

# Novel psychoactive substances in postmortem toxicology

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# Postmortem toxicology in Finland

- Population: 5.5 million
- Deaths: ~51 000 per year
- Medico-legal cause-of-death investigations: 18%  
(98.3% in unintentional injury deaths and 99.5% in suicides\*)
- Postmortem toxicology: 13%

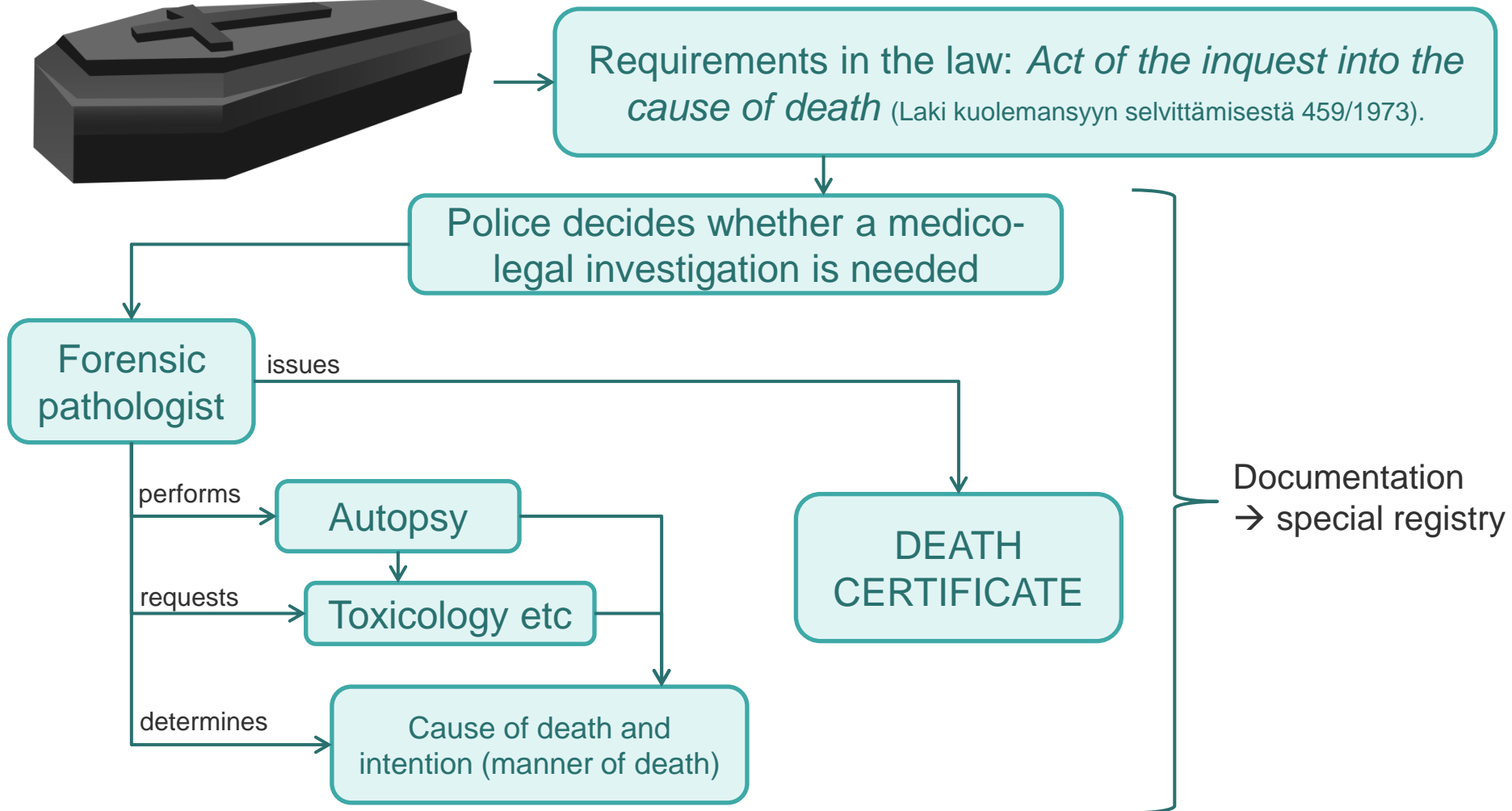
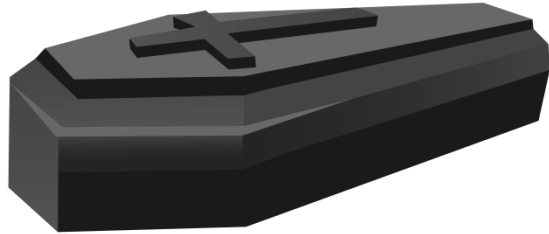
**→ ~6500 cases per year**



\* P. Lunetta, A. Lounamaa, S. Sihvonen, Surveillance of injury-related deaths: medicolegal autopsy rates and trends in Finland, *Inj.Prev.* 13 (2007) 282–284.

# The medico-legal investigation

- (1) death is caused or suspected to be caused by crime, injury, suicide, poisoning, occupational disease or medical treatment, or,
- (2) death has not been caused by a disease, or,
- (3) during the latest illness the deceased has not been treated by a doctor, or
- (4) death is otherwise unexpected



# Analytical approach

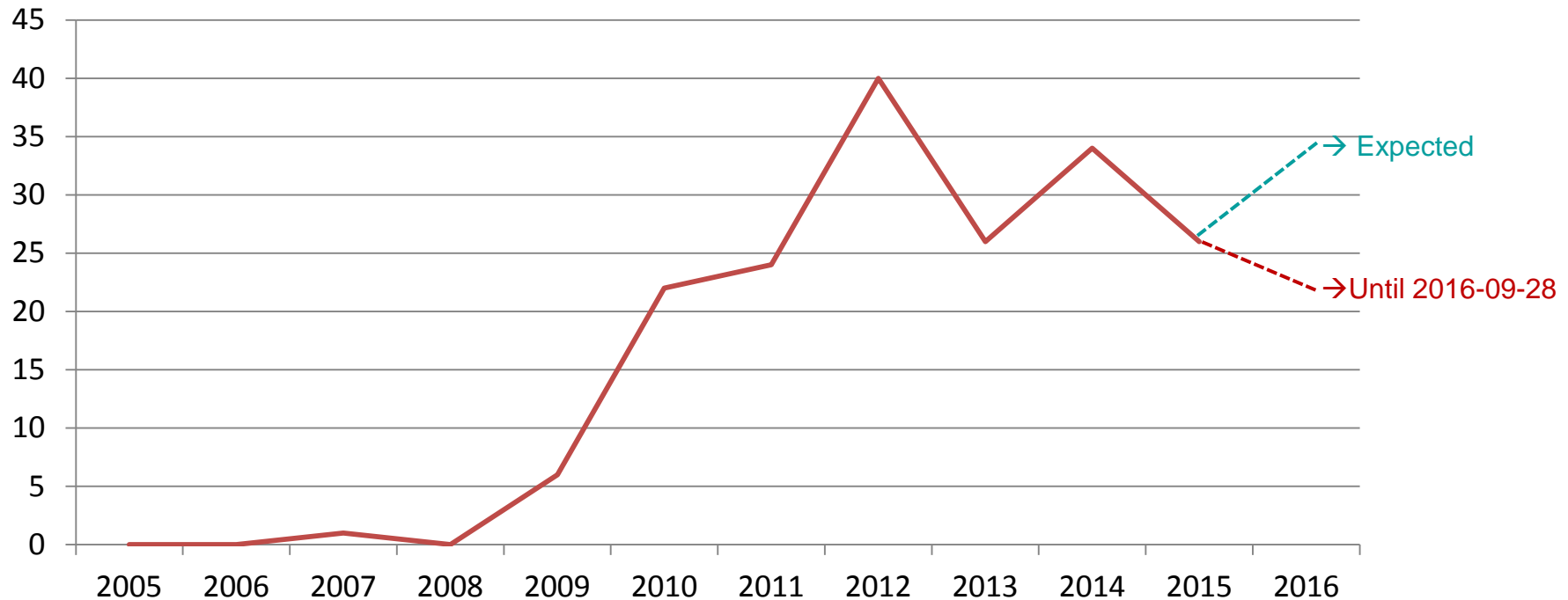
- Analysis of alcohols in **urine and blood** (vitreous, muscle) by HP-GC-FID
- Screening of illegal and medicinal drugs in **urine** (blood, vitreous, liver) by UPLC-TOFMS
- Screening and quantification of the illegal and medicinal drugs in **blood** by GC-MS and GC-NPD
- Digoxin, insulin and ethyl glucuronide by immunoassay
- COHb by spectrophotometry
- Additionally, various individual substances by GC-MS and LC-MS/MS – to confirm findings in screenings or upon request



# NPS findings in post-mortem cases in Finland

- Multiple NPS findings in cases
- Together with other psychoactive substances
- Deceased positive for NPS in 2010-2015:
  - NPS detected 169 times in 126 separate cases
  - Mean / median (range age): 33 / 32 (17-62)
  - Percentage of males: 86%

# Number of NPS findings in Finland 2005-2016



	2010	2011	2012	2013	2014	2015	SUM
α-PVP		0	12	16	9	8	45
Methiopropamine			1	0	0	3	4
F-α-PVP					1	2	3
Etizolam			0	0	0	2	2
Flubromazolam						2	2
MDPV	14	10	8	2	4	1	39
Lormetazepam	0	0	0	0	2	1	3
Methoxetamine			1	0	1	1	3
4-MA			0	0	2	1	3
Mephedrone	2	0	0	0	0	1	3
Ethylone						1	1
PV8					0	1	1
Methoxyphenidine					0	1	1
MDPPP			0	0	0	1	1
Fluoroamphetamines	3	1	1	3	0	0	8
2-DPMP	1	3	1	1	3	0	9
PMA	0	3	4	0	2	0	9
PMMA	0	2	4	0	1	0	7
Bromo-dragonfly	0	2	0	2	0	0	4
Ethylphenidate			0	2	2	0	4
3,4-DMMC		2	0	0	0	0	2
MePPP			1	1	0	0	2
Diclazepam					2	0	2
Flubromazepam				0	2	0	2
JWH-018			1	0	0	0	1
AM-2201			1	0	0	0	1
mCPP	1	0	0	0	0	0	1
Metylone	1	0	0	0	0	0	1
Pyrovalerone		0	0	1	0	0	1
AMT	0	0	0	1	0	0	1
α-PBP				0	1	0	1
Cathinone		0	0	0	1	0	1
Pyrazolam					1	0	1



**2010-2015: 169**  
**2015: 26**

# NPS in post-mortem cases in 2016

(accessed Sept 12 2016)

U-47700	4
Etizolam	3
3-MeO-PCP	2
Lormetazepam	2
Methoxetamine	1
Flubromazolam	1
Diclazepam	1
→ $\alpha$ -PVP	1
DMT	1
Mephedrone	1
F-amphetamines	1
Flubromazepam	1
M-CPP	1
N-MBZP	1
BZP	1








# U-47700

- Potent opioid
- First detected in Europe in 2014.
- EU EWS ALERT 8th June 2016.
- Deaths reported in Belgium, Sweden, UK and Finland.



€12.45

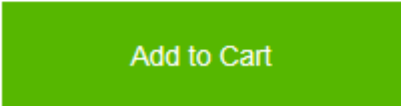
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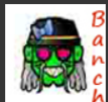
 



Qty:



2015-03-21



Banch  
Karvakuono

Posts: 29  
Joined: 2010-01-11 00:44

Re: U-4770

by Banch on 2015-03-21 17:58

Aivan vitun loistava opioidi, jolla saa aivan vitun loistavat refelat aikaseksi kun useamman gramman ottaa putkeen.. Voi huuuhuh.. Ei vedö subu, fenta tai ite hoo vertoja tälle...

Toim

Suur

”A f\*\*ing good opioid... Subutex, fentanyl or heroin are not nearly as good...

Works well nasally even with very small doses (5 mg +)

The biggest dose I've had IV is 85 mg – which was too big for my taste.”

QUOTE



peemies  
Lepakko

Re: U-4770

by peemies on 2015-04-15 11:37

Mulla oli eka annos iv:nä 12 tai 13mg, ja oli minusta ihan passeli. Näin siis pienellä opparitoilella.

It's 4:30 in the morning, it's always 4:30 in the morning. -Bukowski

”My first IV dose was 12 or 13 mg and it was just right. This with a low opioid tolerance.”

”Like fentanyl or oxycodone, but better!”

”A hit product in July 2016”

“soluble in water ~9mg/L but very soluble in vinegar”

# U-47700 in Finland

- 4 deaths in 2016.
- Cause of death not yet defined.
- Other psychoactive substances present along with U-47700.
- Additionally, two recent cases in which U-47700 was detected in clinical samples (living individuals).

# U-47700: Case 1

- Male, 23 years, died in April 2016.
- Had been using drugs with a friend, went unconscious, friend had tried to wake him up with no success.
- U-47700 only drug present, concentration in blood 0.22 mg/L (in urine 0.02 mg/L).
- **Blood alcohol concentration 3.0‰.**

## U-47700: Case 2

- Male, 28 years, died in July.
  - Found dead sitting on the floor of his kitchen.
  - U-47700 concentration in blood 0.19 mg/L.
  - Multiple other drugs present:
    - BENZOS:  
Phenazepam 0.26 mg/L, Alprazolam 0.034 mg/L
    - PIPERAZINES:  
N-MBZP (N-methylbenzylpiperazine) 0.092 mg/L,  
BZP (benzylpiperazine) 0.0081 mg/L,  
m-CPP (meta-chlorophenylpiperazine) 0.020 mg/L
- (in urine also buprenorphine and amphetamine)

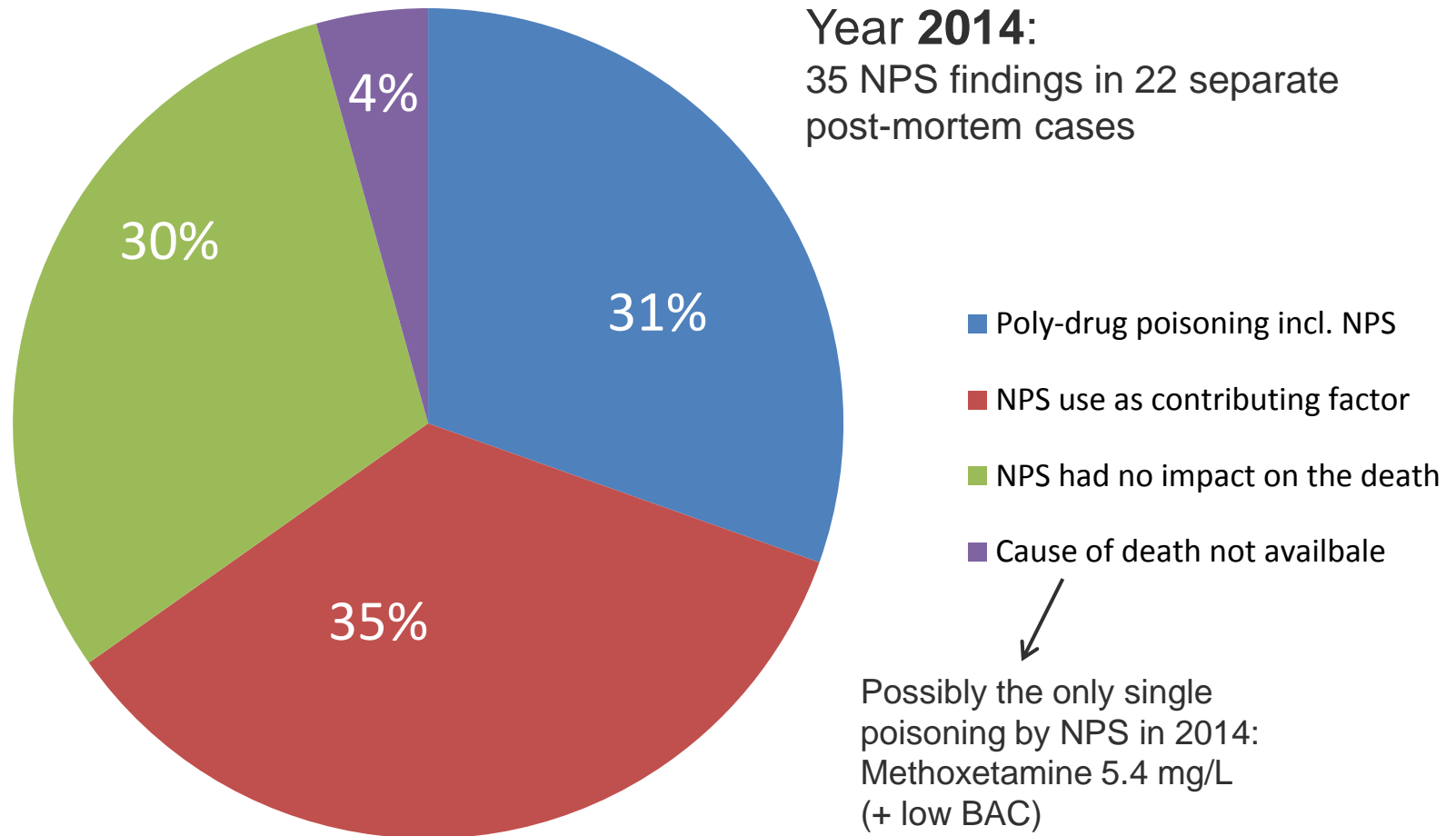
## U-47700: Case 3

- Male, 27 years, died in July.
- Died at his summer cottage. Had been drinking.
- U-47700 concentration in blood 0.32 mg/L (urine 0.03 mg/L).
- Other drugs present:
  - **MDMA 2.4 mg/L**
  - Amphetamine 0.67 mg/L
  - Alprazolam 0.006 mg/L

## U-47700: Case 4

- Male, 24 years, died in September.
- Was found dead with a syringe next to him.
- U-47700 concentration in blood 0.27 mg/L (urine 0.4 mg/L)
- In blood only low concentration of 7-aminoclonazepam
- In urine additionally amphetamine and alcohol (low).

# Relevance of NPS findings in death cases





# Summary

- U-47700 is a dangerous short-acting opioid that has caused deaths in several European countries.
- In Finland, the drug has been detected in four death cases → not (yet) clear whether actually caused them.
- Young males, other drugs affecting the CNS present in all cases except the latest one.
- Blood concentration in the death cases 0.19 – 0.32 mg/L.