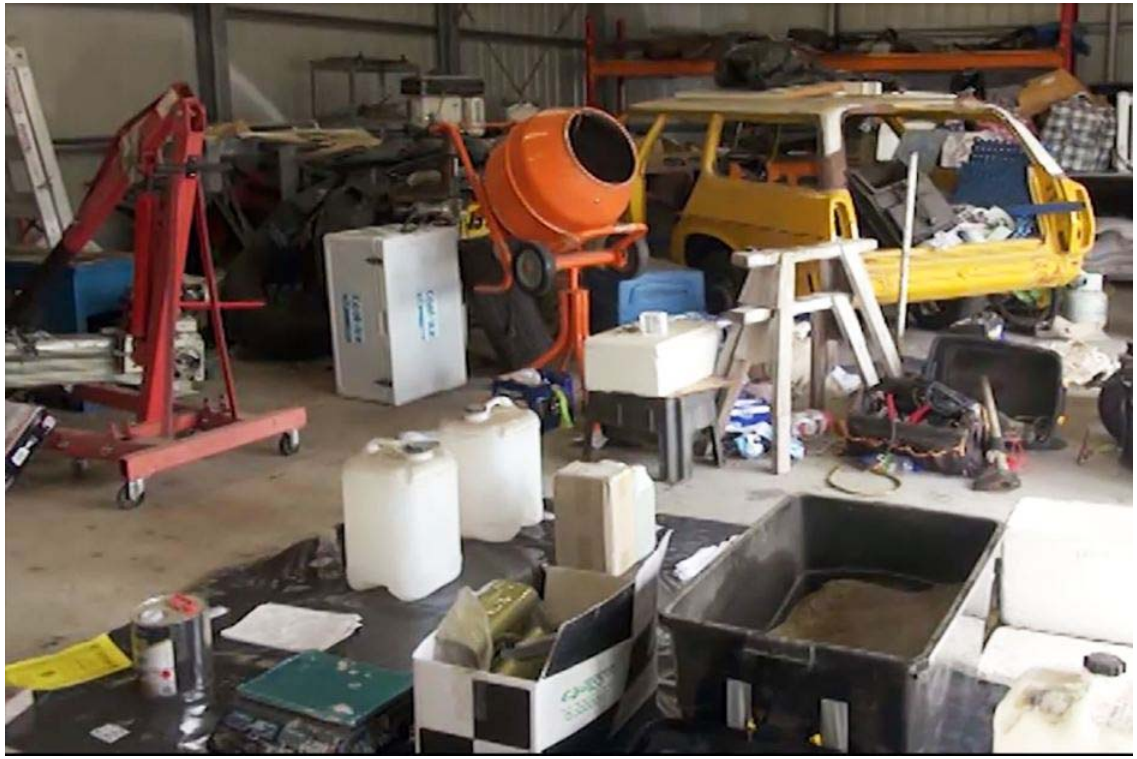
93% (887 of 956) preferred natural



What do consumers of both SCRA and cannabis think?

To cite this article: Kirstin J. Lauritsen & Harold Rosenberg (2016) Comparison of outcome expectancies for synthetic cannabinoids and botanical marijuana, The American Journal of Drug and Alcohol Abuse, 42:4, 377-384, DOI: 10.3109/00952990.2015.1135158

Good Manufacturing Practice in the SCRA industry



- ‘Hotspots’ of high potency substances make consumption risky
- But so do the variable contents of the powders used!
- Risks sudden ‘outbreak’ events

Source: QPS - https://www.abc.net.au/news/2016-03-02/cement-mixer-drug-labs-dangerous-and-unpredictable-police/7213820

Low, but substantially greater risk of acute harm

Table 2. Relative risk per days use of treatment seeking following use of SCs vs cannabis.

	All past-year users	Last-month users	Past-year users of both
SCs			
Sought EMT ***N***	21	6	20
Days use per year	34,899	29,424	33,753
Risk	0.0006017	0.0002039	0.0005925
Cannabis			
Sought EMT ***N***	37	25	8
Days use per year	1,843,130	1,758,000	264,270
Risk	0.0000201	0.0000142	0.0000303
Relative risk (95% CI)	**30.0 (17.5–51.2)**	**14.3 (5.9–34.9)**	**19.6 (8.6–44.4)**

GDS 2018:
2% of SCRA consumers sought acute care
0.5% of cannabis consumers

Risk of emergency medical treatment following consumption of cannabis or synthetic cannabinoids in a large global sample

Adam Winstock[1], Michael Lynskey[1], Rohan Borschmann[1] and Jon Waldron[2]

Neurological, cognitive and psychiatric effects

- Anxiety, irritability and psychosis-like effects
- Inappropriate or uncontrolled laughter, anger, sadness, flat affect, depression and suicidal thoughts, excitability, agitation, combativeness, aggressiveness, thought disorganisation, panic attacks, paranoid thinking, delusions and auditory and visual hallucinations, changes in perception, acute psychosis
- Reduced levels of consciousness; coma
- Numbness, tingling, light-headedness, dizziness, pallor, tinnitus, diaphoresis, tremor, somnolence, syncope, unresponsiveness, nystagmus and convulsions
- Short-term memory and cognitive deficits, confusion, sedation and somnolence, thought blocking, nonsensical speech, amnesia, increased focus on internal unrest

Cardiovascular effects

- Tachycardia, hypertension, hypotension, hypokalaemia, chest pain and palpitations, myocardial ischaemia, myocardial infarction, ischaemic strokes
- Neuromuscular and musculoskeletal effects
- Hypertonia, myoclonus, myalgia, rhabdomyolysis

Renal effects

- Acute kidney injury

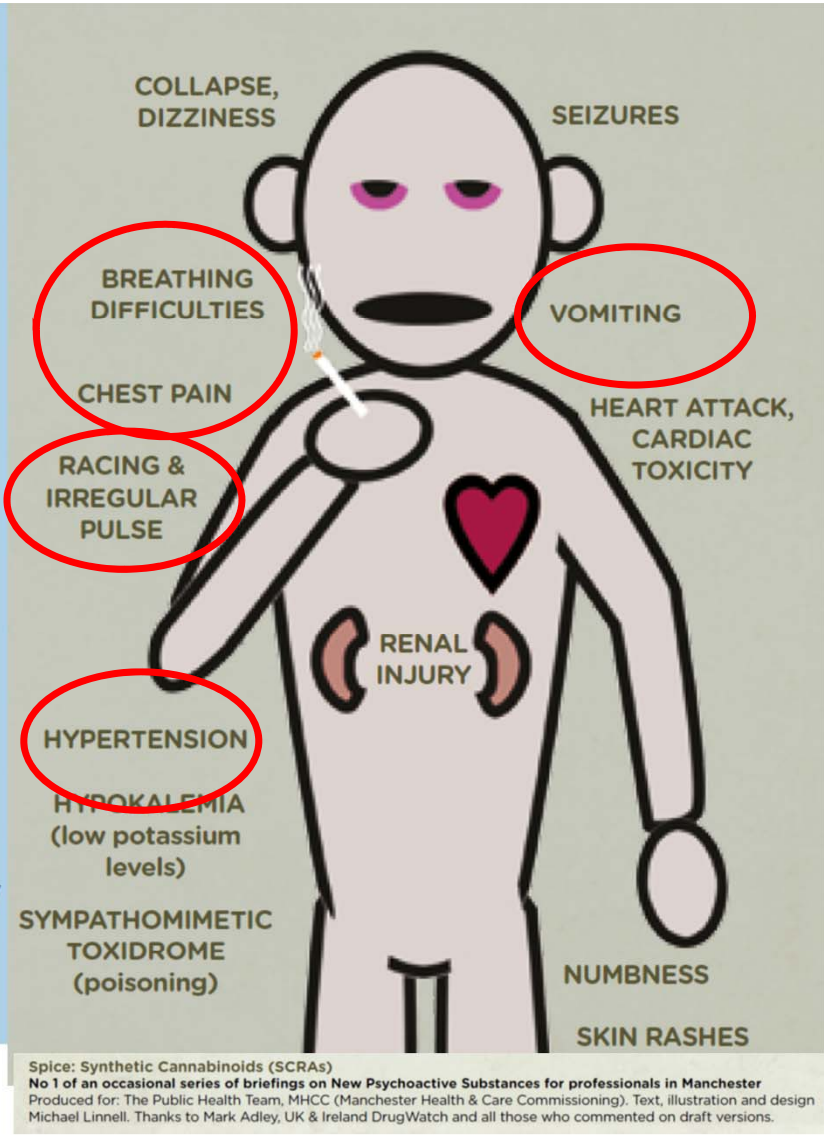
Other effects

- Hyperglycaemia, hypoglycaemia, acidosis, respiratory acidosis, cold extremities, dry mouth, dyspnoea, mydriasis, vomiting, loss of sight and speech

Serotonin syndrome

Novel Psychoactive Treatment UK Network
NEPTUNE

Harms of Synthetic Cannabinoid Receptor Agonists (SCRAs) and Their Management



Acute Harms: Not solely cannabis like, old lit may not generalise
Much resolves in 1-24h monitoring
Panic, fear-generated aggression, hallucinations/delusions
Catatonia, paralysis, inability to communicate

Risk of withdrawal/dependence greater than cannabis

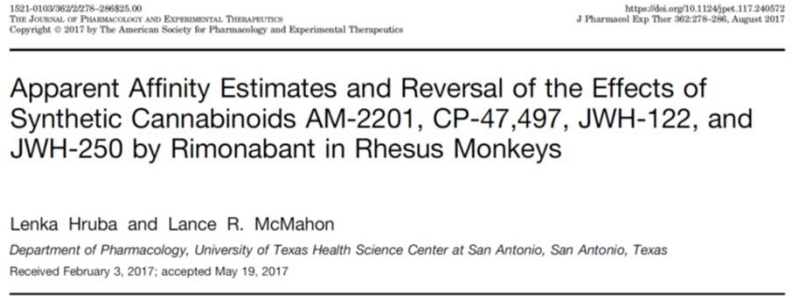
Novel Psychoactive Treatment UK Network
NEPTUNE

Harms of Synthetic Cannabinoid Receptor Agonists (SCRAs) and Their Management

Acute Clinical Responses

- symptoms of SCRA intoxication will usually be self-limiting and resolve spontaneously.
- management of SCRA toxicity is symptomatic and supportive
- Hydration and monitoring may be enough for patients with mild to moderate intoxication
- Supportive treatment is dependent on a patient's specific presentation (e.g. agitation, delirium, hypertension, convulsions).
- Benzodiazepines for symptoms of anxiety, panic and agitation.
  - IV BZD for management of seizures and in some cases of SCRA-related psychosis.
- Some case reports of antipsychotics (e.g. haloperidol) for agitation, aggression, or existing psychosis

Rimonabant = CB1 antagonist (was Acomplia as an anoretic but withdrawn)



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THE JOURNAL OF PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS
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https://doi.org/10.1124/jpet.117.240572
J Pharmacol Exp Ther 362:278–286, August 2017

Apparent Affinity Estimates and Reversal of the Effects of Synthetic Cannabinoids AM-2201, CP-47,497, JWH-122, and JWH-250 by Rimonabant in Rhesus Monkeys

Lenka Hruba and Lance R. McMahon

Department of Pharmacology, University of Texas Health Science Center at San Antonio, San Antonio, Texas

Received February 3, 2017; accepted May 19, 2017

Respiratory Medicine Case Reports 22 (2017) 137–141

Contents lists available at ScienceDirect

Respiratory Medicine Case Reports

journal homepage: www.elsevier.com/locate/rmcr

Case report

Synthetic cannabinoid induced acute respiratory depression: Case series and literature review

Mark Henry Alon [a, *], Margaret Olibrice Saint-Fleur [b]

[a] Department of Internal Medicine, New York City Health+Hospitals Harlem, Columbia University College of Physicians and Surgeons, New York, NY, USA
[b] Department of Internal Medicine, Division of Pulmonary Medicine and Critical Care Medicine, New York City Health+Hospitals Harlem, Columbia University College of Physicians and Surgeons, New York, NY, USA

Case series, ~2017
Acute respiratory failure requiring intubation
Reversible, and in people without underlying pulmonary disease

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

"Zombie" Outbreak Caused by the Synthetic Cannabinoid AMB-FUBINACA in New York

Axel J. Adams, B.S., Samuel D. Banister, Ph.D., Lisandro Irizarry, M.D., Jordan Trecki, Ph.D., Michael Schwartz, M.D., M.P.H., and Roy Gerona, Ph.D.

ABSTRACT

BACKGROUND

New psychoactive substances constitute a growing and dynamic class of abused drugs in the United States. On July 12, 2016, a synthetic cannabinoid caused mass intoxication of 33 persons in one New York City neighborhood, in an event described in the popular press as a "zombie" outbreak because of the appearance of the intoxicated persons.

2016

- Slowed responses
- Blank stare
- Intermittent groaning and limb movt.
- GCS ~13
- Resolved ~9h
- Even in first use

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 62 / No. 6
Februrary 15, 2013

Acute Kidney Injury Associated with Synthetic Cannabinoid Use — Multiple States, 2012

Multi-state breakout, 2012

- Nausea, vomiting, flank pain
- Elevated white blood cell count
- But: elevated risk of chronic / long term issues
- Assoc with fluorinated SCRA (XLR-11)

2018

- Anticoagulant contamination
- Multiple bleeding sympt
- Abdominal / flank pain
- Elevated BP, temp
- Even in 1st use, present ~1day after use

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

An Outbreak of Synthetic Cannabinoid–Associated Coagulopathy in Illinois

Amar H. Kelkar, M.D., Nichole A. Smith, M.D., Annia Martial, M.D., Harsha Moole, M.D., Michael D. Tarantino, M.D., and Jonathan C. Roberts, M.D.

ABSTRACT

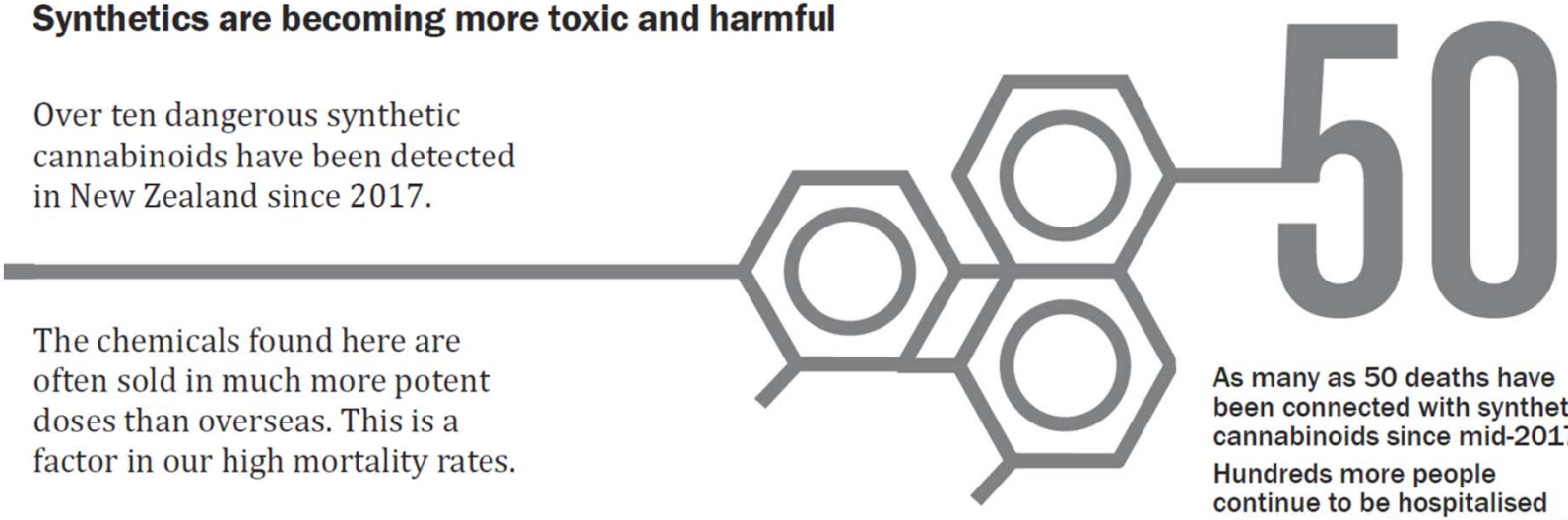
BACKGROUND

In March and April 2018, more than 150 patients presented to hospitals in Illinois with coagulopathy and bleeding diathesis. Area physicians and public health organizations identified an association between coagulopathy and synthetic cannabinoid use. Preliminary tests of patient serum samples and drug samples revealed that brodifacoum, an anticoagulant, was the likely adulterant.

Synthetics are becoming more toxic and harmful

Over ten dangerous synthetic cannabinoids have been detected in New Zealand since 2017.

The chemicals found here are often sold in much more potent doses than overseas. This is a factor in our high mortality rates.



As many as 50 deaths have been connected with synthetic cannabinoids since mid-2017.

Hundreds more people continue to be hospitalised with severe side effects such as seizures and overdose.

AT THE HEART OF THE MATTER, NZ DRUG FOUNDATION.
Te Tūāpapa Tarukino o Aotearoa

State of the Nation 2018

A stocktake of how New Zealand is dealing with the issue of drugs

Published: January 2019

Deaths:

- Sudden cardiac dysrhythmia
- Seizures
- Liver failure
- Kidney failure
- Lost consciousness in dangerous situations
- Self injury / accident

A systematic review of adverse events arising from the use of synthetic cannabinoids and their associated treatment

Robert J. Tait, David Caldicott, David Mountain, Simon L. Hill & Simon Lenton

To cite this article: Robert J. Tait, David Caldicott, David Mountain, Simon L. Hill & Simon Lenton (2016) A systematic review of adverse events arising from the use of synthetic cannabinoids and their associated treatment, Clinical Toxicology, 54:1, 1-13, DOI: 10.3109/15563650.2015.1110590

Harm Reduction responses

There is no safe way to use Spice
It is not the same as cannabis. Spice is more potent, more unpredictable and more dangerous.

Spice varies from batch to batch
Different packets can produce different effects.

Start with a very small dose
Use a match-head size (or less) test dose with every new packet. Potency is hugely variable.

Wait before the effects have worn off before smoking more

Spice should not be smoked neat
Always smoke with a 'mixer' (e.g. tobacco or dried herbs).

Avoid using Spice with other drugs
Avoid using with cannabis, alcohol or stimulants, this may raise the risk of heart problems.

Avoid mixing Spice with medicines and alcohol.

Spice is dangerous
Spice can cause severe harms. If you experience a sustained period of fast heart rate or chest pains, call an ambulance.

Spice can make you anxious
Spice may exacerbate anxiety and paranoia. Only use in an environment in which you feel safe, with people you trust.

Spice can make mental health problems worse
If you suffer from anxiety or mental health problems, avoid using Spice.

Do not drive or operate machinery under the influence of Spice.

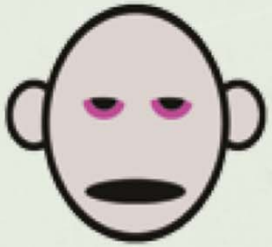
Beware the bottom of the bag
Be careful with dosing the crystalline powder material in the bottom of the bag; use a smaller dose, as this is generally stronger than the plant material which is coated with the SCRA.

Careful with powder
If sourcing pure powder SCRAs only use very small doses, calculated using scales and thoroughly mixed into smoking material.

Spice is very addictive
Regular use of Spice can lead to dependence (addiction) and withdrawal.

NEPTUNE
NOVEL PSYCHOACTIVE TREATMENT: UK NETWORK

Spice: Synthetic Cannabinoids (SCRAs)
No 1 of an occasional series of briefings on New Psychoactive Substances for professionals in Manchester
Produced for: The Public Health Team, MHCC (Manchester Health & Care Commissioning). Text, illustration and design Michael Linnell. Thanks to Mark Adley, UK & Ireland DrugWatch and all those who commented on draft versions.



Spice Intoxication: people who have used Spice may act in a disturbing way, be unsteady and appear 'zombie-like' with pale skin and pink eyes. They will be confused, unable to communicate properly and may repeat actions, as short term memory is severely affected. However in the vast majority of cases people will not require emergency treatment.[9]
If in doubt call an ambulance.

Temperature over 38.5°C, not settling after about 5 minutes of rest or, if no thermometer is available, if very flushed and feels very hot. **Call an ambulance.**
If they are overheating: cool them down by removing outer clothing, fan them, use a wet cloth on their skin, take them outside or somewhere cool. If they are conscious allow them to sip water or a non alcoholic drink.

Seizures (convulsion similar to an epileptic fit). Make sure the area is safe and there is nothing they could hurt themselves on. **Call an ambulance**. Inform paramedics if the fit stops and starts, if it doesn't stop within a couple of minutes or if the person turns blue. **It is important not to hold people down because of the risk of rhabdomyolysis.**

Serotonin syndrome: some SCRA compounds may increase the risk of serotonin syndrome.[9]

The main symptoms: rigid, jerky, twitchy unusual movements, often involving the legs shaking, fully dilated pupils, overheating, shivering, racing heart, agitation and confusion.

Breathing difficulties, such as fast breathing rate, not settling within 5 minutes. If there is no breathing or it is abnormal (e.g. death rattle, agonal breath) then CPR should be attempted.
Call an ambulance.

Severe chest pains: sit them down in a calm environment and reassure them. **Call an ambulance.**

Heart rate over 140 beats per minute, not settling within 5 minutes. **Call an ambulance.**

Unconsciousness: it can be risky to startle or frighten people intoxicated on Spice as this can lead to heart failure. If they can't be woken by gentle shaking and calling, or you notice a blueness of the skin, including lips or fingernails (or greyish with paler lips for darker complexions), make sure they are lying on their side so they don't choke on vomit and **call an ambulance**.

Other concerns: e.g. severe vomiting, frothing at mouth, severe headache, significant agitation or aggression, not settling within 15 minutes. **Call an ambulance.**

Know when to call an ambulance!!!

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To start talking about synthetics with a person you can:

Have a conversation

Watch or talk through the **Did You Know** resources and discuss what comes up. Use the **Did You Know** conversation planner to get your thoughts together.

What to say:

- Synthetic cannabinoids are unpredictable and very addictive
- Not using synthetic substances is the safest option
- If it doesn't smell like cannabis, **it isn't**.

AND THEN

If they are using, or around other people using

Give appropriate information

If someone is using synthetics, it is a good idea to offer detailed advice. The Synthetics brief advice card and Helping someone flip card are good to refer to and pass on.

What to say:

- Ensure one person in a group is not using so they can respond in an emergency.
- Sit down before using synthetic cannabinoids to avoid injury.
- Use less, less often by mixing synthetic cannabinoids with tobacco, using very small amounts, waiting for effects to wear off before taking more, using thin papers and not card.
- Synthetic cannabinoids vary from batch to batch so start slowly with a very small dose.
- If you begin to feel unwell or overwhelmed stop immediately.

Some people use synthetics as an escape from trauma, poverty or emotional distress, and need extra support.

AND THEN

If other support could help

Connect them with the right services

The Alcohol Drug Helpline can let you know what support is available (0800 787 797) or you can look at Healthpoint.co.nz for services in your area.

What to say:

- Most people experience withdrawal almost immediately after using, which can last days.
- Not using at all is safest. But if you aren't there yet, try using a smaller amount, less frequently.
- Withdrawal can start quickly, so you might need support to avoid using again.
- You should seek professional support if you are finding it hard to stop, having strong cravings, experiencing poor mental health or using more to get the same effect.

AT THE HEART OF THE MATTER, NZ DRUG FOUNDATION.

Te Tūāpapa Tarukino o Aotearoa

www.drugfoundation.org.nz

Key Resources

neptune-clinical-guidance.co.uk
Clinical guidance for management (emergency, primary care, mental health, drug treatment)

www.forensicscienceeducation.org/resources/nps-discovery
Bleeding edge of new reports (in US) of SCRA
Hub of links to other forensic sites (with spectra etc)

www.drugfoundation.org.nz
Sensible consumer and family advice and ways to discuss SCRA

DESIRED EFFECTS

Relaxation, euphoria, disinhibition, feeling energised, altered consciousness.

WITHDRAWAL

There is evidence that chronic use of SC may be associated with tolerance and that tolerance may develop more quickly for SC than for natural cannabis. Withdrawal symptoms may follow prolonged and frequent use and for some users these symptoms may be severe and intolerable leading to continued use Gastrointestinal cramps, nausea, tremor, hypertension, tachycardia, coughing, headache, craving, anxiety, restlessness, irritability, depression and suicidal ideation.

ADVERSE EFFECTS

Acute: Convulsions, hypertonia, myoclonus, wide-ranging cardiovascular effects including myocardial infarction and ischaemic strokes, acute kidney injury, hyperglycaemia, hypoglycaemia, vomiting, transient loss of vision and speech, reduced levels of consciousness, anxiety, aggression, extreme bizarre behaviour, amnesia, confusion, panic attacks, inappropriate affect, auditory and visual hallucinations, paranoia, delusions, psychosis.

Chronic: Psychosis, cognitive impairment, catatonic states, dependence, persistent vomiting, withdrawal symptoms on reduction or cessation of use.

USERS / MODES OF USE

Users: Prisoners, workers subject to drug testing, users of other drugs, homeless and vulnerable people.

Modes of use: Smoked in joints or inhaled through a bong, rarely ingested or snorted.

The phased implementation of smoke free prisons

d.

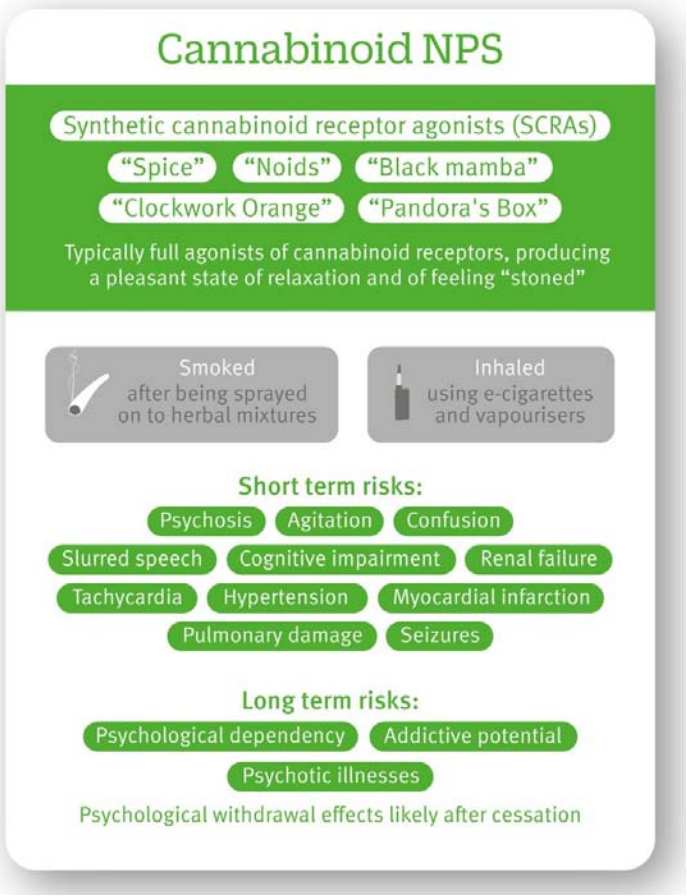
TREATMENT

Acute: Symptom-directed supportive care, medication may be required for agitation, convulsions, or psychosis.

If symptoms are persistent or severe, transfer to hospital may be necessary.

Chronic: Psychosocial and other appropriate support, pharmacotherapy, where appropriate, for enduring symptoms.

Key Points



http://neptune-clinical-guidance.co.uk/wp-content/uploads/2016/07/Synthetic-Cannabinoid-Receptor-Agonists.pdf

Derek K Tracy et al. BMJ 2017;356:bmj.i6848