

# Diesel exposure characterisation in a case-control study of lung cancer

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Taiwan



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Pointer 36°26'01.08" N 64°08'29.26" E

Streaming ||||| 100%

Eye alt 19011.59 km

# Exposure assessment (E.A.)

## *Why E.A.?*

- Different aims for E.A
- Control TLV/OEL (monitoring)
- Evaluation of improvements (control)
- Data for risk assessment (epidemiology)

# E.A. Strategy

- Individual/group
- Present; (effect in the future) strategy, variability
- Past; (true effect today) evaluation, reconstruction
- Generalization (in epidemiology)  
individual => group => occupation

# E.A. Black box

- We don't have the absolute truth
- Limitations, errors, simplifications=>  
Misclassification of exposure
- Factors to deal with in a case-control study of diesel exhaust and lungcancer

# Exposure assessment

## ***General aim:***

- Criteria for possible changing of OEL (Occupational Exposure Limit) for diesel exhaust

E.A.

**LU**ng **CA**ncer in **S**tockholm  
**LUCAS**

- Population based case-control study
- 1,042 lung cancer cases
- 2,364 controls
- Several exposures e.g diesel exhaust

# E.A.

## *Diesel engine exhaust:*

- Several hundreds of chemicals
- Gases
- Particles
- Depends of: Vihecle, fuel, engine, load, time gradienty

**DME** = diesel motor emmission



# E.A. Diesel exhaust

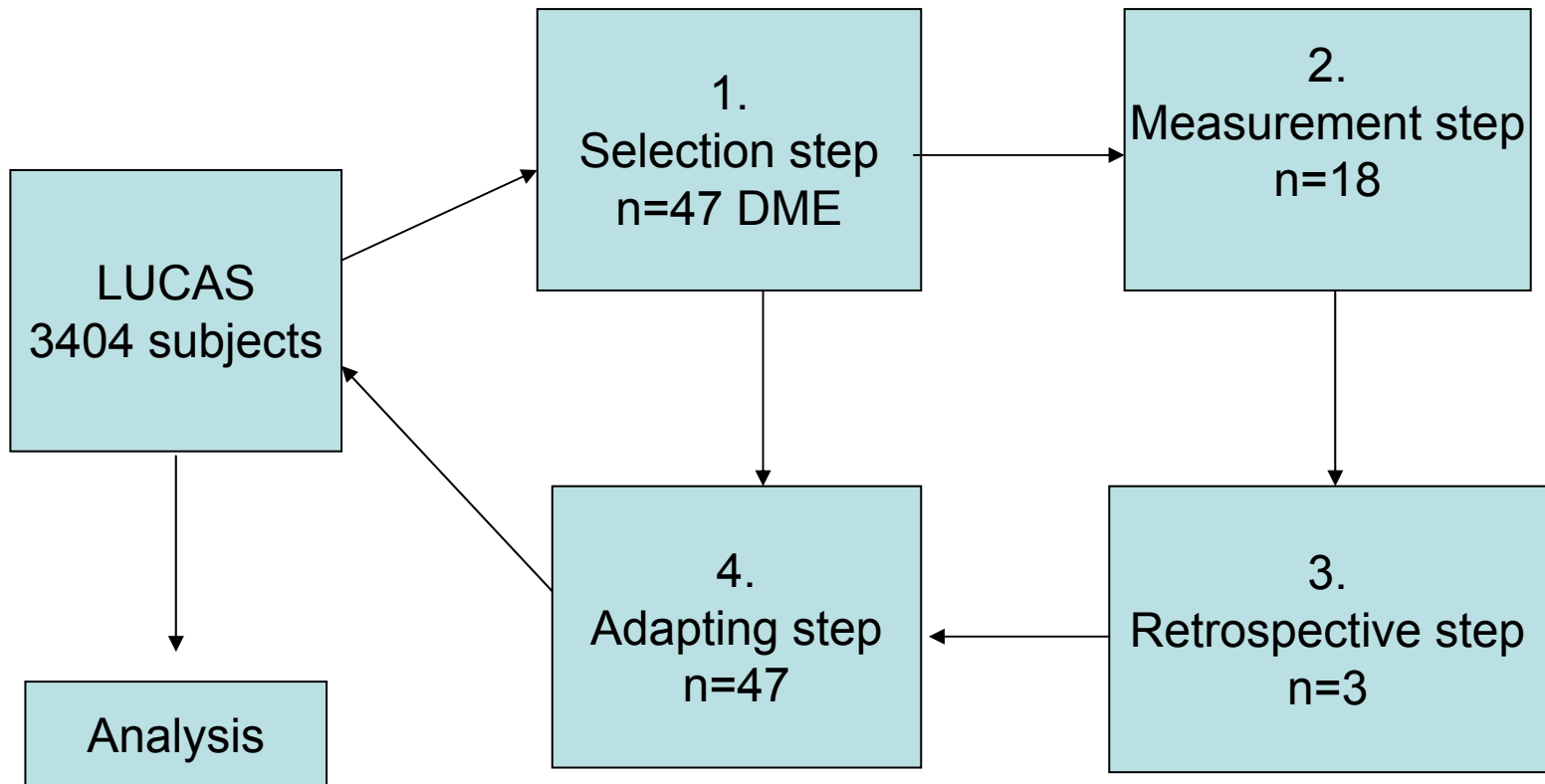
Diesel engine exhaust classified as probably carcinogenic to humans (group 2A) by International Agency on Research of Cancer (IARC), 1989

# E.A Model

## *Industrial hygiene process*

1. Selection step
2. Measuring step
3. Reconstruction step (JEM)
4. Occupational adapting step
5. Analysis

# Flow chart for IH process in LUCAS



# 1. Selection step

- Expert team (n=3)
- 3404 subjects => 15,000 occupational periods 1945-95
- Coded on occupations 5-digit (ISCO68) and industry 5-digit (ISIC Rev 2)
- Quality insurance
- Identified 1,000 occupational periods for 47 different DME exposed occupations

## 2. Measuring step; *Current level*

- Identify appropriate DME surrogates
- Choice of measuring methods and strategy
- 18 occupations measured, 90 subjects á 3 days
- Exposure level, variability and how different occupation relates to each other
- Today presented by Dr Marie Lewné
- E.g. bus garage workers (in 2003)

# Exposure levels, (year 2003)

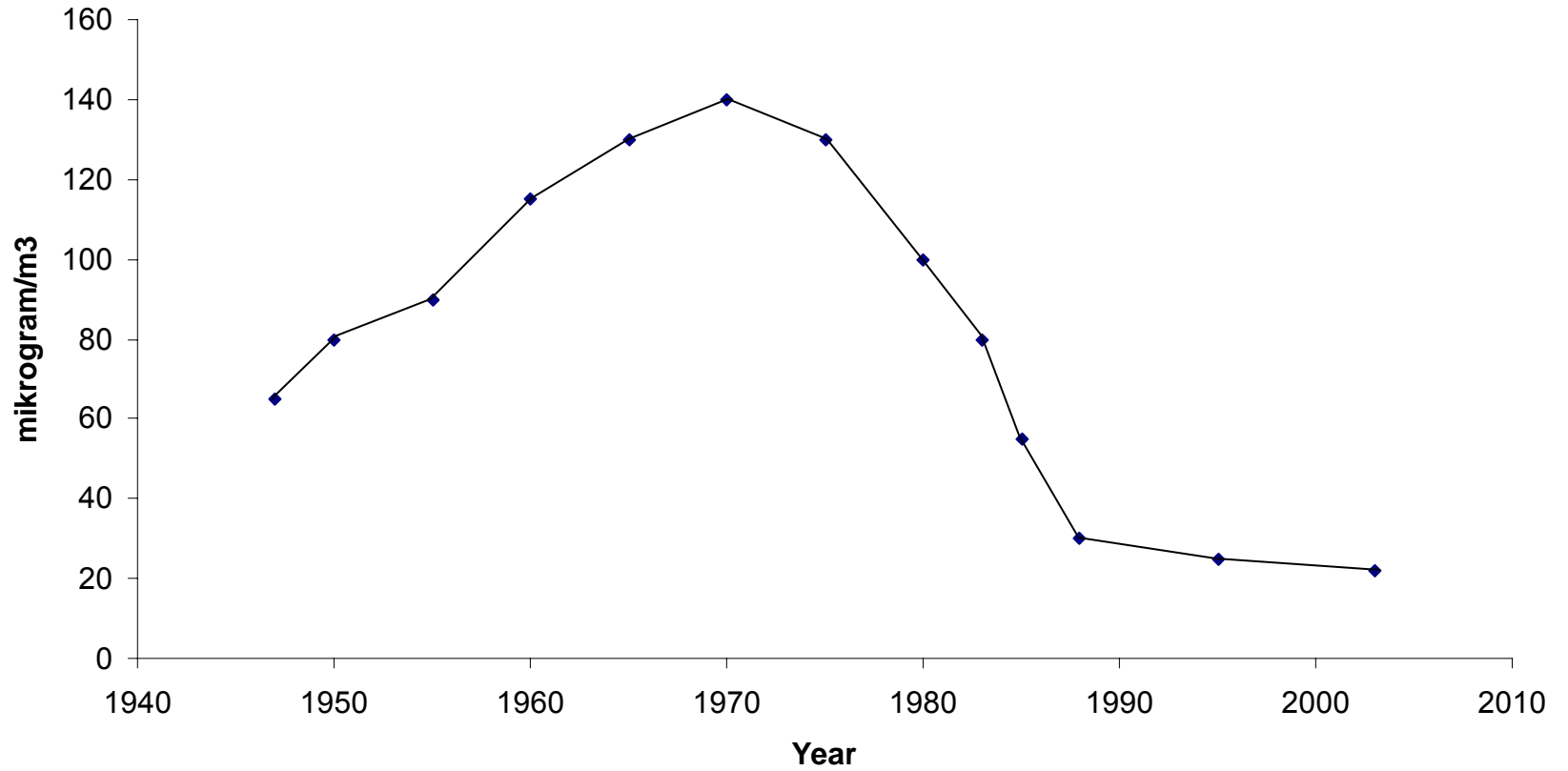
## Bus garage workers

- PM<sub>1</sub> 46 µg/m<sup>3</sup>
- PM<sub>2.5</sub> 105 µg/m<sup>3</sup>
- DataRAM 147 µg/m<sup>3</sup>
- EC (elementary carbon) 22 µg/m<sup>3</sup>
- TC (total carbon) 49 µg/m<sup>3</sup>
- NO<sub>2</sub> 240 µg/m<sup>3</sup>

# 3. Past level

- Reconstruction step
- JEM, job-exposure matrix
- Modelling for 3 occupations
- Construction of exposure curves 1945-1995 for EC and NO<sub>2</sub>
- Data sources: Old measurements, other knowledge
- Data on fuel, engines, load, vehicles etc.

### EC for bus garage workers





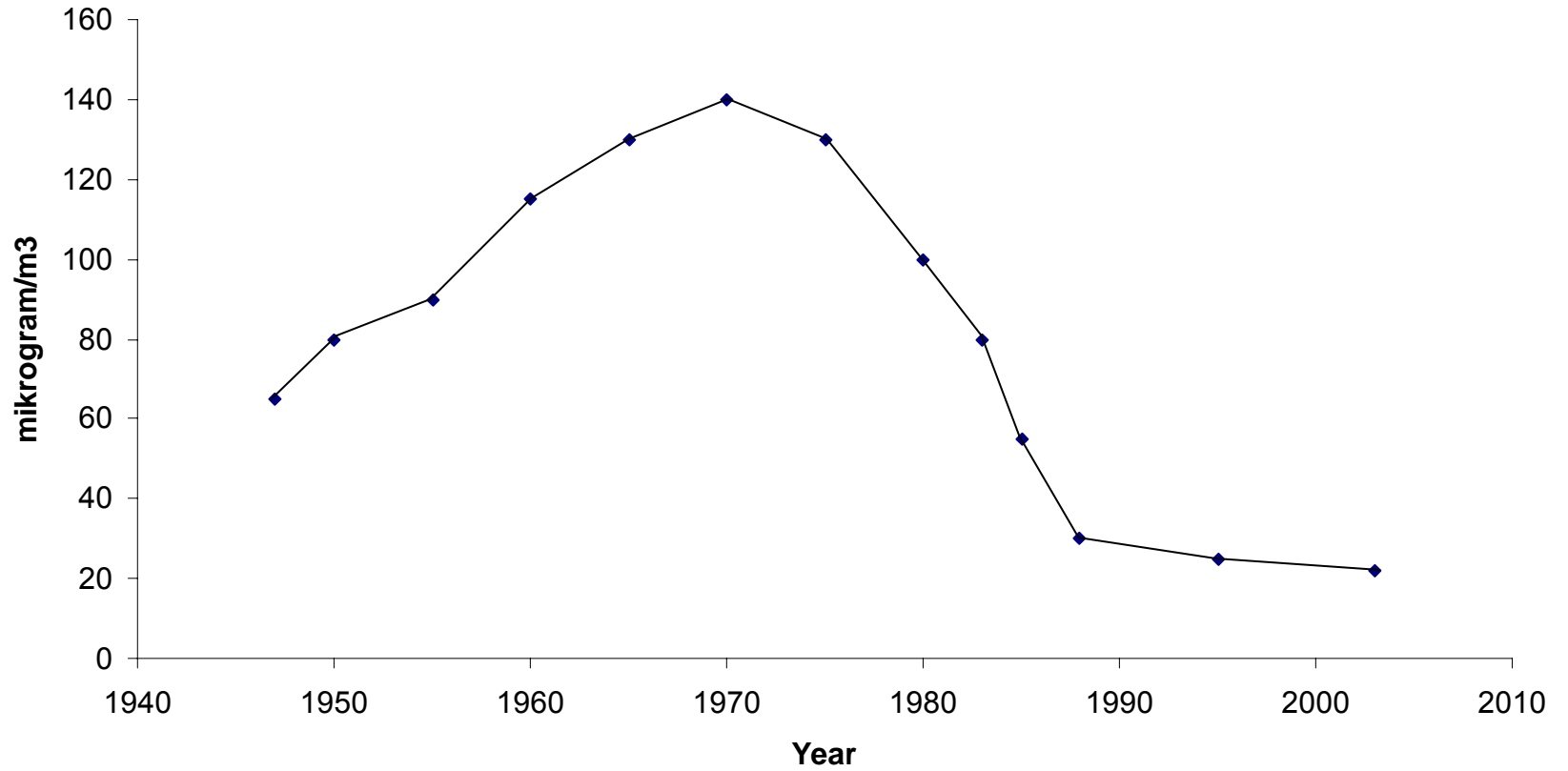
## 4. Adapting step

- Expert team, n=5
- Emanate from the 3 occupational curves in No. 3
- Adopt the 47 occupations by correction factors
- E.g. Busgarage level = 5.4 x cars garage exposure level for EC in year 2003

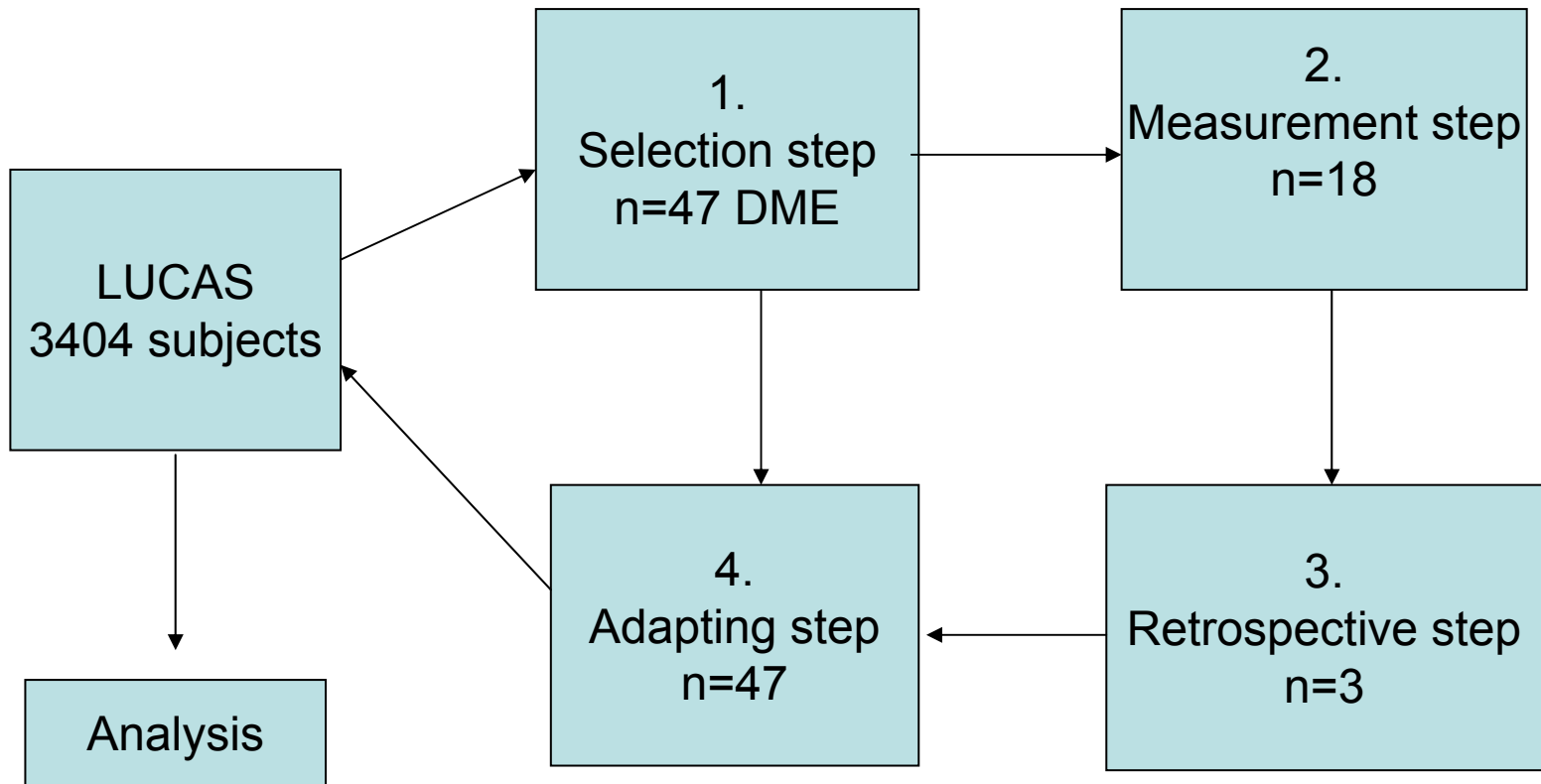
# Correction factors

- Bus garage workers 5.3
- Railway engine work shop 4.2
- Car mechanics 1.0
- Garage workers 1.3

### EC for bus garage workers



# Flow chart for IH process in LUCAS



# Summary

- Total DME characterization in epi time and resource consuming
- Total 3404 subjects were DME exposure assessed in a lung cancer study
- EC and NO<sub>2</sub>, DME surrogates
- Higher exposure levels during the 1970s
- Worst in tunnel construction activity = mining
- In a semi-quantitative earlier study DME dose-response relationship to lung cancer
- Now we will have the level, before summer 2008

# Thanks

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