

„PARTY DRUGS“ TESTING ON THE DANCE FLOOR: EQUIP-



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Introduction

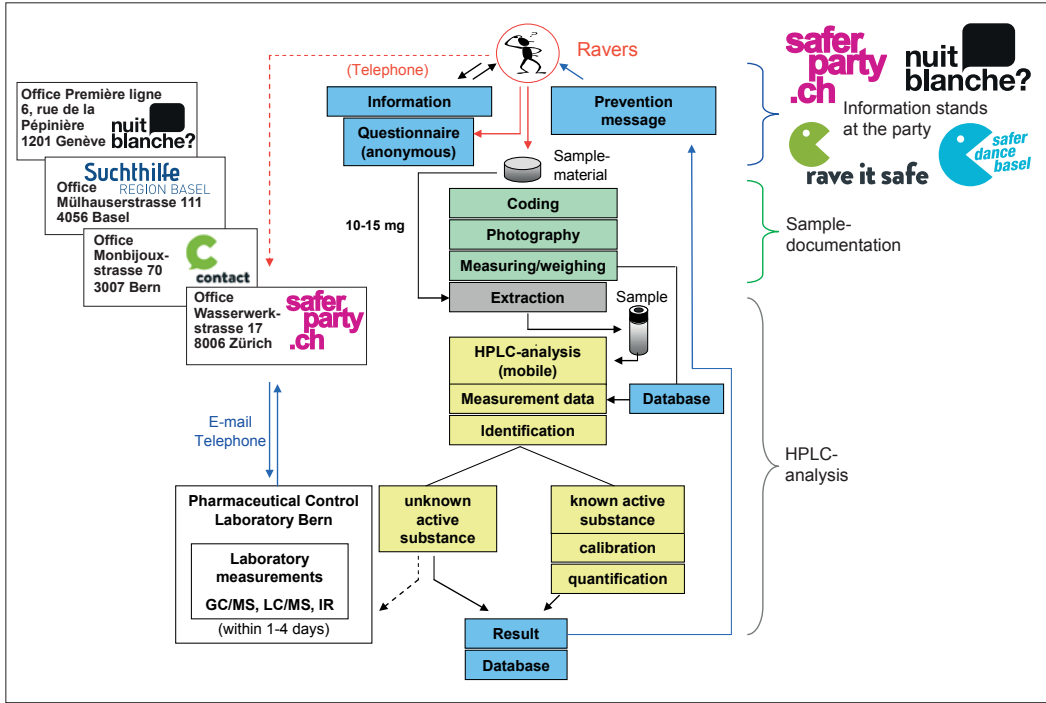
Since 1998 the mobile lab unit of the Office of the Cantonal Pharmacist (Health & Social Welfare Department, State of Berne, Switzerland) is testing so called „Party Drugs“ on the dance floor. At more than 220 events the team has tested over 4700 samples in cooperation with „Streetwork Zurich“, „Contact Berne“, „Suchthilfe Region Basel“ and „Première ligne“ Geneva.

The mobile lab consists of four custom made subunits mounted in steel framed racks on wheels, one for weighing and documentation, one for sample preparation and two with the equipment for chemical analysis (HPLC-DAD). The lab is operated by two experienced technicians. Before analysis the interested customer is asked by the lab crew to fill out a questionnaire concerning information about the sample; thereafter every sample is digitally documented and characterized by physical appearance (form, weight, dimensions etc.).



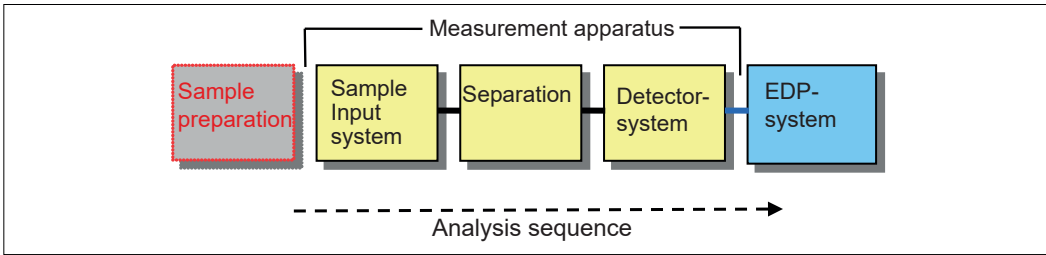
Flow diagram

Collaboration between the prevention-teams and the laboratory



Chemical analysis requirements

Chemical analysis of „Party Drugs“ gives one of three possible results. The findings may be a single active agent, several active agents, or indeed no active agent. Reliable analysis of the substances in a sample cannot be achieved by means of a simple „quick test“ and is only possible by the use of a complex measurement chain, as shown in the following basic diagram:



This arrangement applies to most modern chemical-analysis measurement systems.

Sample preparation:

Due to the very sensitive analytical methods, only a representative part of the sample is used for further analysis. Sample preparation is quick and effective. The material is pulverised in a mortar and dissolved in methanol with the aid of an ultrasonic extractor.



An internal standard is added as control. In most cases this extract still contains insoluble components, which must be filtered off before analysis. The clear sample solution obtained is transferred into a sample vial.



HPLC (measurement apparatus)

For chemical analysis of party drugs separation and detection of different constituents of mixtures (active ingredients and fillers) is necessary. With the mobile lab we are using High Performance Liquid Chromatography (HPLC) for the separation process. Our computer controlled HPLC-systems are equipped with DAD/UV-Vis Spectrometers (Diode Array Detector).



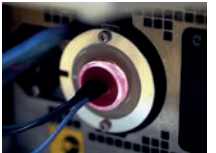
Bottles with mobile phase (solvent mix)

HPLC- Pump
(Part of the separation-system). This high-pressure pump delivers the solvent (with the dissolved sample) through the separating column to the detector.

Autosampler
The autosampler transfers the prepared sample from the vial into the measurement apparatus.

HPLC-column
The „central unit“ of the HPLC-system serves to separate dissolved mixtures of substances into their constituents.

Detector
The chemical detector is positioned at the end of the column. It is the highly sensitive „eye“ of the measurement chain and records substances which absorb ultra-violet light when they pass through the detector cell dissolved in the mobile phase. The detector provides two kinds of information about the molecules measured:



their identity and their quantity. The whole process is continuously monitored with a computer system. Measurement signals are converted into graphical displays appearing on the computer screen. The two most important displays are the chromatogram and the UV-spectrum. The chromatogram is a representation of the separation process. The UV-spectrum is a characteristic constant for a particular substance.

Analytical method (new version, introduction from june 2019)

HPLC-System
Autosampler: HP-1100, Typ G1313A
Pump: HP-1100, Binary Pump, Typ G1312A
Detector: HP-1100, UV-Vis DAD-Detector, Typ G1315B
Instrument control & integration: ChemStation for LC 3D software

HPLC- Conditions
Stationary phase: Spherisorb 80-3 ODS-1 (Waters)
Column dimension: 125 x 4.0 mm
Hold-up volume: 1.002 ml
Elutiontype: Gradient

Eluent A
8,50 g ortho-phosphoric acid 85%
+ 560 µl hexylamine
+ purified water ad 1000 ml

Eluent B
4,25 g ortho-phosphoric acid 85%
+ 280 µl hexylamine
+ 45,75 g purified water
+ 351 g acetonitrile

Gradient program		
Time in min	% A	%B
0.00 – 0.10	95	5
0.10 – 6.00	95 - 44	5 - 56
6.00 – 9.00	44	56
9.00 – 9.33	44 - 95	56 - 5
9.33 – 11.33	95	5

Measuring parameters:
Flowrate: 1.5 ml/min
Pressure: 190 bar
Injection volume: 2.0 µl
Column temperature: 40 °C
Detection: UV 198 nm
Signal-Range: 190-400 nm

Report

Analytical results are available within about 12 minutes. The computer prints the results of the analysis as a report. The report consists of 3 parts: The header, the chromatogram, and the results (including identification and quantification)

Header:

The header contains details like: File-name, sample-number, date of analysis, name of method etc.

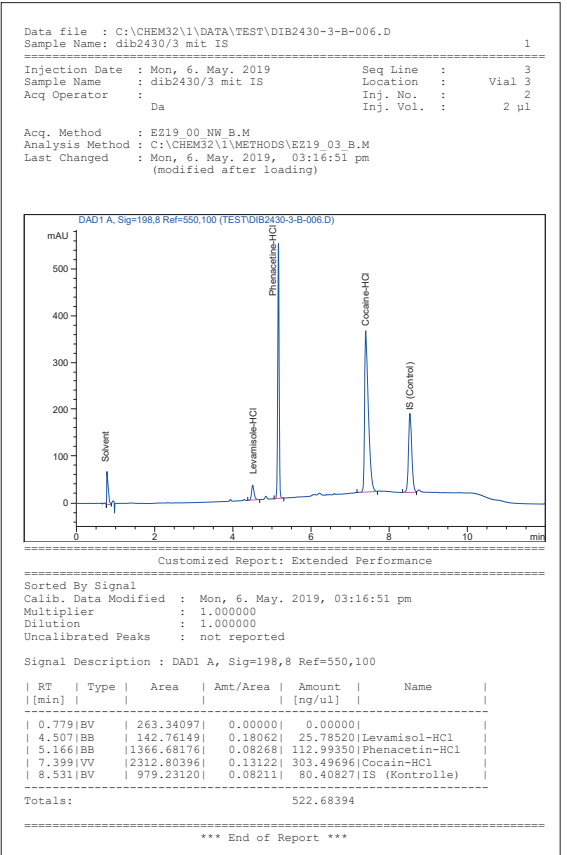
Chromatogram:

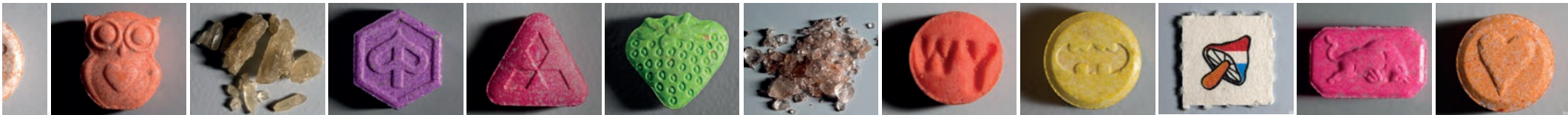
The chromatogram is a graphic visualisation of the separation process. Detected substances appear as „Peaks“.

Results (identification and quantification):

The system compares the area-value of an integrated Peak with the corresponding calibration of the active substance in the specified methods. This automatic process gives us a precise quantification.

Additionally it is possible to get the UV-spectra of the „Peak“ and compare it with our specific UV- Spectra-library.





-MENT, METHODS AND RESULTS

Hans-Jörg Helmlin, Samuel Steiner

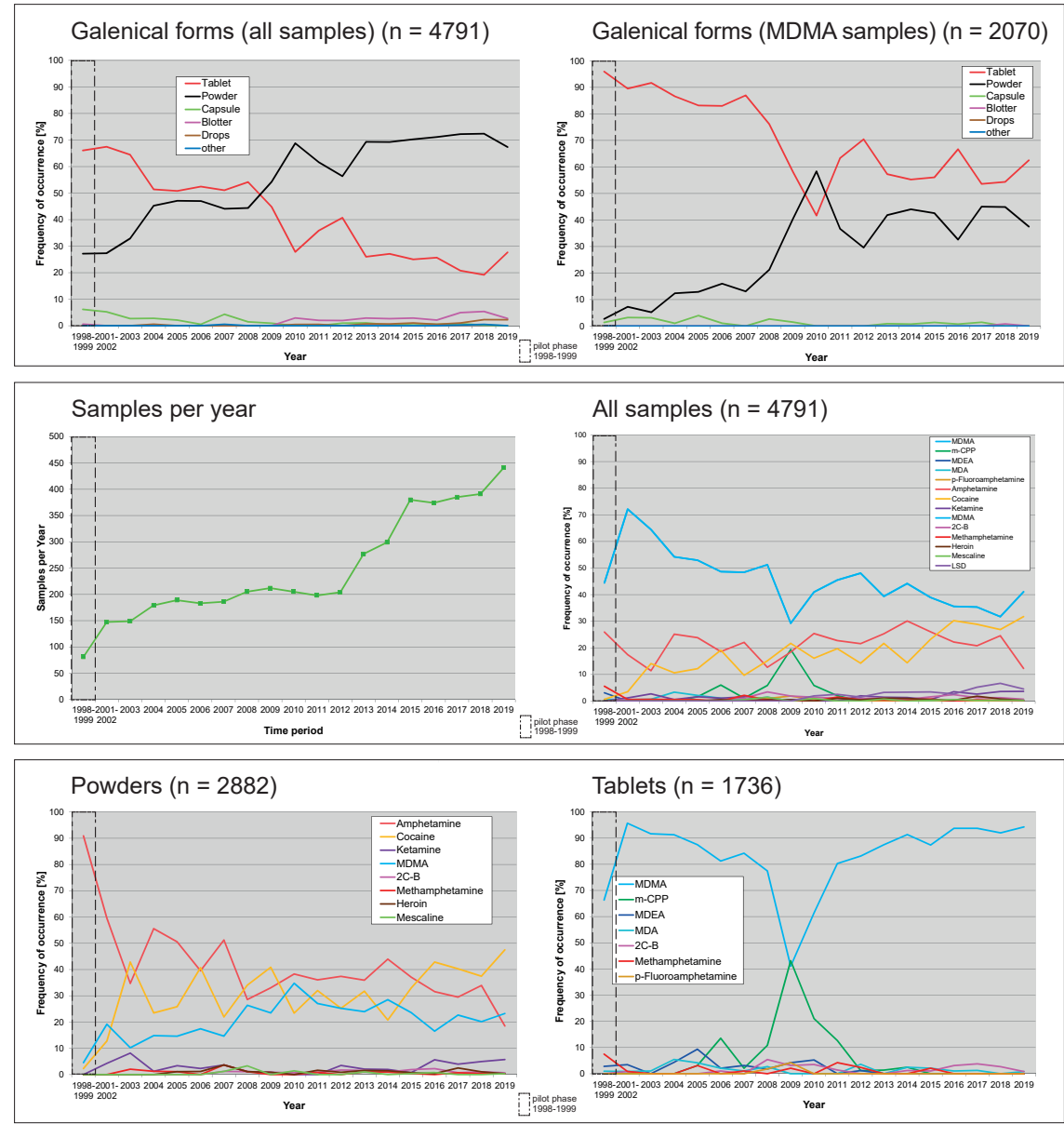
Update: 31.12.2019



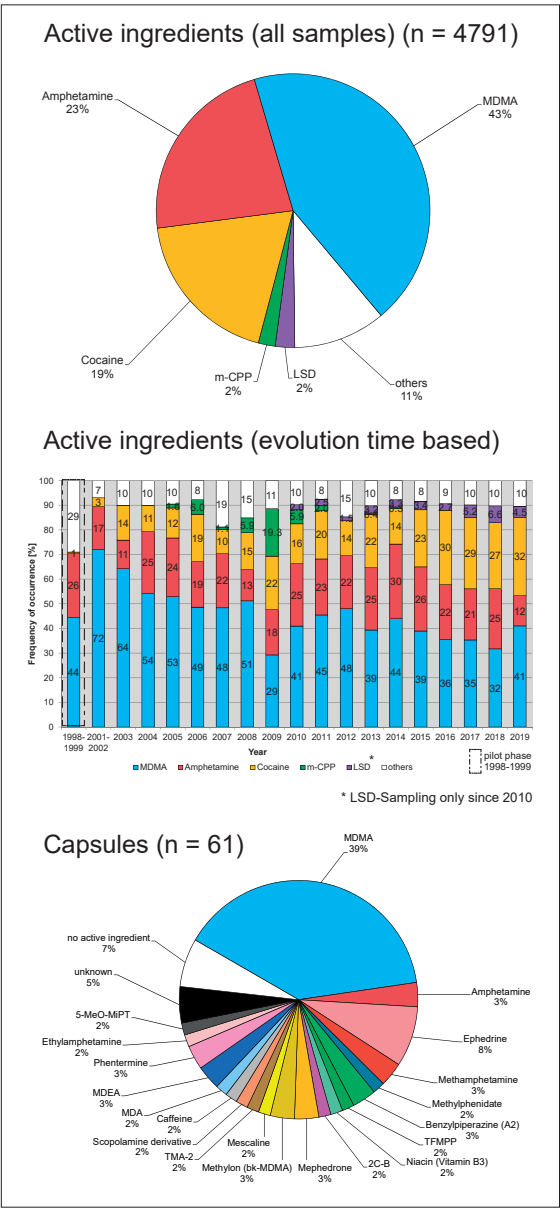
Chemical substances detected		
MDMA	2108	22.29
Caffeine	1113	22.29
Amphetamine	1068	22.29
Cocaine	967	20.18
Levamisole	363	7.58
Phenacetin	290	6.05
LSD	150	2.00
m-CPP	86	1.84
Ketamine	86	1.84
no active ingredient	86	1.84
Lidocaine	72	1.50
Phenylacetone	64	1.34
Amphetamine synthesis by-product	60	1.25
2C-B	56	1.17
Paracetamol	48	1.00
unknown	46	0.96
MDA	42	0.88
Comperidone	41	0.86
Methamphetamine	41	0.86
MDA	37	0.77
iso-LSD	35	0.73
Heroin	30	0.63
Noscapine	29	0.61
Creatin	23	0.48
Acetylsalicylic acid	22	0.46
Metoprolol	22	0.46
MDMA synthesis by-product	19	0.40
related substance	17	0.35
3,4-Methylenedioxyphenyl-2-propanol	16	0.33
Mescaline	16	0.33
2C-I	15	0.31
Hydroxyzine	14	0.29
Hydroxyamphetamine	13	0.27
Ephedrine	13	0.27
Procaine	13	0.27
Benzocaine	12	0.25
Tetracaine	12	0.25
p-Fluoramphetamine	11	0.23
Butorfenol	10	0.21
N-Formylamphetamine	9	0.19
Methylphenidate	9	0.19
Cimetidine	9	0.19
Clonidine	5	0.10
Phenylethylamine	5	0.10
TMPP	5	0.10
Vanillin	5	0.10
3-Methylenethiophene (3-MMC)	4	0.08
Benzylpiperazine (A2)	4	0.08
DMT	4	0.08
DOC	4	0.08
Methylone (Bk-MDMA)	4	0.08
3,4-Methylenedioxyphenylacetone	3	0.06
MDPV	3	0.06
Niacin (Vitamin B3)	3	0.06
N-Methyl-3,4-Methylenedioxybenzylamine	3	0.06
Xylazine	3	0.06
2C-E	2	0.04
4-Chloromethamphetamine	2	0.04
4-Methylthiophene (4-MEC)	2	0.04
Butylone (Bk-MDB)	2	0.04
Chloroquin	2	0.04
Ethacrynic acid	2	0.04
Fumarsure	2	0.04
MDM	2	0.04
MDHCT	2	0.04
Pentadone	2	0.04
Phenamine	2	0.04
PMMA	2	0.04
Pseudoephedrine	2	0.04
Sucrose octasaccharide	2	0.04
TMA-2	2	0.04
Triphenol	2	0.04
1-Benzyl-4-Methylpiperazine (MBZP)	1	0.02
2S-NBOMe	1	0.02
2C-NBOMe	1	0.02
2C-C	1	0.02
2C-I-2	1	0.02
2-Fluor-Ketamine	1	0.02
2-Fluoromethamphetamine (2-FMA)	1	0.02
3-Fluorophenmetrazin (3-FPM)	1	0.02
3-MeO-PMP	1	0.02
4-Chloroethamphetamine	1	0.02
4-Fluorobenzic acid	1	0.02
4-Fluoromethamphetamine	1	0.02
4-HO-MET	1	0.02
4-HO-MPT	1	0.02
4-Methylaminopyrine	1	0.02
4-Methylthiophene	1	0.02
5-MeO-MPT	1	0.02
ALD-52	1	0.02
AL-LAD	1	0.02
Amoxicillin	1	0.02
Benzocaine	1	0.02
Bisoprolol	1	0.02
Carbamazepine	1	0.02
Clozapine	1	0.02
Dextroamphetamine (DXM)	1	0.02
Dextropropionolamine	1	0.02
Dimethyl fentanyl	1	0.02
Diphenhydramine	1	0.02
DOI	1	0.02
Doxylamine	1	0.02
Erdostein	1	0.02
Ergamine	1	0.02
Ethacrynic acid	1	0.02
Ethylamphetamine	1	0.02
Fenpropionol	1	0.02
gamma-Butyrolactone	1	0.02
GHB	1	0.02
Hexamethylenetetramine	1	0.02
Lidocaine	1	0.02
Lidocaine	1	0.02
MDPMP	1	0.02
Meconin	1	0.02
Medicament	1	0.02
Melatonin	1	0.02
Melatonin	1	0.02
Metamfetone	1	0.02
Methaqualone	1	0.02
Methylenedioxymethamphetamine (MTA)	1	0.02
MMDA	1	0.02
N-Methylbenzylamine	1	0.02
N-Methylphenethylamine	1	0.02
Oxycodone	1	0.02
Phenacetin	1	0.02
Phenol	1	0.02
Propylthiouracil	1	0.02
Propylthiouracil	1	0.02
Scopolamine	1	0.02
Scopolamine derivative	1	0.02
Sildenafil	1	0.02
Tadalafil	1	0.02
Theophylline	1	0.02

Results

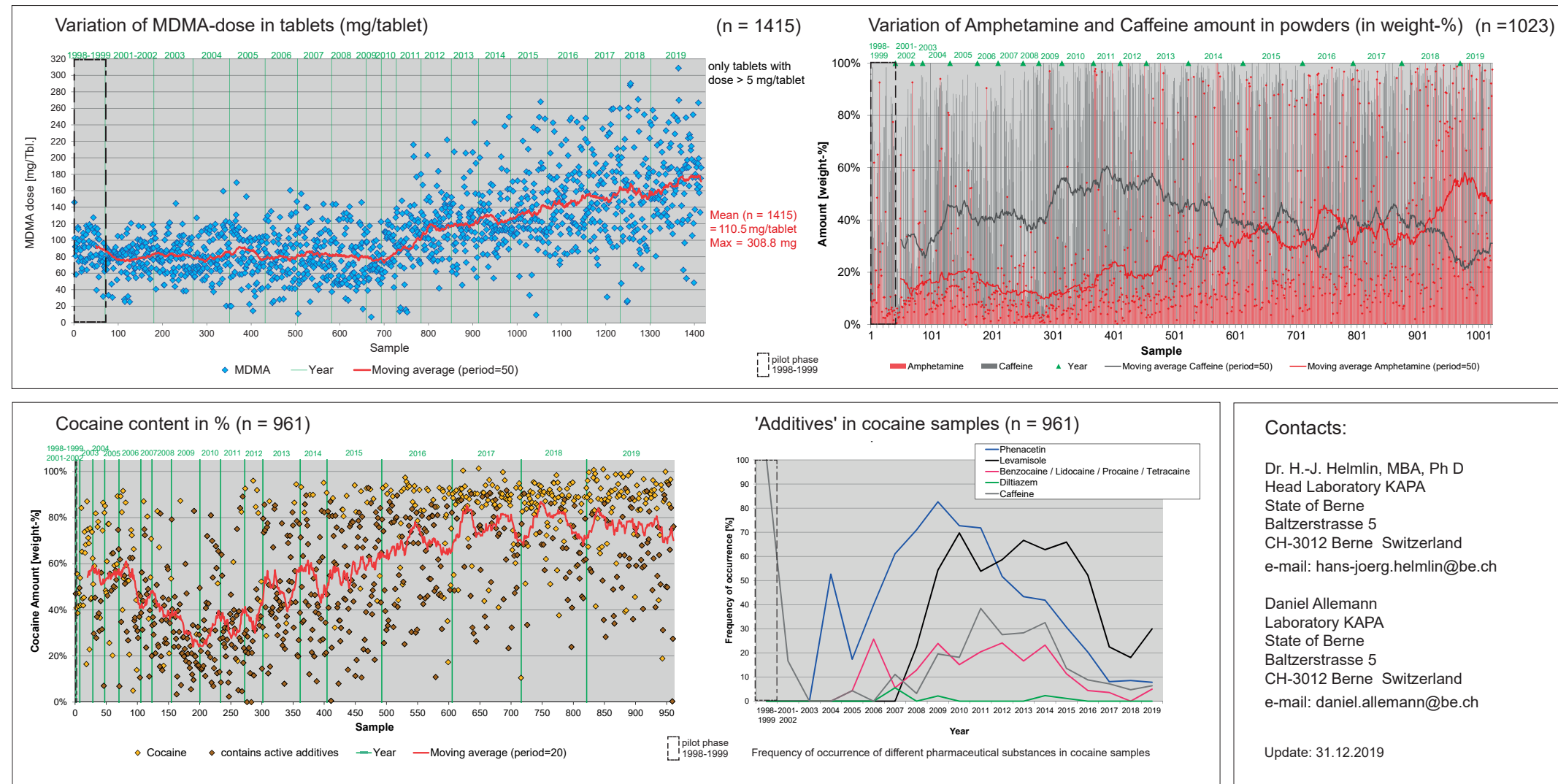
Frequency of occurrence



Qualitative results



Quantitative comparison



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