# Health impacts and HBM in populations exposed to elemental mercury vapor or methylmercury

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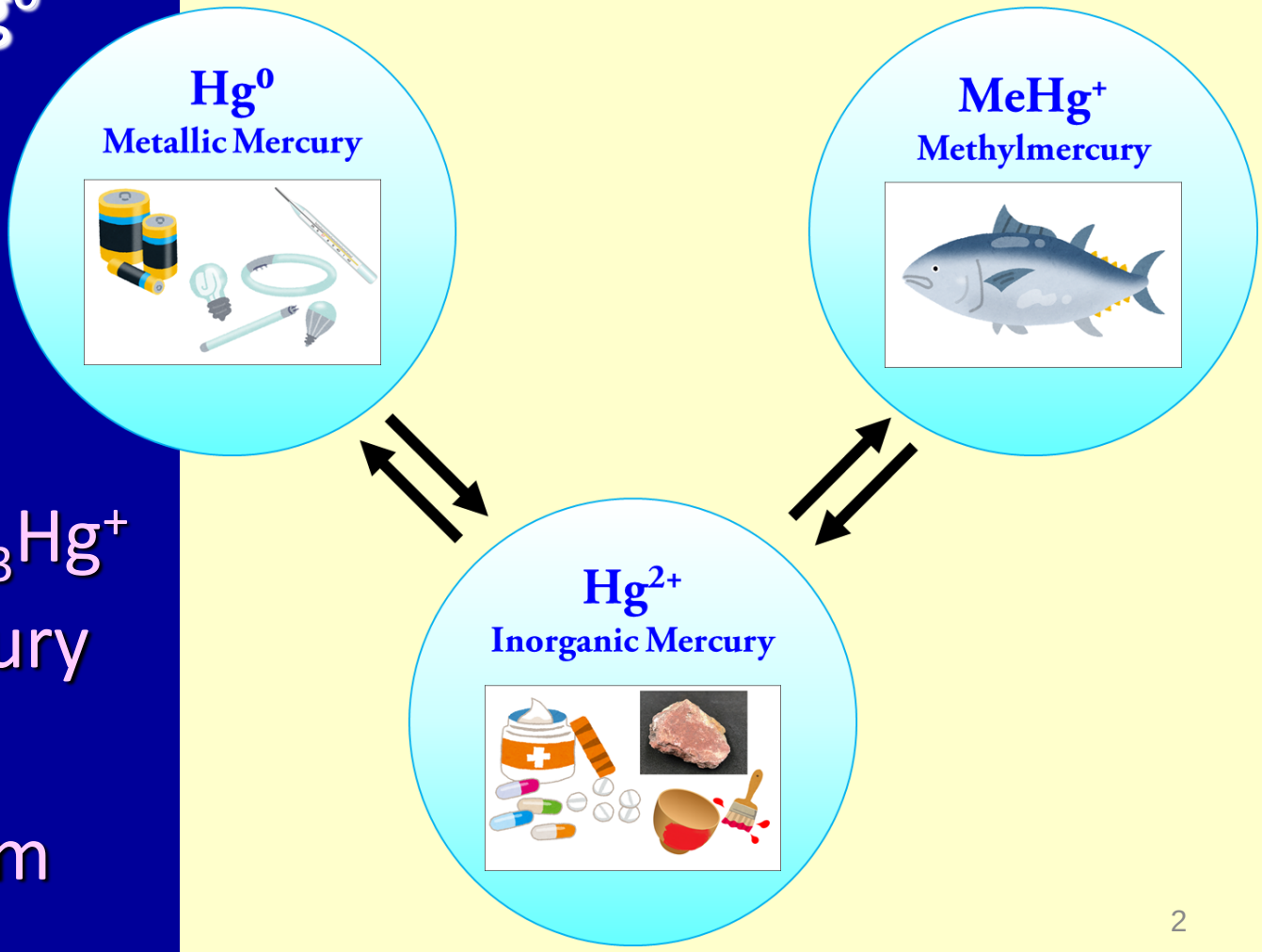
# Three Chemical forms of Hg

- Elemental Metallic : $Hg^0$
- Inorganic: $Hg^{++}$
- Organic: $CH_3Hg^+$ Methylmercury is the most common form



# Mercury use for gold extraction in ASGM

**Since 1980-**

Hg0

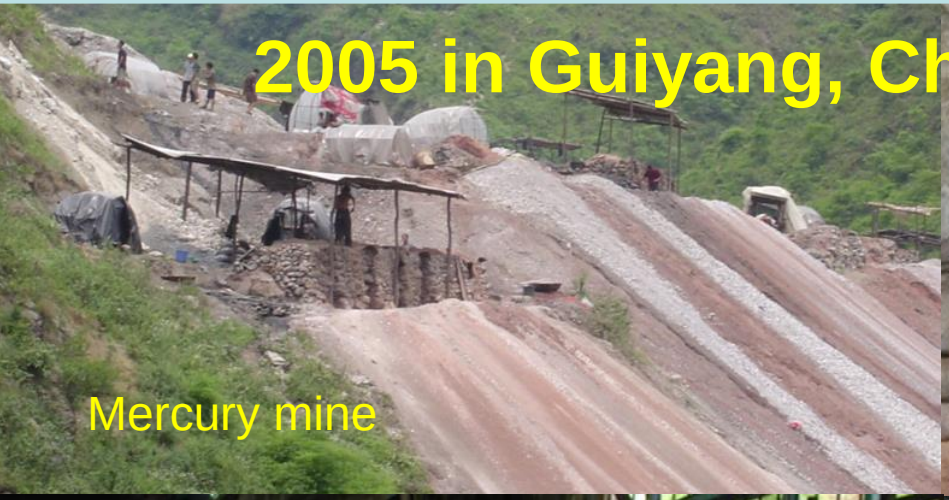

**Burning**

**Hg gold amalgam** → **Gold !**

# Symptom of Hg vapor intoxication


Video from UNIDO

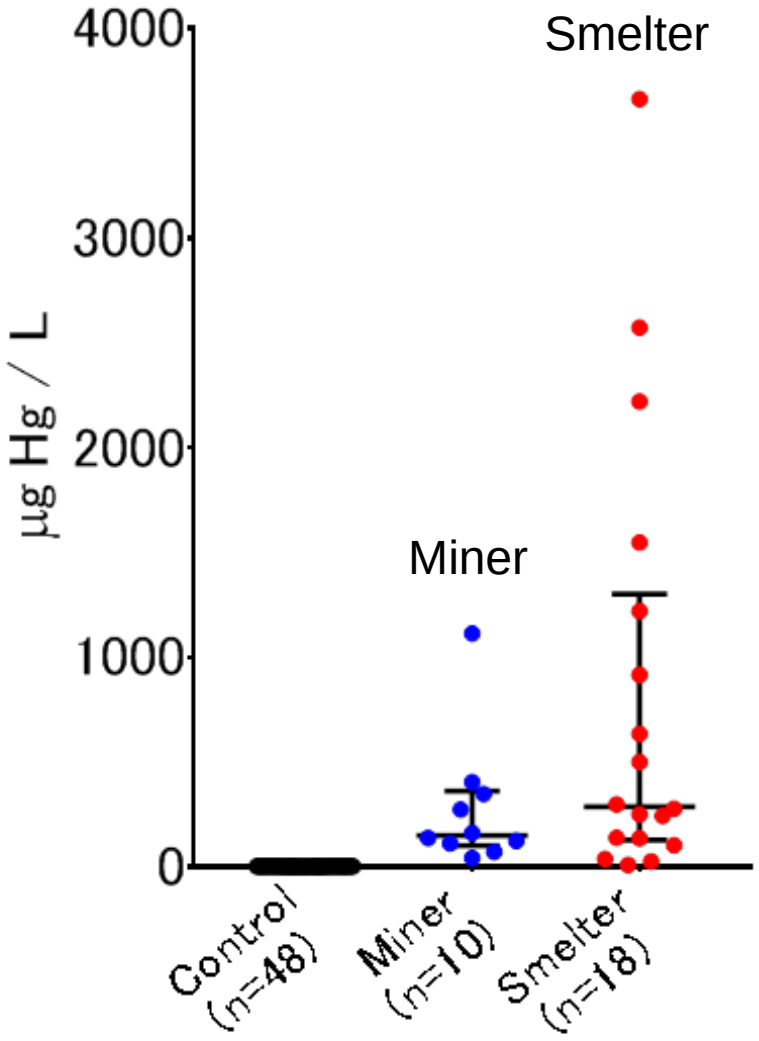
# HBM and health examination in Hg mine workers exposed to Hg vapor

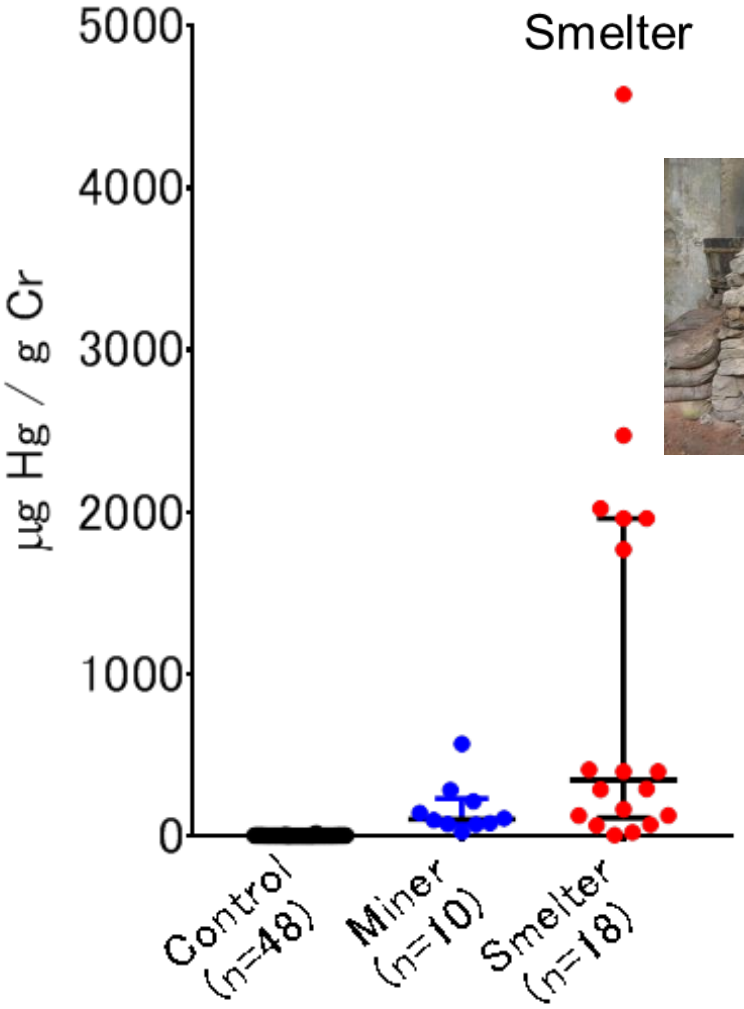






# Urinary Hg concentrations for controls, miners, and smelters



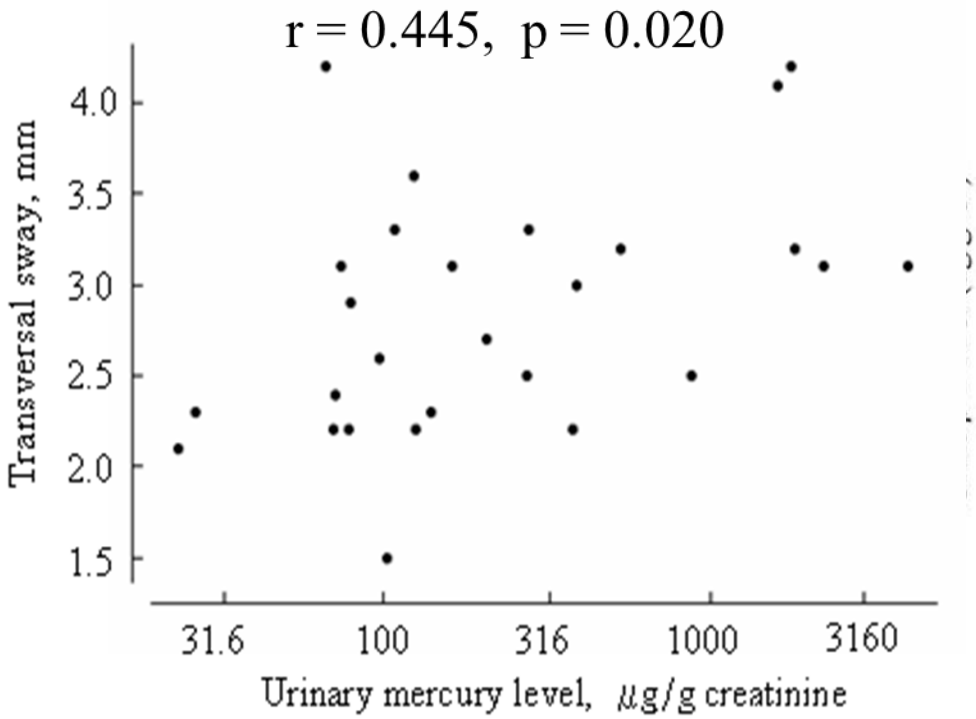

Sakamoto M et al. (2007)Environ Health Prev Med 12(2):66-70

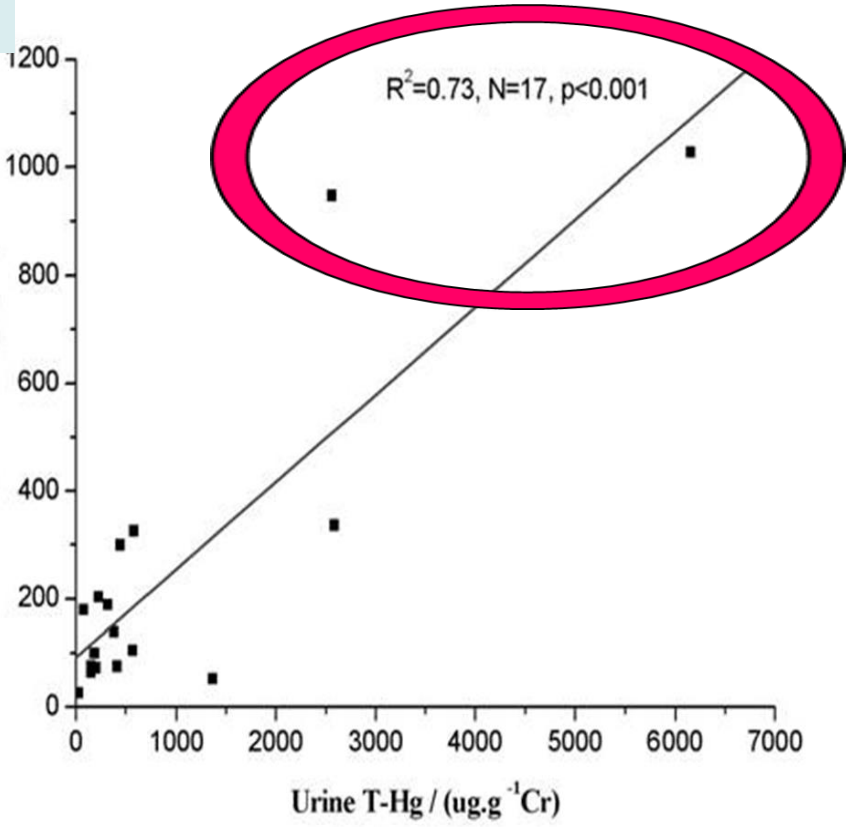
# Hand tremor intensity (mean±SD) between Hg mine workers and controls

| Frequency (Hz) | **Exposed workers (n=27)** | **Control subjects (n=54)** | P values |
|---|---|---|---|
| Dominant hand | | | |
| Total | **0.234±0.111** | 0.172±0.077 | 0.006 |
| 1-6 | **0.090±0.038** | 0.071±0.019 | 0.004 |
| 6-10 | 0.160±0.063 | 0.143±0.063 | 0.258 |
| 10-14 | **0.112±0.076** | 0.071±0.051 | 0.007 |

Iwata T, Sakamoto M, et al. Int Arch Occup Environ Health 70 (5): 381-387 (2007)

# Urinary THg vs postural sway



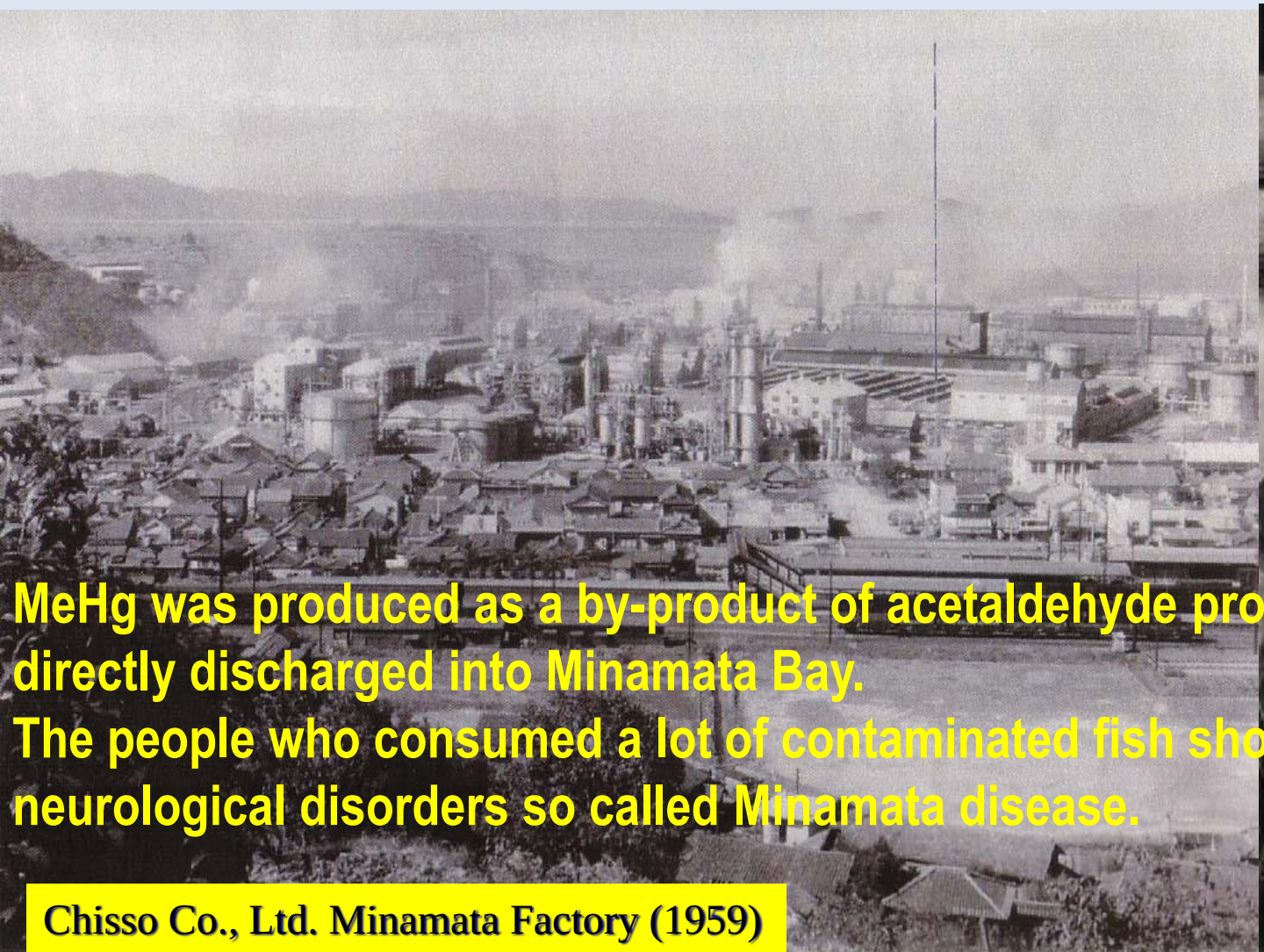

## Urinary THg vs Urine β2 MG

(biomarker of renal tubular resorption disorder)

Postural sway and renal disorder in Hg mine workers.

Li P, et al. (2008) Environ Res. 107(1):108-14.

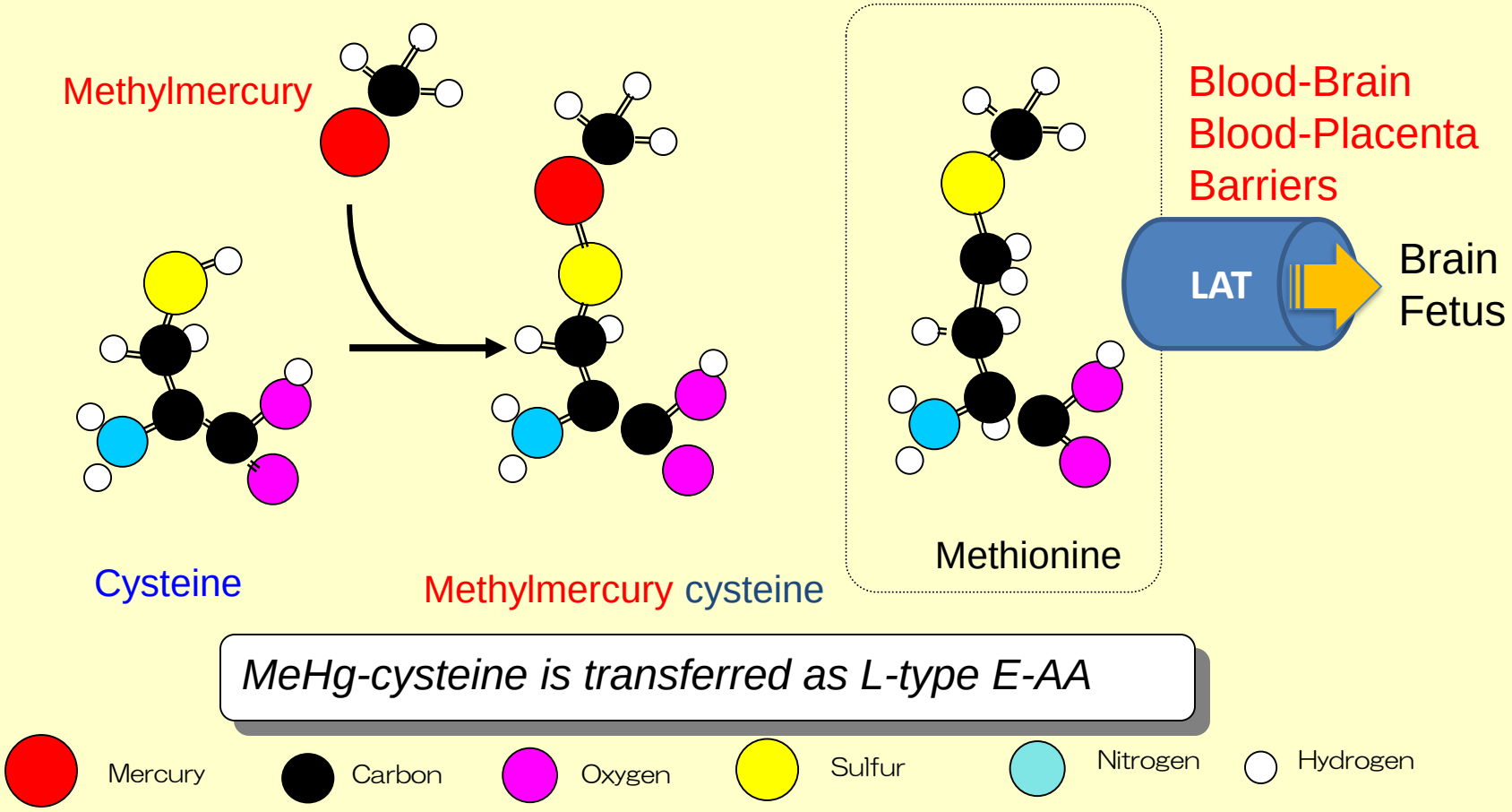
# Background of Minamata disease and MeHg pollution in Minamata Bay



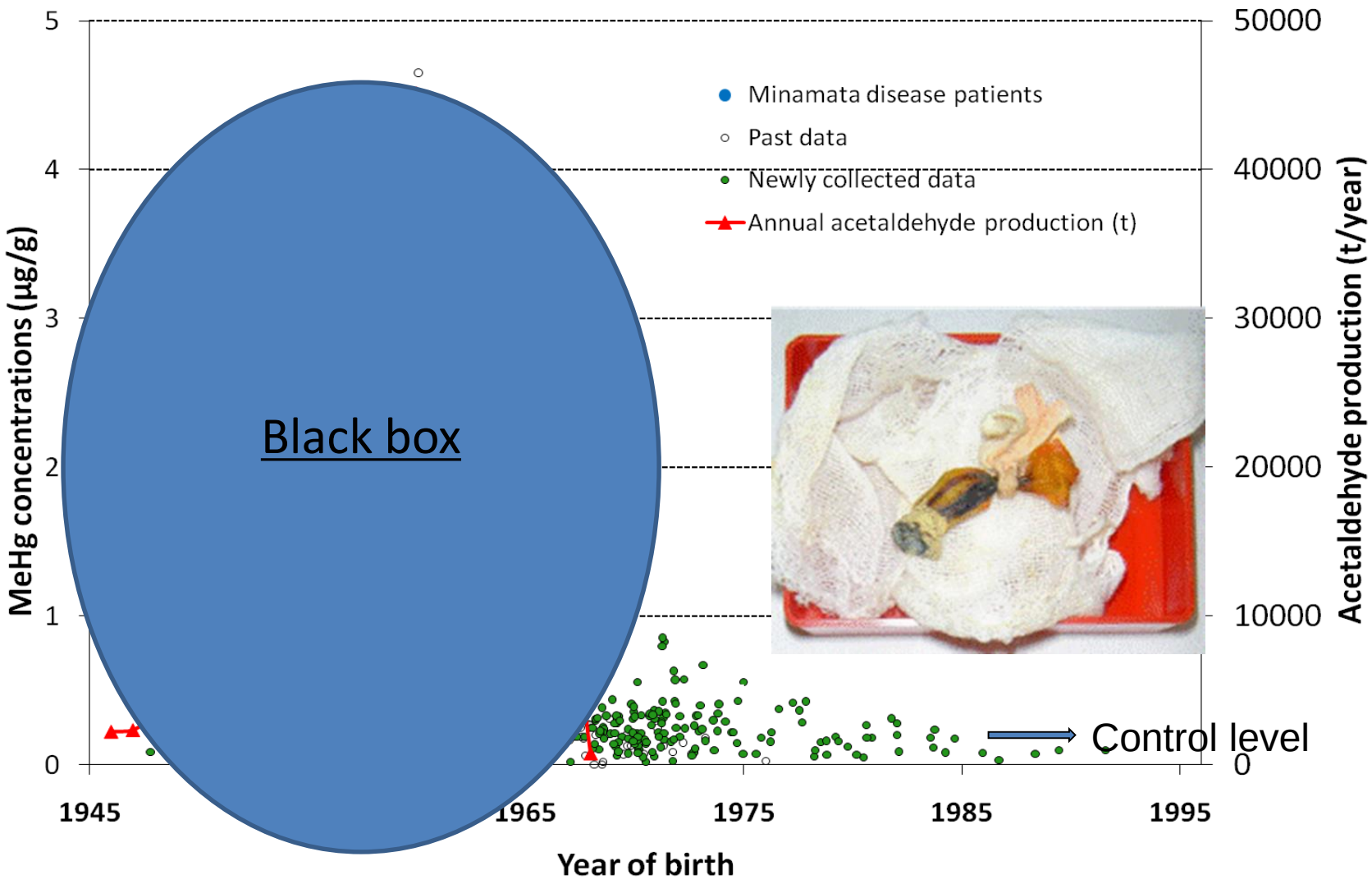
MeHg was produced as a by-product of acetaldehyde production and directly discharged into Minamata Bay.
The people who consumed a lot of contaminated fish showed neurological disorders so called Minamata disease.

Chisso Co., Ltd. Minamata Factory (1959)

# Methylmercury transfer to the brain and fetus




A Yasutake




# Historical time-course changes of MeHg concentrations in preserved umbilical cords from Minamata-area inhabitants

(2010 Env Saf Tox Sakamoto et al)

# Minamata Disease

Video from NIMD.

# MeHg Intoxication in Iraq

Video from Rochester University.

# Severe Fetal-type MeHg Intoxications

**Minamata disease 1956, 1965**

Photo by Eugene Smith

**Iraq MeHg intoxication 1971**

Photo by Bakie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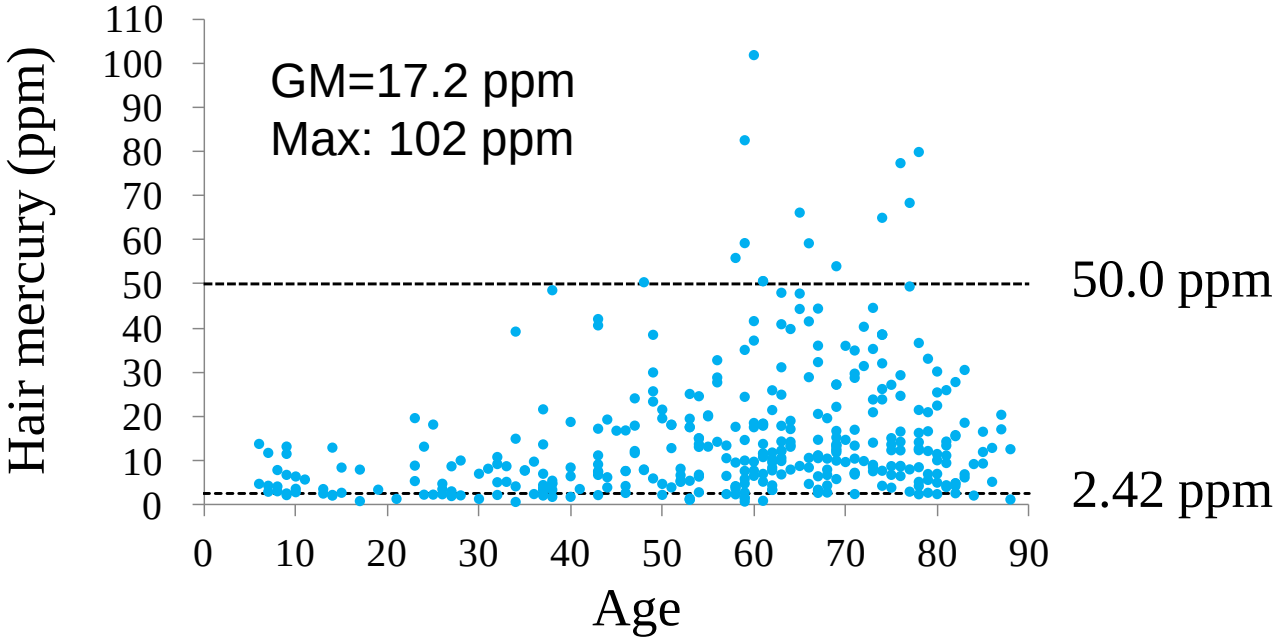
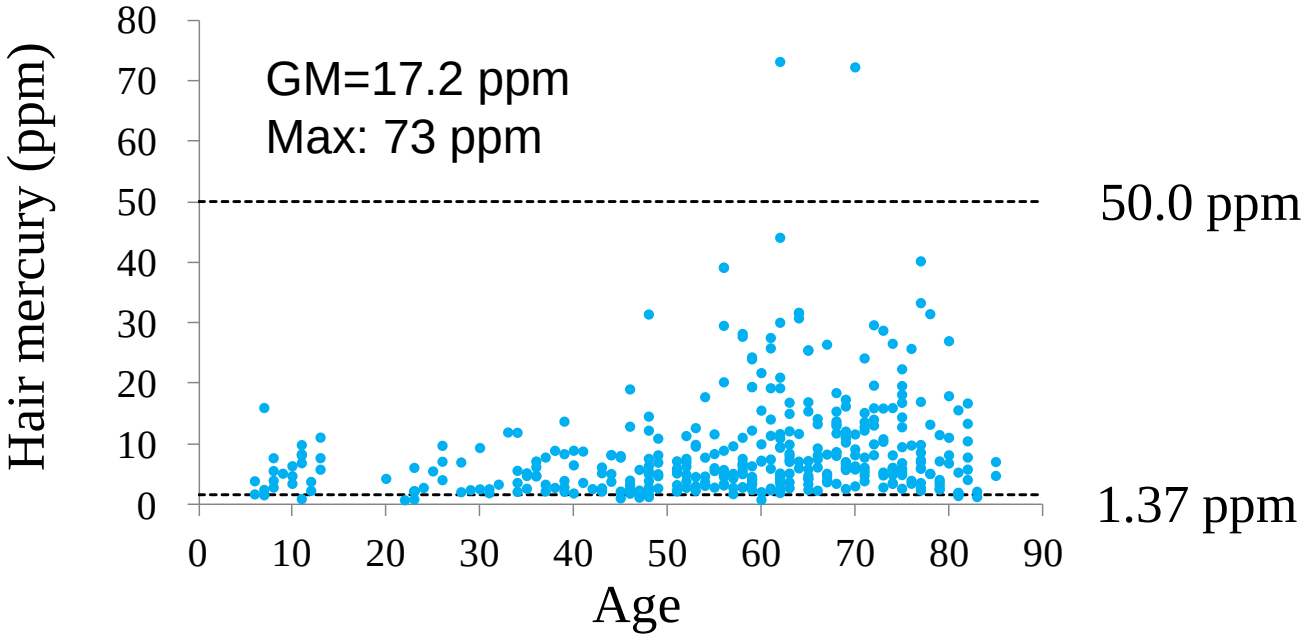
# Distribution of hair mercury concentration of the present study

male




female



# Main cohort studies on the effects of MeHg on child development

◆ *Seychelles Study*

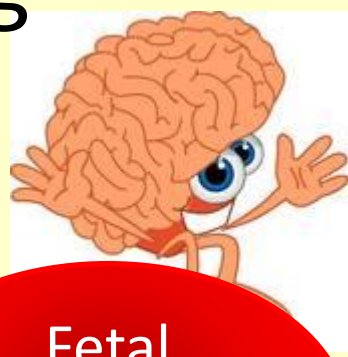
- Rochester Univ. group
- 1989–90
- Fish
- Biomarker: Maternal hair
- 6.8 (Range:0.5–27) ppm by hair Hg
- No significant effects
- NOAEL (Non Observed Adverse Effect Level) : 12 ppm

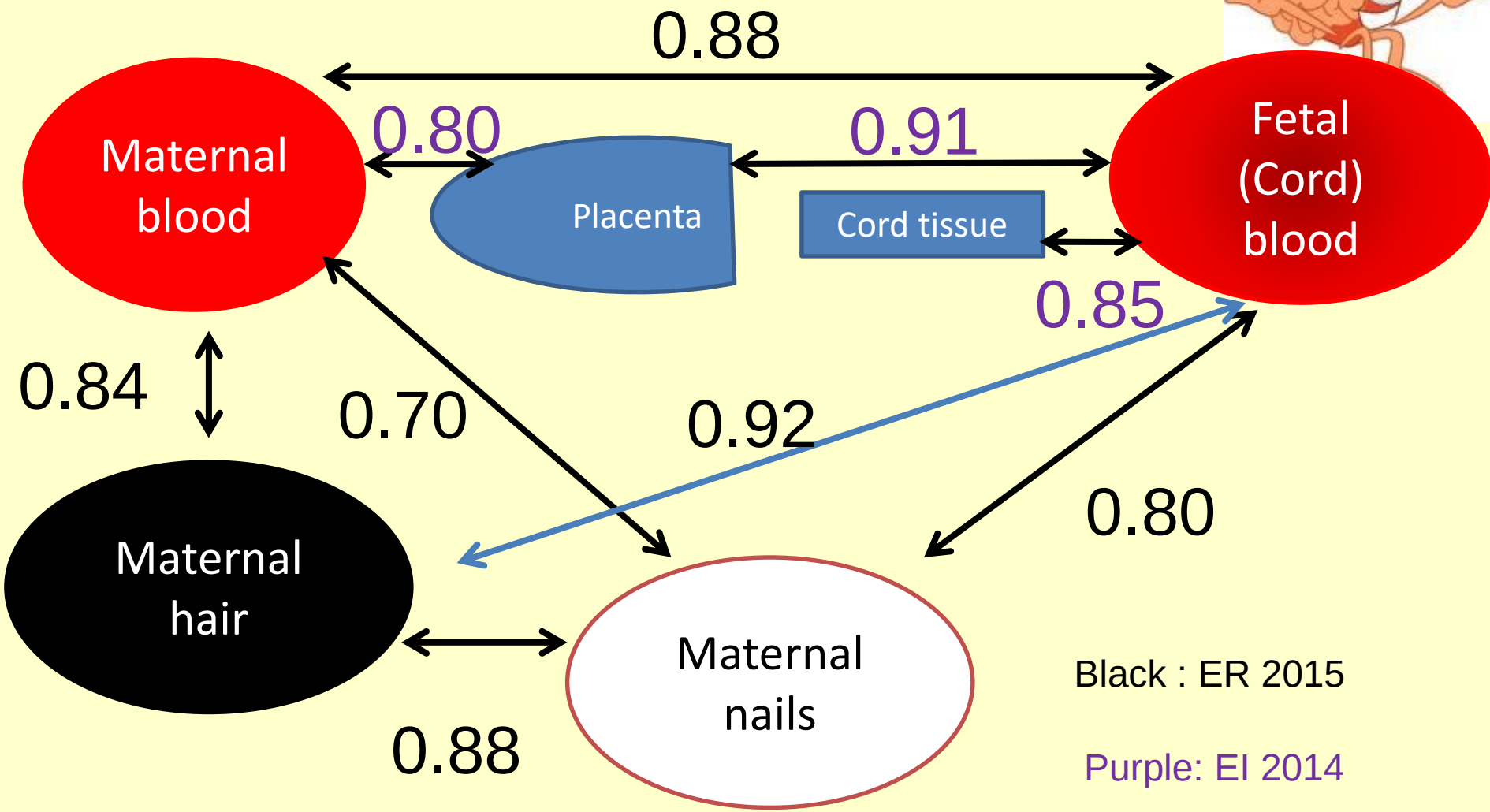
◆ *Faroe islands study*

- Odense Univ. group
- 1986–87
- Pilot whale
- Biomarker: Umbilical cord blood
- 4.3 (Range:0.2–39.1) ppm by hair Hg
- Effect to language, attention and memory.
- BMDL (Boston Naming Test) : 10 ppm

**The results were not consistent with each other.**

# Correlation coefficients (r) among biomarkers at parturition






Black : ER 2015

Purple: EI 2014