Non Standard Toxicology

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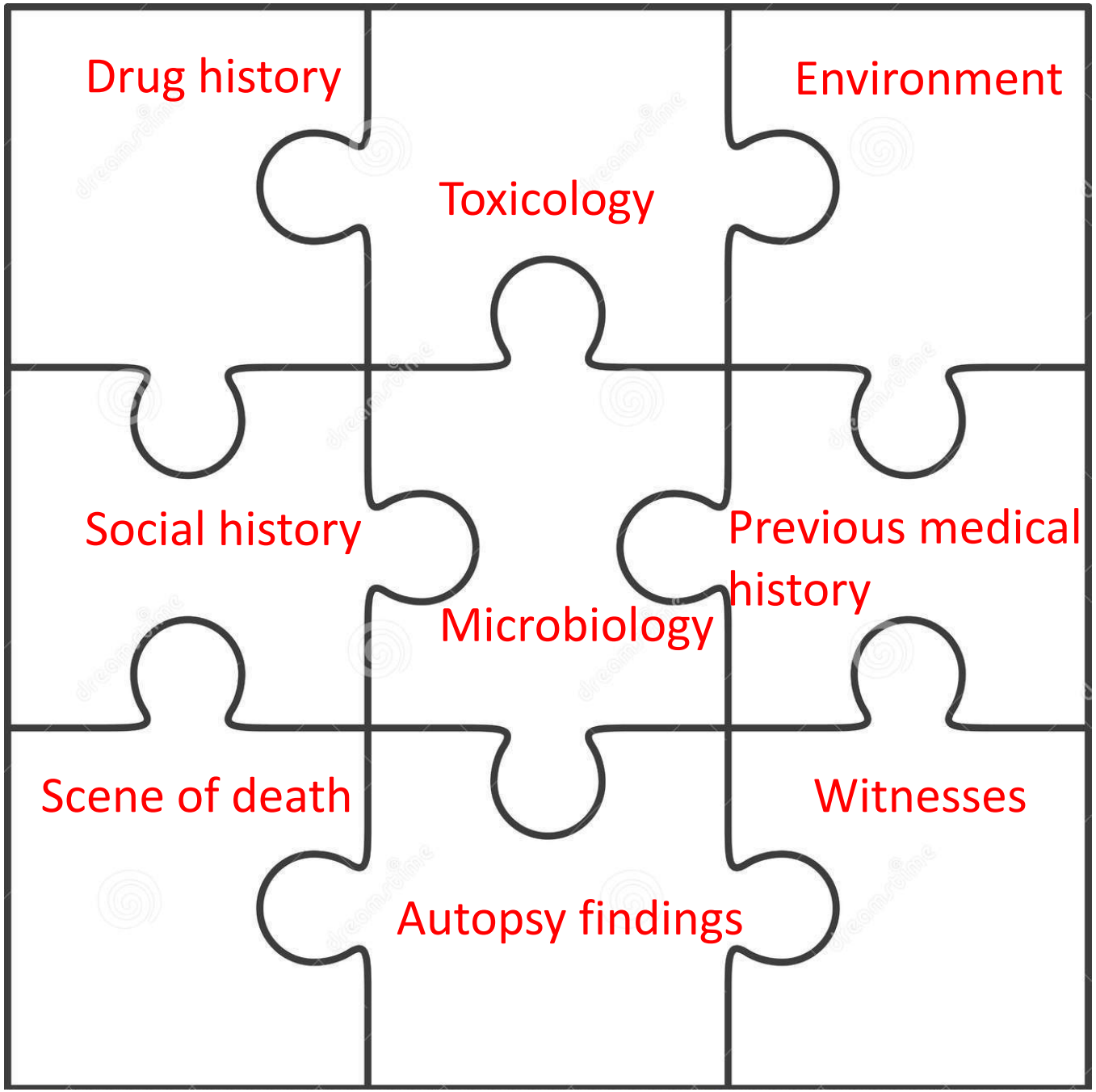
Caring at its best

UNIVERSITY OF LEICESTER


Drug history
Environment
Toxicology
Social history
Previous medical history
Microbiology
Scene of death
Witnesses
Autopsy findings

Leicester / international systematic screens

- Screen for illicit drugs that may have caused death
- Screen for therapeutic drugs that may cause death
- Screen for social drugs that may cause death
- Screen for all above that may affect cognition
- Deaths in fire
- Environmental toxins (pesticide/ herbicide)

Ideal “Routine” Post Mortem Toxicology (UK)

- Ethanol (Blood, urine vitreous)
- Paracetamol (Blood) Salicylate (Blood)
- Drugs screen (blood and urine)
  - GCMS screen or LCMS screen
  - “full” unknown screen- 1000s compounds- relevance unclear so needs expert interpretation.
    - **Does not detect COHb**
    - **If not in the library then will not be reported**

- Quantifications

Additional / specific tests

Vitreous biochemistry

Beta OH butyrate- if acetone > (5 mg/100mL) on ethanol screen

COHb/cyanide

Volatiles (butane/propane)

New psychoactive substances

Synthetic fentanyls

(pesticides in Thailand / Caribbean)

What samples to collect

- I say…….as many as possible-but I will only analyse those I see relevant
- I say…….any ante mortem if available
- Costs? – more tests cost more money

Decomposed / badly burned bodies

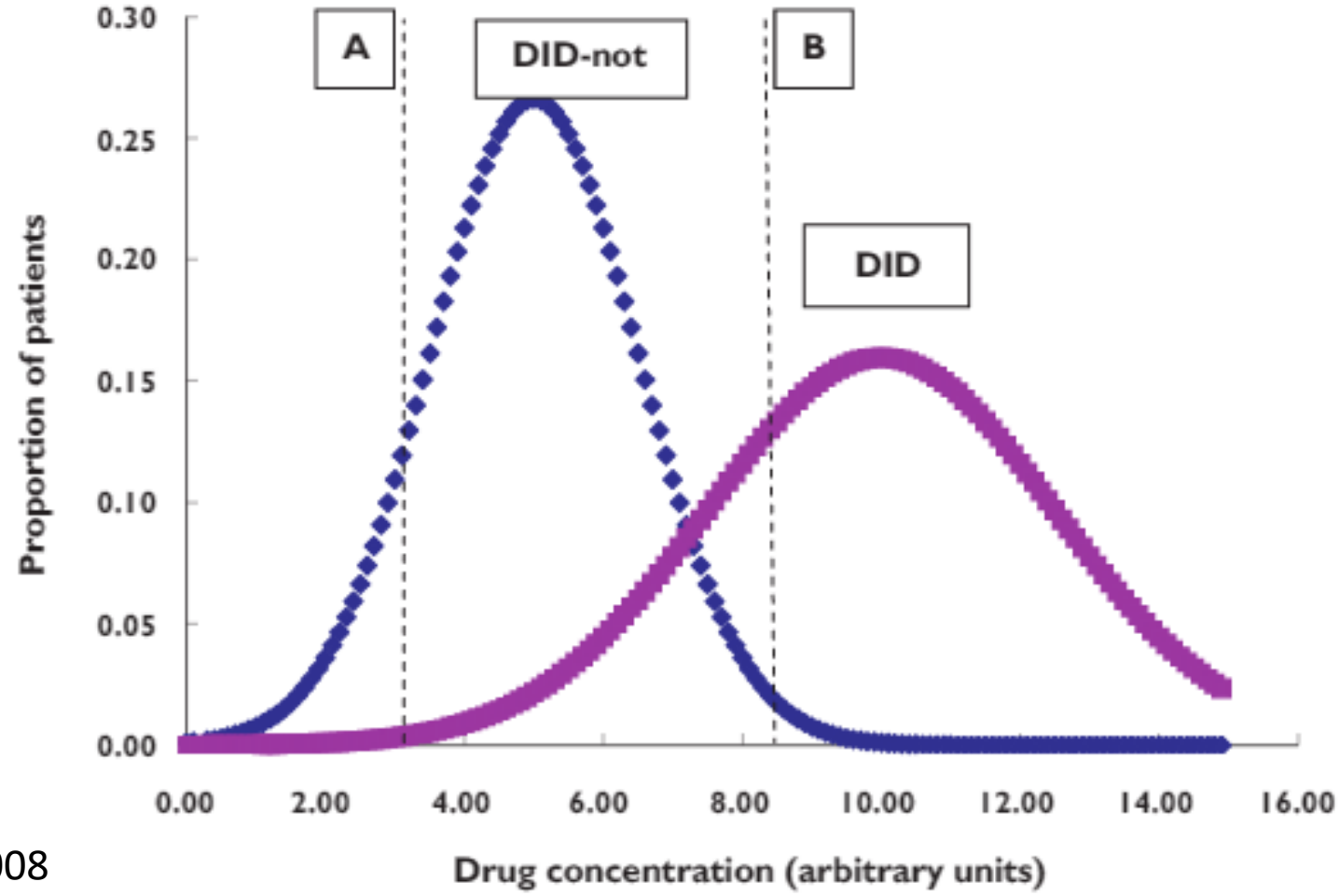
- No blood
- No urine
- No vitreous

- No chance……?????

Should drug quantitation happen

- It is possible to quantify but
- What does a post mortem concentration mean if you take into account post mortem redistribution?
- Are the reference values reliable?
- NEVER interpret in isolation

Did the drug cause death?



Ferner Br J Pharmacology 2008

Research article

Drug Testing and Analysis

Received: 4 March 2013 Revised: 6 June 2013 Accepted: 6 June 2013 Published online in Wiley Online Library: 23 July 2013

(www.drugtestinganalysis.com) DOI 10.1002/dta.1507

Drug concentrations in post-mortem femoral blood compared with therapeutic concentrations in plasma

Terhi Launiainen* and Ilkka Ojanperä

129 drugs investigated

Upper 90/95/97.5 concentrations of study population

Blood vs tissue concentrations

	Codeine			
	N	Mean	Range	SD
Peripheral blood	20	1.8	0.32–8.8	2.1
Heart blood	22	0.94	0.007–3.7	1.1
Vitreous fluid	21	0.93	0.016–4.9	1.2
Muscle	23	0.85	0.019–4.4	1.1
Fat	23	0.49	0.006–3.1	0.75
Brain	23	0.78	0.010–4.9	1.1

Forensic Science International 262 (2016) 128–137

Table 1
Multi-dose study—whole blood clozapine and norclozapine concentrations (mg/l)

Time after death (h)	Central				Peripheral			
	Pig 1		Pig 2		Pig 1		Pig 2	
	Clozapine	Norclozapine	Clozapine	Norclozapine	Clozapine	Norclozapine	Clozapine	Norclozapine
0	*0.86*	*1.11*	*1.07*	*1.15*	*0.86*	*1.11*	*1.07*	*1.15*
4	1.76	3.45	1.75	2.40	–[b]	–[b]	0.87	1.07
8	2.00	4.78	1.59	1.70	1.24	1.81	0.87	1.12
24	1.79	3.84	2.23	2.20	1.33	2.19	1.49	2.12
48	2.60	5.07	2.84	5.27	–[c]	–[c]	1.68	2.02

The values in italic are the ante-mortem samples.
[b] Sample could not be obtained.
[c] Sample lost in storage

Table 2
Multi-dose study—tissue clozapine and norclozapine concentrations (mg/kg wet weight)

Tissue	Time after death (h)	Pig 1		Pig 2	
		Clozapine	Norclozapine	Clozapine	Norclozapine
Adipose	0	0.00	0.00	0.00	0.00
	48	0.00	0.00	0.00	0.00
Myocardium	0	0.95	3.09	1.78	4.36
	48	2.68	7.14	4.75	10.0
Liver	0	7.20	17.1	15.6	30.5
	48	10.6	22.0	17.1	31.9
Striated muscle	0	0.65	1.39	1.83	3.46
	48	1.78	4.05	2.93	5.21
Kidney	0	8.72	21.8	11.5	22.6
	48	11.9	26.4	9.71	20.6

Is liver any better?
All taken in Right lobe of liver

Table 3

Fentanyl concentrations peripheral and central blood.

Collection site	Mean conc. (ng/mL)	Median conc. (ng/mL)	Range (ng/mL)	No. of cases
Femoral (FB)	13.2	11.1	1.3–86.2	192
Iliac (IL)	19.1	12.0	1.3–553	140
Central	24.2	8.4	0.9–226 *	16
Cardiac (CD)	14.8	9.8	0.7–64.6 *	22
Subclavian	42.0	22.6	1.1–250	15
IVC	8.6	7.5	2.2–17.6	6
Vitreous humor (VH)	10.8	8.5	1.2–67.5	234
Liver (ng/g)	185.5	88.3	5.6–13 560	184

Forensic Science International, 2018-03-01, Volume 284, Pages 146-152, Copyright © 2018 Elsevier B.V.

But is there a correlation

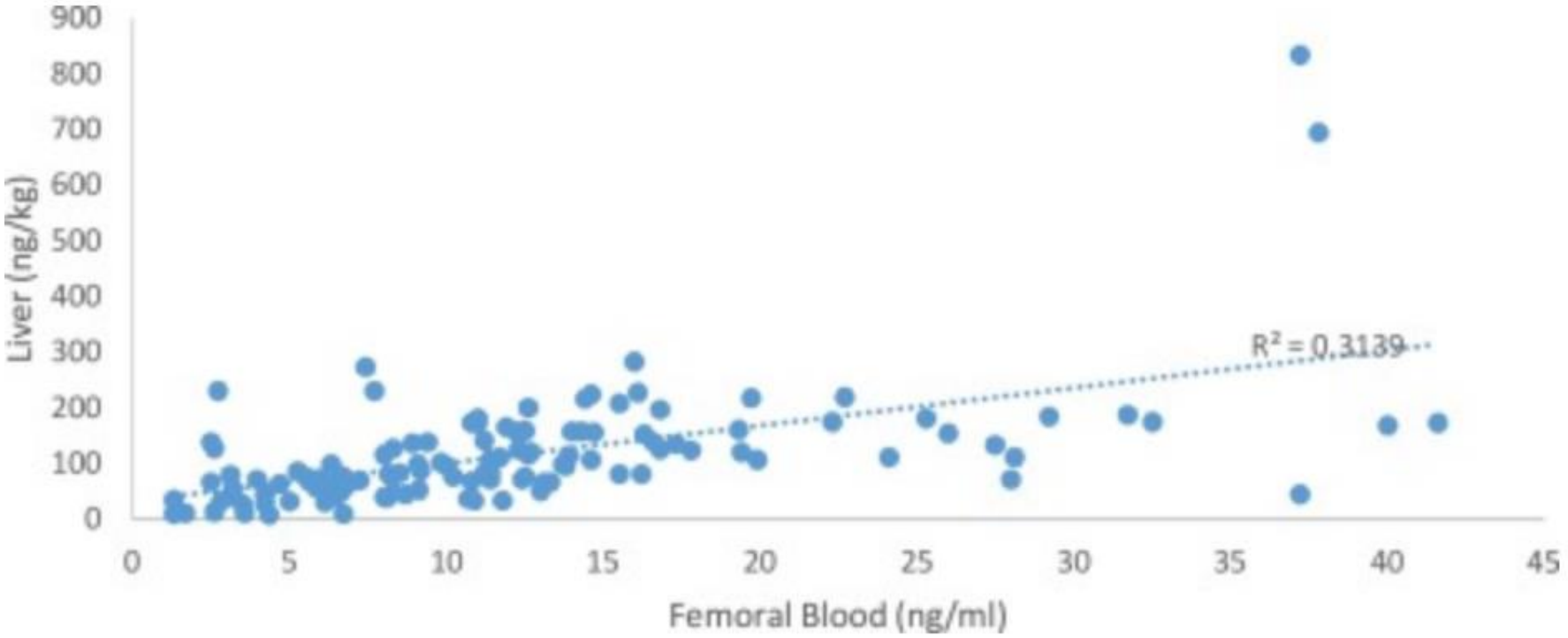


Fig. 1

CLINICAL TOXICOLOGY, 2018
VOL. 56, NO. 1, 7–14
https://doi.org/10.1080/15563650.2017.1339886

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Check for updates

REVIEW

The toxicological significance of post-mortem drug concentrations in bile

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Drug	No. cases	Bile:blood concentration ratio			Sample
		Lowest[a]	Median	Highest[a]	
Paracetamol	3	1.6	2.3	3.7	Femoral blood
Phencyclidine	15	0.25	2.0	10	Unspecified
Phenobarbital	17	0.78	2.3	7.1	Peripheral blood
Pregabalin	6	2.5	3.2	4.8	Peripheral
	6	3.0	3.4	6.9	Central
Zopiclone	2	12	230	450	Femoral blood
Midazolam	6	2.0	6.2	17	Peripheral blood
Mirtazapine	8	2.9	11	35	Femoral blood
Morphine	141	0.05	37	1300	"Blood", or peripheral blood or not specified

Over to the audience …..