EMERGING POLLUTANTS IN DRINKABLE WATER

WATER Focus 1

Medicine residues may be present in the various parts of the water cycle. They are introduced into the cycle mainly via waste water containing human excreta, through the disposal of medicines (by sink, toilet, etc.) or through runoff containing animal droppings. These residues are referred to as "emerging pollutants" that means substances of concern to the environment but not currently regulated.

The Walloon government has entrusted the SWDE with the research programme IMHOTEP[1], which aims to measure the concentrations of 42 residues of human and veterinary medicines belonging to 8 different therapeutic classes in about 1,500 water samples, in order to draw up an inventory of the problem in the water cycle in Wallonia. The matrices selected are groundwater, runoff, rainwater, surface water, public drinking water, bottled water and treated effluents from waste water treatment plants.

The presence of medicine residues in drinkable water

During the period 2015-2016, 262 samples of drinkable groundwater and 27 samples of drinkable surface water[2] were collected, representing 10,589 and 1,096 usable analytical results respectively. In terms of volume, this sampling made it possible to cover 77% of the water production in Wallonia. As regards the groundwater (83% of the volumes of water consumed in Wallonia in 2014)[3], around 4% of the analytical results showed concentration levels above the limits of quantification[4], whereas this figure was almost 19% for surface water (17% of the volumes of water consumed in 2014)[3], which are more exposed to this type of contamination.

Quantifiable results for all therapeutic classes investigated

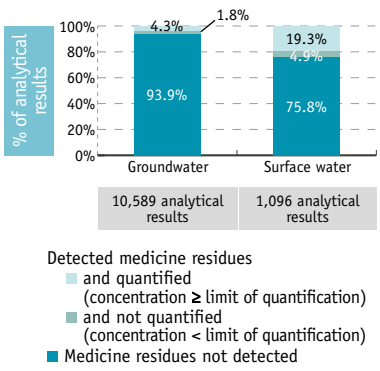
If a classification needs to be carried out, neuroleptics represented the most frequently quantified therapeutic class in groundwater (1.3% of the analytical results), whereas for surface water, this was analgesics (5.7% of the analytical results). Compared to the overall quantified data, the most frequently observed drug residues were carbamazepine[5] (0.9% of the analytical results) and sulfamethoxazole[6] (0.7%) for groundwater, and paracetamol[7] (1.5%), irbesartan[8] (1.3%), sotalol[8] (1.3%), venlafaxine[5] (1.3%) and hydrochlorothiazide[9] (1.3%) for surface water. Certain residues of investigated medicinal products are included on the watch list drawn up in accordance with Directive 2013/39/EU[10].

Contamination levels generally lower than 100 ng/l

Contamination levels in drinkable water are low. In groundwater, 95% of the quantified results[11] were equal to or less than 18 ng/l. The highest concentration was found for carbamazepine[5], at 307 ng/l. As regards surface water, 95% of the quantified results[12] were equal to or less than 47.5 ng/l. The analytical result with the highest concentration was for paracetamol[7] (518 ng/l).

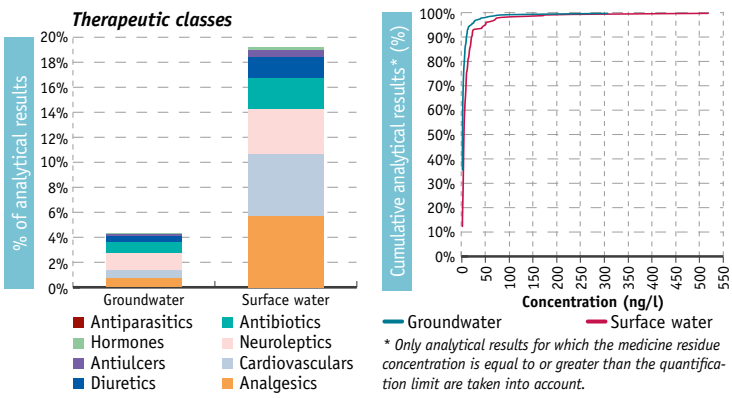
[1] Inventory of trace hormonal and organic substances in patrimonial waters and drinkable water (Walloon Government Decree of 28/06/2012) | [2] Ry de Rome dam, Vesdre dam, Gileppe dam, Ourthe dam at Nisramont, Warche dam at Robertville, Tailfer intake on the Meuse, Bras intake on the Lhomme | [3] According to AQUAWAL | [4] These vary from 0.2 ng/l to 12.2 ng/l depending on the molecules. | [5] Neuroleptic | [6] Antibiotic | [7] Analgesic | [8] Cardiovascular medicine | [9] Diuretic | [10] → WATER 8 | [11] 455 analytical results considered (concentration ≥ quantification limit) | [12] 211 analytical results considered (concentration ≥ quantification limit)

Fig. WATER Focus 1-1 Presence of emerging pollutants in drinkable water in Wallonia (2015-2016)



SOERW 2017 – Sources: SPW - DGO3 - DEE & DEMNA; SWDE

Fig. WATER Focus 1-2 Level of contamination of drinkable water in Wallonia (2015-2016)



* Only analytical results for which the medicine residue concentration is equal to or greater than the quantification limit are taken into account.

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