



# EU Interreg IV B project noPILLS

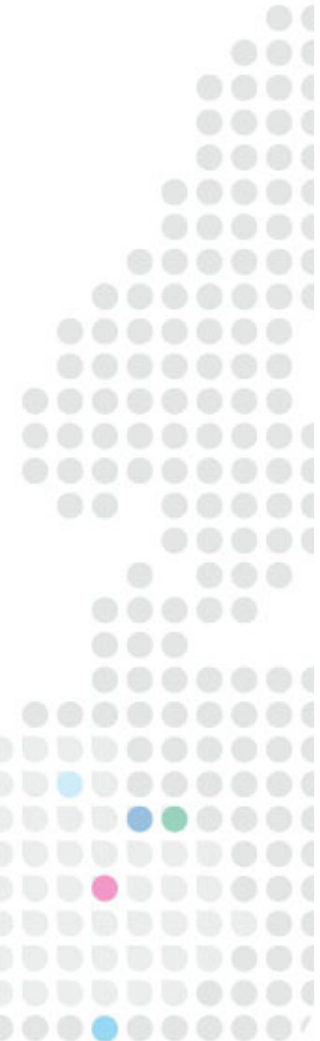
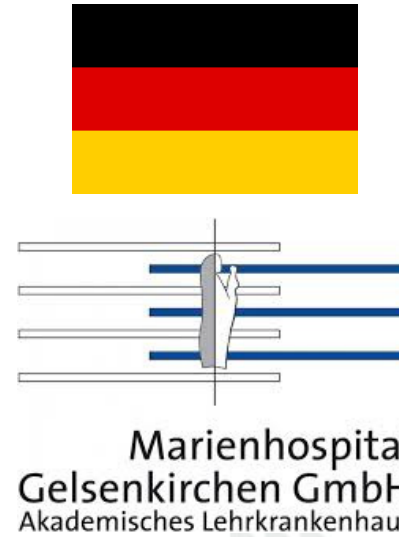
The potential of source separation  
of pharmaceuticals like x-ray contrast media  
Outcomes of the noPILLS case studies in **Luxemburg** and **Germany**

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# Acknowledgements





# Introduction



- **Outcome of PILLS project**

- Pharmaceutical residues efficiently eliminated by advanced treatment

- High consumption of energy / resources

- ⇒ **Especially for Iodinated X-ray Contrast Media (ICM)**

- **Properties of ICM**

- Polar and persistent compounds

- Almost exclusively excreted

- As parent substances

- Via kidneys/urine (90% - 99%)

- Within 24h after administration

- ⇒ **Separate collection and disposal of urine**



[www.chem.lu](http://www.chem.lu)



# Introduction



- **Questions to answer in noPILLS**

→ Can ICM emissions be reduced by separate collection and disposal of patient urine?

⇒ **Comparison expected vs. observed loads on hospital/catchment level**

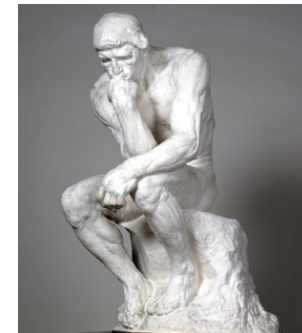
→ Will the hospital staff support urine separation campaign?

⇒ **Staff survey requesting patient information (dosage etc.)**

⇒ **Workshop with staff**

→ How motivated are patients to participate voluntarily in the urine separation campaign?

⇒ **Patients survey after use of urine bags (nb. used bags etc.)**





# Methodologies



- Common elements of case studies

→ Collaboration with radiology  
of partner hospital

→ Meetings to inform and instruct  
radiology collaborators

→ Flyers for staff and patients  
poster in waiting room



**Information zur getrennten Sammlung von Röntgenkontrastmitteln**

**Liebe Patientin, lieber Patient, wir bitten um Ihre Unterstützung!**  
Für Röntgenuntersuchungen können es zur Anwendung gegebene Röntgenkontrastmittel sein.

- Die Kontrastmittel sind für den Menschen absolut unbedenklich, sie können aber durch die Abgabe von Ionen und Jod in großen Mengen schädlich sein.
- Die Kontrastmittel werden vollständig innerhalb von 24 Stunden mit dem Urin wieder ausgeschieden.
- Über den Urin können die Kontrastmittel in die Kanalisation und in Flüsse und Bäche.
- Dort können die Kontrastmittel nicht entfernt werden und gelangen in Flüsse und Bäche.
- So gelangen Kontrastmittel auch in die Trinkwasser- und in die Fischwasser.

**Wie können Kontrastmittel aus dem Wasserablauf entfernt werden?**

- Durch die Sammlung von Urin in Urinbecken.
- Die Entsorgung des Urinbeckens (Kanalisation) und die Entsorgung des Urinbeckens (Kanalisation) sind durch die Entsorgung des Urinbeckens (Kanalisation) und die Entsorgung des Urinbeckens (Kanalisation) möglich.

**Freiwilligkeit der Teilnahme**

Die Teilnahme an der Studie ist freiwillig. Sie können Ihre Teilnahme jederzeit beenden, ohne dass dies negative Auswirkungen auf Ihre Behandlung hat.

**EMSCHER**  
GEMEINSCHAFT

**Information zum Projekt „noPILLS in waters“**

„noPILLS in waters“ ist ein europäisches Forschungsprojekt mit dem Ziel, die Sammlung von Kontrastmitteln durch Medizintechnik zu vereinfachen. Das Team sucht nach kostengünstigen Methoden, um allen allen Patienten, die sich einer Röntgenuntersuchung unterziehen, eine sichere und effektive Methode zur Sammlung von Kontrastmitteln zu ermöglichen. Durch die richtige Entsorgung von Urinbecken durch separate Kanalisation.

Mehr zu den Partnern und Ihren Projekten unter [www.nopills.eu](http://www.nopills.eu)



# Methodologies



- **Common elements of case studies**
  - Monitoring campaign in hospital sewer
  - Urine separation campaign within monitoring campaign
  - Questionnaires for staff survey
  - Questionnaire for patient survey
  - Textile bags incl. material for patients participating in campaign (urine bags etc.)





# Methodologies







- **Specific elements case study Luxembourg**

- Xenetix® (lobitridol)

- Exclusively used in observed department

- Native languages staff:   (  ) (info: staff)

- Native languages patients:    (  )  
(Info+bags: LIST)

- 80% ambulant patients (bags to ambulant patients only)

- Monitoring on hospital level & catchment level (WWTP inflow)

- Timetable

- Monitoring/staff survey:

- Separation campaign/ patient survey:





# Methodologies



- **Specific elements case study Germany**

- IMERON<sup>®</sup> (lomeprol)

- Also used by other departments

- Native language staff:  (Info+bags: staff)

- Native languages patients:  

- 80% stationary patients (bags to all patients)

- Monitoring on hospital level

- Timetable

- Monitoring:

- Separation campaign/ patient survey:





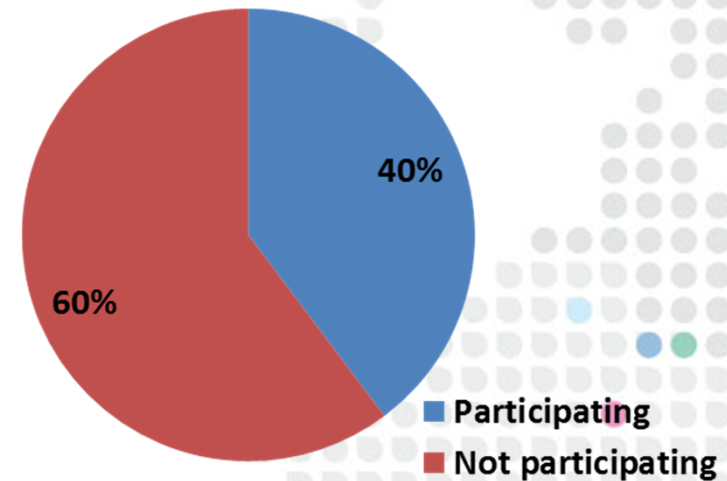
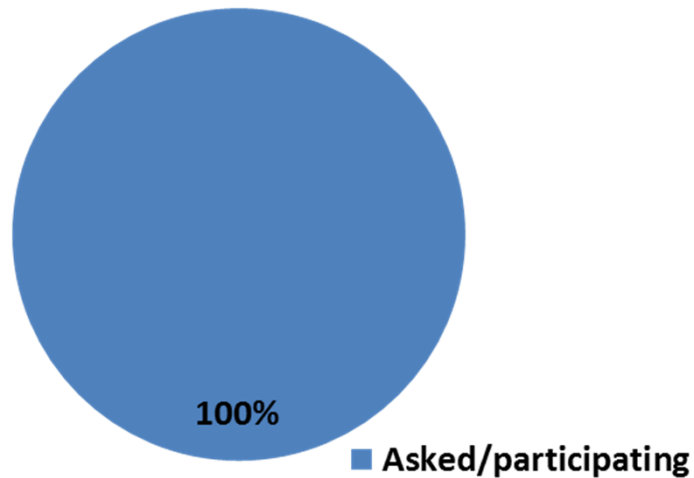
# Results Germany



- Patients getting IMERON® (lomeprol): 156 patients
- In critical physical/mental condition: 95 patients
- Patients asked to participate: 62 patients
- Percentages of patient participation

→ Asked & willing to participate

→ Total share of participation





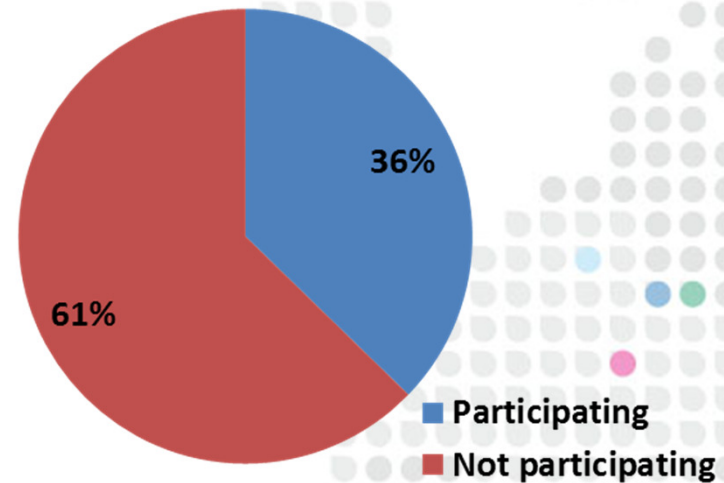
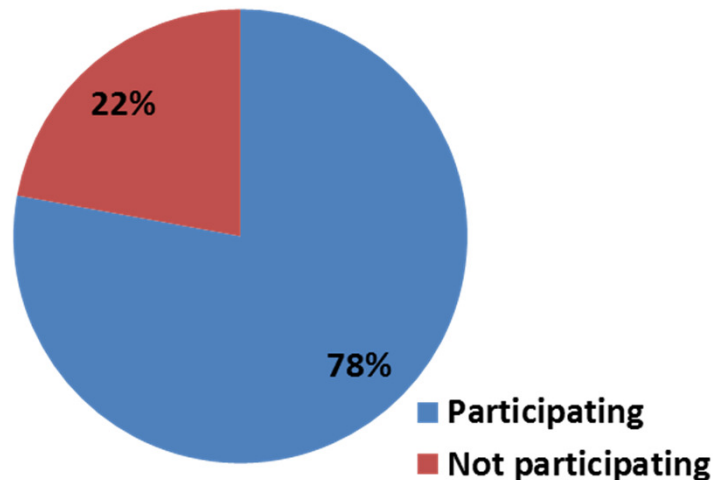
# Results Luxembourg



- Patients getting Xenetix<sup>®</sup> (lobitridol): 261 patients
- Ambulant patients: 208 patients (80% all pat.)
- Patients asked to participate: 122 patients
- Patients participating: 95 patients (45% ambulant)
- Percentages of patient participation

→ Asked & willing to participate

→ Total share of participation







# Results Ger/Lux



- **Evaluation of patients survey (after use of urine bags)**

→ Number patients giving feedback:  41 patients (43%)  
 20 patients (30%)

→ Number urine bags used per patient

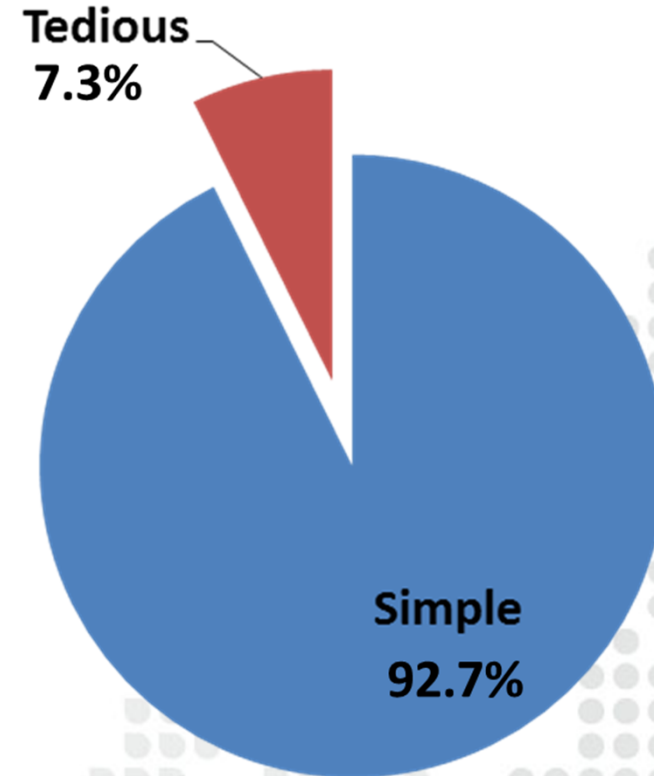


- **Evaluation of patients survey**

- Perception of using urine bags  
(simple, tedious, very tedious)

- Further comments

- Total number: 8
- One urine bag was leaking (1x)
- Not enough bags (1x)
- Urine bags not big enough (1x)
- Positive responses to use of bags and project in general (5x)





# Results Luxembourg



- **Lessons learned from reference campaigns before and after urine separation period**
  - Detected load hospital level > predicted load
    - ⇒ Contribution ambulant patients to hospital load
    - Difference equivalent to 52% lobitridol load administered to ambulant patients and excreted ≤2h**
  - Detected load catchment level > predicted load
    - ⇒ Contribution ambulant patients not living in catchment
    - Difference equivalent to lobitridol load excreted by 12% of ambulant patients not living in catchment**

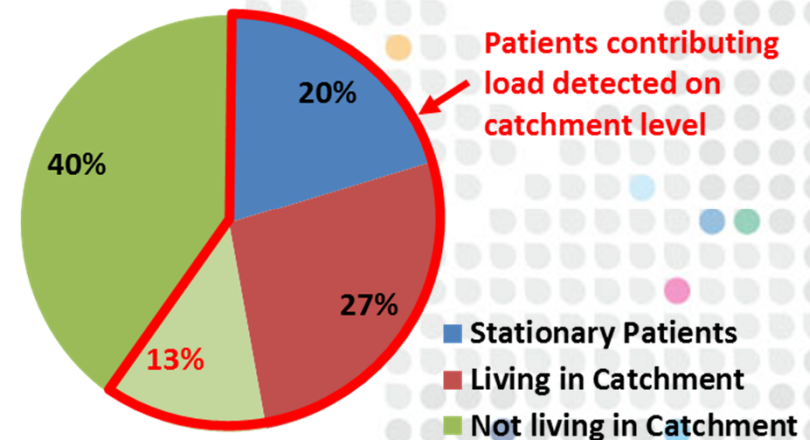
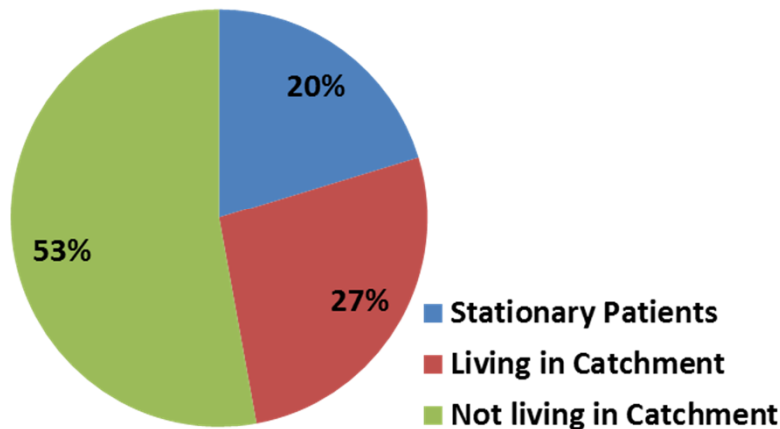


# Results Luxembourg



- **Urine separation campaign**

- Total administered lorbitidol load: 15.7 kg
- lorbitidol administered per patient: 60 g/patient (78ml)
- Detected lorbitidol catchment level: 7.8 kg
- Patients contributing to catchment load: 156 patients (60%)
- Detected lorbitidol load per patient: 50 g/patient (65ml)
- Patients contributing to load detected in catchment level

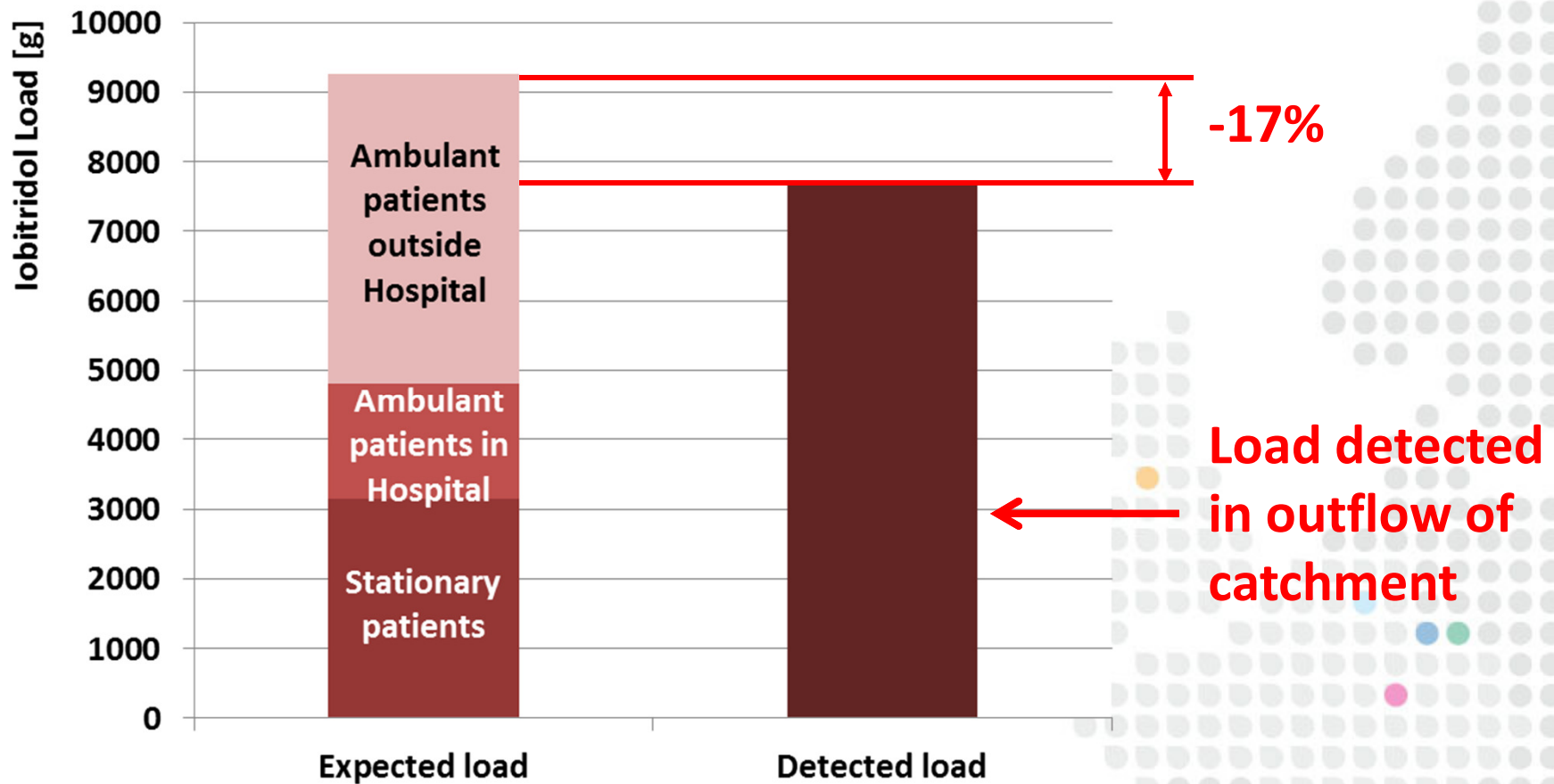




# Results Luxembourg



- Expected lomitridol load from catchment without urine separation campaign vs. detected load

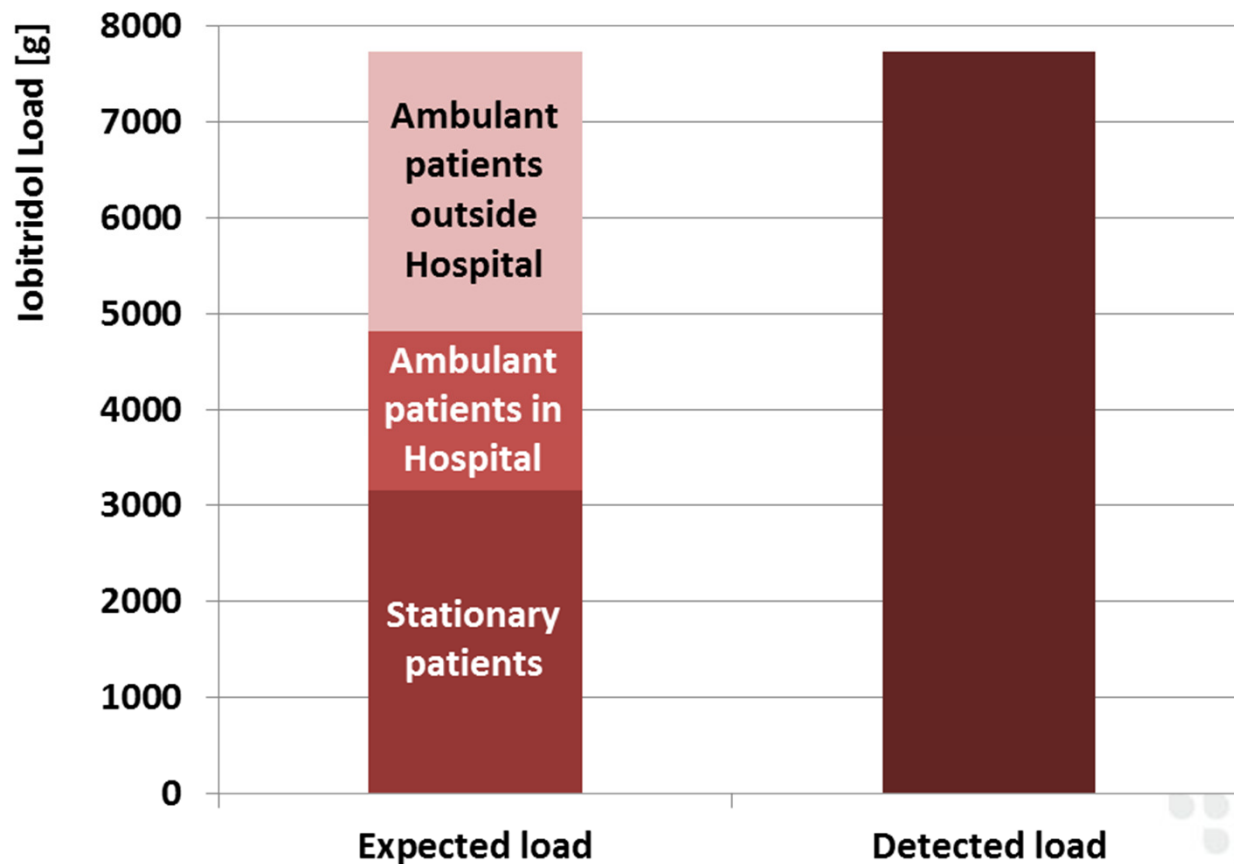




# Results Luxembourg



- Results lomitridol load balance on catchment level



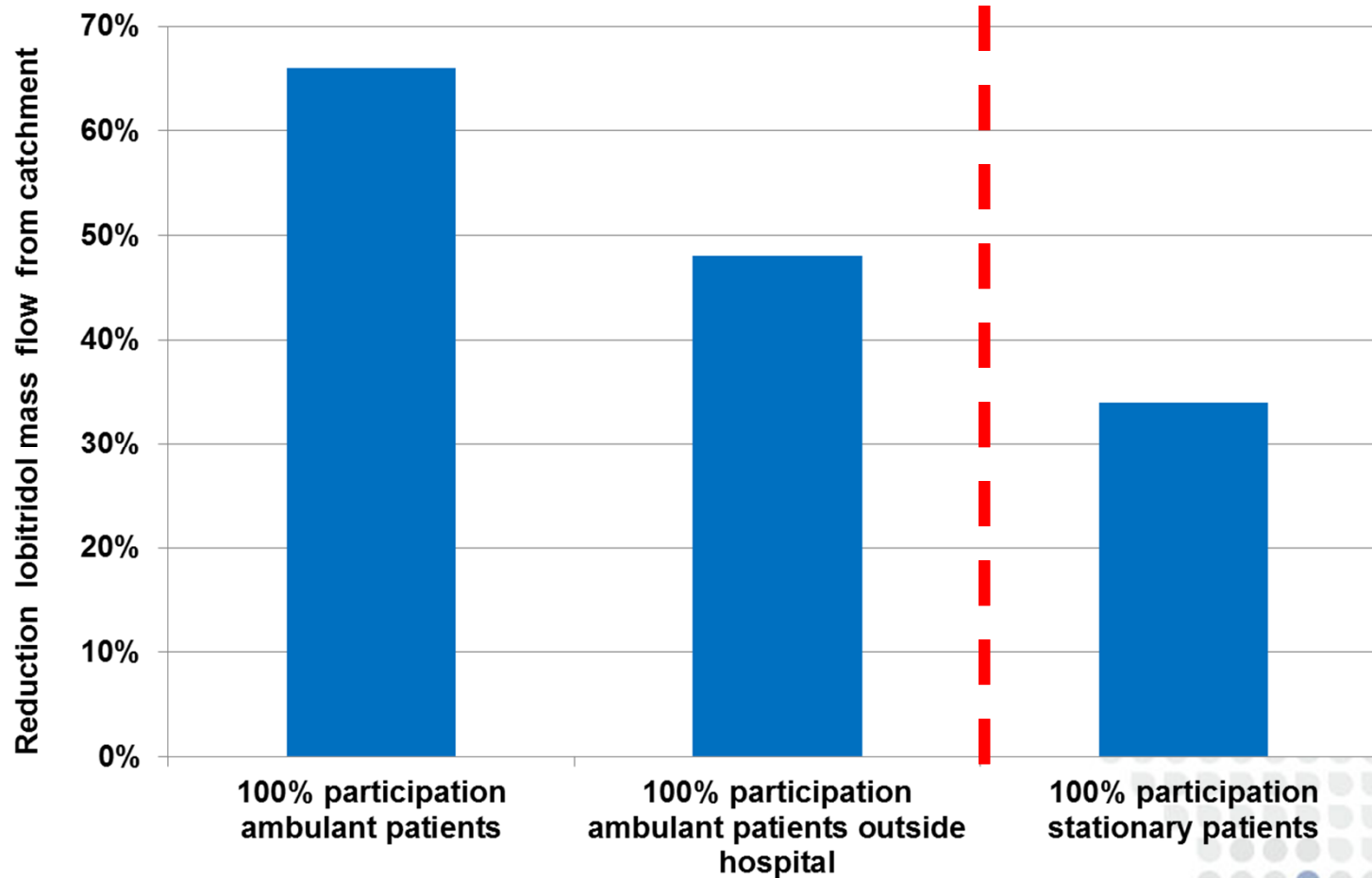
**Mass reduction equivalent to mass excreted by 63% of ambulant patients having received urine bag and using them outside the hospital**



# Results Luxembourg



- Expected reduction of lobitridol loads from catchment for different scenarios

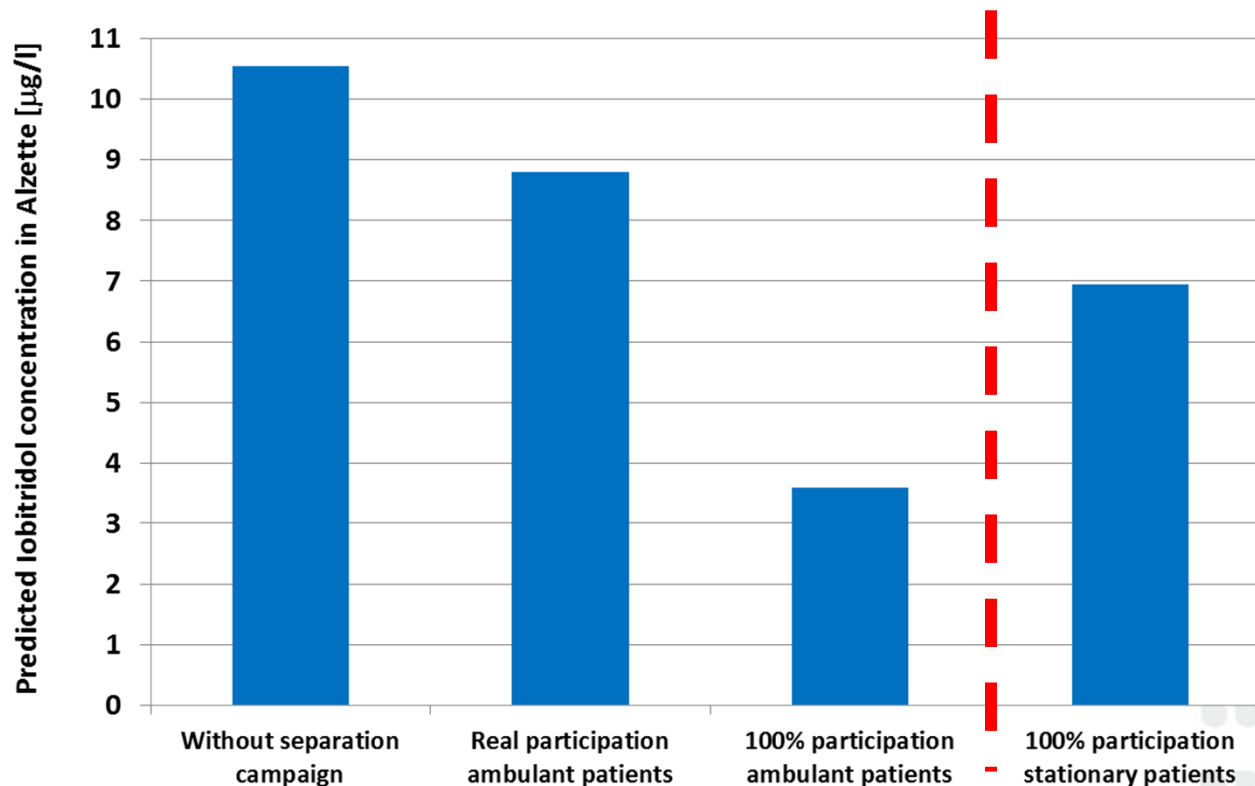




# Results Luxembourg



- Predicted environmental concentrations of lomitrodo in the river Alzette under different conditions



Percentage of WWTP effluent to total flow in river Alzette: 22%

**Toxicity lomitrodo**  
**Acute toxicity**  
Invertebrates (EC50) and fish (LC50):  $>100\text{mg/l}$   
**Chronic toxicity**  
Daphnia (NOEC):  $108\text{mg/l}$   
Zebrafish (NOEC):  $>13.4\text{mg/l}$   
(Guerbet, 2015)



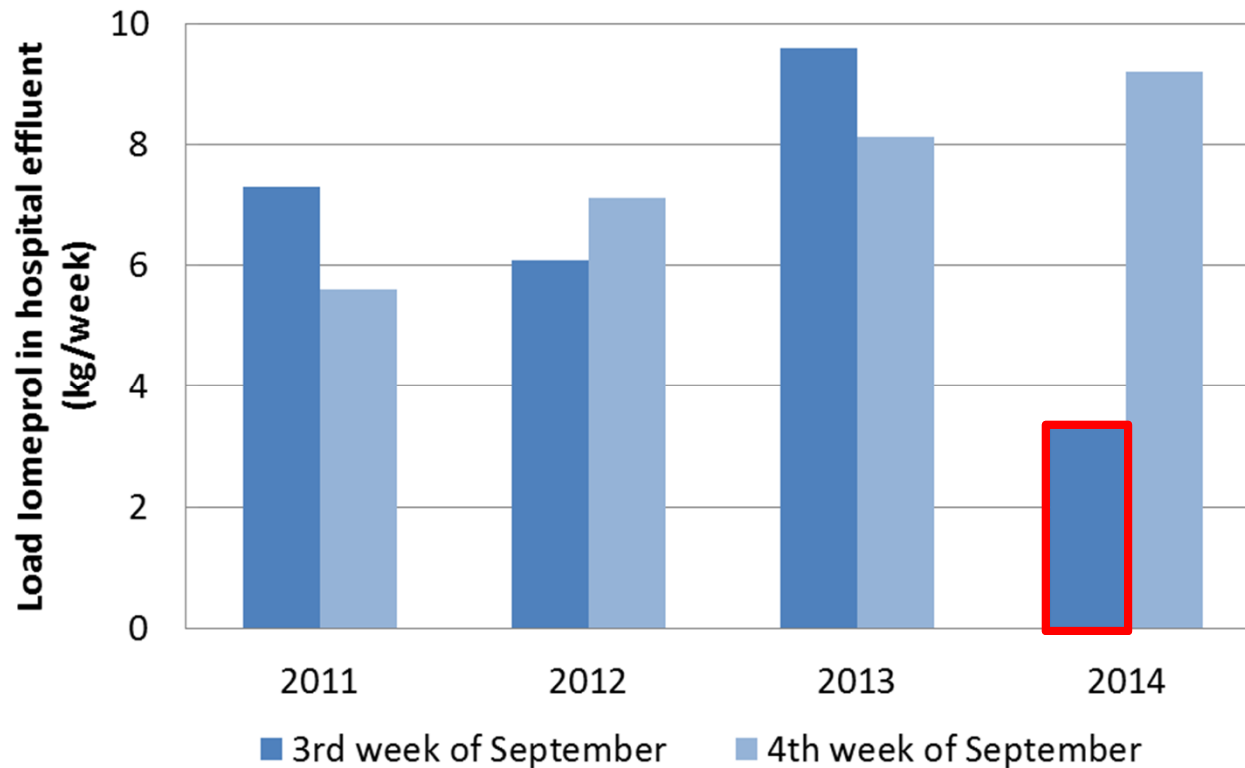
# Results Germany



- **Evaluation of patients survey**

→ No reliable load ballanceing possible

→ Significant lomeprol load reduction 3<sup>rd</sup> week Sept. 2014





# Lessons learned



## Summary

- Administered ICM loads do significantly depend on substances used and local conditions
- Separate collection & disposal of urine of all patient groups resulted in a detectable reduction of ICM emissions
- Active involvement of medical staff is key for efficiency of separation campaigns
- Procedures needed for separate urine collection can be included in routine treatment of patients ( $\leq 10$  min/patient)
- Clear need to inform medical staff of hospitals about environmental effects of pharmaceutical residues

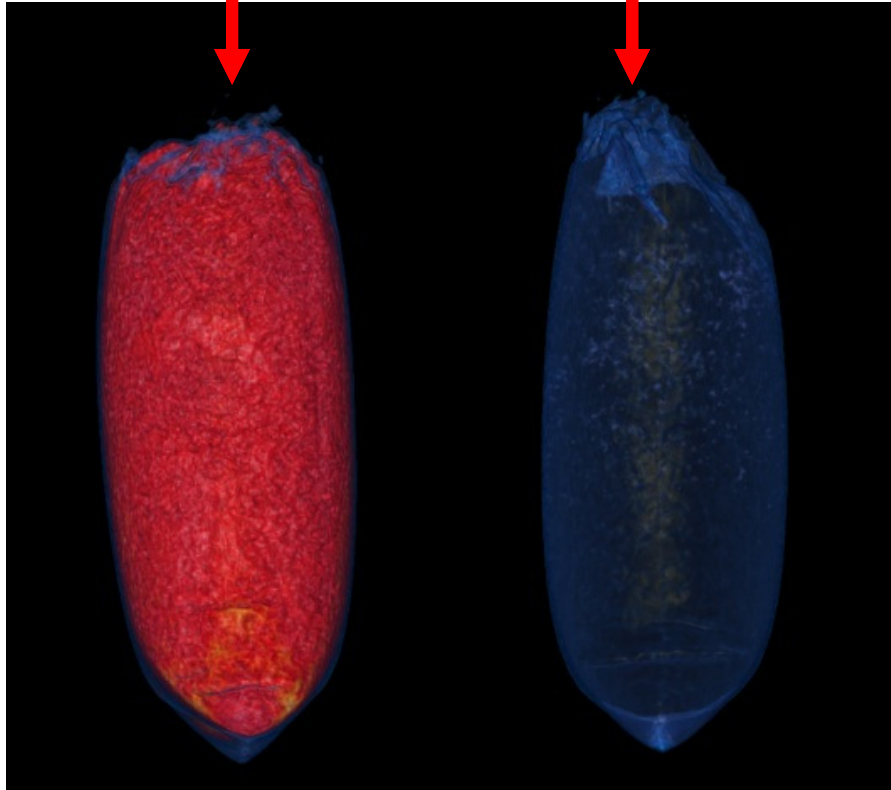


## Policy pointers

- Area wide separate urine collection would reduce ICM emissions to surface waters
- Urine separation of ICM on hospital level even works under difficult boundary conditions
- Transfer of results to other substances with properties administered in high amounts in hospitals
- Measures of segregation like separate urine collection offer opportunity to recover substances



Scan of used urine bag  
with and without ICM



Bayer HealthCare / LIST

Thank you for  
your attention!