

Monitoring of emerging micropollutants in hydric media in Bragança district

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EMERGING MICROPOLLUTANTS

POLLUTANTS

- Substances in different environmental matrices.

EMERGING POLLUTANTS

- Compounds detected due to recent advances of analytical techniques and instrumental methods;
- These compounds were not considered as pollutants until now [1].

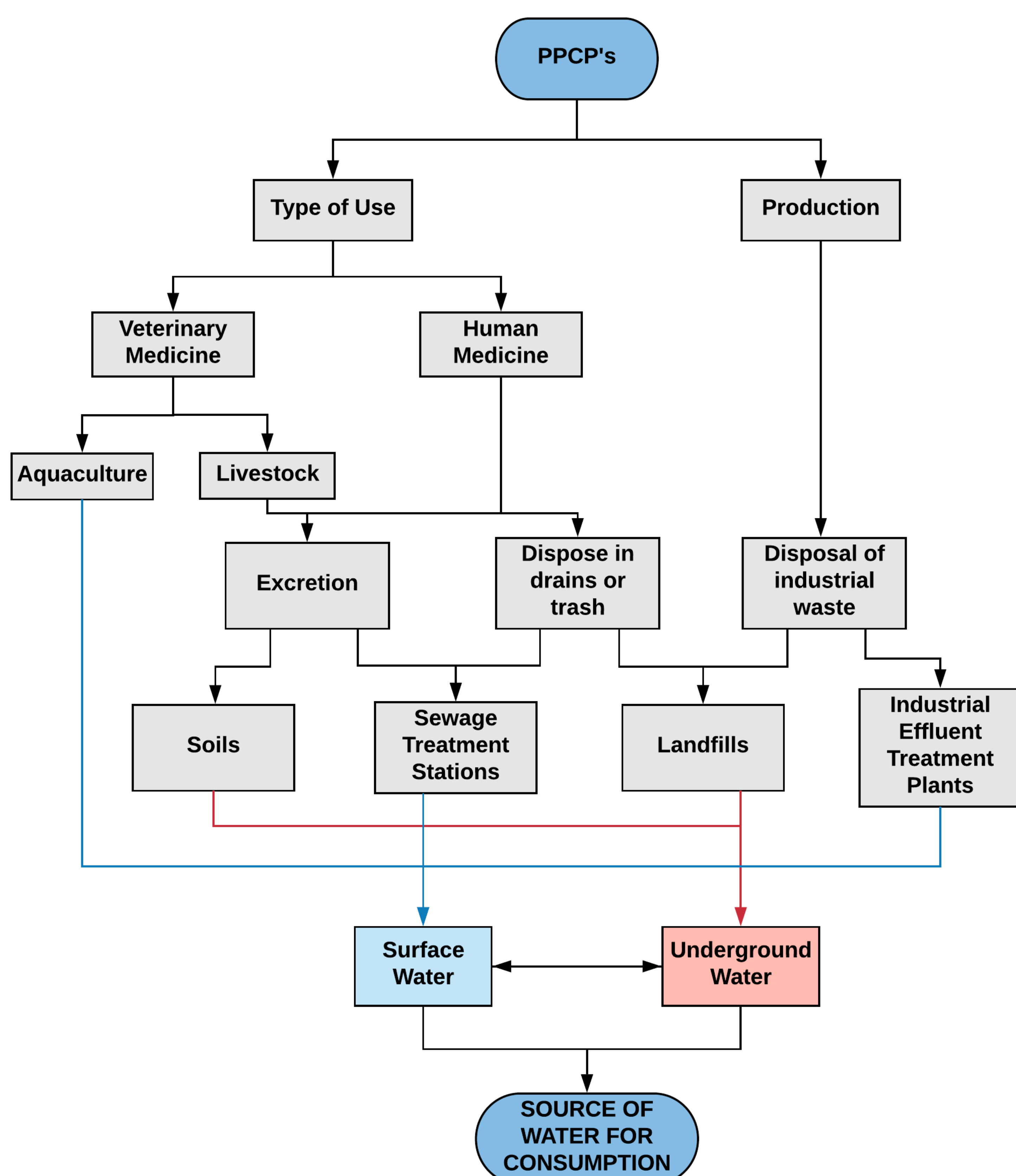
EMERGING MICROPOLLUTANTS

- Very small concentrations ($\mu\text{g/L}$ or ng/L);
- Persistent organic pollutants (POP's);
- Endocrine disrupting compounds (EDC's);
- Pharmaceuticals and personal care products (PPCP's) [2].

Emerging Micropollutants are a subclass of Pollutants and they can be classified as Persistent Organic Pollutants, Endocrine Disrupting Compounds and Pharmaceuticals and Personal Care Products (**PPCP's**). These compounds may cause undesired effects to health or to the environment when used in high quantities or wrong ways. Generally, a pharmaceutical drug is prescribed to cause the desired therapeutic effect. However after their use, even at low concentrations they can retain their physicochemical properties [1].

Because of these effects, among others, **PPCP's** are substances excreted in relevant quantities by the human body and are not effectively removed from water in sewage treatment plants [2].

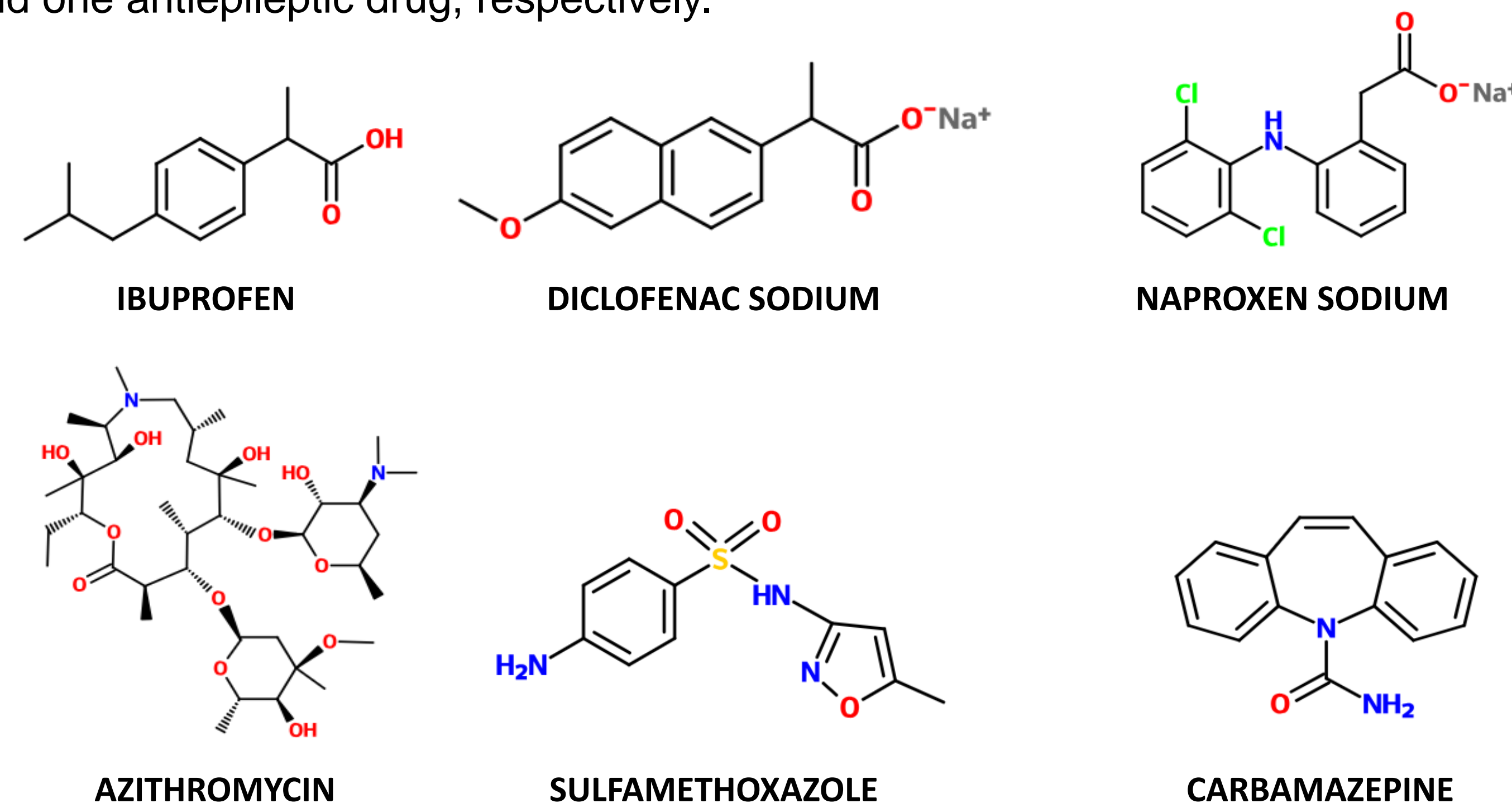
MAIN SOURCES OF PPCP's CONTAMINATION



EXPERIMENTAL METHODOLOGY

SELECTED PPCP'S TO THIS STUDY

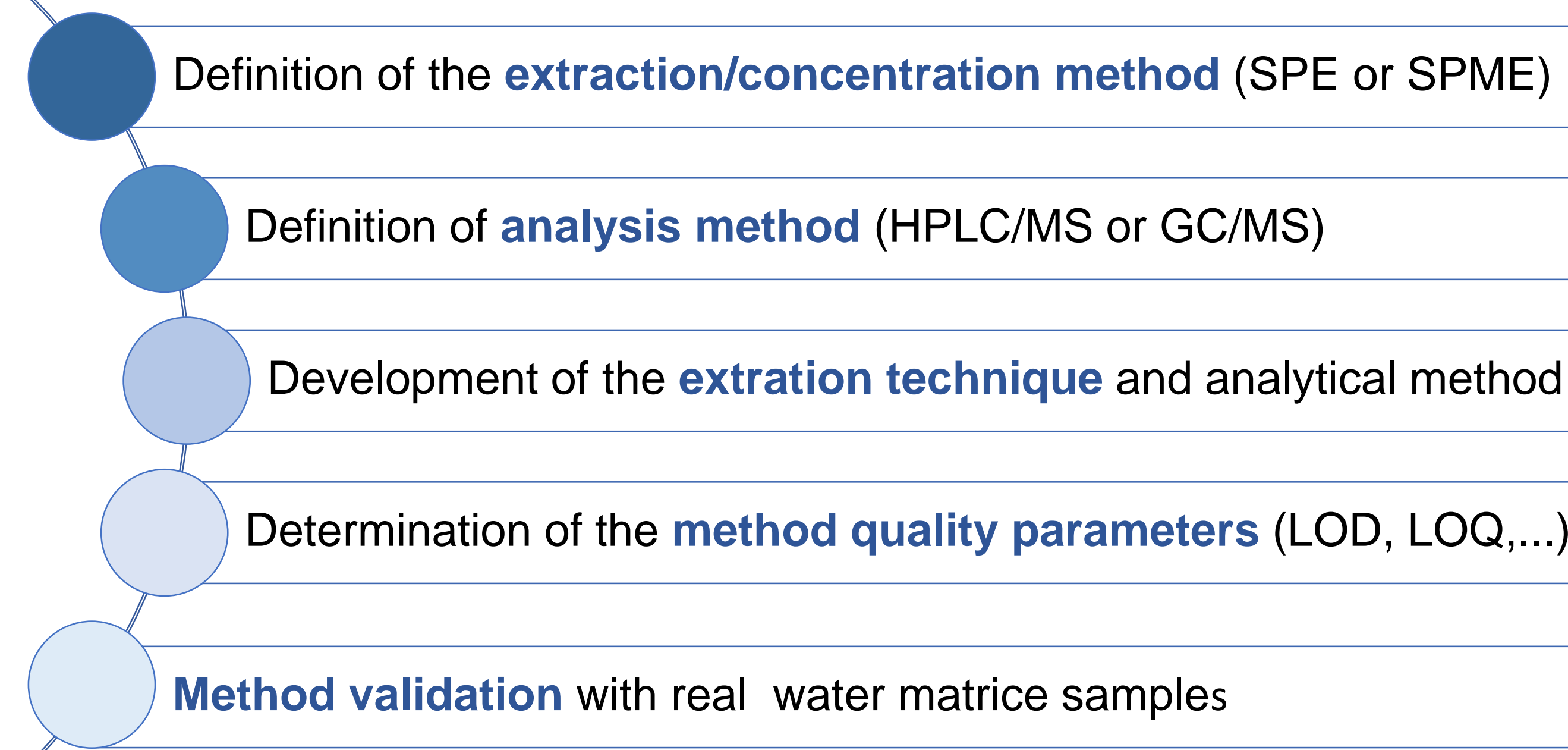
After a preliminary screening, six pharmaceutical drugs were selected for this study: **ibuprofen**, **diclofenac**, **naproxen**, **azithromycin**, **sulfamethoxazole** and **carbamazepine**. The first three are anti-inflammatory, followed by two antibiotics and one antiepileptic drug, respectively.



The main **extraction techniques** for micro contaminants in environmental matrices are Solid Phase Extraction (**SPE**), Solid Phase Micro Extraction (**SPME**) and Liquid-Liquid Extraction (**LLE**). Due to the large amount of organic and toxic solvents used in LLE, the SPE AND SPME techniques are actually preferable [2].

Due to the very low levels of PPCP's concentration in water matrices, Gas Chromatography-Flame Ionization Detection (**GC-FID**), Gas Chromatography-Mass Spectrometry (**GC-MS**), High Performance Liquid Chromatography-Diode Array Detection (**HPLC-DAD**) or High Performance Liquid Chromatography-Mass Spectrometry (**HPLC-MS**) are instrumental methods of analysis normally used [2].

METHOD DEVELOPMENT AND VALIDATION



LITERATURE REVIEW (SUMMARY)

COMPOUND	LOQ (ppb)	MATRICE	METHOD	REFERENCE
IBUPROFEN	170	Effluent	SPE-HPLC-DAD	[3]
DICLOFENAC	0.0229	Raw sewage	SPE-HPLC-MS	[2]
NAPROXEN	0.12	Wastewater	SPE-HPLC-DAD	[4]
AZITHROMYCIN	0.013	Wastewater	SPE-LC-MS-MS	[5]
SULFAMETHOXAZOLE	0.00625	Raw sewage	SPE-HPLC-MS	[2]
CARBAMAZEPINE	0.00071	Pool water	SPE-GC-MS	[6]

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