Ecopharmacology: the Deliberated or Casual Dispersion of Pharmaceutical Principles, Phytosanitary, Personal Health Care and Veterinary Products in Environment Needs a Multivariate Analysis or an Expert Systems for the Control, the Measure and the Remediation

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Abstract

In the abstract is not usual start with conclusions, but one of the sub-topics of the CMA4CH 2006 Meeting is "expert and decision system to support authority in environmental problems solution" and this will be our suggestion after the analysis of this problem.

The question of dispersion of pharmaceutical products in the environment is well known by researchers from almost 20 years. Many European projects concerned this new kind of pollution and many works have been published, but a whole world vision is still missing.

A unique definition accepted by all researchers, which can describe "the voluntary or accidental dispersion of pharmaceutical products in the environment", is still not found.

Reading the title of the Meeting anyone connect "Multivariate Analysis" with their father R.A. Fisher or "Chemometrics" with B. Kowalski. With this work we would like to define some terms as "Ecopharmacology", "Biopharmacology", "Pharmacovigilance" and "Biorape".

Definitions

Biopharmacology: the science that studies the production of pharmaceuticals by biotecnologies, is a word accepted in all the world by researchers.

Pharmacovigilance: is a feedback system, which is able to control the response of a subject to a given pharmaceutical product. Reading the 2006 report of WHO Programme for International Drug Monitoring [1] we can find "The WHO National Adverse Drug Reaction Monitoring Programme will continue pharmacovigilance efforts by conducting drug safety courses for healthcare professionals and building closer ties with other member countries in the exchange of drug safety information". This is, from our point of view, the correct definition and correlated activity of this term.

Herbalpharmacology or *Enviropharmacology* or *Ethnopharmacology* or *"something of more adapted"* : pharmacology needs a word to define all that branch of research that studies the extraction of active pharmaceutical ingredients from natural environment. An example is Aspirin or acetylsalicylic acid that is a drug extracted from willow bark that could ease aches and pains and reduce fevers. [2].

The word used by Andy Greller "Sri Lanka Rainforest: Birthplace of Ecopharmacology" [3] seems not good for us.

It is well known the word "*Biorape*" as the removal of active pharmaceutical ingredients from plants growing in a territory, with no benefit for the people living there.

Finally *Ecopharmacology*: the study, the knowing and the methods for contrasting the presence in the environment of pharmaceutical products and their metabolites.

Problems and possible solutions

Many studies demonstrate that several active pharmaceutical ingredients and their metabolites are dispersed in the environment. These emissions are mainly due to: 1) discharge of large amounts of pharmaceutical products, with expiration date passed, through sewage systems by consumers; 2)

increase of average age of the population that usually requires more use of drugs; 3) improved access to health care; 4) advances in medicine; 5) healthier lifestyles; 6) against law use in doping.

The presence of pharmaceutical products in the environment is known since the 1980s; however only from the 1990s has become more widely evident.

Pharmaceuticals do not usually persist in the environment but continuous input into the environment keep concentrations relatively constant. However, these ones are usually very small (e.g. ng/l, µg/l). The risks and effects for the environment have not been determined yet [4]. In the last years four European projects have tried to approach a solution to this problem: Eravmis, RemPharmaWater, Poseidon and Triton.

Before these projects, there was little available information about environmental concentrations of pharmaceutical products, but they have confirmed that antibiotics and other pharmaceuticals are present in sewage and in natural waters. These four EU projects were so far providing the first data at this European scale to assess the presence and effects of antibiotics in the aquatic environment and soils. After these projects many studies are available on impact of some pharmaceuticals in the environment, as well some effective techniques to eliminate these compounds.

We do not want to resolve the problem after this work, but we would just give some definitions and an idea, from our point of view, about the method for controlling the environmental pollution.

Finding a pharmaceutical in the environment produce high cost (often hidden) for the community. Controlling all these parameters for almost 35,000 active pharmaceutical ingredients in the world, necessarily needs of an Expert System. In the USA something of this kind already exists but promoted by producer itself, the PhATE™ (Pharmaceutical Assessment and Transport Evaluation) model [5].

Suggestions

When the Swiss National Centre (Swissmedic) needed to upgrade their systems of Adverse Drugs Response reporting and feedback, not build a completely new software but develop a national ADR database parallel with the WHO database. This software, called Vigibase Online (VOL), has been made available for other pharmacovigilance centres.

With this paper, we would like to prompt the European Commission to produce a directive and a project for realisation of a "Ecopharmacology Expert System, ExpEcoPhaS" also to answer some trivial questions as "the most sold drug is also the most present in the environment or the most recalcitrance?" or "why in a region we find active pharmaceutical principles?" and so on.

Medical Expert Systems have reached good performance, as "MYCIN, for diagnosing of bacterial infections"; "deDombal`s Leeds Abdominal Pain System"; "Help System, developed at LDS Hospital in Salt Lake City", and we believe this software system stable and quite complex to support all the active pharmaceutical ingredients existing, produced or delivered in Europe.

References

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5) The pharmaceutical industry trade association, PhRMA (Pharmaceutical Research and Manufacturers of America) developed a watershed-specific model to predict environmental concentrations from patient use.