

# Monitoring of the internet market for synthetic cannabinoids – Are there specific effects related to the German law on new psychoactive substances (NpSG)?

Sebastian Halter, Verena Angerer, and Volker Auwärter

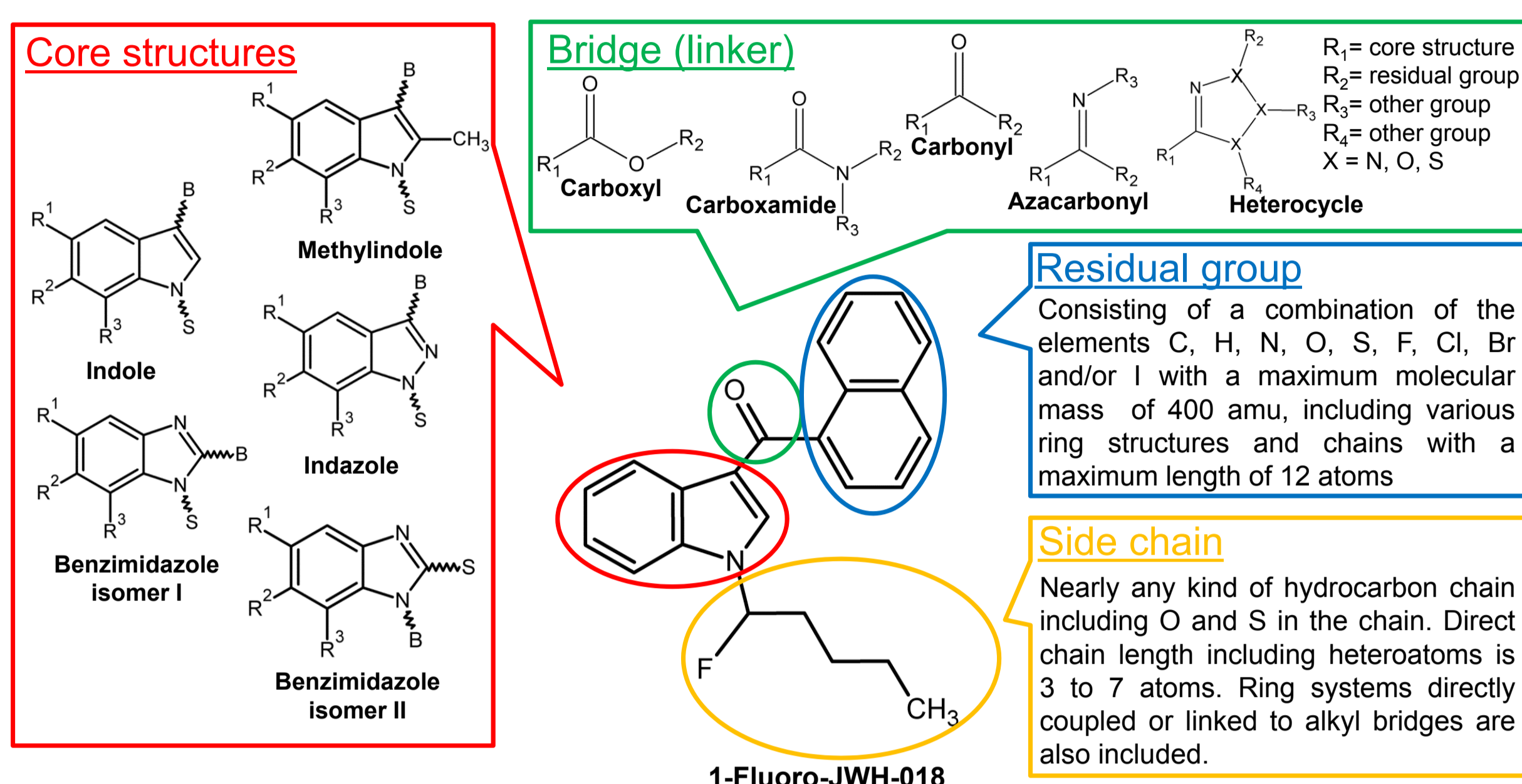
Forensic Toxicology, Institute of Forensic Medicine, Medical Center – University of Freiburg, Freiburg, Germany

## Background

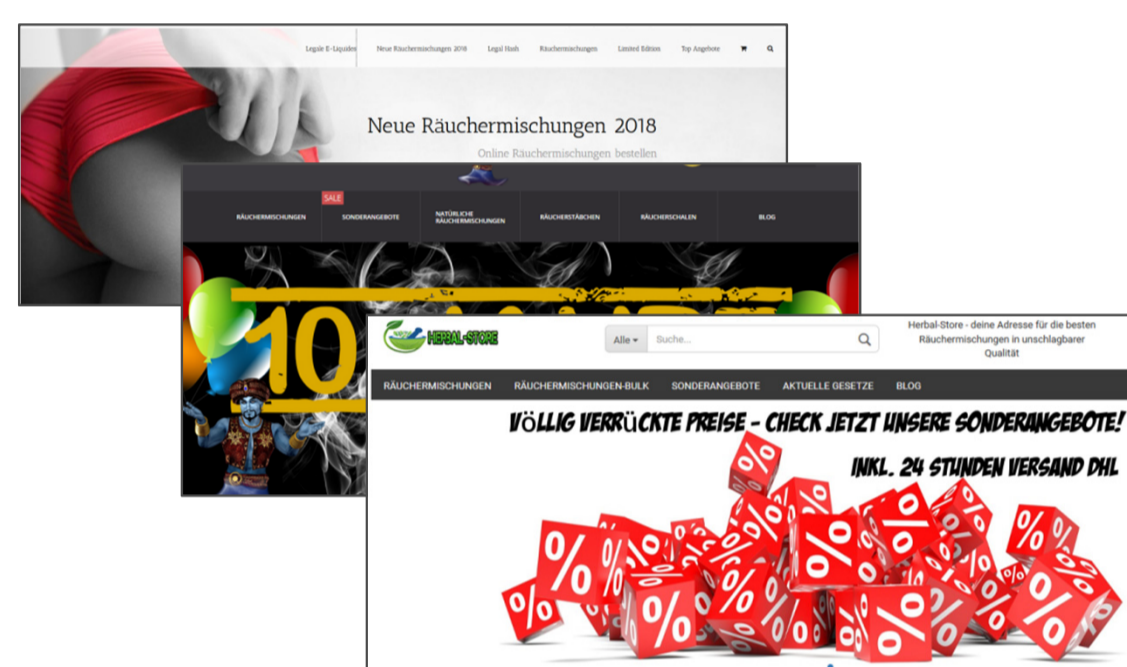
New psychoactive substances (NPS) have become a substantial part of the drug market many years ago. The largest group of NPS observed by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) is the group of synthetic cannabinoids (SCs). Since 2008, 179 SCs were detected on the European drug market.<sup>[1]</sup> They are mainly distributed via online shops in the form of herbal blends, 'legal hash' or e-liquids. In addition to the German Narcotics Act (BtMG) which defines single substances as narcotics, on 26<sup>th</sup> November 2016 the so-called NpSG came into force, a German law providing generic definitions for two groups of NPS. One of the groups – the SCs – is made up of a modular system comprising indole and indazole core structures carrying defined substituents, covering nearly all SCs that emerged in Europe until 2016. To investigate the influence of the NpSG on the spectrum of substances offered by online shops, a systematic evaluation of in-house online monitoring results before and after the law was conducted.

## Legislative Background

According to the NpSG a synthetic cannabinoid is defined as any chemical compound which consists of a structure made up of a **core structure**, a **bridge (linker)**, a **residual group** and a **side chain**.<sup>[2]</sup>

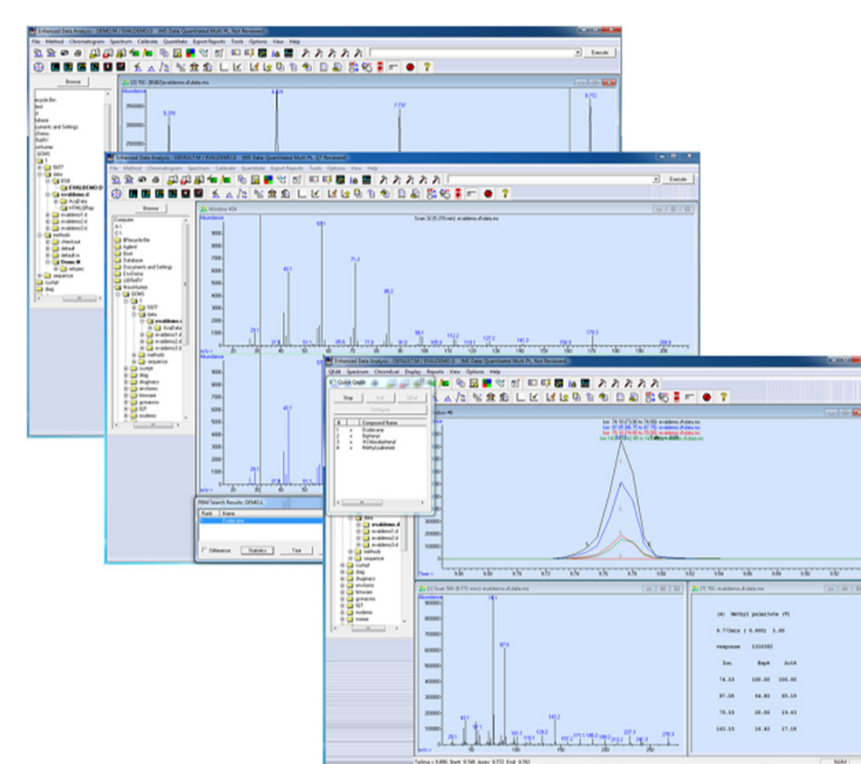


## Methods



- Search for websites of online retailers
- Test-purchase of herbal blends, 'legal hash' and e-liquids
- Documentation of delivered products
- Extraction with methanol, ethanol or *n*-hexane

**GC-System:** Agilent Technologies 6890N  
**Column:** HP-5-MS capillary (30 m × 0.25 mm I.D., 0.25 µm film thickness)  
**Oven:** Initially 100°C for 3 min, ramped to 310°C at 30°C/min, 310°C for 10 min  
**MS-System:** Agilent Technologies MSD 5973  
**Software:** MSD Chemstation D.03.00.611



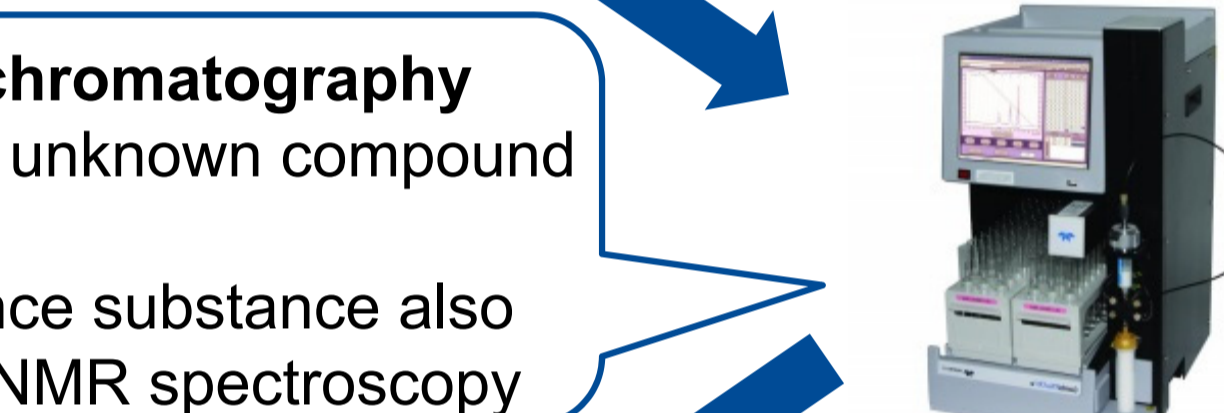
- Comparison of MS spectra with several MS libraries
- In-house library of synthetic cannabinoids, Cayman Spectral Library and SWGDRUG Mass Spectral Library
- Identification of the compound by matching a library entry

No match with MS-libraries  
→ Structure elucidation

**Flash chromatography**  
Isolation of unknown compound  
→ Reference substance also used for NMR spectroscopy



**HRMS-analysis (qToF)**  
Exact mass  
→ Tentative molecular formula and structural information



**Nuclear magnetic resonance spectroscopy (NMR)**  
→ Additional structural information and final confirmation

## Results

During the sample period from January 2016 to July 2018, in total 681 products were ordered and analyzed. Before the NpSG has taken effect 241 herbal blends, 14 e-liquids and 11 'legal hash' products were purchased. After that date 378 herbal blends; 25 e-liquids and 12 'legal hash' were bought. Figure 1 shows that the proportion of narcotics nearly doubled after the coming into force of the NpSG. Simultaneously, the substances covered by the new law decreased significantly from 60% to 16%. Furthermore, substances circumventing the NpSG appeared right after the law had become effective with a proportion of 31% until July 2018.

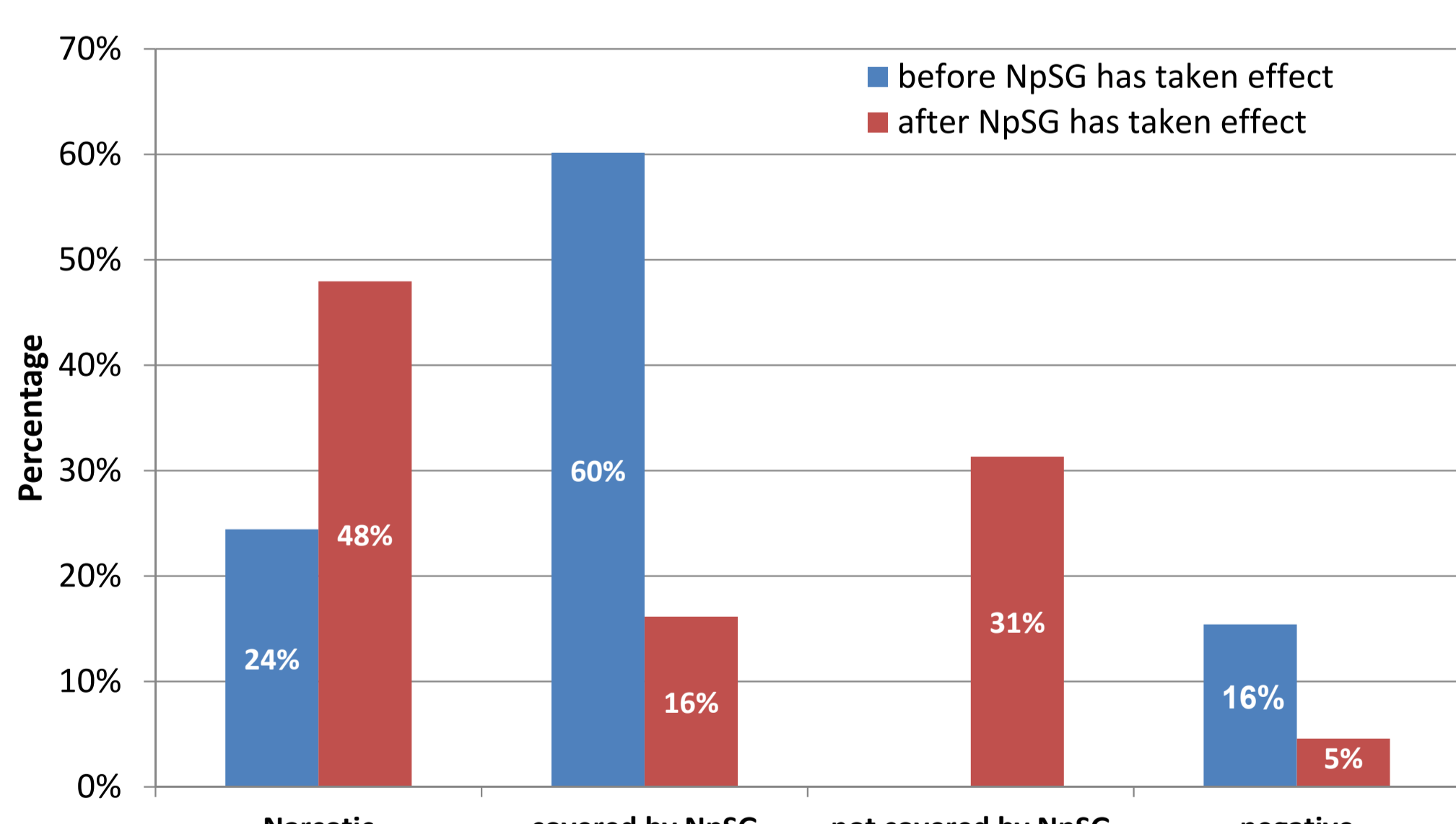


Figure 1: Relative distribution of ordered products from January 2016 to July 2018 divided into two parts: before and after the NpSG has taken effect in Germany.

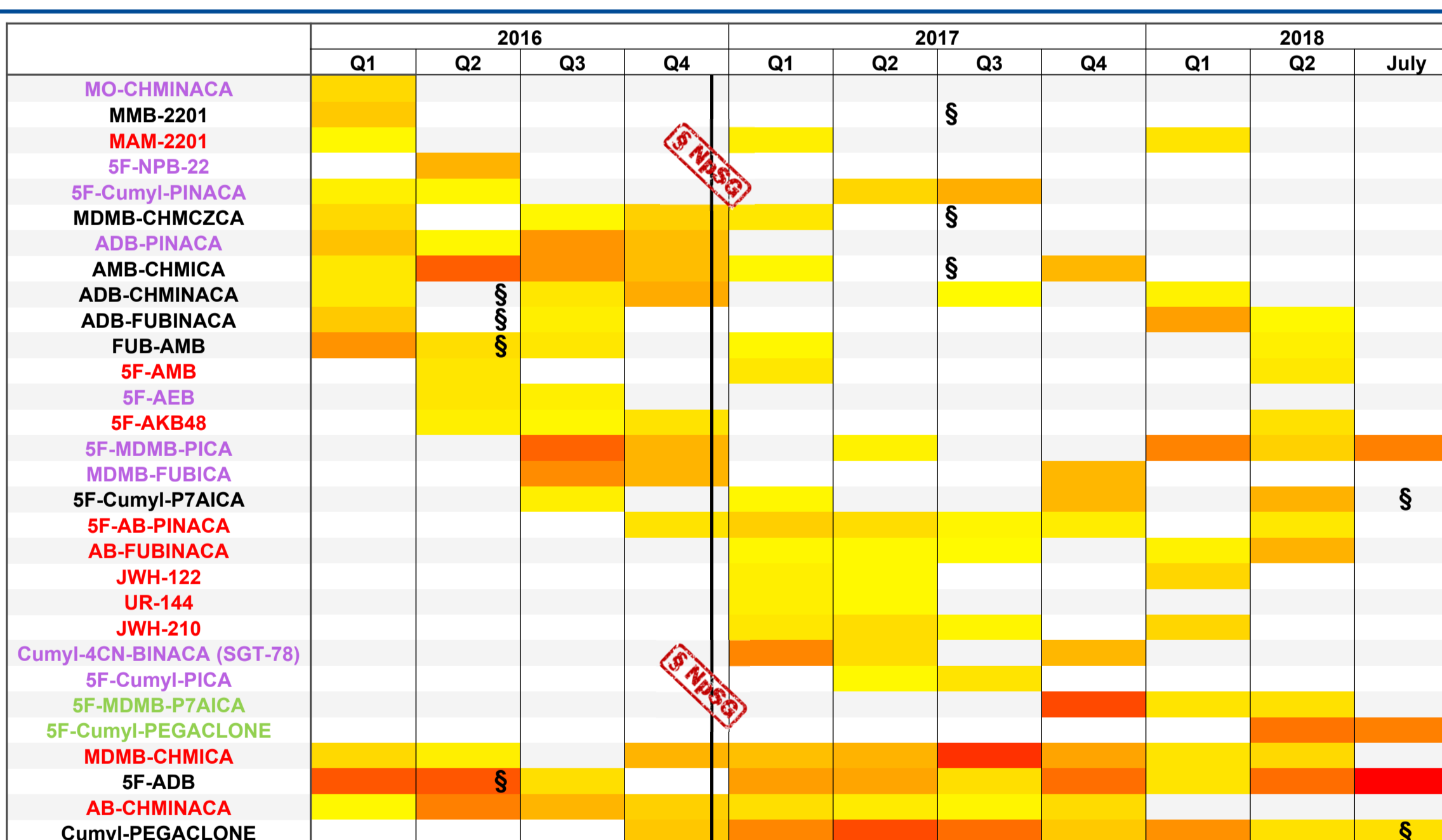


Figure 2: Heat map showing the distribution of the substances found during the monitoring. Red: narcotics before 2016. Black: became narcotics during the sample period (§ marks the date of scheduling). Purple: covered by the NpSG. Green: not covered by any law so far.

Figure 2 shows the distribution of the analyzed substances detected during the product monitoring on a quarterly base until July 2018.

The following substances were also found during the monitoring: 5CI-AKB48, 5F-AB-FUPPYCA, 5F-ADB-PINACA, AB-PINACA, AM-2201, APICA, Cumyl-4CN-B7AICA, EAM-2201, EG-018, FDU-PB-22, JWH-022, JWH-081, MDMB-CHMINACA, STS-135 and XLR-11. Due to their low overall prevalence (detected less than 3 times within the sample period) these SCs were not included in the heat map.

## Discussion

The fact that 5F-Cumyl-PEGACLONE appeared in herbal blends directly after Cumyl-PEGACLONE became a narcotic is less surprising because shop owners anticipate modifications of the BtMG. Interestingly, there are a few 'evergreens' like MDMB-CHMICA and 5F-ADB which were present in the analyzed products during the whole sample period. The proportion of narcotics significantly increased after the NpSG has taken effect in Germany.

## Conclusions

Despite the implementation of the NpSG, shop owners are still well prepared to release SCs circumventing legal restrictions, like e.g. 5F-Cumyl-PEGACLONE. The product monitoring is crucial for a timely detection of new SCs on the market. The NpSG led to a shift in the detected SCs without reducing the market supply.

## Acknowledgement

We would like to thank the 'Bund gegen Alkohol und Drogen im Straßenverkehr' (B.A.D.S.) for financially supporting the research project "Überwachung des Onlinemarktes hinsichtlich 'neuer psychoaktiver Stoffe' (NPS) sowie Weiterentwicklung bereits bestehender LC-MS/MS Methoden zur Detektion von NPS in Serum- und Urinproben."



## Literature

- [1] European Drug Report – Trends and Developments 2018, EMCDDA, [http://www.emcdda.europa.eu/system/files/publications/8585/20181816\\_TDAT18001ENN\\_PDF.pdf](http://www.emcdda.europa.eu/system/files/publications/8585/20181816_TDAT18001ENN_PDF.pdf).
- [2] Gesetz zur Bekämpfung der Verbreitung neuer psychoaktiver Stoffe. Neue-psychoaktive-Stoffe-Gesetz (NpSG). <https://www.gesetze-im-internet.de/npsg/>

## Contact

Sebastian Halter  
Institute of Forensic Medicine,  
Forensic Toxicology,  
Medical Center – University of Freiburg  
Albertstraße 9, 79104 Freiburg, Germany  
sebastian.halter@uniklinik-freiburg.de



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