



# Module 2: Toxic effects and Risk assessment

Author/s: Fernando Remião and Bárbara Silva

Date of release: June 2022



Co-funded by the  
Erasmus+ Programme  
of the European Union

*This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein"*

[Ines.unibo.it](http://Ines.unibo.it)

2021-1-IT02-KA220-SCH-000032570 - Cooperation Partnership in School Education  
[project duration: 2021-2024]



# Module description and DUs summary

## Module aims (overview)

This module aims to introduce some basic concepts of toxicology and address the toxic effects that result from the consumption of these new psychoactive substances (NPS). The effects of **synthetic cathinones**, **synthetic cannabinoids** and **phenethylamine designer drugs**, which are the most representative groups of these NPS, will be addressed in more detail.

## DUs summary

1. Synthetic cathinones
2. Synthetic cannabinoids
3. Phenethylamine designer drugs



# Toxicology

What does “toxic” mean?

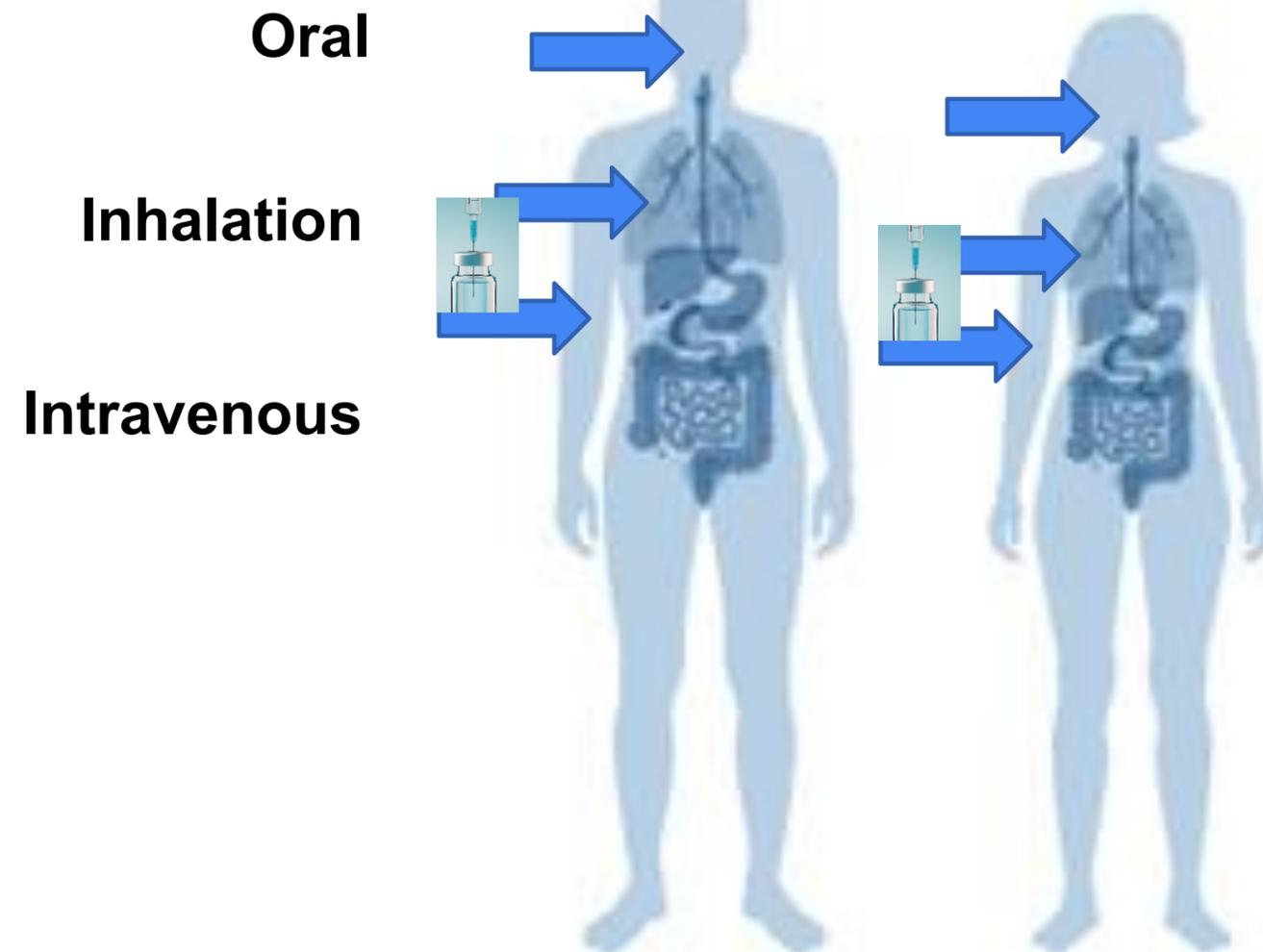


... **any substance** that can cause severe **injury** or **death** as a result of physicochemical interaction with a living tissue

# Toxicology

**Toxicology:** Study of adverse effects of chemical on the body

## Routes of exposure





# Toxicokinetic

---

## How the body deals with the drug?

**Absorption**



**Metabolism**



**Distribution**



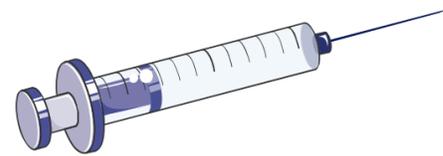
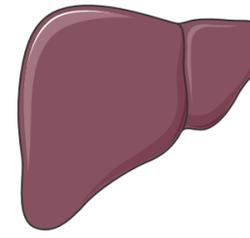
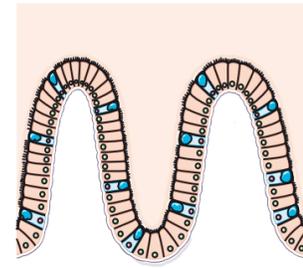
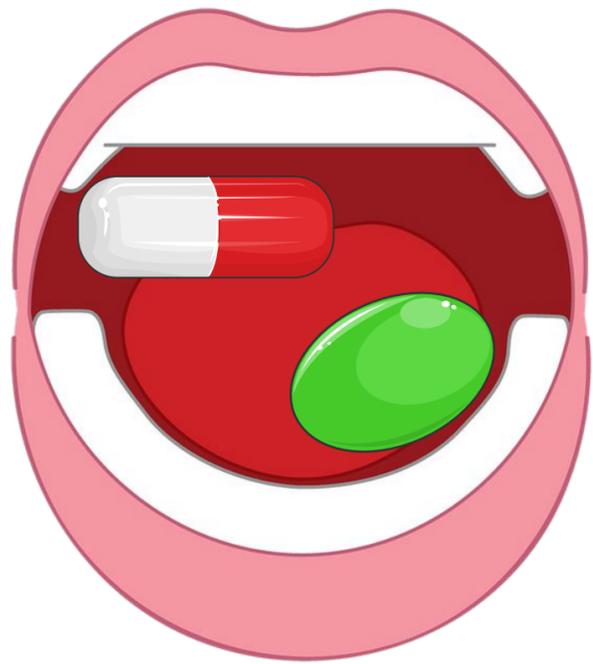
**Excretion**



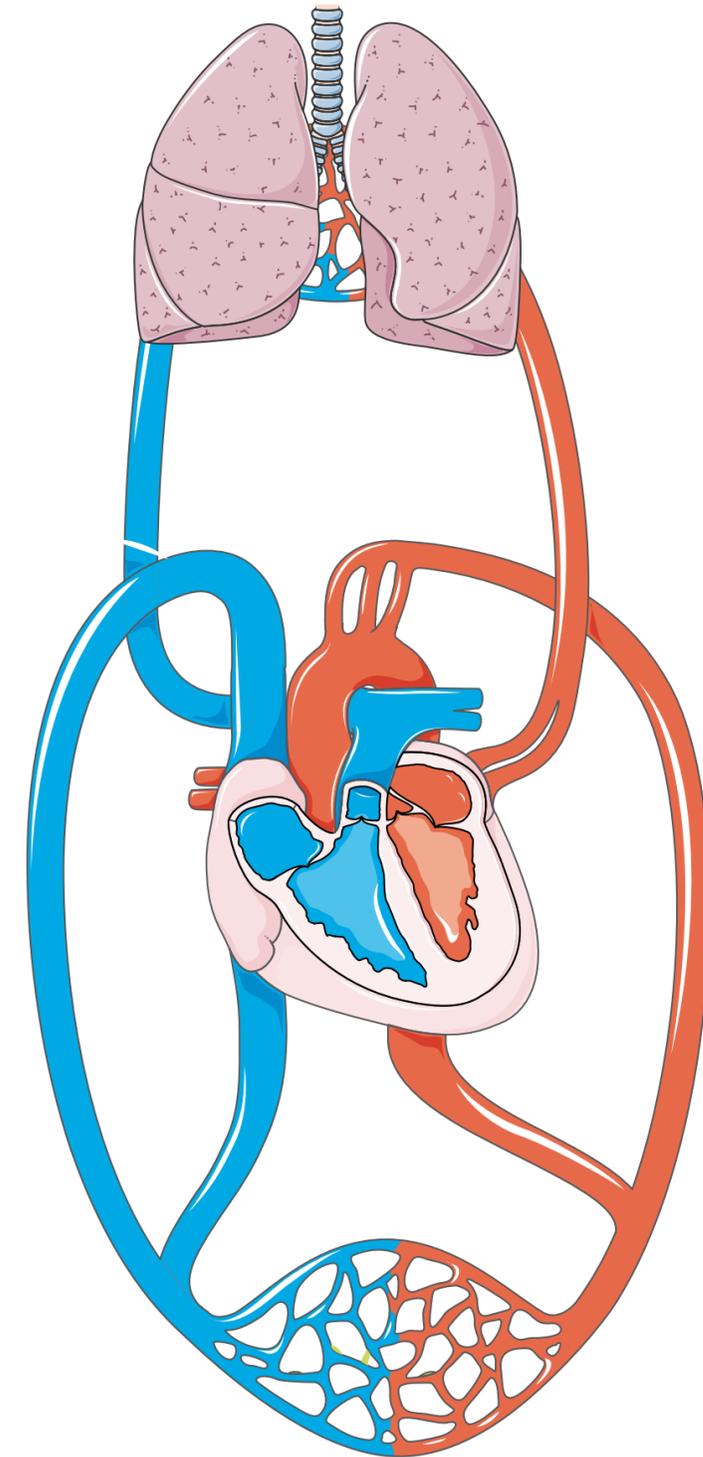


# Absorption

Bioavailability < 100%

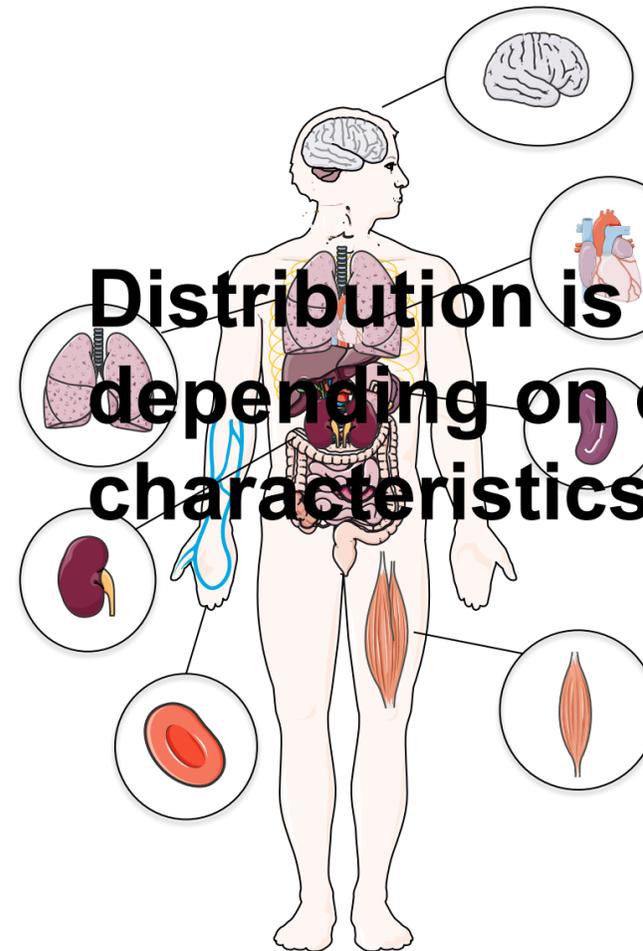


Bioavailability = 100%





# Distribution



**Distribution is generally uneven,  
depending on certain drug  
characteristics**

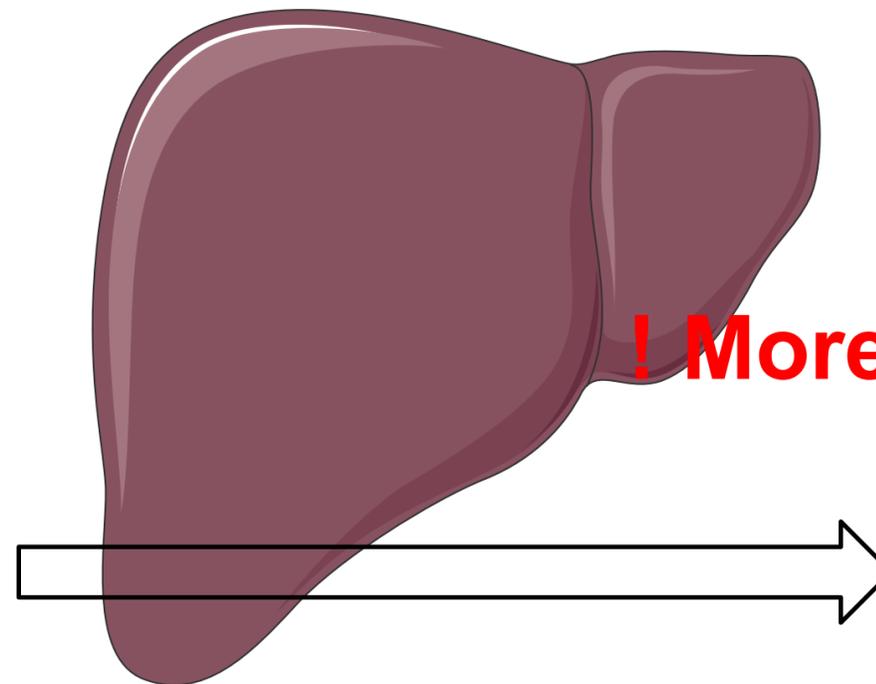
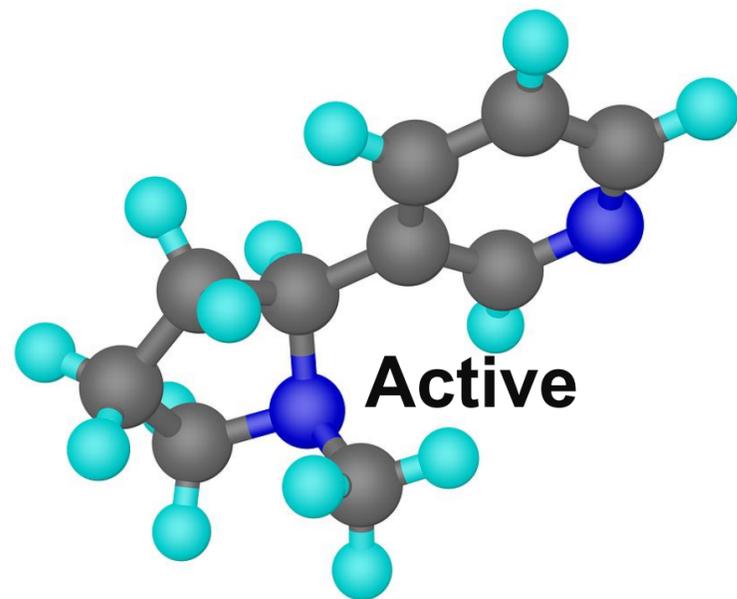
**Hydrophilic / Lipophilic**

**Molecular size**

**Highly bound to plasma proteins**



# Metabolism

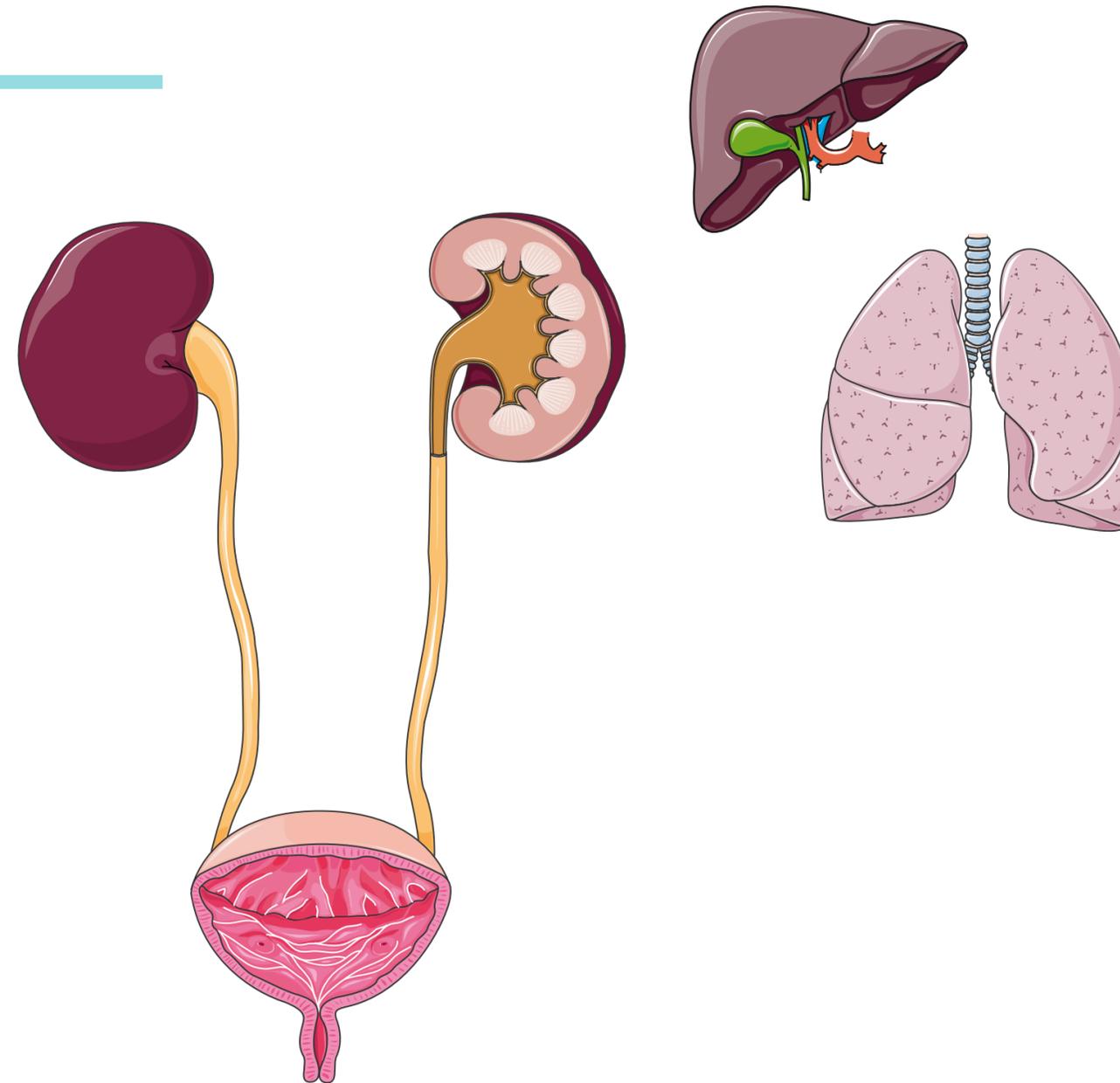


**! More active or inactive and toxic**

**More water soluble compounds  
Inactive**



# Excretion





# Adverse effects

## Local effects

Site of exposure

## Systemic effects

Whole body



## Acute toxicity

Short amount of time

## Chronic toxicity

Continuous exposure



# NPS



ew Ps



PS)?





# NPS

**Street\_Drug Dealers**



**Head Shops**

**Legal Highs**



**Internet**

**Not for Human  
Consumption**



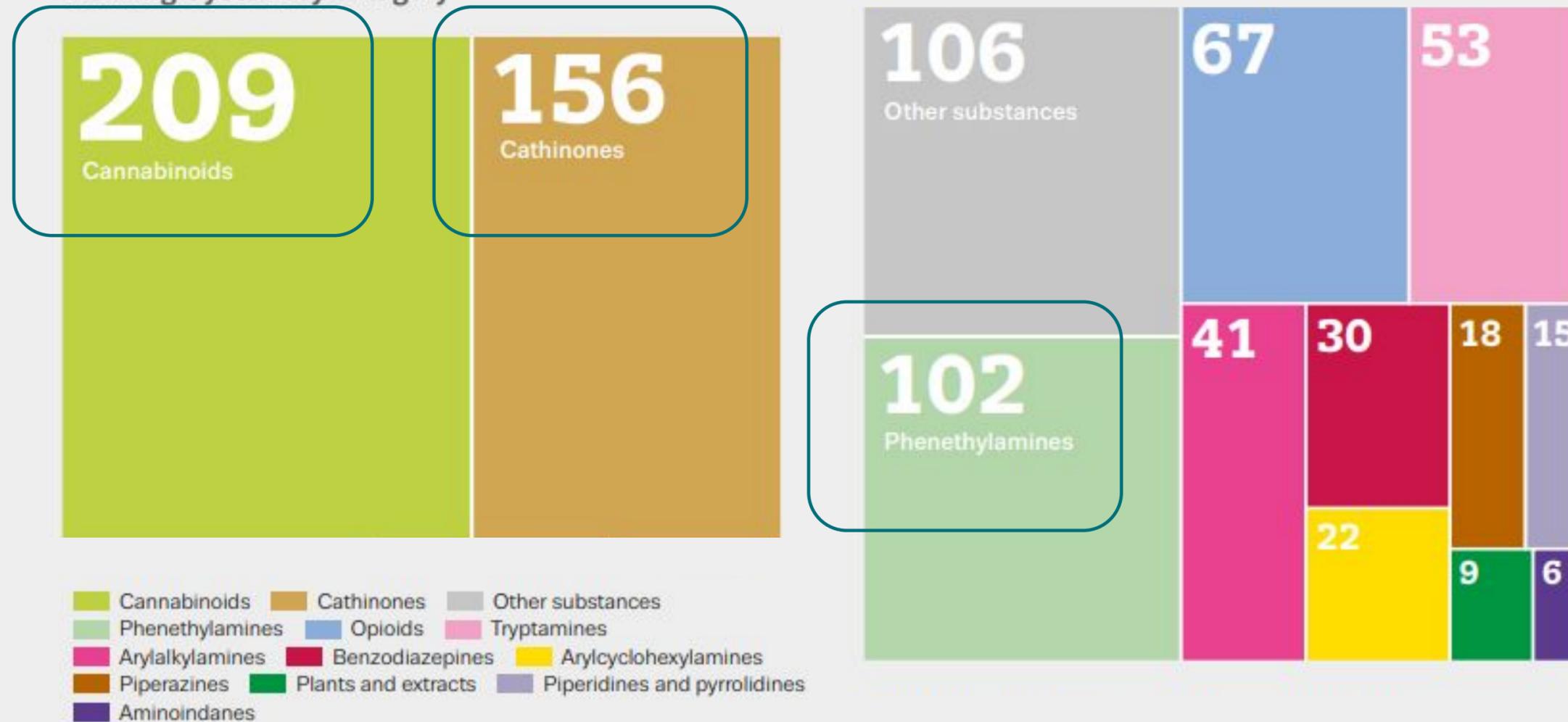
# NPS





# NPS

Number of substances monitored by the EU Early Warning System by category





Co-funded by the  
Erasmus+ Programme  
of the European Union



[ines.unibo.it](http://ines.unibo.it)

2021-1-IT02-KA220-SCH-000032570 - Cooperation Partnership in School Education  
[project duration: 2021-2024]

