

Unravelling the potential of progestins to contribute to (anti-)androgenic and (anti-)progestagenic activities in aquatic environments

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Introduction

Progestins are emerging contaminants of aquatic environments and they exhibit progestagenic and (anti-)androgenic activities. Thus, they could adversely affect the endocrine system of exposed organisms when present in the aquatic environment. (Anti-)androgenic and (anti-)progestagenic activities are frequently reported to occur in wastewaters and surface waters. However, it is still not clear yet, which compounds are responsible for these activities and to which extent progestins can account to.

Aim

To determine if progestins have potential to contribute to (anti-)androgenic and (anti-)progestagenic activities in wastewater and surface water

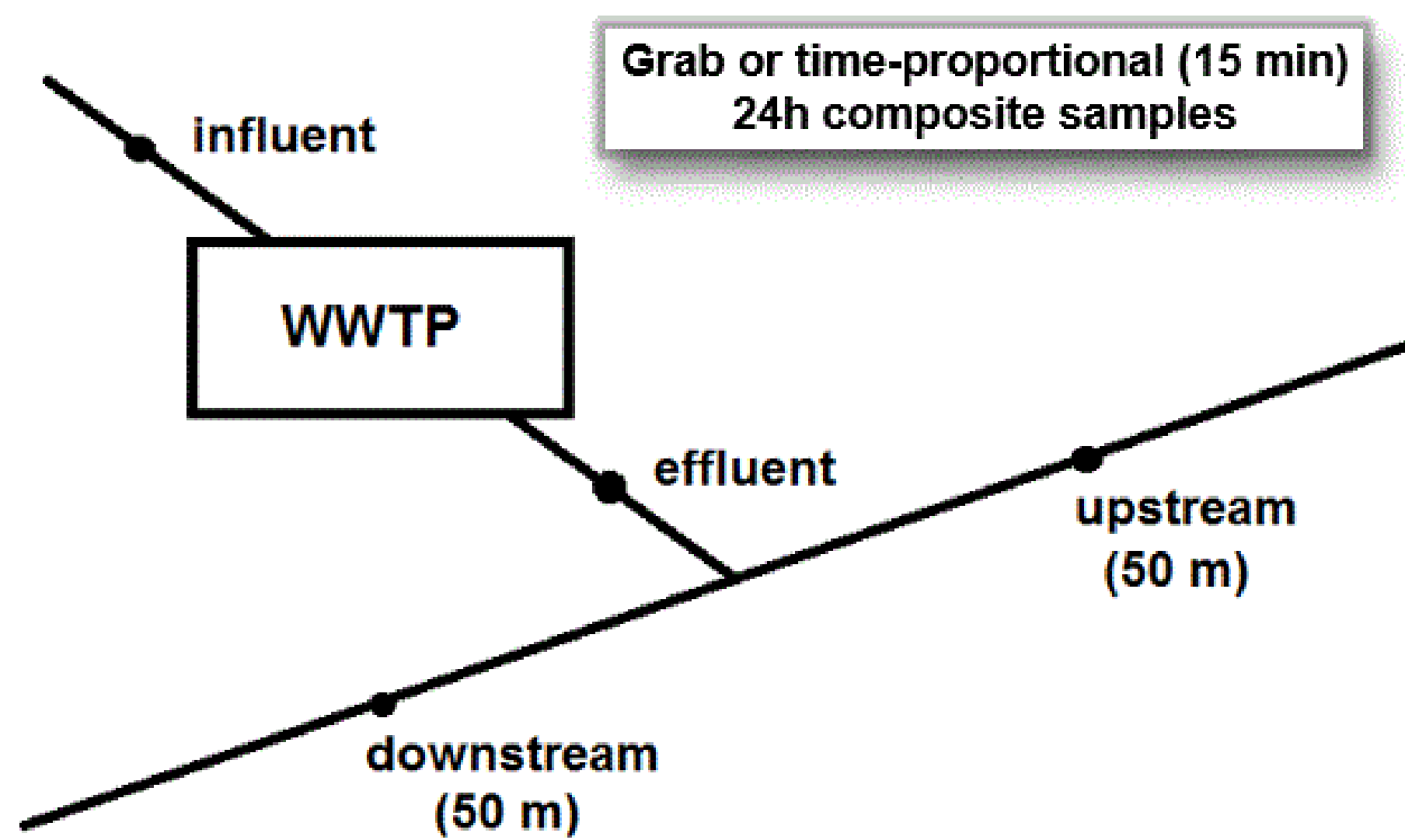
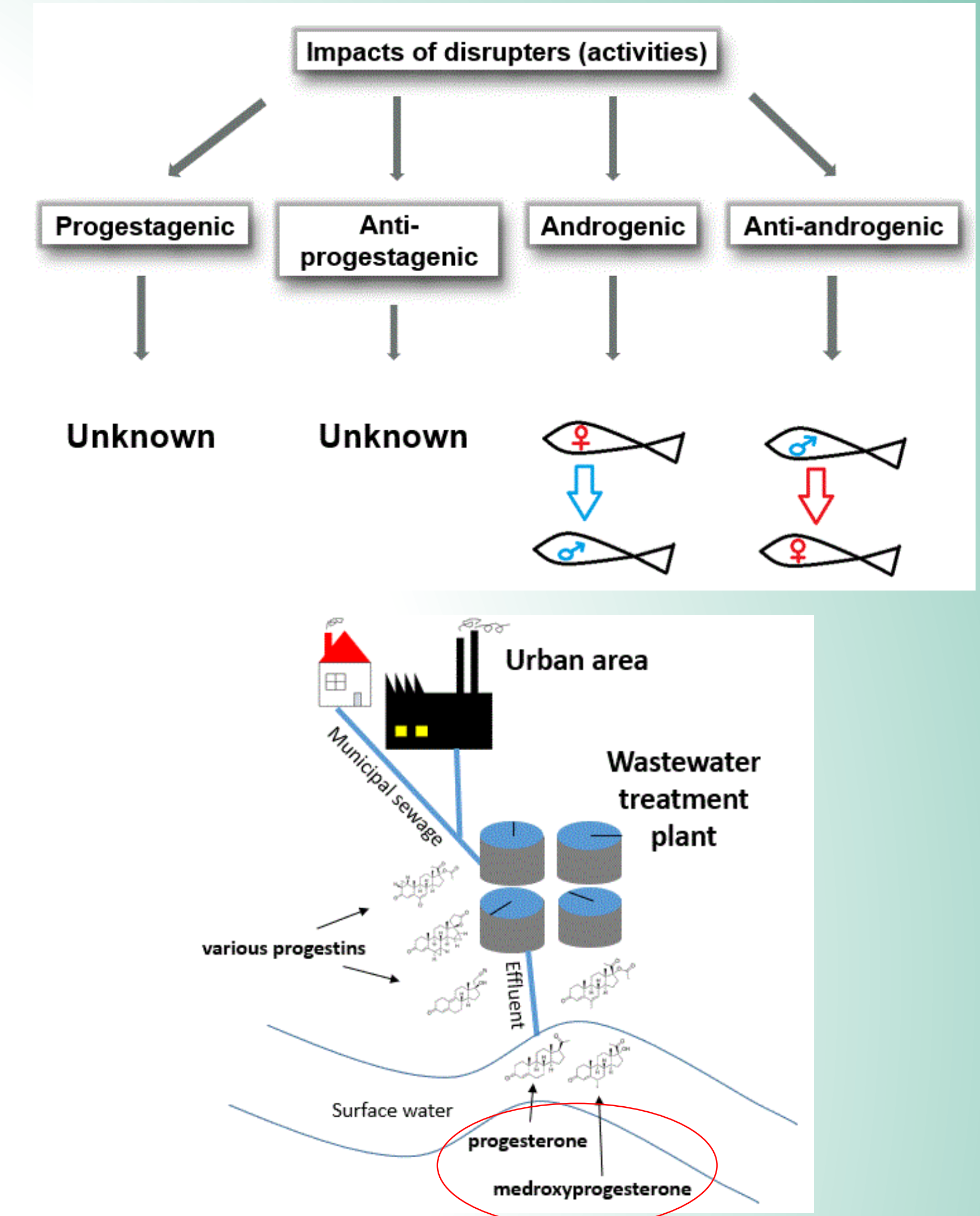
Materials and methods

Selection of analytes: 14 synthetic progestins, 1 natural progestin, 1 progesterone receptor (PR) antagonist and 1 selective PR modulator consumed in the Czech Republic

Extraction: automated solid-phase extraction, sorbent C18 SPE disks, elution with acetonitrile

In vitro bioassays: (anti-)AR-/(anti-)PR-CALUX assays (BioDetection Systems b.v., NL) with
1) water extracts (4-6 WWTP sites)
2) pure compounds

Chemical analysis: liquid-chromatography tandem atmospheric pressure chemical ionization/atmospheric pressure photoionization with hybrid quadrupole/orbital trap mass spectrometry operated in high resolution product scan mode (LC-APCI/APPI-HRPS), performed with each water sample



Results and Conclusions

Estimated potential of progestins to contribute to activities

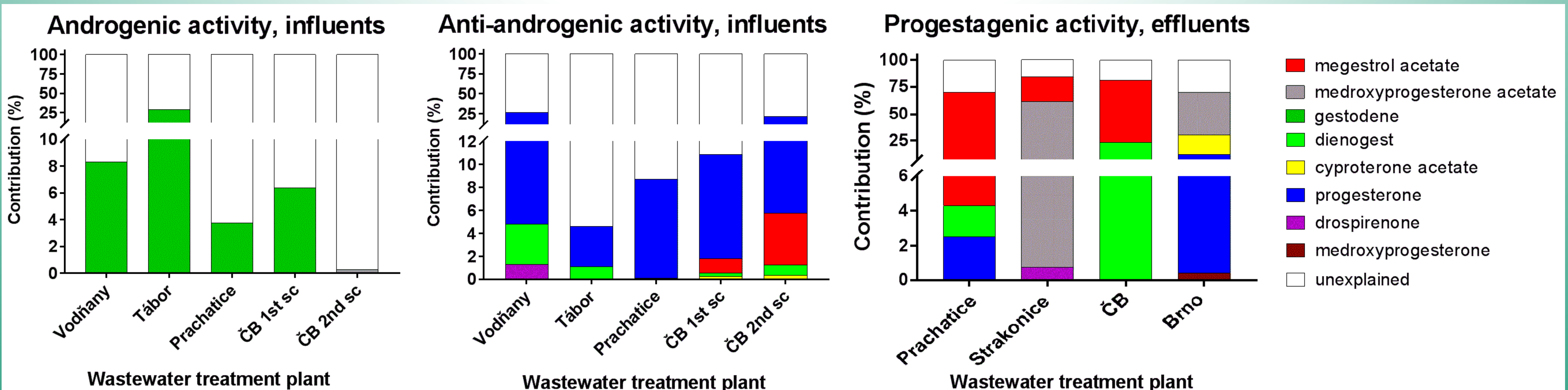
High potential: progestagenic activities in effluents (58-114% contribution)

Low to high potential: (anti-)androgenic activities in influents (0.3-29%), progestagenic activities in surface waters (0-83% contribution)

Low potential: (anti-)androgenic activities in effluents and surface waters (0-2.1%)

No potential: (anti-)progestagenic activities in effluents and surface waters (0%)

The contribution of progestins to (anti-)androgenic activities seems to be important only if their concentrations reach or exceed tens of ng/L levels or multiple strong progestins are present at units of ng/L.



Acknowledgments

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