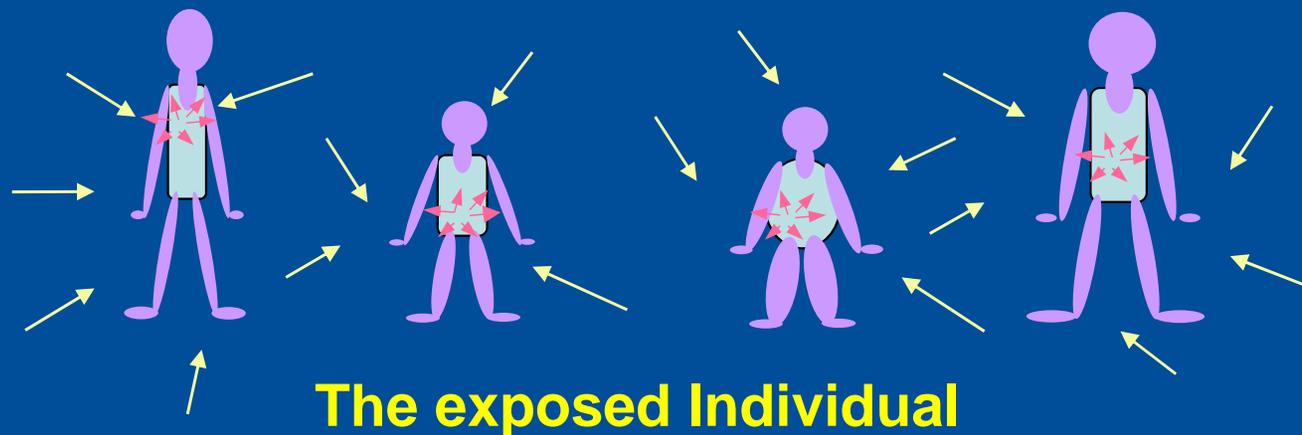


# Biokinetic modeling of chelation therapy for Am-241 USTUR Case 0846

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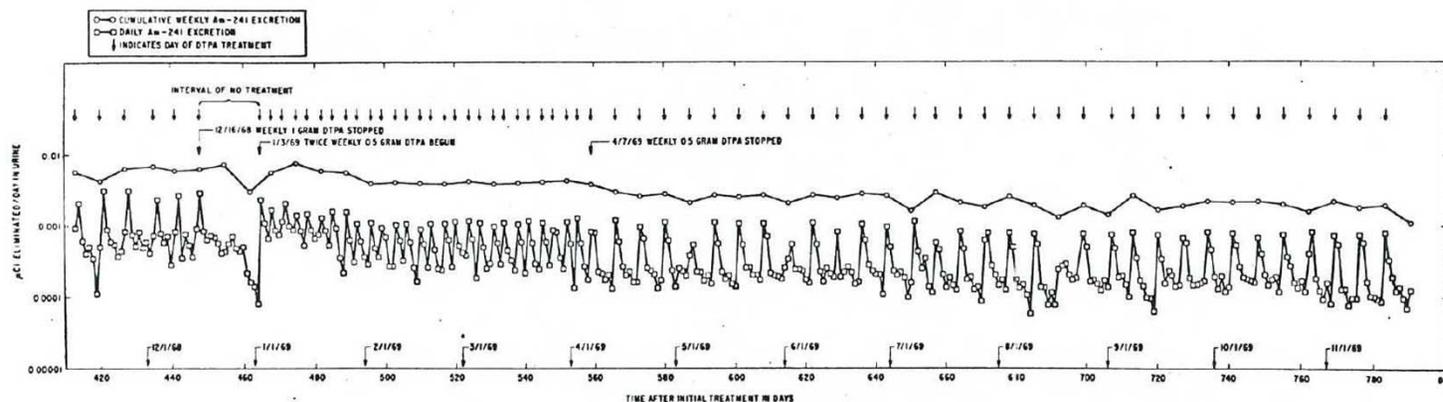


# USTUR Case 0846 - Overview

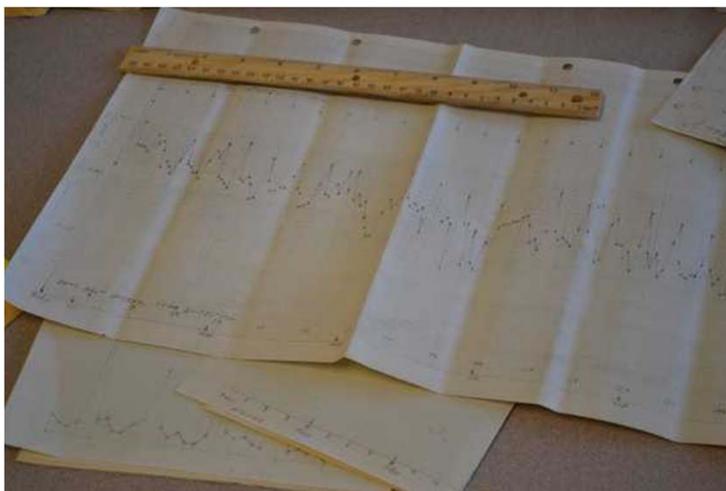
- Am-241 Inhalation Case
  - estimated initial body burden:  $1.8 \mu\text{Ci} = 66.6 \text{ kBq}$
- massively chelated
  - 7 y of DTPA-therapies with weekly injections of DTPA
  - Virtually all urine under therapy has been collected !!!!
- Many studies and publications on case since 1968
- Whole-body donor to USTUR, died in 2008
  - Several studies including post mortem external counting at PNNL
  - Formalin-fixed samples measured with ICP-MS and external counting
  - Generation of a voxel model of the leg for calibrations for in-vivo counting

# USTUR Case 0846 – Generating the dataset

- No tabulated data available, only graphic representations
  - From publications

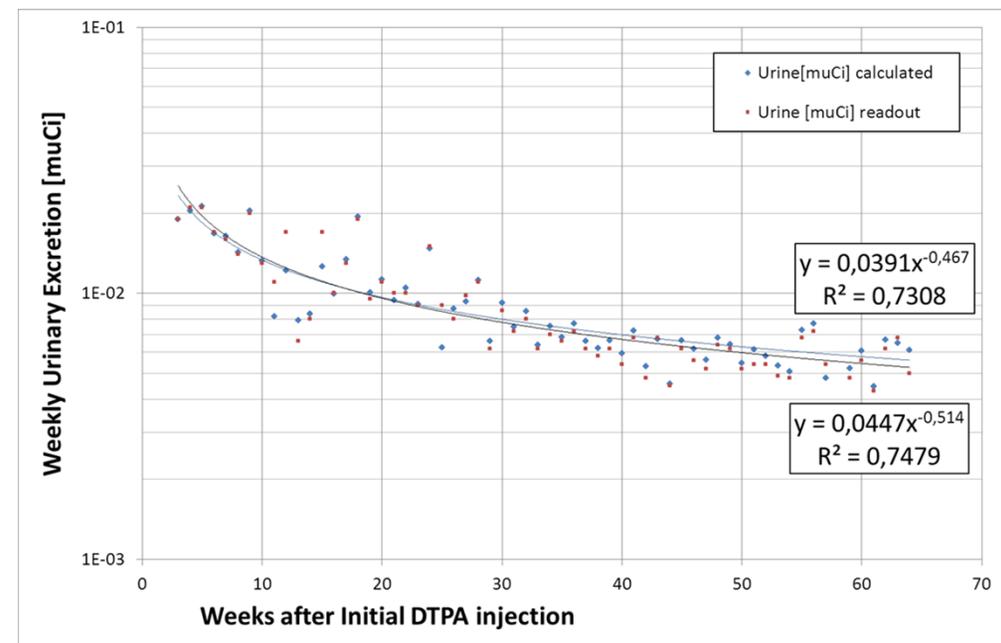
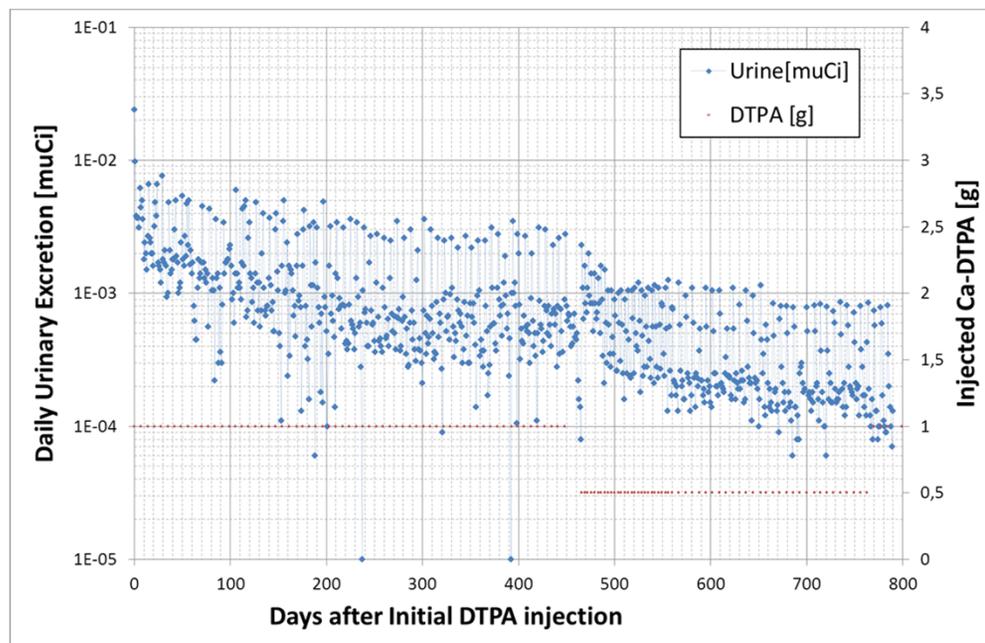


- Hand-drawn graphs on scaled paper



# USTUR Case 0846 – Generating the dataset

- Data were collected in an Excel spreadsheet
  - Consolidation of values from different sources
  
- Therapy schedule reconstructed from files
  - Duration: 7 y (September 1967 – December 1974)
  - 342 i.v. injections of Ca-DTPA (315.5g)



# USTUR Case 0846 – First steps in modeling

- Using the pre-therapy information available
- Interpretation of pre-therapy data as samples of special monitoring yields doses in a range of 1-160 Sv
  - Be careful with Interpretations of single measurement long times after exposure, especially when little information about intake is available

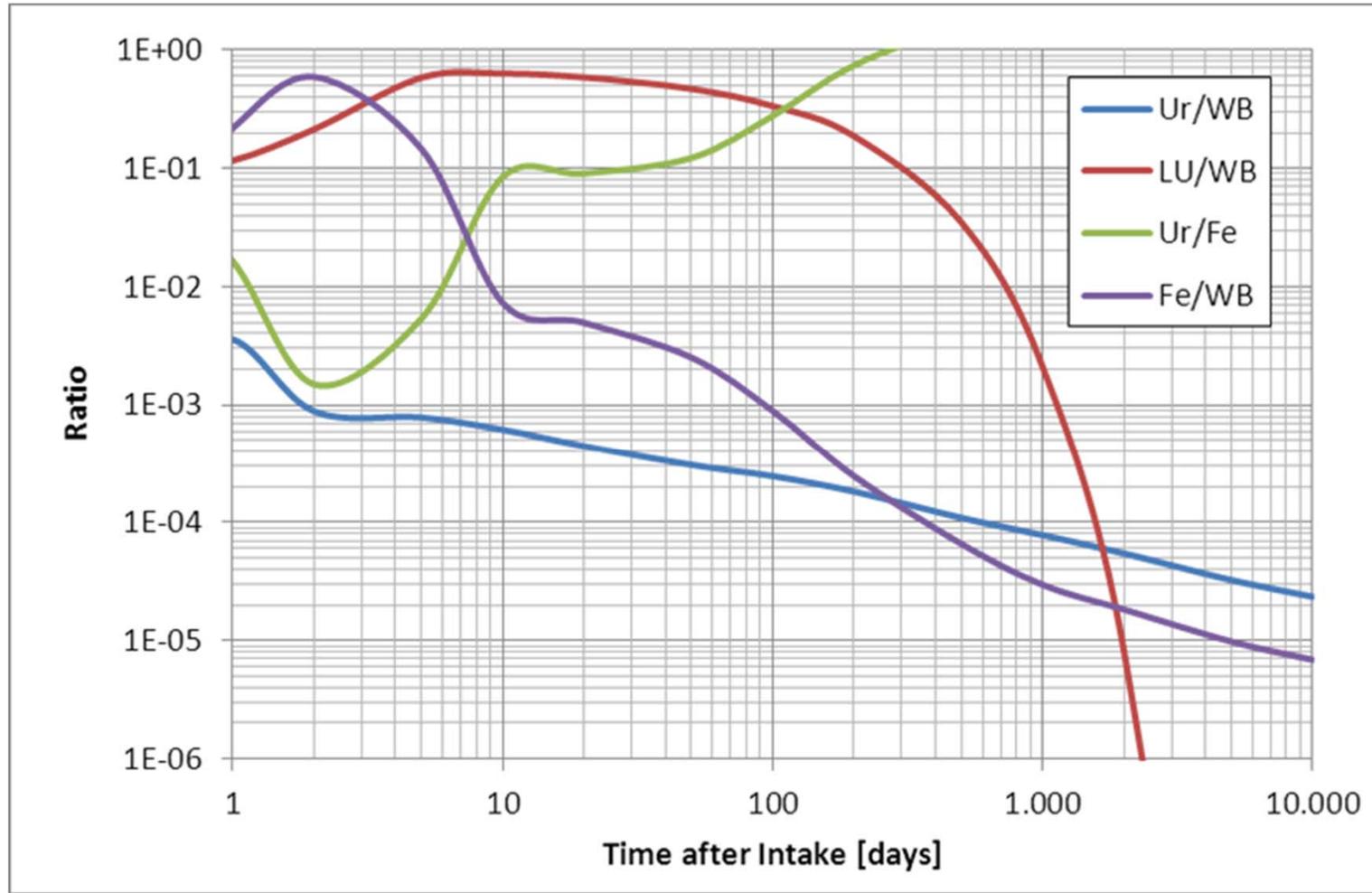
Assumed day after intake	Based on Body Burden			Based on Urinary Excretion		
	Intake [MBq]	Dose [Sv]		Intake [MBq]	Dose [Sv]	
		effective	Lungs		effective	Lungs
<b>Type M</b>						
<b>1</b>	0.066	1.8	1.6	0.005	0.1	0.1
<b>120</b>	1.127	30.4	27.1	0.594	16.0	14.3
<b>Type S</b>						
<b>1</b>	0.066	0.4	0.6	0.271	1.7	2.3
<b>120</b>	1.833	11.5	15.8	18.169	113.74	156.26

# USTUR Case 0846 – First steps in modeling

- Using the pre-therapy information available
  
- Several possible scenarios solved with IMBA Professional
  - Single acute intake
  - Chronic intake 30d, 90d, 180d, 365d, 730d at begin/end of working period
  - Chronic intake 1120d (covering complete working period)
  - All scenarios for type M and Type S material

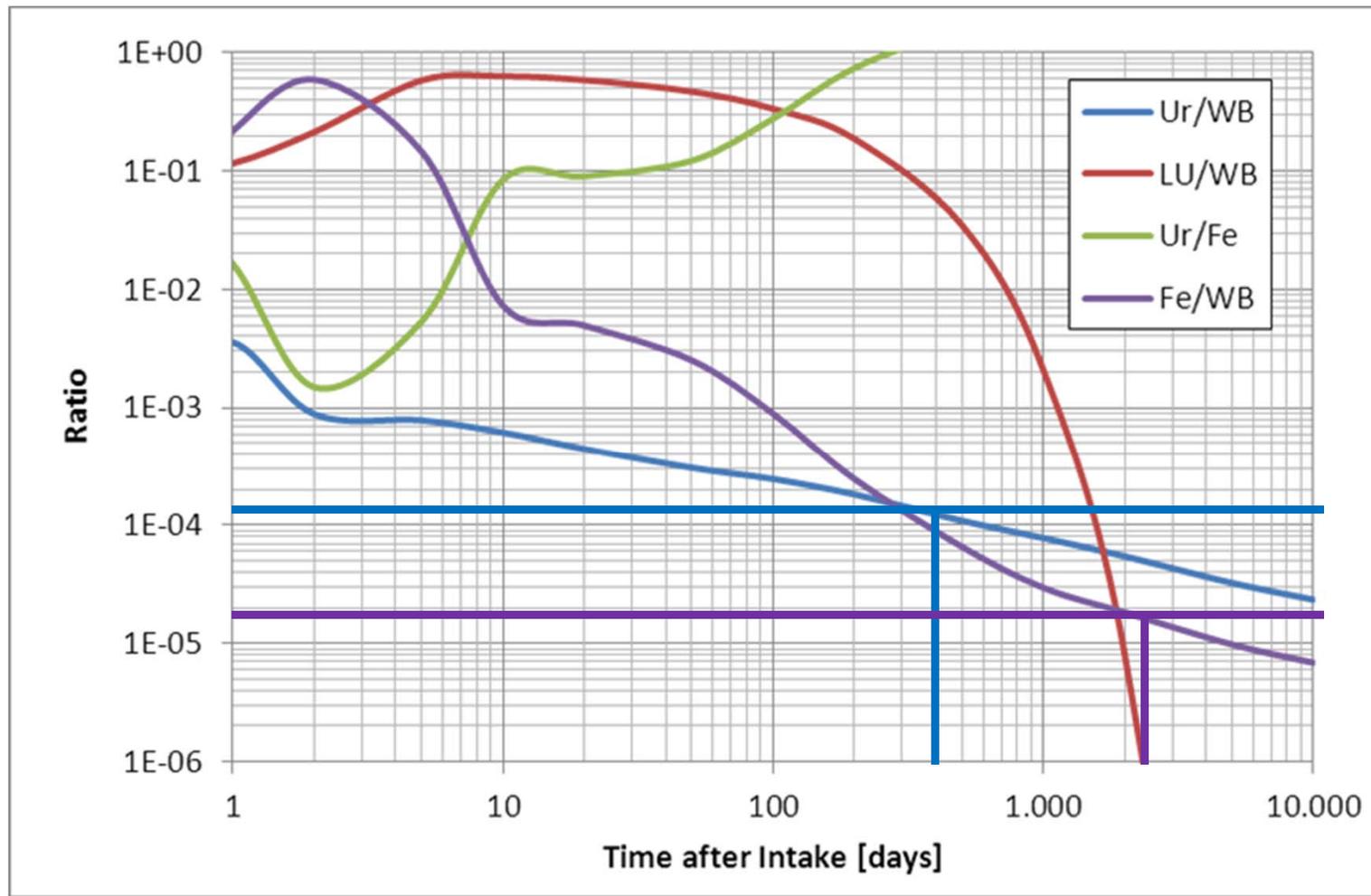
# USTUR Case 0846 – First steps in modeling

- Example acute intake of Type M material



# USTUR Case 0846 – First steps in modeling

- Example acute intake of Type M material

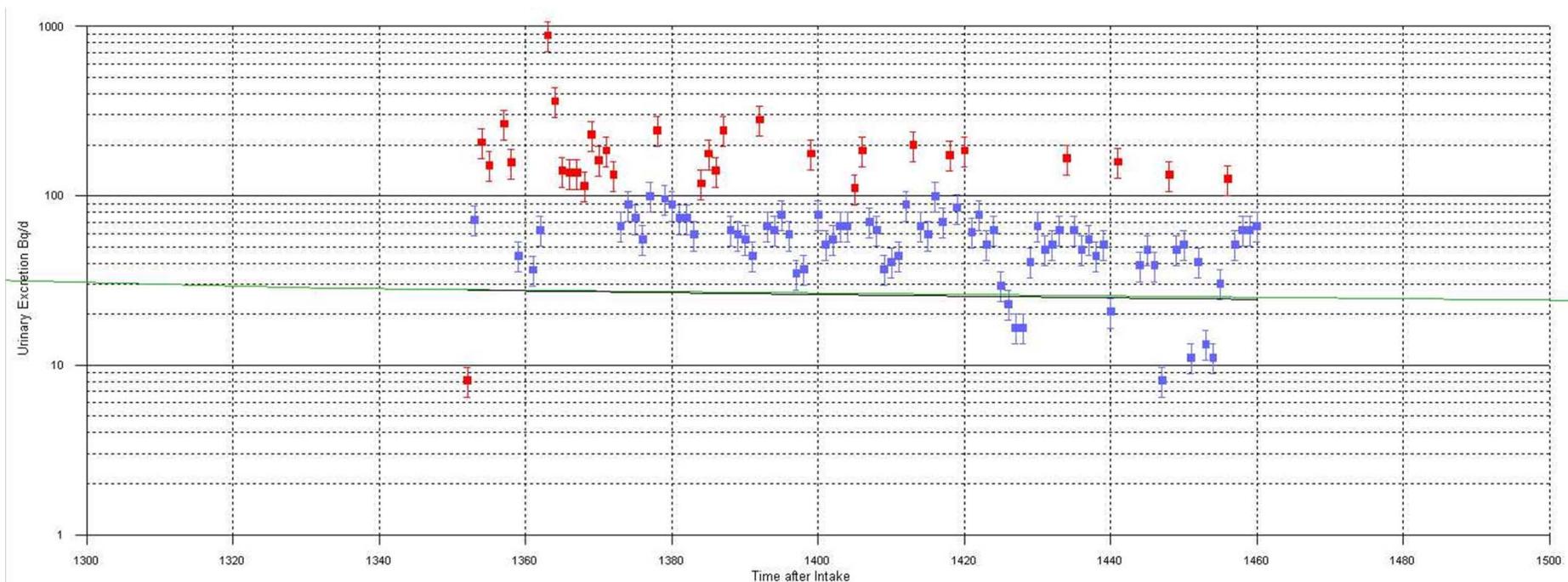


# USTUR Case 0846 – First steps in modeling

- None of the selected scenarios fits the observed data
  - Some of the observed ratios are never reached
  - Observed ratios are reached at different times
  - Little better applying USTUR parameters for AmO<sub>2</sub>
  
- Analysis of breathing zone samples shows that intake is also possible by chronic inhalation

# USTUR Case 0846 – First steps in modeling

- Trying to fit baseline urinary excretion using IMBA
  - Data of first year, used only points presumably not affected by DTPA
  - No good fit with any scenario
  - Baseline seems to be elevated
    - Frequency of therapies might be to high to drop back to baseline in between



# USTUR Case 0846 – Next steps in modeling

- Application of CONRAD/EURADOS Model
  - Model implemented first time for Am-241 Inhalations
  - Assumption: single acute inhalation of Type M material
    - 380 d before therapy → ratio Urine/Whole Body correct
    - Scaled intake to fit pretherapeutic data
  - Detailed analysis and studies with model in progress
  
- Analysis of tissue samples to define „biokinetic distribution of Am-241“
  - by gamma-spectrometry (KIT)
  - by radiochemistry (USTUR)

# Thank you for your attention

If you've got any questions, ideas or remarks feel free to contact  
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