


 SWITCH Scientific Conference
Sustainable Water Management Improves Tomorrow's Cities' Health:
achievements and way forward
10-11 November 2011, Leuven, Belgium

Removal of pharmaceuticals practical experience

Katarzyna Kujawa (WUR/LeAF)



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Consumption of human pharmaceuticals

100 000 tons per year → 15 g/p.y

industrialized countries: 50-150 g/p.y

< 50 compounds make up 95% of total
consumption (US, Sweden, survey)

In NL 12000 human pharmaceuticals
850 active compounds

(Sources Kummerer, 2004, Sedlak et al., 2005, Stockholm County Council, 2005)

High consumption of PhACs

| Soort geneesmiddel | Gebruik in gram/dag |
|-----------------------|-----------------------------------|
| Melatonine | 1 mg |
| Zapconal | 3,75 mg |
| Ternapax | 30 mg |
| Fentanyl pleister | 25 mcg elke 3 dagen = 83,33 mg |
| Perindopril tetr.-Bu | 2 mg |
| Bisoprol fumar. merc. | 3,75 mg |
| Metoprolol | 150 mg |
| Meropenem | 1500 mg |
| Besantrol ret. | 300 mg |
| Chlorzoxazone RP | 200 mg |
| Amelodip | 25 mg |
| Chlortalap | 20 mg |
| Flucloxacil 50% | 15 ml |
| Flucloxacil | 1600 mg |
| Acetylsal. Card. KTW | 80 mg |
| Bumetanide | 3 mg |
| Clonidine | 50 mg |
| Flucloxacil | 4000 mg |
| Oxycontin | 5 – 15 mg |
| Tramadol HCL | 150 mg |
| Isoprenal | 2 mg |
| Ranolazine | 300 mg |
| Elefix XR | 150 mg |
| Levetiracetam | 37,5 mg |
| Atacal cardio brsp. | 100 |
| Dypridamol drag. | 300 mg |
| Citalopram | 10 mg |
| Nitroglycerin | 5 mg |
| Fraxiparin inj. | 2500IE/0,2ml 19/3 1000 u/kg |
| Combivent aerosol | 100 ppoortocht |
| Gali chaw | 500/4000 IB |
| Furosemide | 40 mg |
| Micardip | 80 mg 2 x |
| Microsomal | 40/2,5 mg |
| Atacal Car | 160 mg |
| Atenolol | 100 mg |
| Atenolol | 3000 mg |

| | |
|---------------------------|-------------------------------|
| Zolpidem(tart) | 10 mg |
| Plaquenil | 400 mg |
| Paritazol | 40 mg |
| Betahistine 2 HCL | 24 mg |
| Nebilet | 5 mg |
| Novocipon powder | 5 mg (1 x 2 x 3 doses) |
| Omeprazol | 40 mg |
| Evelon | 30 mg |
| Oxazepam | 95 mg |
| Etiopiratsol | 30 mg |
| Hydrochlorothiazide | 25 mg |
| Atassantin ret | 25/200 2x |
| Acenocumamarol | 10 mg 1 volgens schema |
| Limon | 0.75 |
| Tofutamide | 3000 mg |
| Actonnel | 35 mg |
| Meloxicam ret | 15 mg |
| Isovaldin ret | 400 mg |
| Seroclofen | 25 mg |
| Novomix Insul. Cal. disp. | 400 mg |
| Novomix Insul | 3000 U/ml volgens schema |
| Carbasalaat cal. card. | 100 mg (poder) |
| Ferrogadung | 105 mg |
| Actrapid penfil | 300U/2 ml volgens voorschrift |
| Selokene zout | 50 mg |
| Actrapid Act. Ret. | 100 mg |
| Lipitor | 40 mg |
| Thivax | 0.1 mg |
| Novomix Insul | 400 mg |
| Cenasep | 60 mg po 3x 3ml 1 x 2 wk |



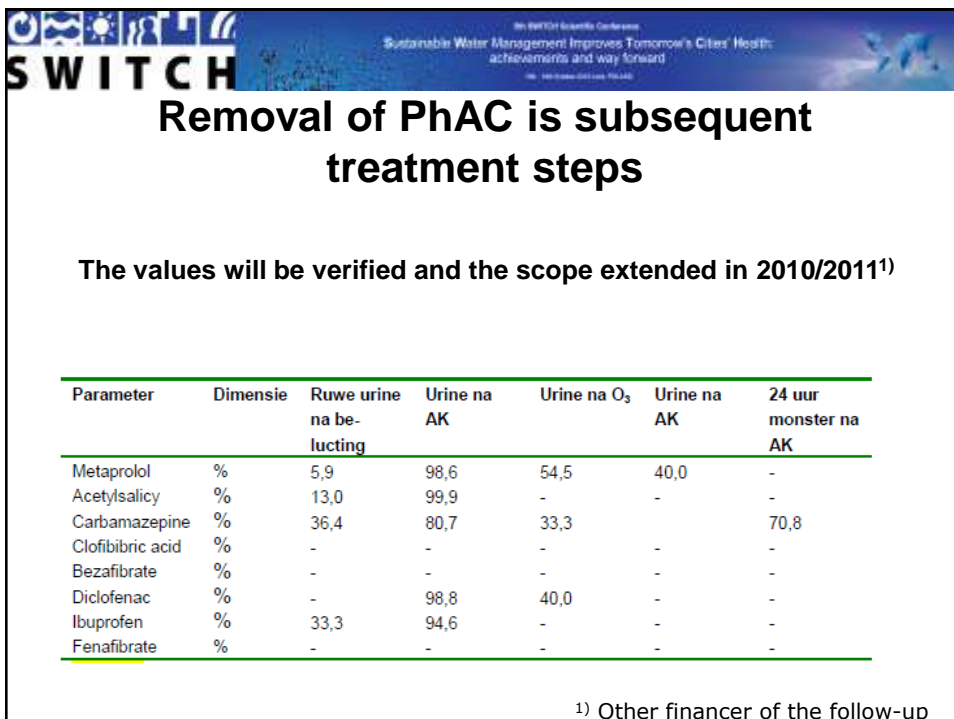
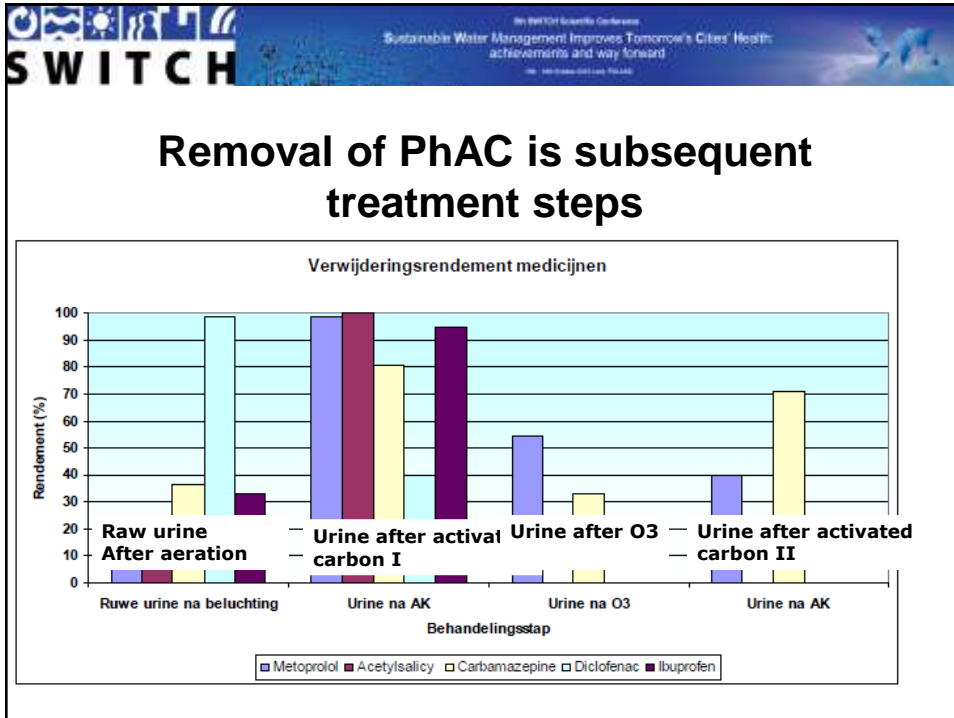
= 100 pills per day (20 residents)



Nursing home Sleen

Urine separately collected and once upon a time treated using advanced physical-chemical processes (activated carbon + ozonation) – demo plant





Removal of PhAC in soil after urine fertilization (Anderen)





Biodegradation and sorption of PhAC

▪ Lab tests

- Sorption (soil Anderen)
- Biodegradation (wwtp biomass)



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|---|--|----------------------------------|---|
| Biodegradation and sorption of PhAC | | | |
| | Risk of breakthrough after first 60 cm of soil within 20 years at maximum DDD without biological degradation | Aerobic biodegradability at 10°C | Overall risk for groundwater contamination |
| Acetylsalicylic acid | high | +++ | very low risk |
| Fenofibrate | low | ++ | |
| Bezafibrate | high | +/- | low risk; depends on balance between desorption and degradation |
| Diclofenac | mediate | +/- | |
| Ibuprofen | low | ++ | |
| Metoprolol | low | + | |



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Removal of PhAC in soil after urine fertilization (Anderen)

- Urine separately collected in activity/residence center for handicap people.
- Reused as fertilizer for energy crops






More info:
www.stowa.nl