Environmental Pharmaceuticals Persistent Pollutants (EPPPs): IPEN position

IPEN supports the nomination of pharmaceutical chemicals that represent a threat to the environment and human health, particularly in respect to the "cocktail effect" they would contribute to, their potential for endocrine disruption and the growing evidence of water contamination. Many potentially hazardous products of nonmetabolized drugs and their metabolites are identified in surface water, ground water and even drinking water. We believe that by adding EPPPs to SAICM's purview as an emerging issue, more recognition about the need to address pharmaceuticals contamination will develop, leading to the generation of more information and a more preventative, precautionary and proactive way forward.

1) **Environmental Monitoring.**

EPPPs continually enter the environment including surface or ground waters. Sewage treatment facilities, which often cannot remove all pharmaceutical chemicals discharge inadequately treated or untreated sewage into rivers, lakes and oceans particularly during periods of high volume.

In many countries including developed ones, private houses do not have sewage systems and directly discharge unpurified raw sewage into waters, avoiding leach fields and black water systems. It is especially true for small and geographically isolated communities, which usually discharge their waste waters directly into natural water sources. These unregulated sources of water pollution could have a serious impact on the environment in terms of EPPPs discharge, and ultimately on human health.

Sludge generated in waste water treatment process can concentrate a wide range of EPPPs[i]. When used as fertilizer, irrigated sewage sludge could release chemicals into the soil.

Reuse of treated wastewater reduces negative impacts on surface and underground waters. However, current wastewater treatment technologies do not specifically target pharmaceuticals for removal, so these chemicals are likely to be present at high levels in effluents from these processes[ii].

Permanent monitoring of water sources including potable water, surface and ground water sources, sewage treatment effluents and sewage sludge for the presence of EPPPs and their bioactive transformation products is needed as a priority. Major attention should be focused on the survey of the most persistent EPPPs or those that could potentially pose the highest risk on people and aquatic organisms at very low concentrations. The identification of those drugs which do not degrade and have equal or more toxicity than the parent compounds is important. The use of chemical indicators of pollution could be developed as the first step for tracking the fate and transport of EPPPs from different sources without the need to identify every chemical present in the mixture.

2) **Research on endocrine effects.**

Even though certain pharmaceuticals are intended to address diseases associated with endocrine and immune systems they have not been subject to investigation of possible adverse environmental effects. This is unfortunate, since many of them could reveal characteristics of endocrine disruptors and act as that in the environment. There is, for example, evidence from rodent and fish studies that suggest some endocrine-disrupting compounds, including those found in prescribed synthetic hormones, may contribute to tumor formation in humans.[iii] To date, environmental fate data has been published for the only limited

IPEN Secretariat: 1962 University Ave.., Suite 4, Berkeley, CA 94704, USA • Tel: 1 (510) 704 1962 • Fax: 1 (510) 883 9493
website: www.ipen.org

number of non-antibiotic drugs (of the thousands in use today); numerous others may be present in the aquatic environment.[iv]

There is a need to prioritize scientific research and develop scientific techniques to start comprehensive assessments for all EPPPs entering the environment. Standardized analytical methods with sufficient quality assurance and control and representative sampling methods are needed to assure that environmental data for EPPPs is sufficient for decision making[v]. Countries should be encouraged to develop a knowledge-based inventory that includes physical and chemical properties of EPPPs, occurrence data, analytical methods, waste water treatment plant influent and effluent measurements, and a bibliographic database for research. Research projects in developing countries and economies in transition should be encouraged and facilitated to ensure the availability of data from these countries and regions.

Numerous epidemiological studies have presented data on the burden of hazardous pesticides and industrial chemicals, including POPs and heavy metals. Further research is needed for a better understanding of the burdens EPPPs may present to human health or the environment. A comprehensive assessment of the consequences of exposure to the mixture of pollutants including EPPPs is needed.

Individual EPPPs may remain in the environment at very low concentration and ongoing exposure to numerous EPPPs could result in adverse health consequences. This could be intensified due to a cocktail effect with chemicals including pesticides, other EPPPs and industrial chemicals. Research is needed to better understand the result of exposure of cocktails of EPPPs and other chemicals on biological organisms.

3) **Environmental Fate**

Numerous studies on the global transport of POPs helped to provide a better understand of their global fate. Long-range atmospheric transport and transport by ocean currents are two of the main transport route for many POPs.[vi] While many EPPPs reveal the features of POPs, their environmental fate is practically unknown. Transport by water is considered the primary means of EPPPs distribution in the environment due to their low volatility, however, further research is needed to better understand and predict the environmental transformation and fate of EPPPs.

4) **Public Awareness**.

Outreach campaigns should be supported to raise public awareness and understanding of the danger of EPPPs for the environment, wildlife and humans. Stakeholders should include pharmaceutical producers, farmers, regulators, legislators, health care professionals, managers of waste water treatment facilities, non government organisations and the public. The campaigns could address responsible disposal of leftover drugs from the consumer sector as it helps to reduce the amount of medicine that goes unused into waste water systems. Public guidance on consumer drug disposal should be developed. The need to avoid prescription of unnecessary medications; to regulate the medication trade through internet; to have warning signs and labeling to avoid the disposal of pharmaceuticals to the domestic waste water sewage system should be highlighted. Toilet flushing of unused medicine should be discouraged whereas household trash disposal and take-back programs should be promoted as an effective way of removing the unused medicine contribution to water contamination.

5) **Environmental hazards**.

Pharmaceuticals need to be assessed before being placed on any market for their environmental hazards. “No data no market” should be the leading principle to assure that less toxic, persistent and

bioaccumulating medications enter the environment. A global data base using the experience of Sweden[vii] is needed to help rate pharmaceuticals in terms of their toxicity or persistence. Cooperation between producers, governments, physicians and the public needs to be strengthened to ensure the choice is made in favor of environmentally friendly medication.

6) **Development of non-persistent pharmaceuticals**.

Development of new production technologies is needed to maximize the use of pharmaceuticals that quickly degrade in the environment. Special attention should be paid to the needs of developing countries and economies in transition to ensure pharmaceutical manufacturers in these countries do not practice a double standard approach as a result of weaker environmental and health regulations in these countries.

7) **A balanced international network**.

The establishment of an international network on EPPPs should be encouraged that will retain SAICM's multi-stakeholder nature and include scientists, medical professionals, manufacturers of medications, representatives of public interest NGOs, waste water treatment facilities and trade unions. Participation of these stakeholders in the activities developed by the network will ensure that interests and concerns of major players are properly addressed while meeting the 2020 goal on sound chemicals management. The network will help to improve cooperation, data sharing, education, overall facilitation of the activities and research to address EPPPs issues comprehensively. Activities that are focused on the minimization of EPPPs exposure of the most vulnerable groups need to be prioritized. It is especially important for developing countries and economies in transition facing lack of environmental and health regulations and no data on EPPP health effects.

Additional Resources

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