

# Association between persistent organic pollutants and diabetes

“The use of registers and biobanks”

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# Organochlorine pollutants and type 2 diabetes

- Type 2 diabetes, former “adult-onset diabetes”
- A metabolic disorder that is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency.
- Known risk factors:



**Genetic**



**Age**



**Exercise**



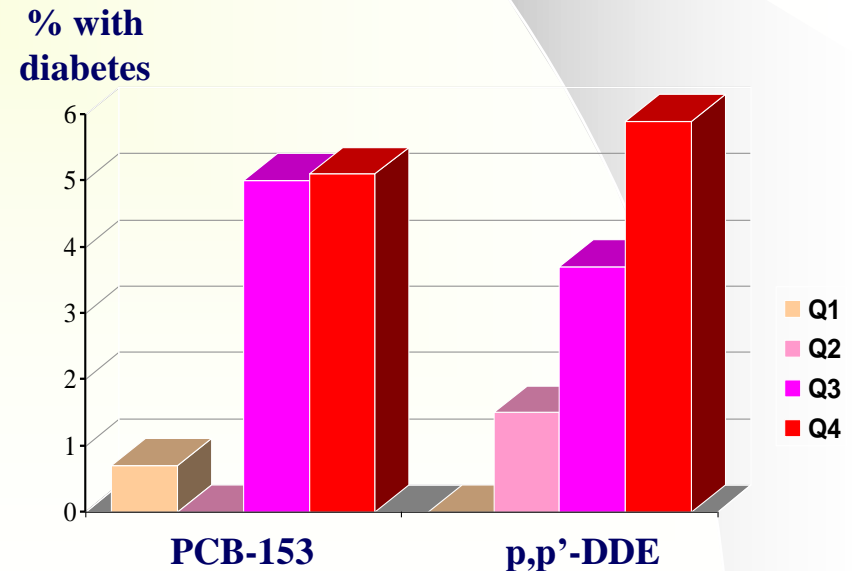
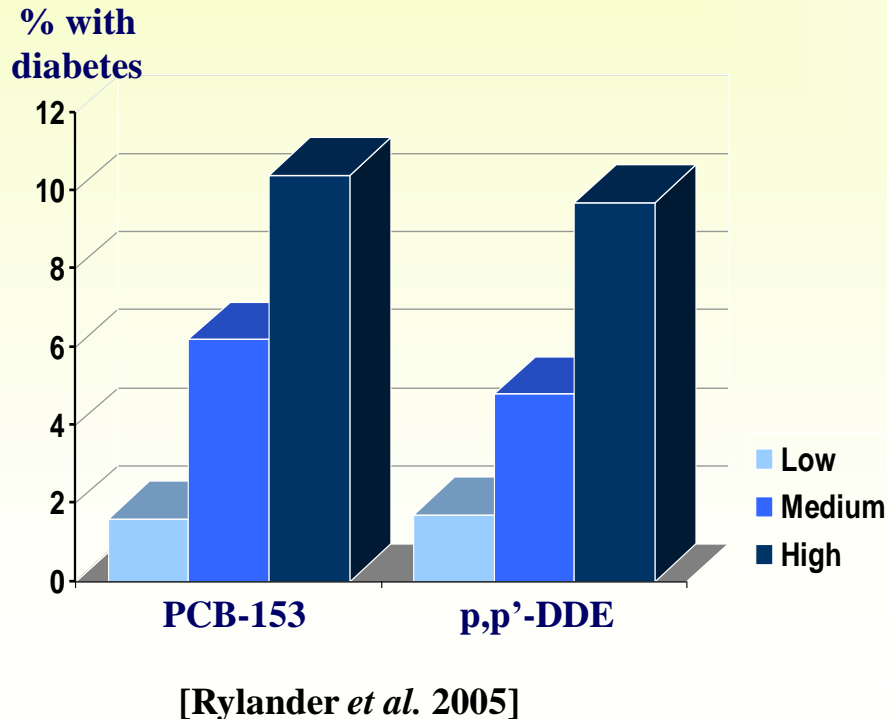
**Diet**



**Obesity**

# Cross-sectional studies - STRONG ASSOCIATIONS!!!

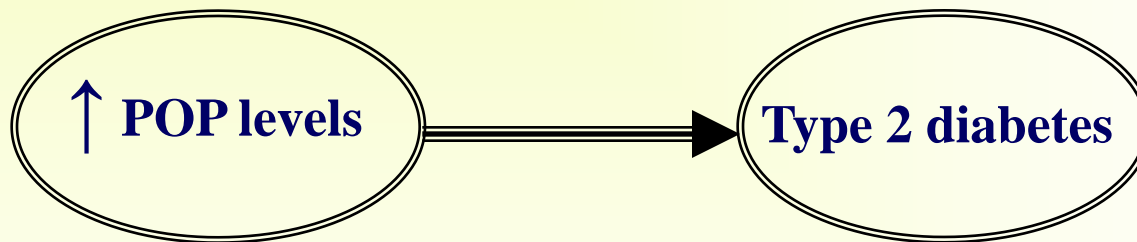
For instance, studies among fishermen's wives from Sweden.



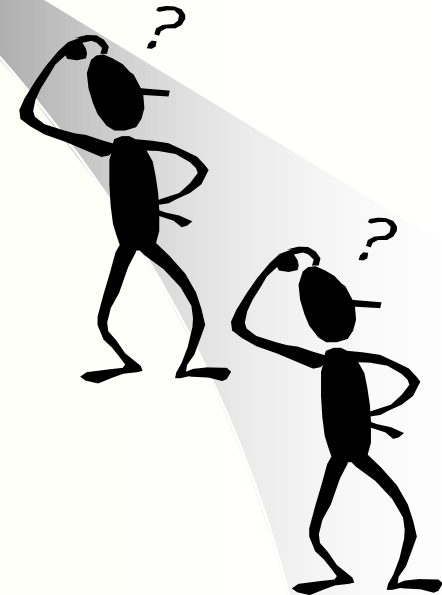
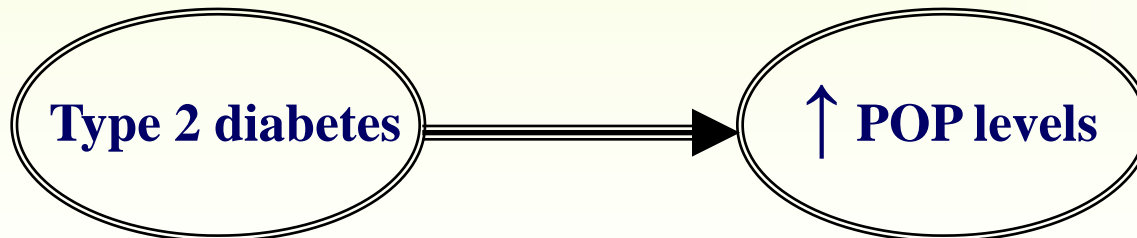
# Organochlorine pollutants and type 2 diabetes

**Association: YES!!! - Causality:???**

a)



b)



\*POP = Persistent Organochlorine Pollutants, t ex PCB, DDT, Dioxin, ...

# Registers in Sweden

- In Sweden all individuals have a unique ID NUMBER (personnel code number)
- Population register
- Multi-generation register
- .
- .
- .
- Occupational register
- Pharmaceutical register
- .
- .
- Medical Birth Register (1973- )
- Congenital Malformation Register
- Cancer Register (1958- )
- Diabetes Register
- Fracture Register
- In-patient Register
- .
- .
- .
- Cause of Death Register (1952- )



From an epidemiological point of view these registers are fantastic research resources!!!



# Registers

+

# Biobanks

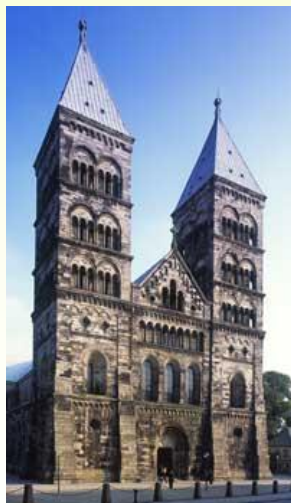


**From an epidemiological point of view these registers in combination with biobanks gives us sometimes unique research possibilities!!!**

# Organochlorine pollutants and type 2 diabetes

## Cohort study (follow-up study)

### The WHILA study (=Women Health In Lund Area)



Women in the Lund region

Age 50-59 years

1995-2000

Interviewed

Serum samples

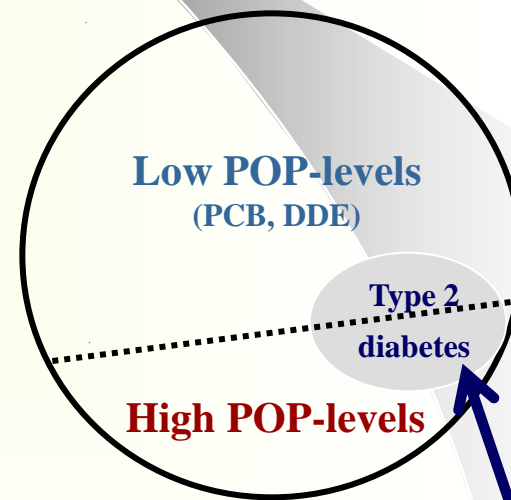
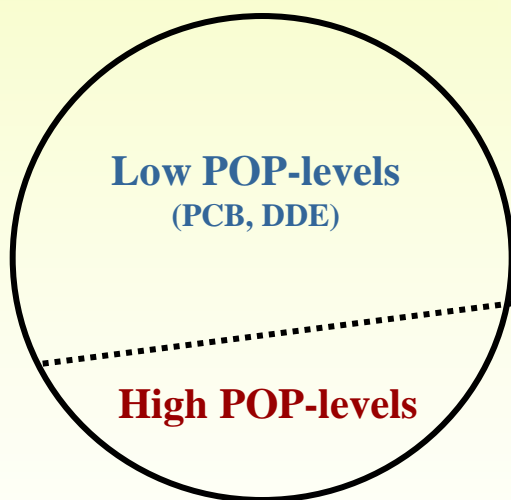
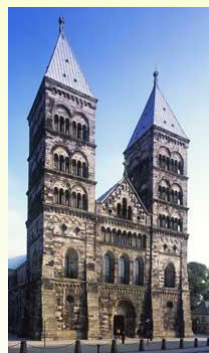
~7000 women



# Organochlorine pollutants and type 2 diabetes

## Population:

WHILA (i.e. those without type 2 diabetes at baseline)



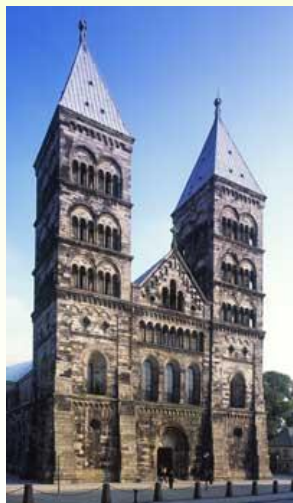
via  
register  
linkage



# Organochlorine pollutants and type 2 diabetes

## A case-control study

### The WHILA study (=Women Health In Lund Area)



Women in the Lund region

Age 50-59 years

1995-2000

Interviewed

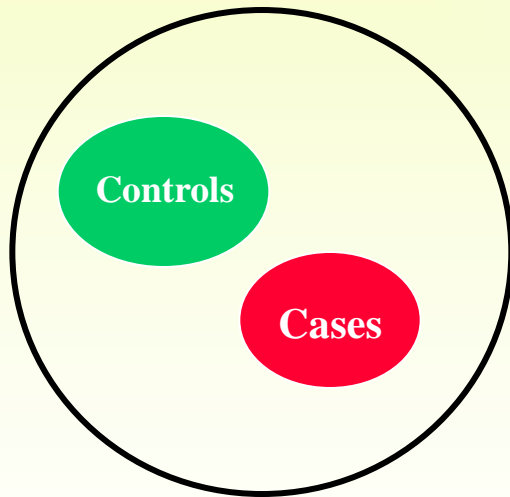
Serum samples

~7000 women



# Case-control study

## Population The WHILA cohort



### **CASES:**

Women diagnosed with type 2 diabetes after the baseline investigation (n=371).

### **CONTROLS:**

Women NOT diagnosed with type 2 diabetes after the baseline investigation.

**Our task was to find out the exposure distributions among the cases and the controls.**

# RESULTS

Included	n	PCB-153		p,p'-DDE	
		OR	95% CI	OR	95% CI
All	371	0.99	(0.71, 1.4)	1.1	(0.76, 1.5)
>3 years	107	1.4	(0.72, 1.6)	1.5	(0.80, 2.8)
>7 years	39	1.6	(0.61, 4.0)	5.5	(1.2, 25)

>1790 pg/mL vs  
 ≤1790 pg/mL (ref)

>4600 pg/mL  
 ≤4600 pg/mL (ref)

# Organochlorine pollutants and diabetes - what is the current evidence?

Two reviews published during 2013

1) Taylor *et al.* Environ Health Perspective 2013;112:774-83.

- \* A National Toxicology Program (NTP) Workshop Review
- \* >70 epidemiological studies (until 2011)
- \* Only few longitudinal studies

“...overall, evidence is sufficient for a positive association of some organochlorine POPs with type 2 diabetes. Collectively these data are not sufficient to establish causality.”

2) Kuo *et al.* Curr Diab Rep 2013;13:831-49.

- \* 11 new articles (2 prospective studies)

“...the evidence is suggestive for a relationship between persistent organic pollutants and diabetes ”

“...the need for additional prospective studies...”