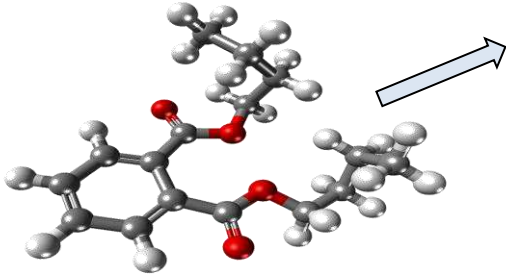


# **Danskernes udsættelse for hormonforstyrrende stoffer**

Seniorforsker, kemiker Hanne Frederiksen  
Afdeling for Vækst og Reproduktion, Rigshospitalet

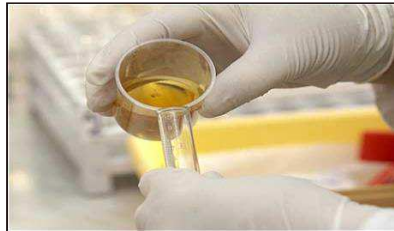
# Måling af Hormonforstyrrende stoffer

**Eksponering**



Serum  
Fedtvæv  
Sædvæske  
Fostervand  
Brystmælk

**Metabolitter udskilles i urin (4-24 timer)**



# Ikke-persisterende stoffer



## Phthalater

Plastblødgørende stoffer i industrielle produkter



## Parabener

Anti-mikrobielle konserveringsmidler



## UV-filtre



## Phenoler

Polykarbonat og epoxy-resin



## Triclosan og Triclocarban

Anti-mikrobielle konserveringsmidler

➤ Optages via kosten, ved indånding og gennem huden

➤ Anti-androgene og østrogene effekter

## 32 Phthalat-metabolitter fra 14 phthalater

Phthalate diester		Human urine metabolite	
Di-methyl phthalate	DMP	Mono-methyl phthalate	MMP
Di-ethyl phthalate	DEP	Mono-ethyl phthalate	MEP
Di-iso-propyl phthalate	DPrP	Mono-propyl phthalate	MPrP
Di-n-butyl phthalate	DnBP	Mono-n-butyl phthalate	MnBP
		Mono-(3-hydroxybutyl) phthalate	MHBP
Di-iso-butyl phthalate	DiBP	Mono-iso-butyl phthalate	MiBP
Butylbenzyl phthalate	BBzP	Mono-benzyl phthalate	MBzP
Di-n-pentyl phthalate	DPP	Mono-n-pentyl phthalate	MPP
		Mono-(4-hydroxypentyl) phthalate	MHPP
		Mono-(4-oxopentyl) phthalate	MiPrP
Di-(2-ethyl-hexyl) phthalate	DEHP	Mono-(2-ethyl-hexyl) phthalate	MEHP
		Mono-(2-ethyl-5-hydroxyhexyl) phthalate	MEHHP
		Mono-(2-ethyl-5-oxohexyl) phthalate	MEOHP
		Mono-(2-ethyl-5-carboxypentyl) phthalate	MECPP
		Mono-(2-carboxymethyl-hexyl) phthalate	MCMHP
Di-n-hexyl phthalate	DHxP	Mono-n-hexyl phthalate	MHxP
		Mono-(5-hydroxyhexyl) phthalate	MHHxP
		Mono-(5-carboxypentyl) phthalate	MCPeP
Di-cyclohexyl phthalate	DCHP	Mono-cyclohexyl phthalate	MCHP
Di-n-heptyl phthalate	DHpP	Mono-n-heptyl phthalate	MHepP
		Mono-(6-hydroxyheptyl) phthalate	MHHpP
		Mono-(6-carboxyhexyl) phthalate	MCHxP
Di-octyl phthalate	DOP	Mono-octyl phthalate	MOP
		Mono-3-carboxypropyl phthalate	MCPP
Di-iso-nonyl phthalate	DiNP	Mono-iso-nonyl phthalate	MiNP
		Mono-hydroxy-iso-nonyl phthalate	MHiNP
		Mono-oxo-iso-nonyl phthalate	MOiNP
		Mono-carboxy-iso-octyl phthalate	MCIOP
Di-iso-decylphthalate	DiDP	Mono-iso-decyl phthalate	MiDP
		Mono-(9-hydroxydecyl) phthalate	MHiDP
		Mono-(9-oxodecyl) phthalate	MOiDP
		Mono-(9-carboxynonyl) phthalate	MCI DP

## 9 Phenoler

Bisphenol A	BPA
Triclosan	TCS
Triclocarban	TCCB
Benzophenone-3	BP-3
2,4-Dichlorophenol	2,4-DCP
2,5-Dichlorophenol	2,5-DCP
2,4,5-Trichlorophenol	2,4,5-TCP
2-Propylphenol	2-PP
4-Propylphenol	4-PP

## 7 Parabener

Methyl paraben	MeP
Ethyl paraben	EtP
iso-Propyl paraben	i-PrP
n-propyl paraben	n-PrP
iso-Butyl paraben	i-BuP
n-Butyl paraben	n-BuP
Benzyl paraben	BzP

## 9 UV-filtre

Benzophenone	BP
Benzophenone-1	BP-1
Benzophenone-2	BP-2
Benzophenone-3	BP-3
5-chloro-2-hydroxybenzophenone	BP-7
4-methyl-benzophenone	4-MBP
4-hydroxy-benzophenone	4-HBP
3-(4-methylbenzylidene)-camphor	4-MBC
3-benzylidene camphor	3-BC



# Procent deltagere med målbare koncentrationer af ikke-persisterende stoffer



Børn (4-9 år) 2006-07



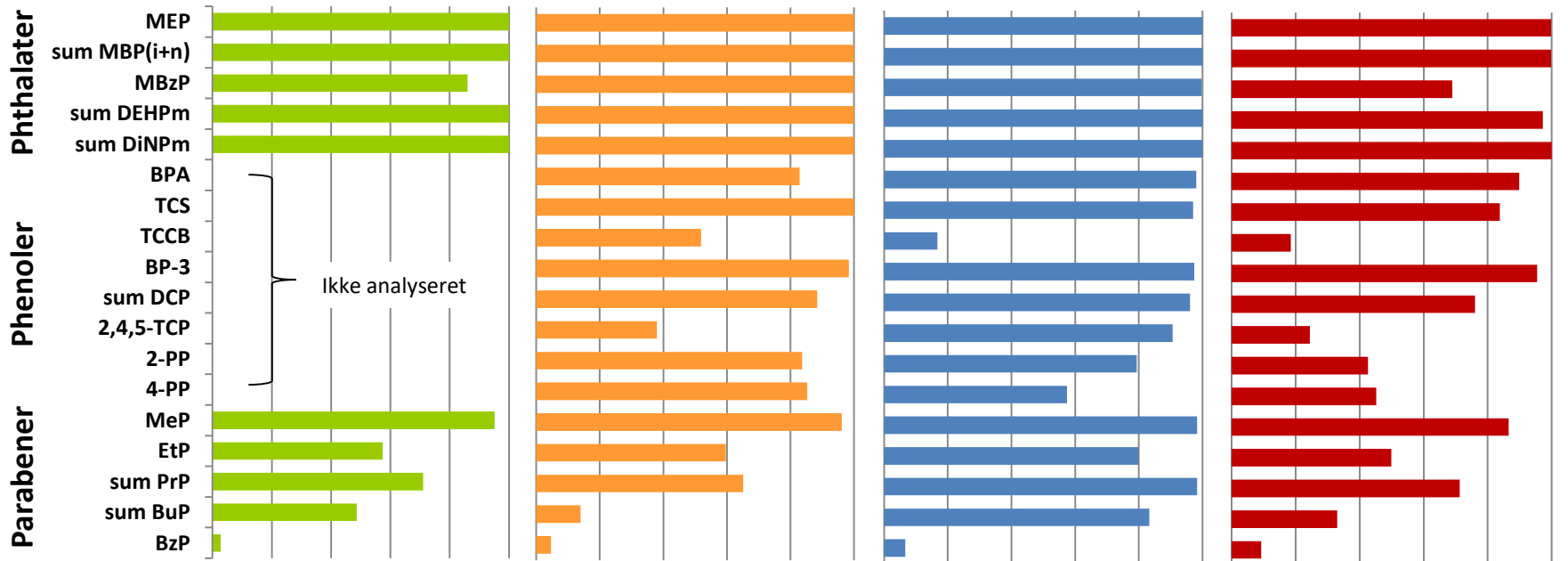
Pubertet (6-20 år) 2006-08



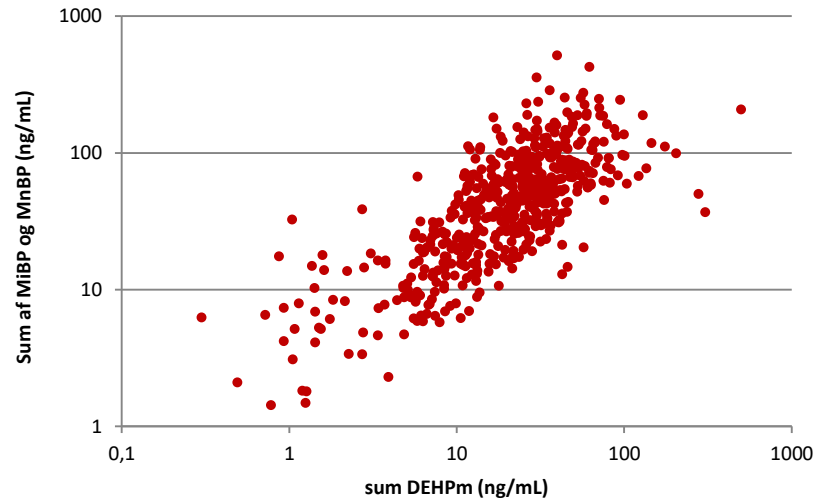
Mænd (18-27 år) 2007-09



Gravide kvinder, 2011-12



## Korrelation mellem ikke-persisterende stoffer hos gravide kvinder



➤ Danskere eksponeres for mange phthalater, phenoler og parabener samtidig

## Phthalat- eksponering gennem det første leveår



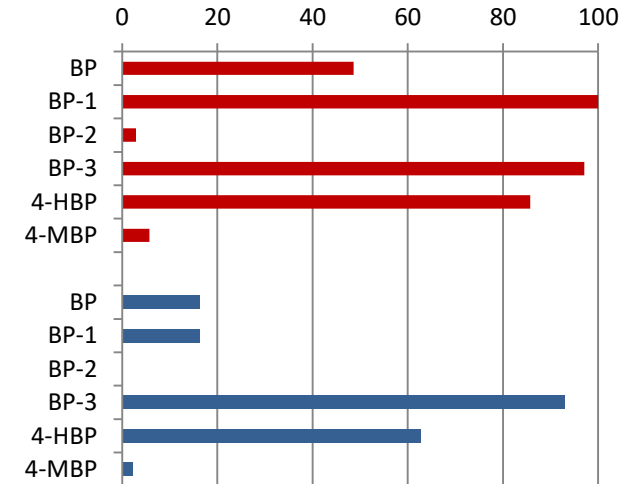
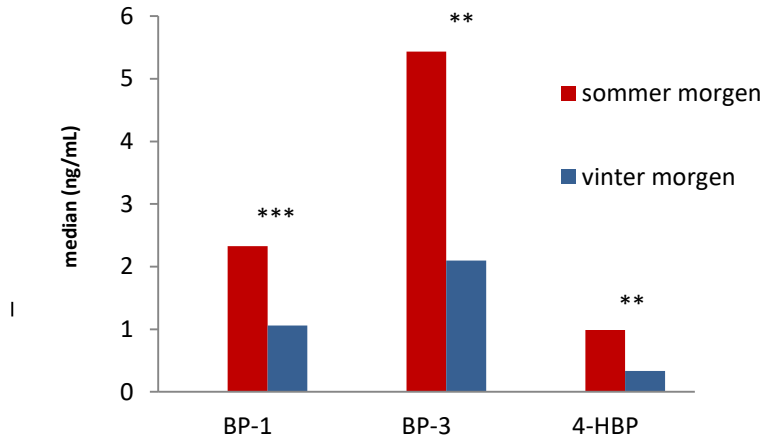
➤ Mindst 30% af alle børn eksponeres gennem det første leveår for phthalater på et niveau, der overskrider EFSA's anbefalinger for anti-androgene stoffer



# UV-filtre i danske børnehavebørn

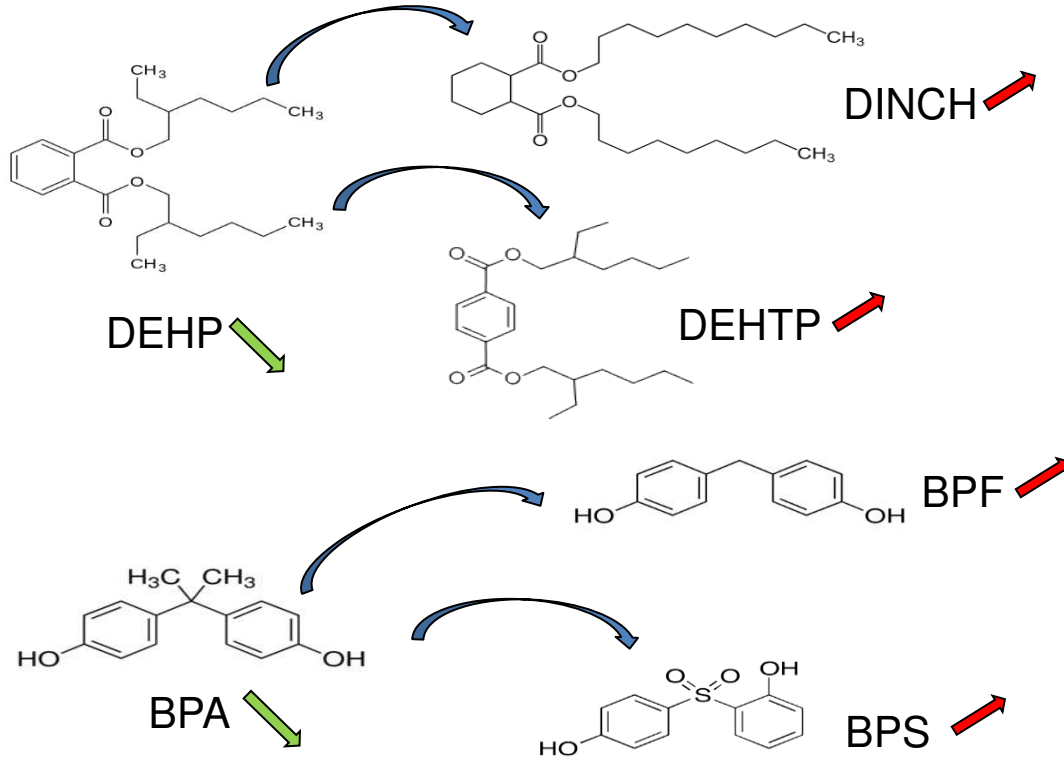


Procent børn med målbare UV-filterkoncentrationer



- Børn eksponeres for nogle UV-filtre året rundt
- Nogle UV-filtre bruges også som absorbere i forbrugerprodukter

# Udfasning og substitution



➤ Kræver nye metoder og nye analyser



