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Stop Pharmaceuticals Pollution of the Environment

Environmentally Persistent Pharmaceutical Pollutants (EPPP) are an emerging issue

Pharmaceuticals are designed to act on living cells. Many Pharmaceutical chemicals are only slowly degradable or even non-degradable. This make them resistant to chemical degradation during passage through the human or animal body and causes ecological problems when entering the environment. Surveys have shown the global occurrence of pharmaceuticals in the environment. When entering the environment, pharmaceuticals can accumulate and/or have an impact on ecosystem functions and organisms.^{2,3,4} Persistent Pharmaceutical Pollutants (EPPP) have been recognized as an emerging issue under SAICM.⁵

Treated humans and animals are excreting intact or metabolized pharmaceuticals with their urine and faeces. These pharmaceuticals enter the environment via sewage treatment plants, via the application of organic manure and slurry from treated animals in livestock facilities or directly in regions where animals are mainly kept and being treated outside. Additional environmental contamination comes from wrongly discharged unused pharmaceuticals and from pharmaceutical production sites.⁶

Pharmaceutical does not only contaminate water bodies, their residues are also found in soil and sediments, where many of them are persistent according to OECD standards⁷. Particularly veterinary pharmaceuticals enter the soil either directly from the treatment of pasture animals, or indirectly through the application of organic manure and slurry from livestock facilities. Pharmaceutical residues can persist and accumulate in soil and sediment. Here they can lead to changes in the composition of soil-microorganism communities. The uptake of some pharmaceuticals by plants and soil organisms has been documented by scientists. Residues of pharmaceutical in the soil can lead to changes in the structure of soil-microorganisms and can provoke a decrease of microbiologic performances. Antibiotics in soil can further select resistance. Livestock excrements containing residues of antiparasitics have shown to pose a danger to dung fauna with the consequence of reduced degradation rates.⁸

A healthy world for all. Protect humanity and the environment from pesticides. Promote alternatives.

¹ IWW (2015): Pharmaceuticals in the environment: Global occurrence and potential cooperative action under the Strategic Approach to International Chemicals Management (SAICM) http://www.bmub.bund.de/fileadmin/Daten BMU/Pools/ Forschungsdatenbank/fkz 3712 65 408 chemicals management bf.pdf

Hillis, D.G. et al. Structural responses of Daucus carota root-organ cultures and the arbuscularmycorrhizal fungus, Glomus intraradices, to 12 pharmaceuticals, Chemosphere 73 (2008) 344–352

³ Kümmerer, K. (ed) Pharmaceuticals in the Environment. Sources, Fate, Effects, and Risks. Springer Verlag 2008

⁴ Bergmann, A., Fohrmann, R. & Weber, F.-A., Zusammenstellung von Monitoringdaten zu Umweltkonzentrationen von Arzneimitteln. Umweltbundesamt (ed.) Dessau-Rosslau 2011

⁵ http://www.saicm.org/EmergingPolicyIssues/Pharmaceuticalnbsp;Pollutants/tabid/5477/language/en-US/Default.aspx

⁶ SumOfUs (2015): Bad Medicine. How the pharmaceutical industry is contributing to the global rise of antibiotic-resistant superbugs

⁷ European Environment Agency: Pharmaceuticals in the environment. Technical report No 1/2010, p. 18,

⁸ Lumaret, J.-P. et al. A review on the toxicity and non-target effects of macrocyclic lactones in terrestrial and aquatic environments. Current Pharmaceutical Biotechnology. 2012 May; 13(6): 1004–1060

Though systematic environmental monitoring schemes are missing, there is relevant information showing that human and veterinary pharmaceuticals in the environment are a global issue. Studies shows that pharmaceutical residues in the environment can have negative effects on water and soils communities. Scientists have shown that antibiotics can inhibit the growth of plants and primary aquatic producers such as algae and cyanobacteria, antiparasitics affect invertebrates like insects, worms and crabs, and hormone residues in bodies of water have shown significant effects on the development and reproductive capacities of fish. An example therefore are macrocyclic lactones, which effects non-target organisms, especially larval instars of invertebrates are used globally for the control of livestock pests and which are substances of high concern regarding environmental aspects. 10

With a growing world's population and an aging society in many industrialised countries medical treatments will raise and with it the degree of environmental pollution from chemicals of human pharmaceutical origin. In addition, also the degree of environmental pollution from veterinary pharmaceuticals can be expected to increase as the world meat production and consumption is expected to grow, with a growth dominated by developing countries. 11 Thus, to mitigate current and to prevent future problems, recognition and global management actions must be established to ensure environmental protection from pharmaceutical contamination.

We would like to underline the necessary to strengthen international efforts that lead to an enhanced protection of the environment from adverse effects of (veterinary) pharmaceuticals.

To ensure this, we see a strong need to establish coherence with other spheres of regulation e.g. on water protection or animal welfare and husbandry.

- The extent, quality, and transparency of data on the use of veterinary medicinal products need to be improved.
- Special attention must be paid to active ingredients and co-formulants which are especially hazardous to the environment, such as PBT-substances, which are persistent, bio-accumulative, and toxic; vPvB substances, which are very persistent and very bioaccumulative; and hormonally active substances, known as endocrine disrupters (EDs).
- There is a need for systematic monitoring data on the occurrence and fate of pharmaceutical in the environment (soil, sediment and water).
- There is a need for publishing monitoring data in a data base; free access to the data should be ensured.
- Information generated from the environmental monitoring needs to be linked to the authorisation of pharmaceuticals.
- Pharmaceutical producers should take responsibility for the production process and their products beyond the counter and ensure a collection system for left overs and unused pharmaceuticals.
- Prevention measures, like good husbandry and robust breeding lines are key measures to prevent illness and therefor important measures to reduce pharmaceutical use and consequently pharmaceutical pollution of the environment.

For further information on veterinary pharmaceuticals in the environment please visit http://www.pan-germany.org/gbr/project work/veterinary pharmaceuticals.html

OECD/FAO, "Meat" in OECD-FAO Agricultural Outlook, OECD Publishing 2013

⁹ Maack, G. und Rönnefahrt, I. Toxische Wirkungen von Pharmaka – ein Problem für die Umwelt? In: 24. Kolloquium zur

Abwasserwirtschaft: Hamburg 12/13 September 2012. pp. 57-58 Lumaret, J.-P. et al. A review on the toxicity and non-target effects of macrocyclic lactones in terrestrial and aquatic environments. Current Pharmaceutical Biotechnology. 2012 May; 13(6): 1004–1060