Pharmaceuticals in the Environment: Sweden and the EU

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Health Care Without Harm

European efforts

- European Medicines Agency (EMEA) has issued draft guidelines
- Sweden has prioritized pharmaceuticals in the environment as a national environmental concern
- Stockholm County Council has taken a leadership role

Proposals from the European Commission

- Proposed new role for European Medicines Agency (EMEA) addressing environmental concerns
- New directives for human and veterinary pharmaceuticals

European Parliament proposals

- Include "risk to the environment" in the risk/benefit assessment of new drugs
- Develop an environmental classification system for new drugs
- Require eco-toxicological data on new drugs
- Require "return to pharmacy" label on all drugs

ERAPharm

- ERAPharm is a research project funded within the priority 'Global change and ecosystems' of the 6th framework programme of the European Commission.
- Started in October 2004; the project duration is three years.
- http://www.erapharm.org/summary.html

EU proposed approach for estimating risk

- Predicted environmental concentration (PEC) in recipient; depends on:
 - Amount sold/year
 - Recipient volume
 - $-\,$ Requires assumptions about metabolism, degradation in STP
- Compare PEC to predicted no effect conc. (PNEC);
- Proposed: PEC > 0.01 microgm/L; > PNEC/1000 triggers more detailed testing and ecological RA (? How these numbers derived)

Stockholm County

- 1.8 million inhabitants
- 180 km from north to south
- 26 municipalities
- Swedish Medical Products Agency report August, 2004.

Stockholm County Council

 Pollution of ground, water, and air with residues of pharmaceutical drugs is among the top five environmental priorities

Stockholm County Council

- <u>Vision</u>: County Council activities should not add any persisting drug residues to the ground, water, or atmosphere
- <u>Periodic goal</u>: In 2006, all County Council health care services will have adopted action plans for diminishing pollution of ground, water, and air with residues of pharmaceutical drugs.

Possible levels of intervention

- Research and production
- EU directives
- Public purchasing
- Prescriptions to patients
- Use and excretion

Research and production

- Established, together with the national pharmacy organization (Apoteket AB), a dialogue with domestic producers of pharmaceuticals
- Consensus:
 - Drugs pose an environmental problem
 - Future drugs should not be persistent
 - Preferential purchasing may be an effective tool

Public purchasing

- Method: compulsory questions on ecotoxicologic data in all public purchasing
- Environmental questions should yield:
 - Increased awareness among producers
 - Data received may be used for environmental classification of pharmaceuticals

Patient prescriptions

- Develop a classification system for drugs based on risk assessment
- Provide generic names, recommended products
- Use an easy to understand labeling system (an icon) for products that meet certain criteria
- Convince providers to consider eco-tox data in addition to all other criteria for drug selection

Use and excretion

- In 2003, a joint campaign started among Apoteket AB, drug producers, drug distributors, health care providers
- Purpose: To inform consumers that unused drugs should be returned to the pharmacy

Summary of conclusions

- Management of pharmaceutical residues requires:
 - Specific activities on several different levels
 - Collaboration among stakeholders
 - Eco-toxicological expert knowledge
 - Information and campaigning
 - Patience and sustainability

Factors to consider

- Amount sold annually
- · Ecological half-life
- Recipient volume (e.g. water body)
- Eco-toxicity
- Bioavailability
- Bioaccumulation
- Constituents
- Inappropriate packaging

Stockholm County Council model

- Collaboration among SCC, Apoteket AB, and ecotoxicological experts
- Considers: persistence, bioaccumulation, toxicity to aquatic organisms.
- Each property assigned a value on a scale from 0-3. The sum of these values is the PBT index.

SCC model

- Biodegradability based on OECD test 301 or other equivalent test.
- Bioaccumulation based on OECD 107 or 117 (o/w partition coefficient) or on actual test data.
- Toxicity at three trophic levels: fish, daphnia, algae (OECD 203, 202, 201)
- Worst case assumption when no data

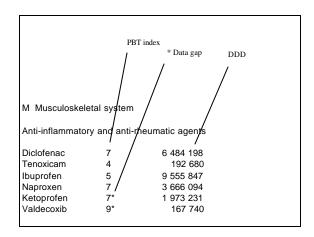
Toxicity classification

- LC/EC/IC50 < 1 mg/l; very high toxicity
- LC/EC/IC50 1-10 mg/l; high toxicity
- LC/EC/IC50 10-100 mg/l; moderate toxicity
- LC/EC/IC50 > 100 mg/l; low toxicity

SCC model

- Defined daily dose (DDD): estimated average administered dose per day when used for the drug's main indication
- Note that the number of DDDs does not necessarily correlate with quantity of active substance in kilograms.





SCC recommendations

- Follow SCC's "wise list" of recommended drugs for common diseases
- When medical efficacy, safety, and price are comparable, use the drug posing the lowest environmental risk
- Prescribe starter packs.
- Encourage patients to return unused drugs to pharmacy

SCC recommendations

- Inform patients that even used estrogen patches contain estrogen that should not be discarded to water
- Do not prescribe more than can be used
- Review patients' total use of medications
- Read the Swedish Medical Products Agency study "Environmental Impacts from medications, cosmetics, and hygienic products"

Recent status

- Swedish Pharmaceutical Company's branch organization (LIF), the MPA, the Pharmacy Association and the Federation of the County Councils finalizing a common classification system for pharmaceuticals
- · A combined risk and hazard assessment.
- Large pharmaceutical manufacturers involved
- The system may become a European standard for classification of the environmental effects of drugs.

Resources

- http://www.janusinfo.se/imcms/servlet/GetDoc?m eta_id=7242_ SCC Brochure
- http://www.janusinfo.se/imcms/servlet/GetDoc?m eta_id=7236_SCC home page on pharmaceuticals and environment
- http://www.emea.eu.int/pdfs/human/swp/444700e n.pdf EMEA draft guideline for risk assessment of pharmaceuticals for human use