



# Toxicity profiling in European river sediments with emphasis on the identification of thyroid hormone disrupting compounds

Jana Weiss, Marja Lamoree, Pim Leonards, Timo  
Hamers, Peter Cenijn, Martin van Velzen

# Background

(<http://www.modelkey.ufz.de/>)

- Selection of samples
- Bioassays performed
- Effect directed analysis (EDA)

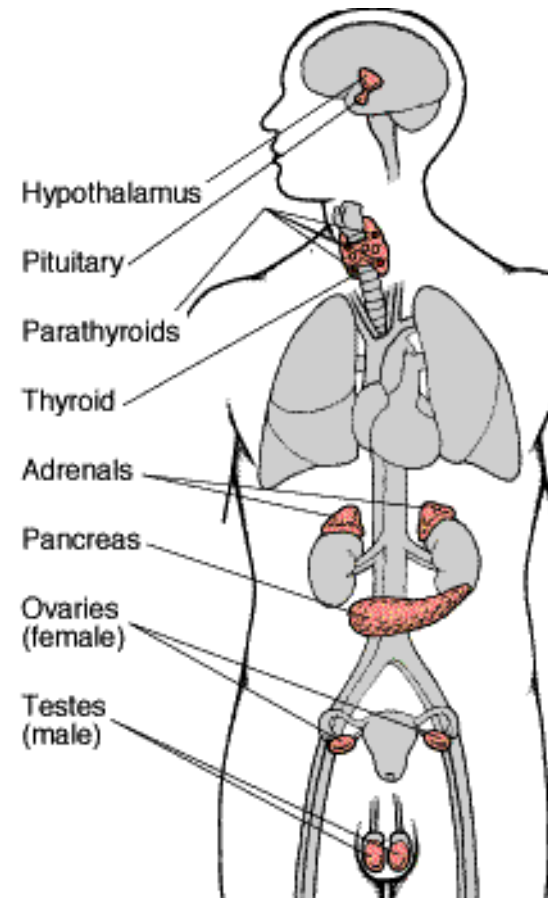


The screenshot shows the Modelkey website interface. At the top left is the 'modelkey' logo. A navigation menu on the left lists: MODELKEY, First Page, Approach, Sub-Projects, Partners, Information documents, End-User, Communication Board, Meetings, Links, Publications, Open Positions, Training, Login, and Contact. The main header area contains the project title: 'Models for Assessing and Forecasting the Impact of Environmental Key Pollutants on Marine and Freshwater Ecosystems and Biodiversity'. Below this are the logos for the European Union and the Sixth Framework Programme. Project details include: Coordinator: Dr. Werner Brack, Deputy coordinator: Dr. Mechthild Schmitt-Jansen, Project Office: Dr. Michaela Hein, and Project duration: 1st February 2005 to 31st January 2010. A 'NEWS' section features a link to a 'CONFERENCE "Risk Assessment in European River Basins"'. A paragraph below states: 'The European Water Framework Directive (WFD) demands for a good ecological status of European surface waters by 2015.' A diagram titled 'Sources of contamination' shows arrows pointing to a box labeled 'insufficient ecological status'. This leads to a box for 'MODELKEY', which is described as a 'WFD by 2015' tool for 'End users'. The diagram lists 'Identification of driving forces causing insufficient ecological status' and 'Prioritisation of causes, sources and measures (decision support system)'. It also lists 'Key toxicants', 'site and basin scale exposure', 'effects and effect propagation', and 'risk indexes'. To the right of the diagram, text explains that a driving force for insufficient ecological status is chemical stress due to pollutants, and that the WFD classifies quality status based on traditional parameters and priority pollutant (PP) concentrations.



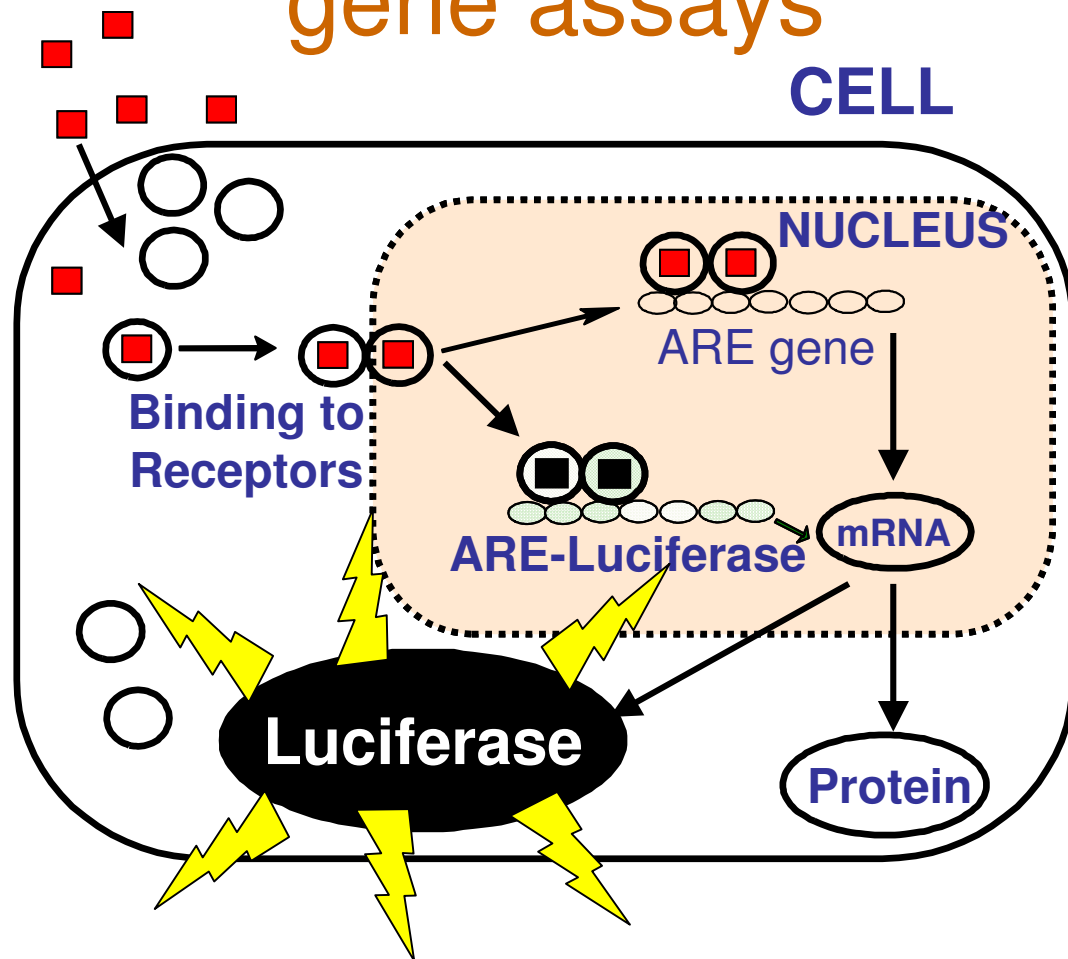
# Endocrine disruption

- ABC
- Ames II
- Anti-YAS
- Anti-YES
- AR Calux (antagonistic)
- AR-CAlux (agonistic)
- DR Calux
- Green screen
- Narcosis SPME
- T4-TTR
- ToxAlert
- UmuC
- YES



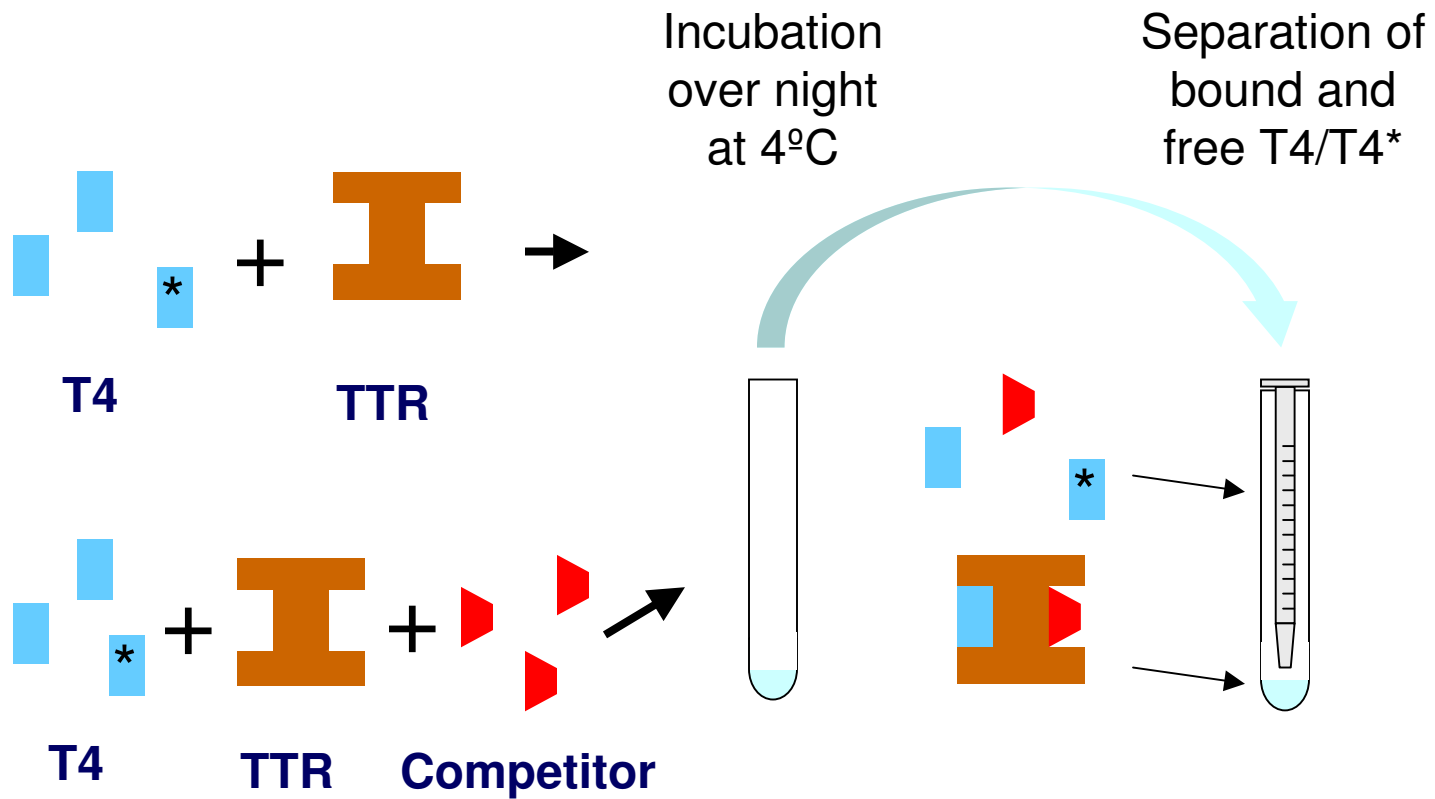
# Principle of (anti-) AR-CALUX® reporter gene assays

Endocrine Disrupting Compounds



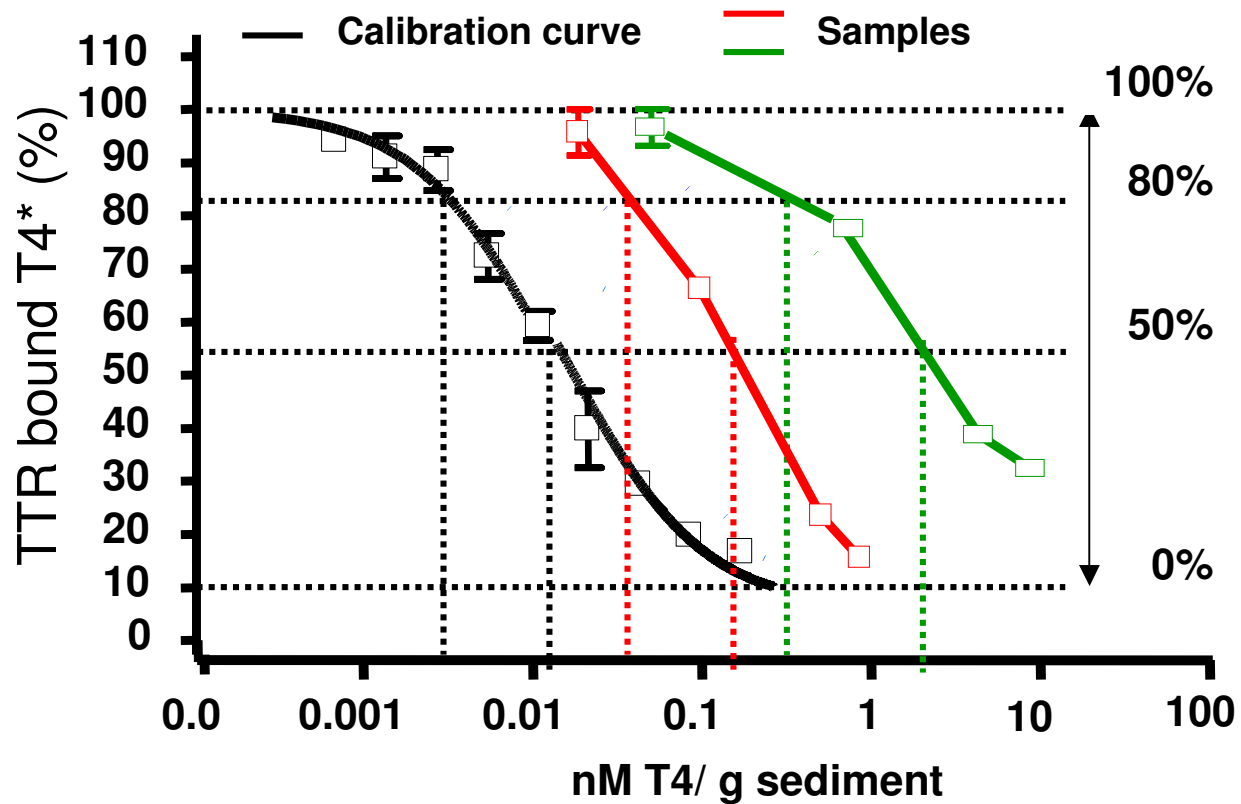
Stable transfected cell lines

# Principle of Radio Ligand T4-TTR binding assays (RLBA)



Lans *et al.* 1993

# Principle of T4-TTR binding assays

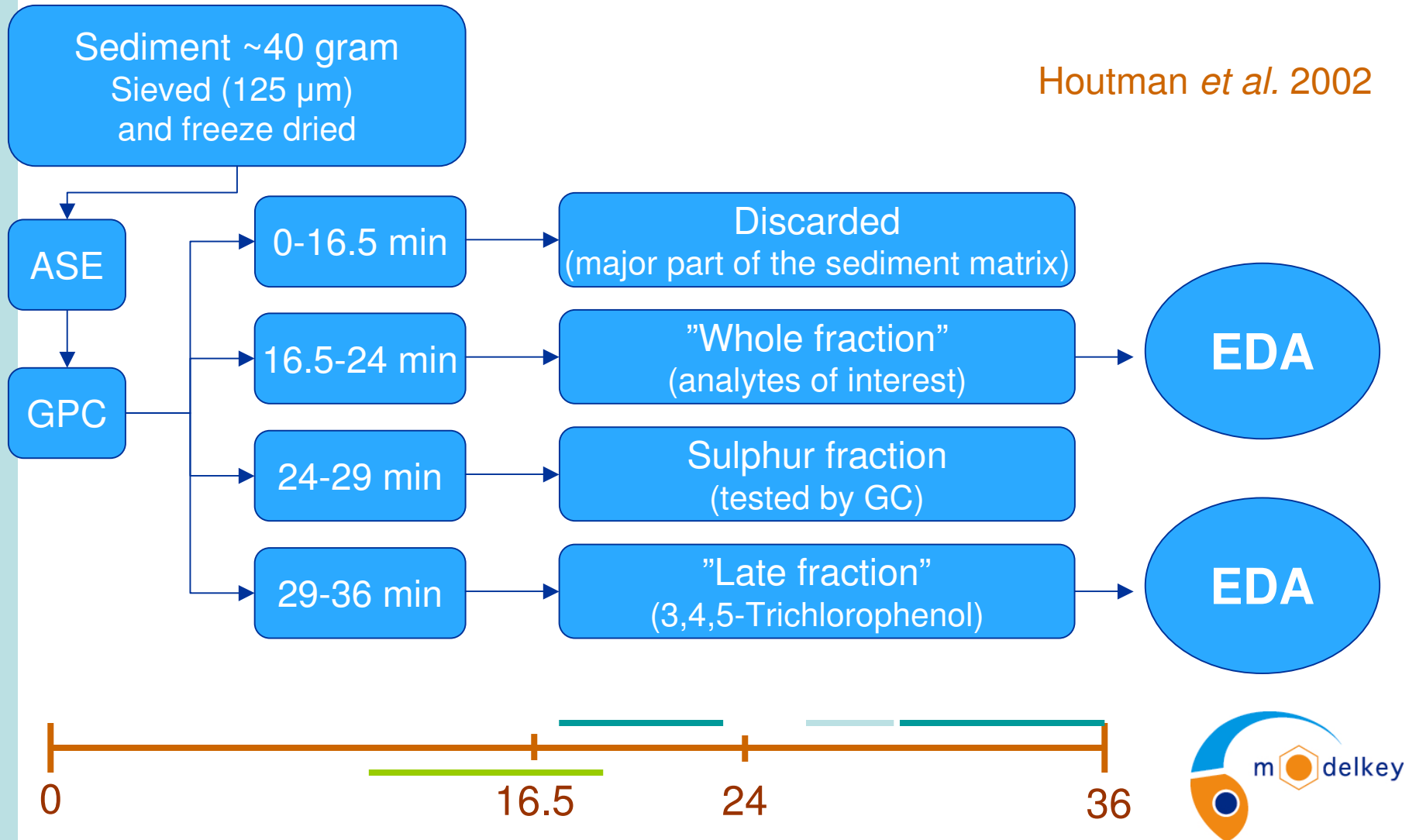


# Preliminary results

		RLBA	CALUX	
		TTR-binding	AR-agonist	AR-antagonist
Llobregat	A1	x		
Llobregat	A2	x	x	
Llobregat	4	x	x	
Bilina	Jirkov			
Bilina	Most	x		x
Elbe	Pardubice	x		
Elbe	Prelouce	x		x
Scheldt	Schijn	?		x
Scheldt	SRV	x	x	
Scheldt	TRN	x		
Scheldt	HW	x		

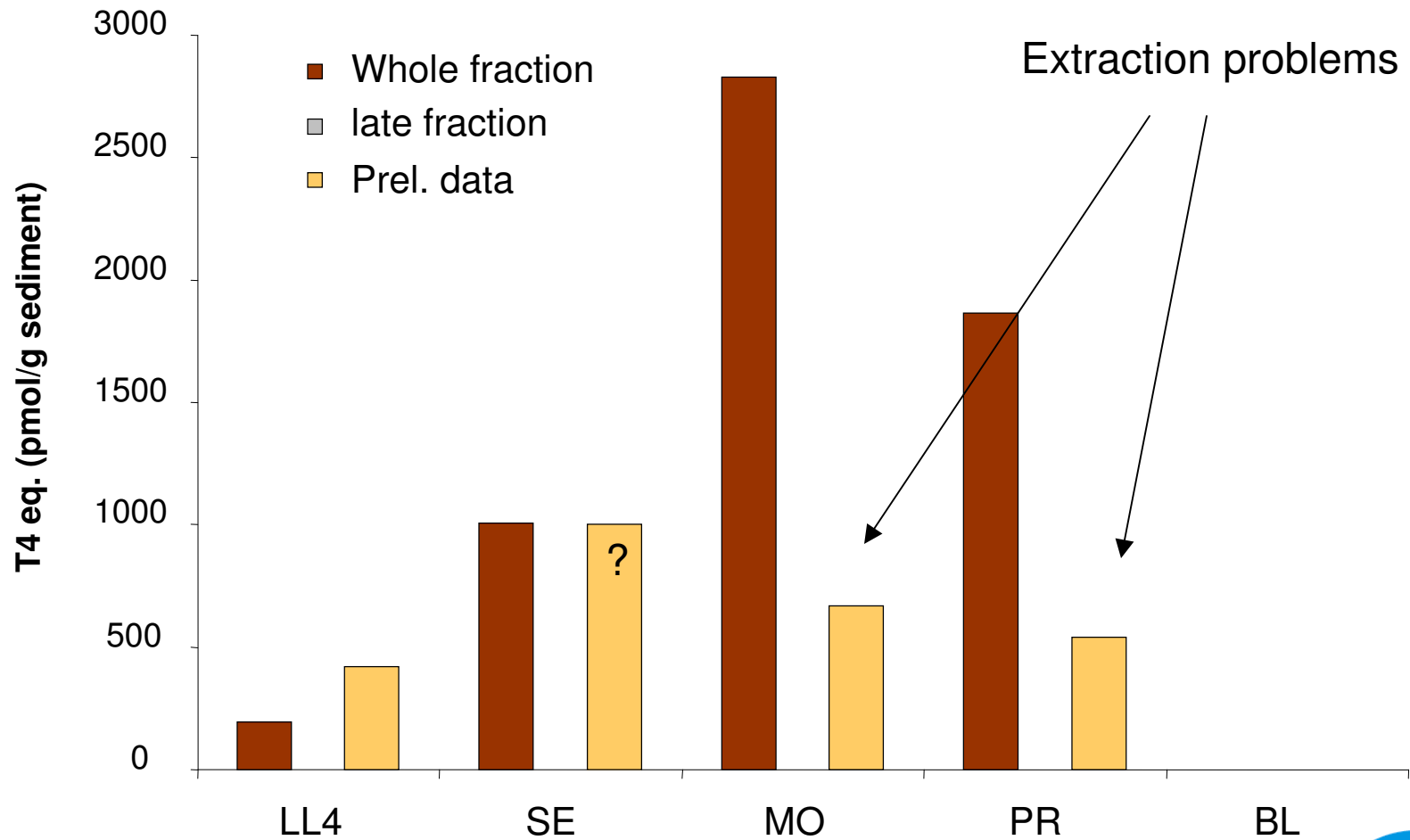
# Effect Directed Analysis/ GPC

Houtman *et al.* 2002

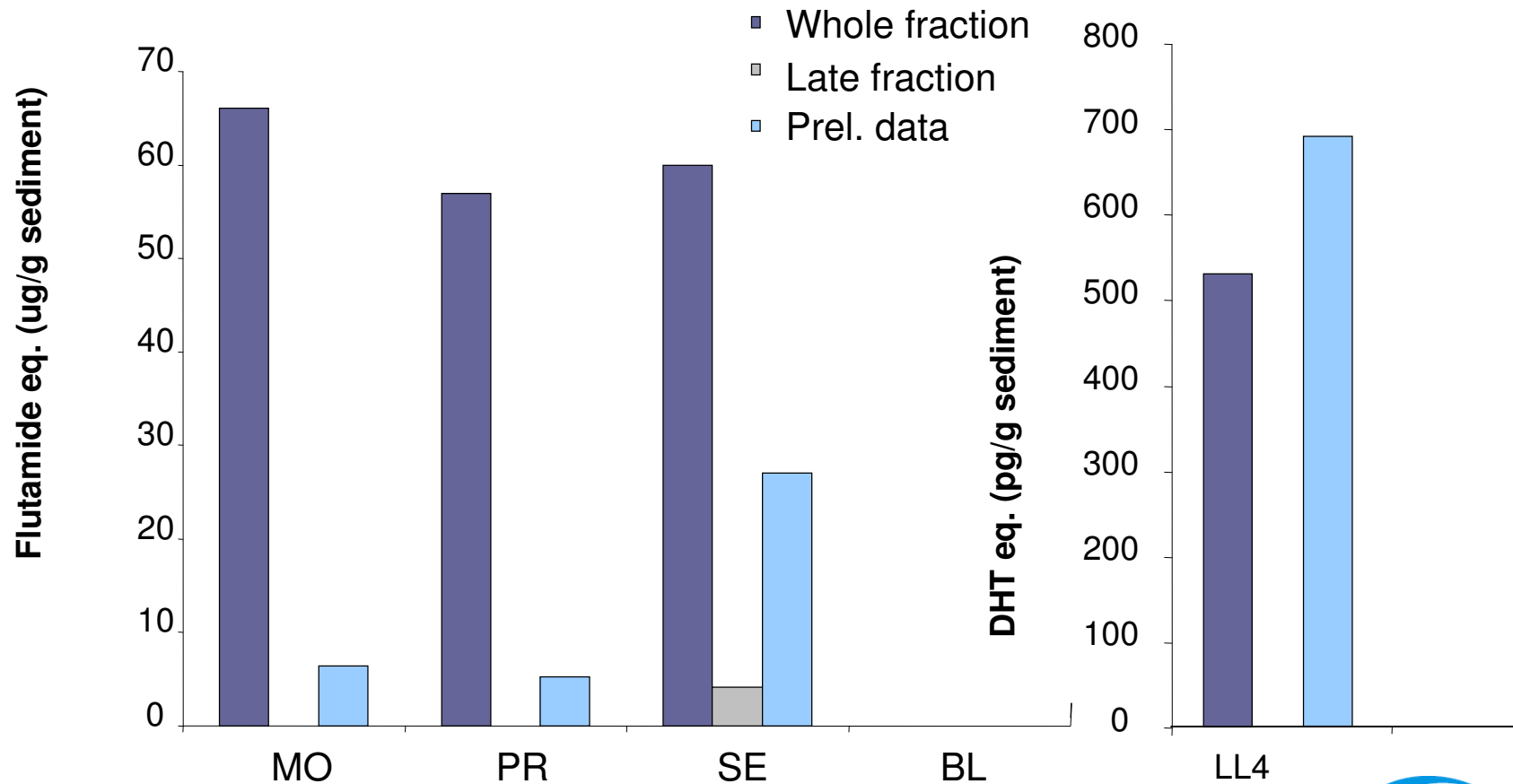




# EDA results/ TTR Binding assay

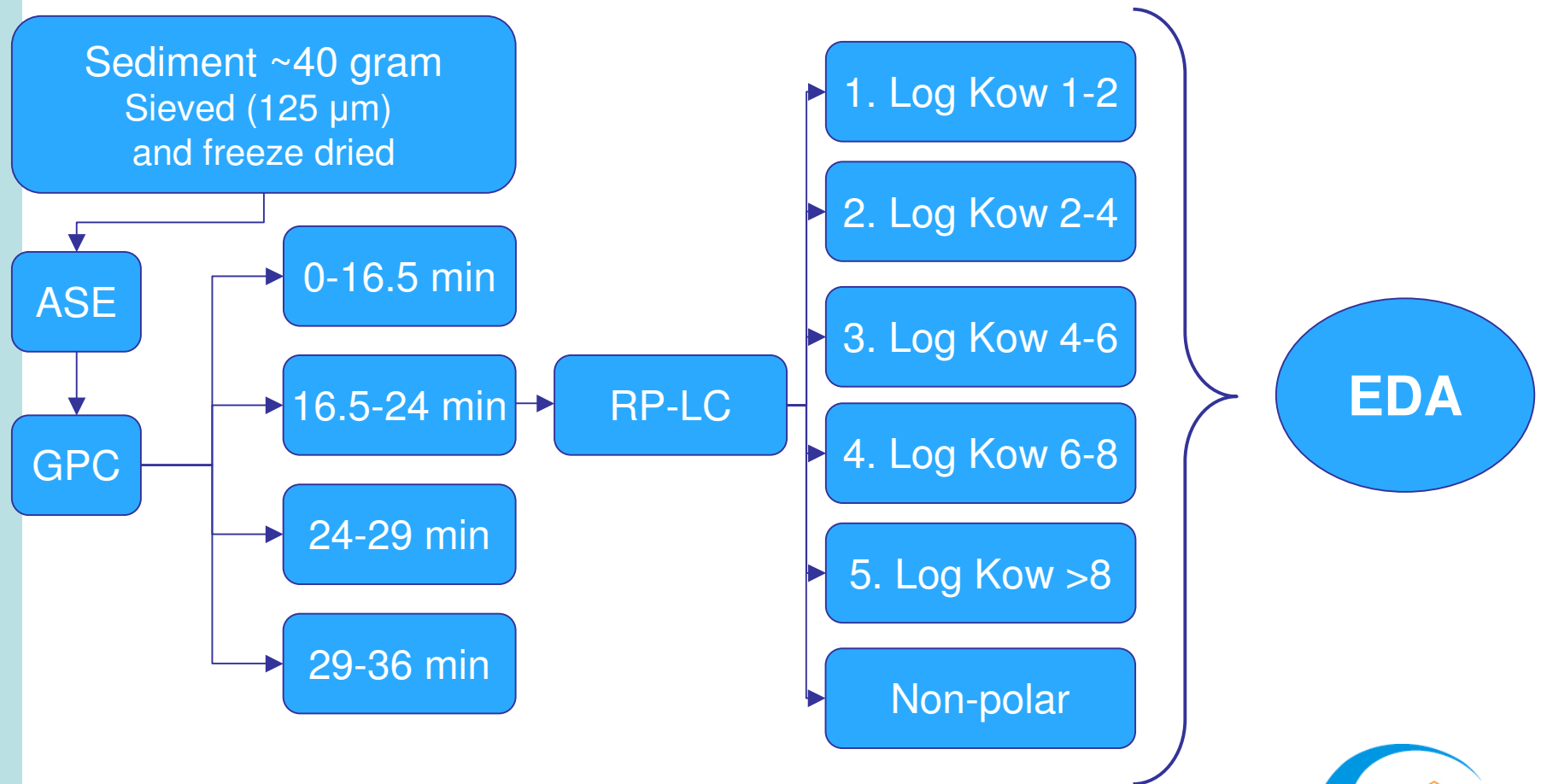


# EDA results/ (anti-) AR-CALUX

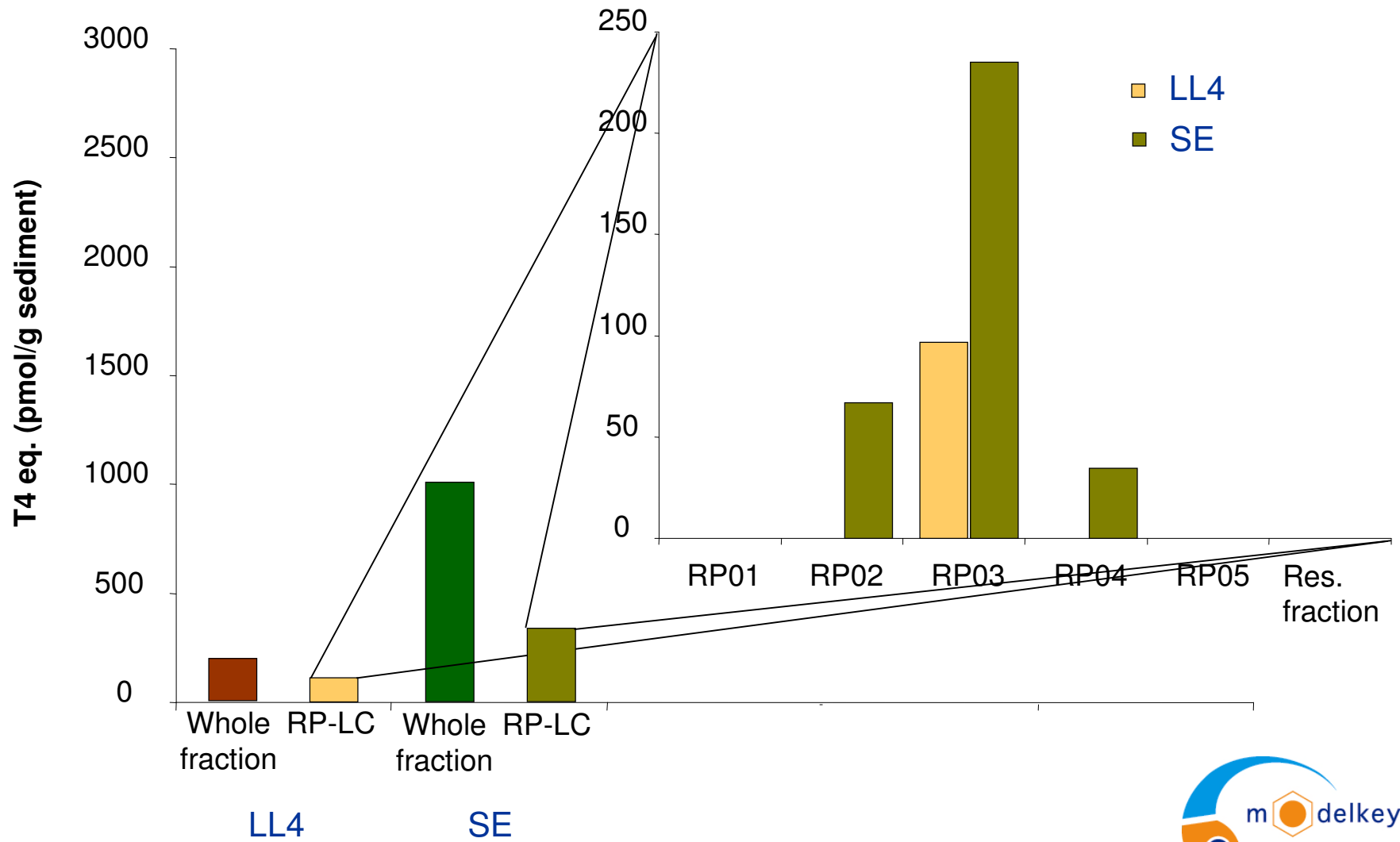


# Effect Directed Analysis / RP-LC

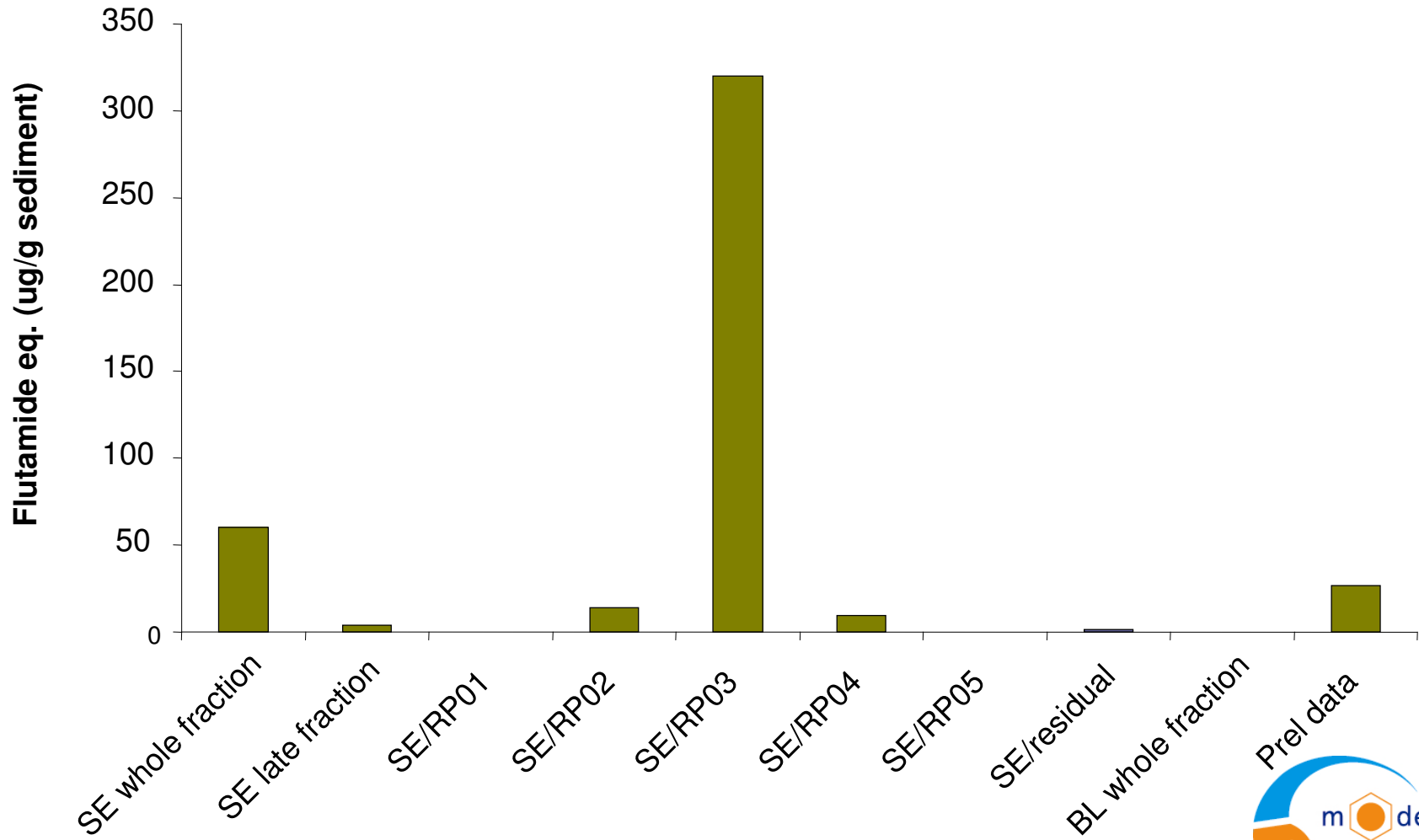
Houtman *et al.* 2004



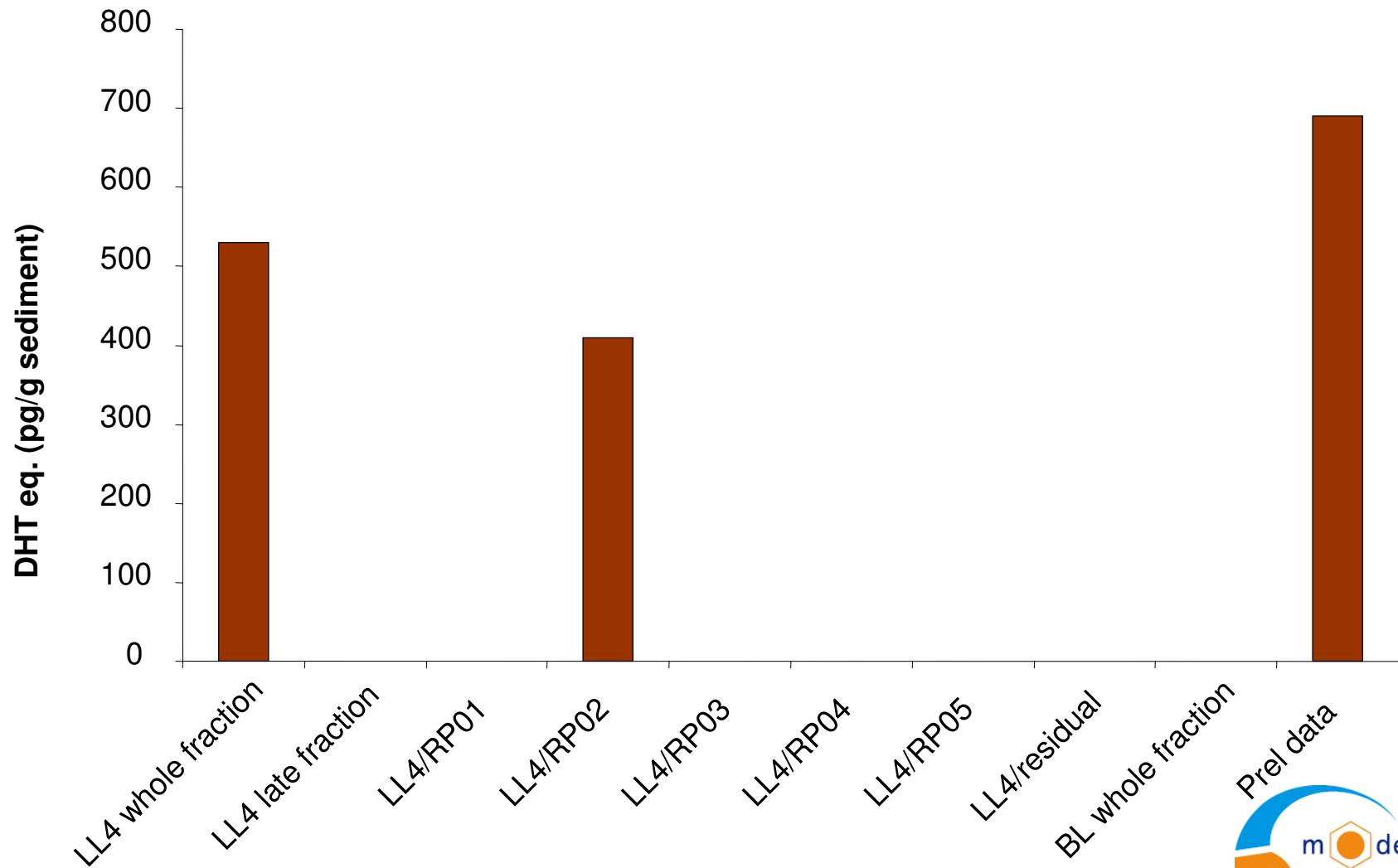
# EDA results/ TTR Binding assay



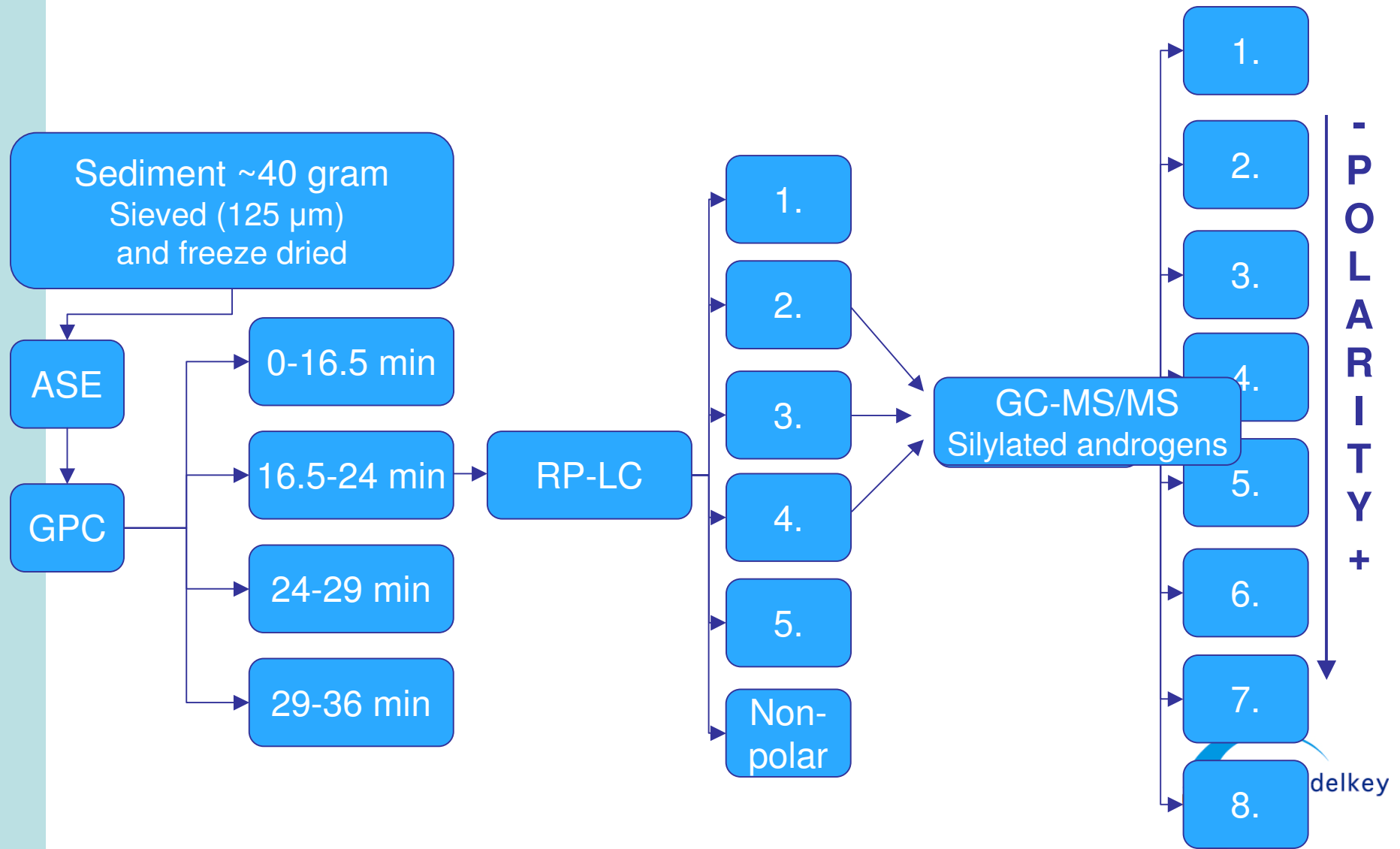
# EDA results/ anti AR-CALUX



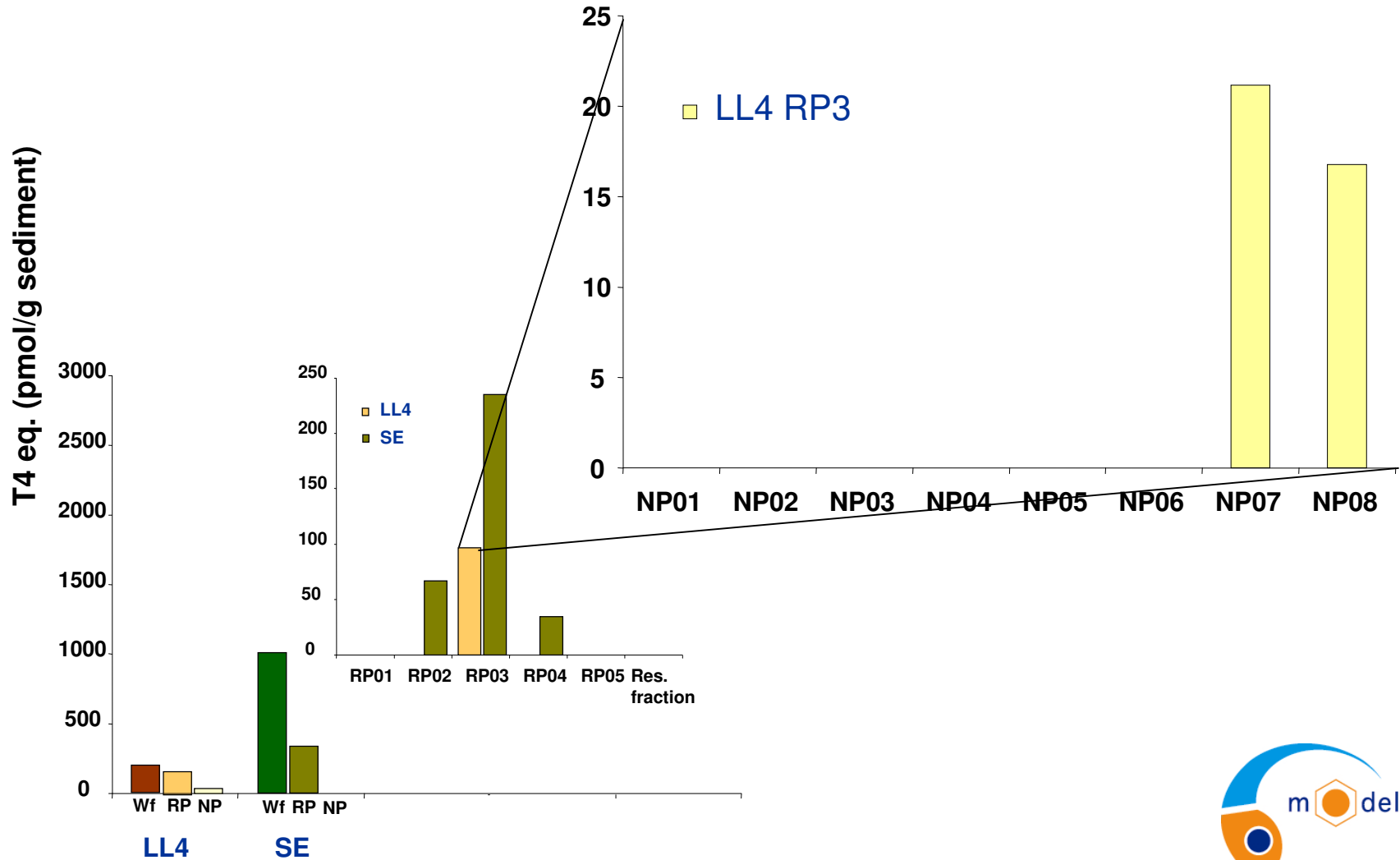
# EDA results/ AR-CALUX



# Effect Directed Analysis/ NP-LC

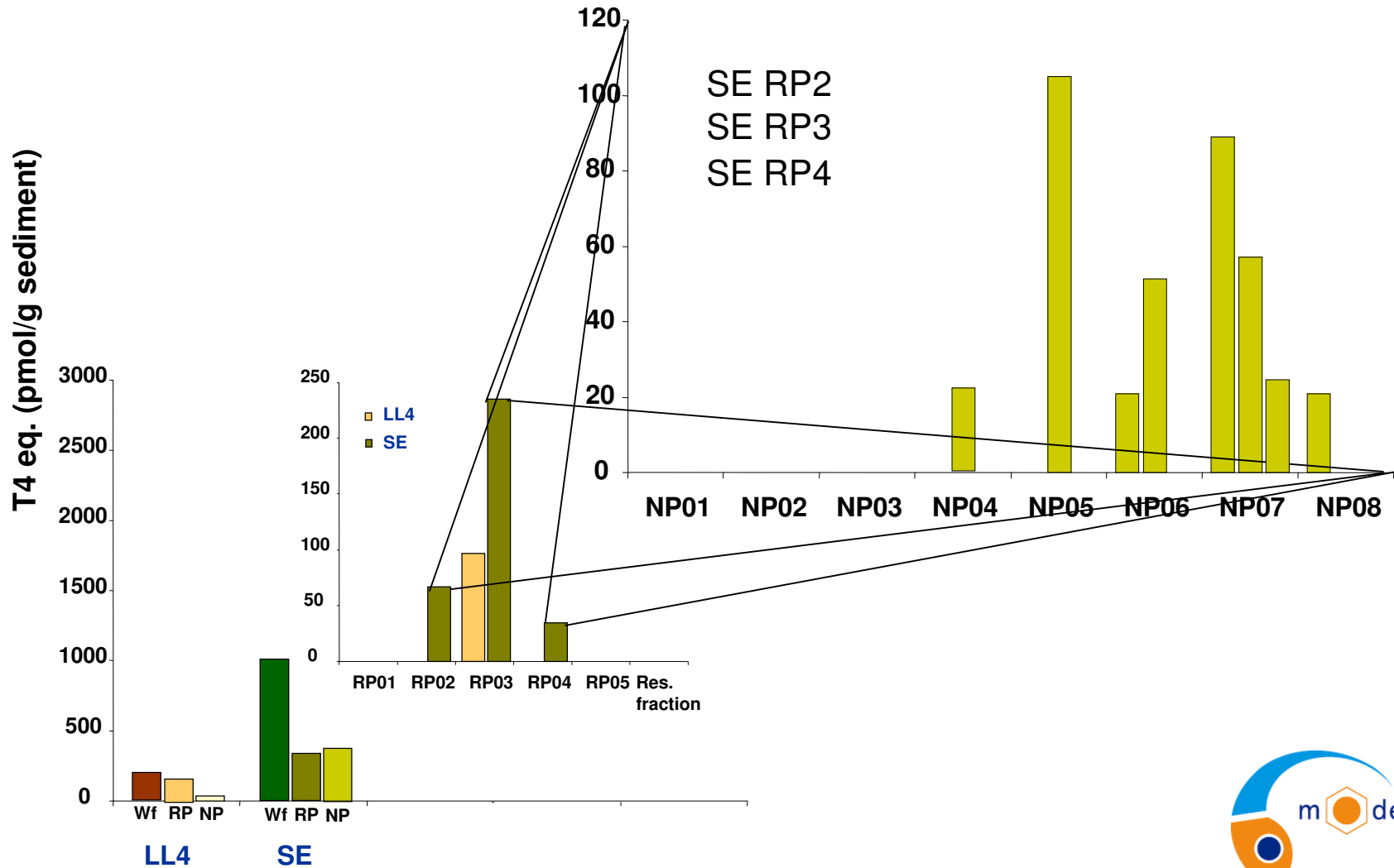


# EDA results/ TTR Binding assay

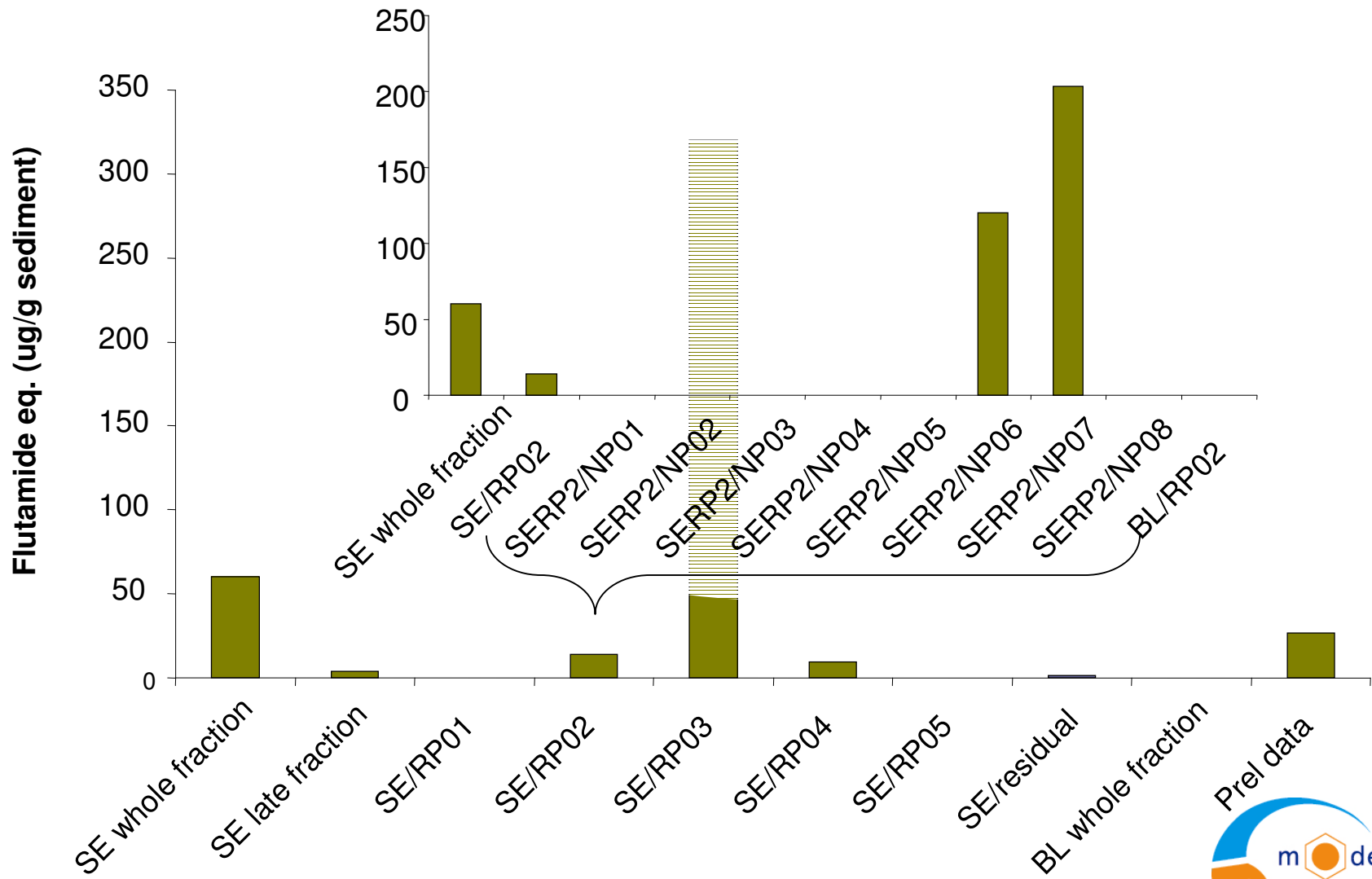




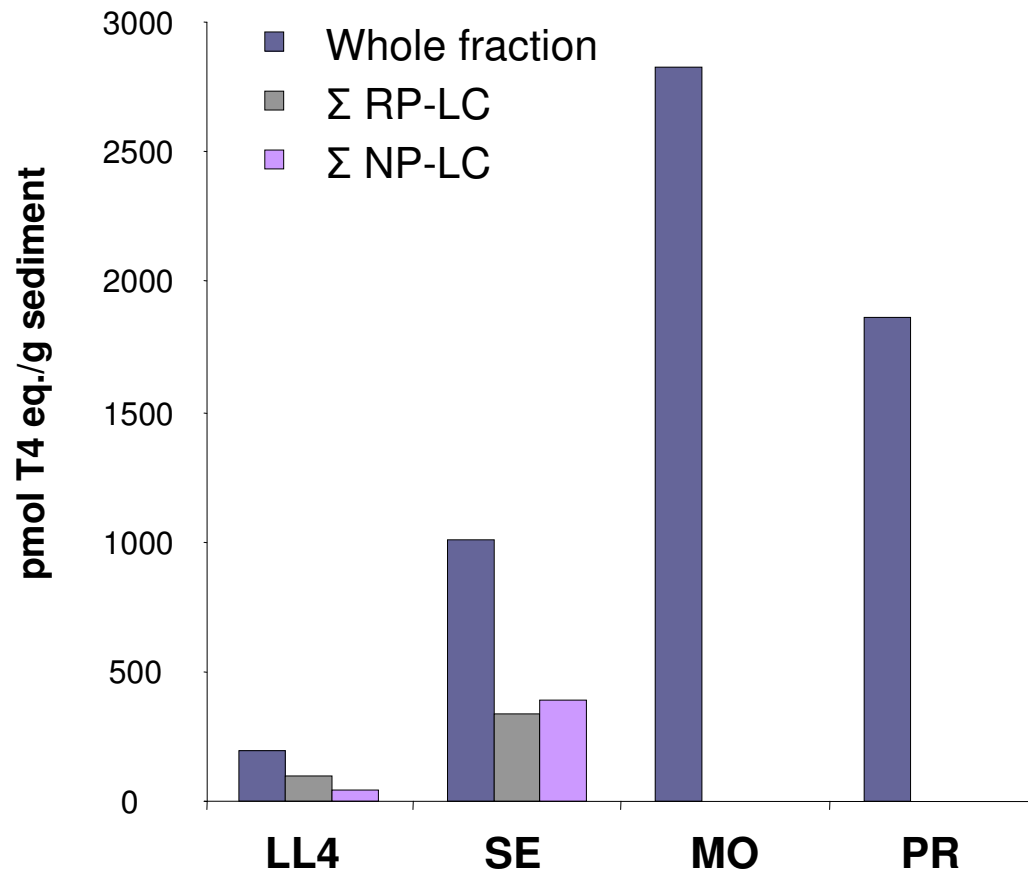
# EDA results/ TTR Binding assay



# EDA results/ anti AR-CALUX



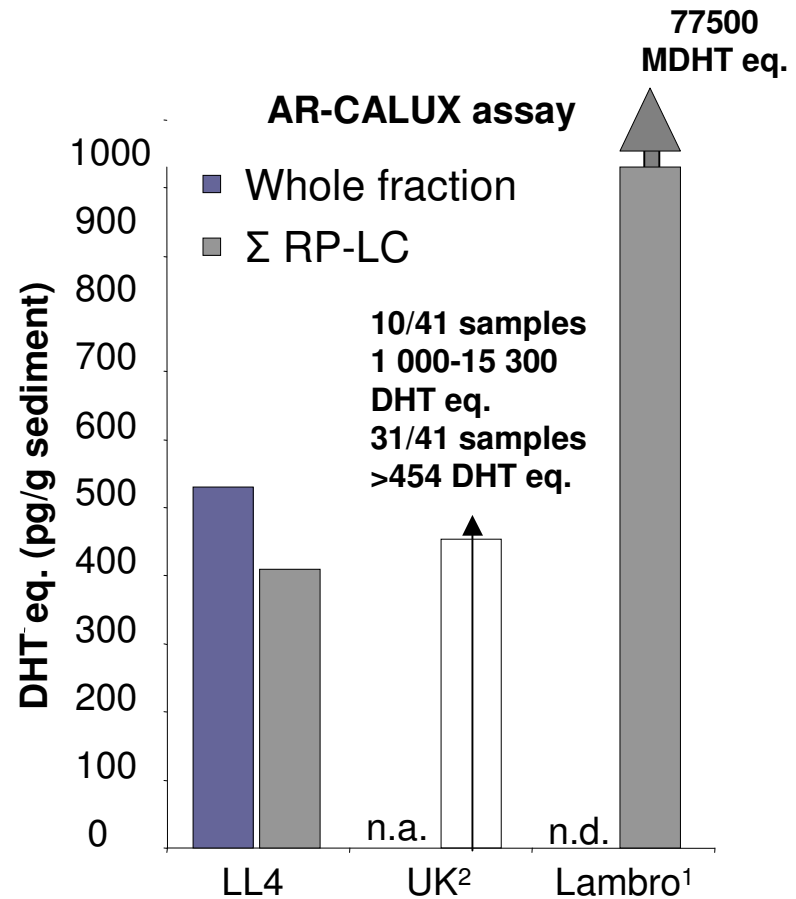
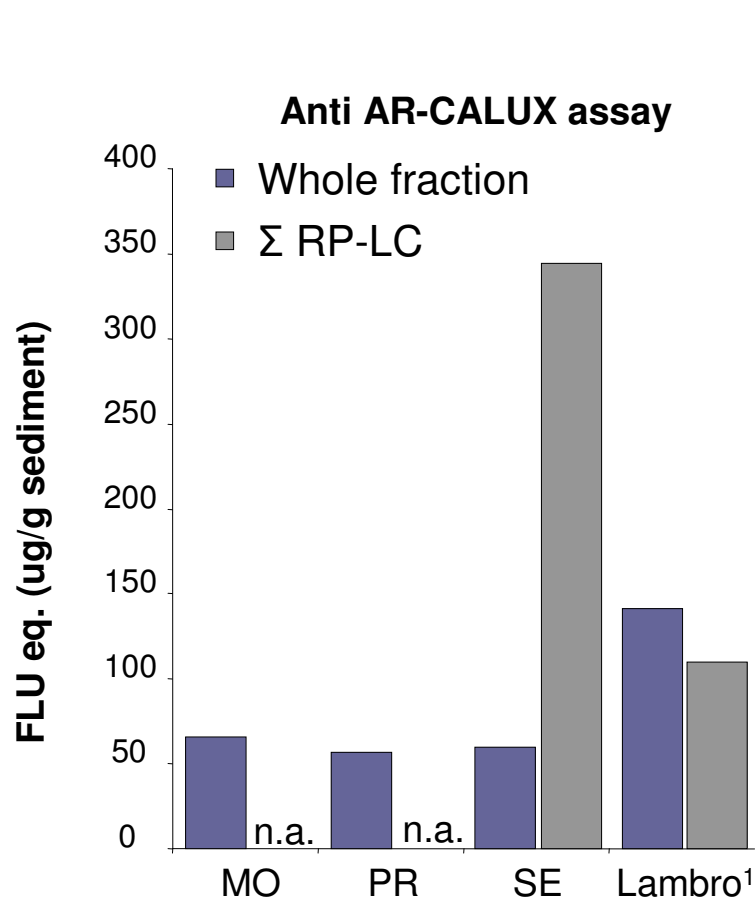
# Summary and comparison/ T4 equivalency



6-16 pmol T4 eq./g  
sediment (Zierikzee, NL)

Houtman *et al.* 2004

# Summary and comparison/ (anti-)androgenogenicity



<sup>1</sup> Urbatzka *et al.* 2007, <sup>2</sup> Thomas *et al.* 2002

# Effect Directed Analysis / Identification

## Chemical analysis

GC-MS

Full scan

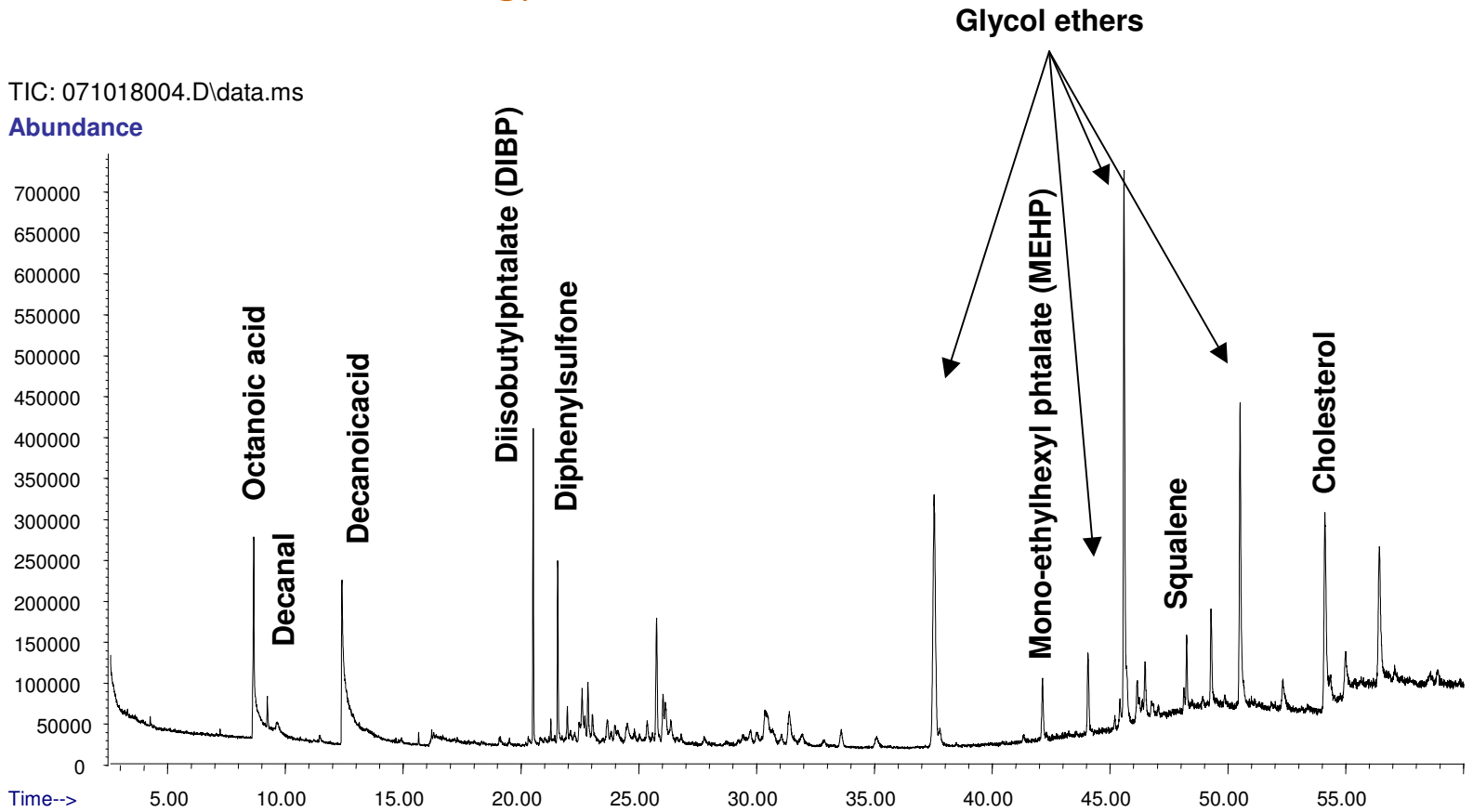
Amdis

NIST



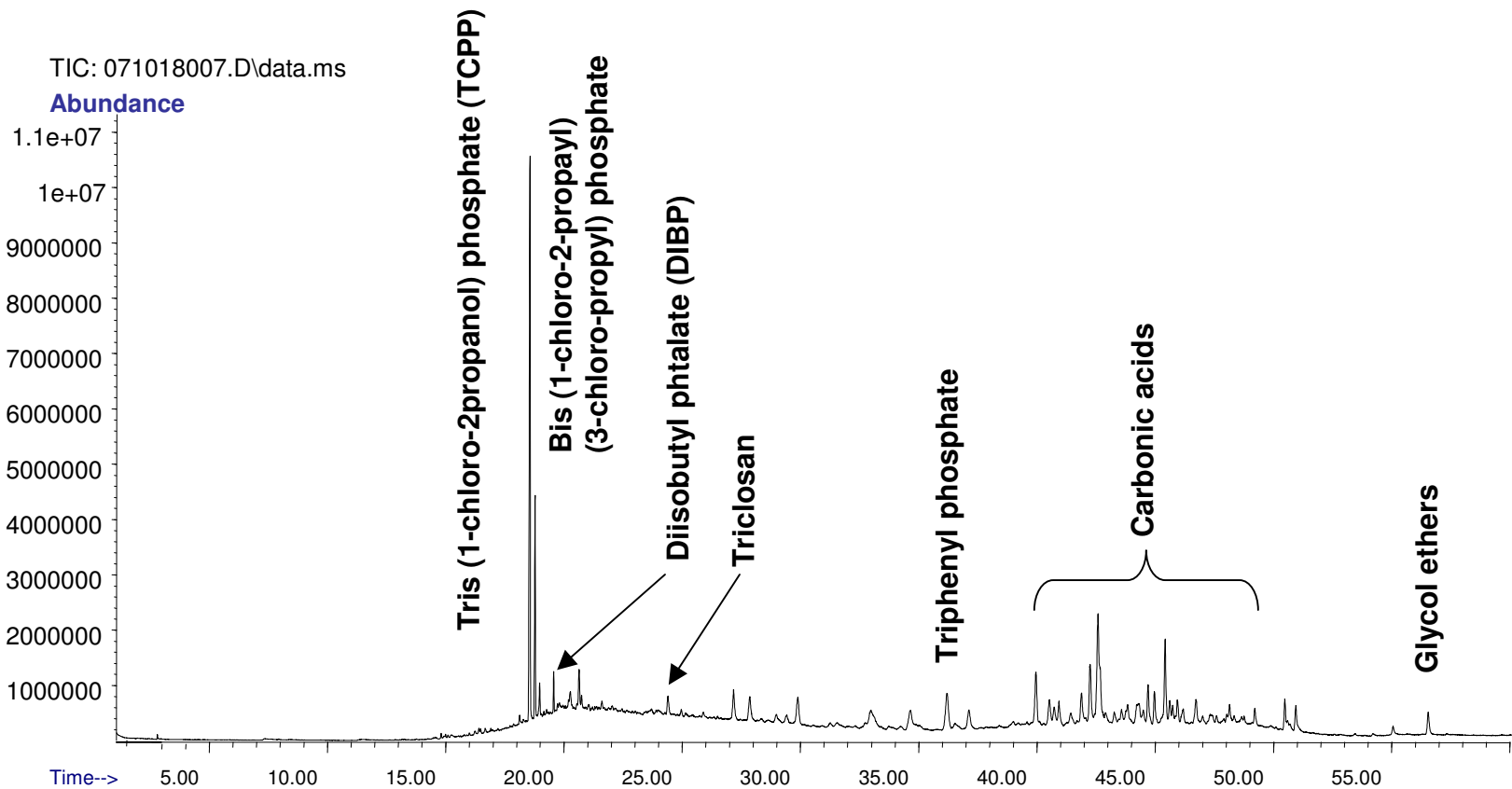
# Chemical analysis

LL4RP3/NP7



# Chemical analysis

SERP2/NP7



# Future Issues

## Chemical analysis

GC-MS

Full scan  
Amdis  
NIST

LC-MS/MS

GCxGC-TOF

Accurate mass

## Identification

RT (several columns)

Mass spectra

NMR

Accurate mass

## Confirmation

Analytical

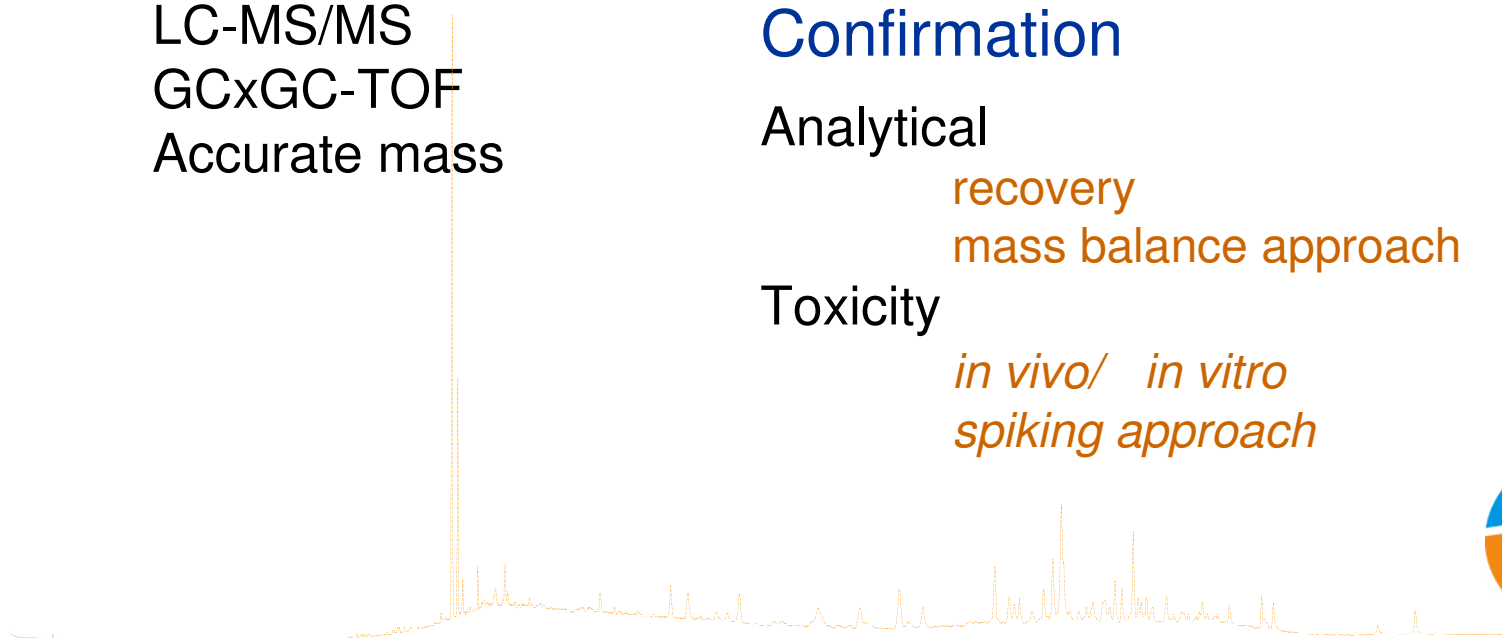
recovery

mass balance approach

Toxicity

*in vivo/ in vitro*

*spiking approach*





Thank you for your attention!

