Pharmaceuticals in the water environment
from identification as ‘new substance’
to reduction of emission

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Introduction

- **Survey of ‘new’ pollutants**
  - Fragrances, surfactants, brominated flame retardants, endocrine disrupting substances, pharmaceuticals
  - Bacteria and viruses

- **Special attention for group pharmaceuticals**
  - Diversity, social importance, biological active substances

- **Overview activities in NL**
  - Four periods: screening and monitoring substances, contacting stakeholders, increasing public support

- **Emission reduction water-environment (letter Parliament)**
  - General cost-effective and specific emission reducing actions
Special attention pharmaceuticals

- Large diversity of pharmaceuticals
  active substance formulation
  - humane 850 12,000
  - antibiotics, analgesics, X-ray contrast media, anti-epileptics, cytostatics, β-blocker, synthetic hormones, anesthetics, tranquilizer, lipid regulators

- Present in environment; waste-, surface- and drinking water

- Biological active substances with possible (coincidental) environmental effects at low concentrations

- Perception of consumer about good drinking water
## Overview activities in NL (1)

<table>
<thead>
<tr>
<th>period</th>
<th>activity</th>
<th>publication</th>
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<tbody>
<tr>
<td>1999 - 2001</td>
<td><strong>Screening ‘new’ substances</strong></td>
<td>RIZA 2000.051</td>
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<td></td>
<td>• Inventory on human and veterinary pharmaceuticals in water environment</td>
<td>RIZA 2001.053</td>
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<td>• Advice of Dutch Health Council ‘Environmental risks of pharmaceuticals’</td>
<td>Dutch Health Council 2001/17</td>
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## Overview activities in NL (2)

<table>
<thead>
<tr>
<th>period</th>
<th>activity</th>
<th>publication</th>
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</table>
| 2002 - 2003 | **Monitoring** | RIZA/RIKZ 2002.01  
RIZA 2003.019  
SETAC 2006  
Kiwa 2003.040  
RIVM 703719004  
RIWA 9066831065  
RIZA 2003.023  
AquaSense 1690-4  
RIVM 601500004 |
|          | • LOES-research hormone disruptors (EE2) |
|          | • Monitoring of human pharmaceuticals in waste water, surfacewater, groundwater and drinking water |
|          | • Survey ecotoxicological effects |
|          | • Research veterinary pharmaceuticals in areas with animal husbandry (2007) |
## Overview activities in NL (3)

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<thead>
<tr>
<th>period</th>
<th>activity</th>
<th>publication</th>
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<tbody>
<tr>
<td>2004 - 2006</td>
<td><strong>Attention stakeholders</strong></td>
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<td></td>
<td>• National working group ‘pharmaceuticals and water environment’</td>
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<td></td>
<td>Tasks: Interdepartmental communication</td>
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<td></td>
<td>Reduction environmental impact</td>
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<tr>
<td></td>
<td>Members: ministries, registration organisation, drinking water sector, pharmaceutical industry</td>
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<tr>
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<td>• Chain analysis, list of possible actions for emission reduction, elaboration of the most promising actions, workshop stakeholders</td>
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<tr>
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<td>Letter Parliament 28808(35)</td>
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<td>Working group Grontmij</td>
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</tbody>
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## Increase public support

### Activity

- Reporting Parliament emission reducing actions
  - water environment
- Executing actions in letter Parliament 28808 (39):
  - cost-effective for reducing the emission in general
  - specific for reducing the environmental impact
- Reporting progress of actions to Parliament (2008)
- Inventory of policy-related development European countries + ICBR-workshop

### Publication

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<tr>
<th>Period</th>
<th>Activity</th>
<th>Publication</th>
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<tbody>
<tr>
<td>2007 - 2008</td>
<td><strong>Increase public support</strong></td>
<td>Letter Parliament 28808(39)</td>
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<td><strong>Increase public support</strong></td>
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<td><strong>Increase public support</strong></td>
<td>ECT ICBR</td>
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Policy for emission reduction in NL

- Cost-effective ‘no regret’ actions for emission reduction in general
  - Effects on water environment are unknown but not to be excluded
  - Univocal environmental assessments will take many years
  - Autonomous increase of use pharmaceuticals

- Specific actions for reducing the environmental impact
  - Perceptible (ecological) effects on water environment
    - hormone (EE2)
  - Problems for the production of pure drinking water
    - X-ray contrast media (iopamidol, iopromide, amidotrizoic acid)
    - anti-epileptics (carbamazepine)
Cost-effective ‘no regret’ actions for emission reduction in general (1)

- **Promote restrictive use**
  - To incorporate the aspect of environment in public information
  - Smaller quantities of medicines per package

- **Green Pharmacy**
  - Promising improvement for the environment (biodegradable medicines, application, dosage)

- **Applicability of Swedish classification system in NL**
  - Environment an additional criterion, next to effectivity, efficiency and patient safety

- **Public nature of environmental data from product registration pharmaceuticals**
  - Improvement of the accessibility environmental endpoints
Cost-effective ‘no regret’ actions for emission reduction in general (2)

- Environmentally aware delivery of not-consuming pharmaceuticals
  - Public information, collection drugstore/chemical waste bin
- Emission reduction at hospitals
  - Pilots emission reduction hospitals
  - Pilots collection of urine from patients following a cure
- Additional polishing-technique for sewage treatment plants
  - Co-operation with pilots for additional treatment within the Water Framework Directive
Specific actions for reducing the environmental impact

- **Covenant**
  - Green pharmacy
  - Specific agreements for ‘problem pharmaceuticals’ ecotoxicological effects / production drinking water
  - Result-oriented
  - Public support
No, not three times a day a pill with a glass of water, three times a day a glass drinking water is enough
Discussion / statements (1)

- **Cost-effective actions are desired since:**
  - Effects on water environment are unknown but not to be excluded in advance
  - Univocal environmental assessments will take many years for such a large diversity of (combinations of) pharmaceuticals at low concentrations and long exposure period
  - Autonomous increase of use pharmaceuticals
What are the possibilities for the Rhine river states for an effective approach for emission reduction, if environmental effects are not included in the decision of the EU registration process for pharmaceuticals?
The ICBR could start initiatives to reduce emissions of pharmaceuticals that cause problems within the drinking water production, because of the perception of consumers. Starting with the pharmaceuticals which are mentioned in the list of Rhine substances:

- X-ray contrast media (iopamidol, iopromide, amidotrizoic acid)
- Anti-epileptics (carbamazepine)
- Diclofenac, bezafibrate?
- Cytostatics?