

Emerging Pollutants: Environmental Impact of Disposal of Drugs

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Introduction

The term “pollutant emergent” refers to any type of contaminant originated from previously undetected or products that were not problematized in health and environment [1]. In this group of pollutants has a product for veterinary use, personal care products, and pesticides. The pharmaceuticals in the aquatic environment should be highlighted by reaching the environment through discharges or excretion in unaltered form by the animal organism. The greater attention to this emerging type of pollutant occurs both by the increasing incidence of these concentration in the environment, as well as the increase of studies that show the health risks that these products can cause in cases of long-term exposure [2]. The emerging pollutants are found in soil, rivers, surface water and even groundwater, which in principle would require no specific treatments for its drinkability [3].

Analytical Techniques

According to Boxall [4] although pharmaceuticals are released into the environment for decades, researchers have only recently begun to quantify their levels in the environment. Using information from different countries and different usage patterns, prioritization exercises identified several drugs that are most likely to be released into the environment. For example, data from the UK on the annual use of veterinary drugs was combined with information on routes of administration, metabolism and ecotoxicity to identify drugs that should be monitored on a national recognition program [5]. Hilton et al. [6] conducted a similar exercise for human medicines, using information about the use and annual dose therapy with predictive models. Although these studies are usually based on country-specific information, they still give an indication of these substances to be investigated at the international level. New analytical techniques such as liquid chromatography coupled with mass spectrometry (LC-MS-MS), have enabled us to develop a better understanding of how drugs behave in the environment and to determine the concentrations in plants, waste water treatment, soils, surface water and groundwater [5].

Ecotoxicological Test

The qualitative and quantitative determination by instrumental analyzes are of utmost importance, but currently this is also emphasizing what the environmental impacts in the medium and long term to living beings obtained by ecotoxicological test. Pharmaceuticals are biologically active substances that were persistent and recognized as a permanent threat to environmental stability. Chronic x data as well as information on current distribution levels in different environmental compartments remain scarce and are focused on these therapeutic classes that are most often prescribed and consumed. However, they indicate that the negative impact of these chemical contaminants can have on living organisms, ecosystems and, ultimately, public health [7].

The analysis ecotoxicological to detect the toxicity of the sample as whole combined effects of the different constituents of the sample, while only the chemical analysis allows quantifying compounds isolated from a sample. This fact is of the utmost importance in the case of waste water, which exhibit great complexity, wherein the overall effect cannot correspond to the addition of the effects of the different components

present may be synergistic (greater than the sum of the toxicity values of different constituents analyzed) or antagonistic (less than the sum of the toxicity values of analyzed separately).

The test measures the ecotoxicological effects of different concentrations of a sample in individuals of a given species. The effect concentration EC_{50} or LC_{50} lethal concentration corresponds to the concentration of the sample responsible for the effect in 50% of the organisms tested.

These tests can be acute or chronic depending on its duration and the observed effect. In the case of acute tests evaluated the effect is related mortality rates, immobilization or inhibition of growth and the lower this value, the higher is the toxicity of the sample, which often leads to misinterpretation of results achieved. Thus, began to use UT unit (toxicity) which corresponds to $(1/CE_{50} * 100)$ for expression of results. The tests can measure the chronic effects on reproduction and genetic damage on the particular species.

The ecotoxicological tests may be performed using aquatic organisms or terrestrial depending on the type of study to be performed. These studies may be developed at the individual, population, community and even the ecosystem and may in some cases extend for several years.

In the process of evaluation of toxicity is to highlight the need to conduct a battery of tests with various organisms belonging to different trophic levels since these organisms have a different sensitivity to various types of toxic. Examples of organisms used in ecotoxicological tests, bacteria, fish, algae, amphibians, micro crustaceans and higher plants.

Advantages of toxicity tests provide an estimate of lethal and sub lethal toxicity when measuring the toxic agent is not chemically identified. These tests may provide an alarm signal or predict the potential environmental damage account for the effects of mixtures toxic an effluent chemically complex can be assessed generally as single pollutants and the results of these tests are more easily understood and accepted by the industrial and governmental in general.

How Limitations toxicity testing for toxic substances are not identified and the bodies-being tests that majorities of tests happen through visual analysis. Faced with these problems two devices

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were developed in which one obtains an automated way these tests. The Microtox® [8] using the marine bacterium *Vibrio fischeri* non-pathogenic naturally emitting light. The metabolism of the body is affected by low concentrations of toxic, affecting the intensity of the light emitted. It's greater the toxicity, greater the degree of inhibition of light production. Other equipment available on the market is the NGTOX® (New Generation ECOTOX) than through a system of image analysis and real time points up to 10 possible physiological variations algae *Euglena gracilis* [9].

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