Two-point discrimination threshold of inhabitants in the methylmercury-polluted area.

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【Objective】

In chronic methylmercury poisoning, two-point discrimination is impaired as well as superficial and deep sensations. We measured two-point discrimination threshold (TPDT) in the polluted area, and explored clinical meanings of TPDT by comparing TPDT, subjective complaints, and neurological findings.

【Methods】

Subjects were 569 people who had lived in the methylmercury-polluted area and were hospitalized, had four limb sensory disturbance, and inspected for two-point discrimination of tongue or forefinger from May, 2006 to spring of 2007

(Exposed, Age=62.0±10.5, M/F=269/300). As control, we measured two-point discrimination thresholds of 154 inhabitants (Control, Age=60.9±10.5, M/F=64/90) who were older than 44 around Kagoshima City, Kumamoto City, and Fukuoka City from October, 2007 to March, 2008.

Threshold was decided as the smallest distance between 1-15mm (1, 2, 3, 4, 5, 6, 8, 10, 12, and 15mm) in tongue and 1-36mm (1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 25, 30 and 36 mm.) in fingers. Threshold was decided by Yes-No method (N=117) or two-alternative forced choice (TAFC) method (N=452) in tongue, and TAFC method in fingers (N=472). Because we used narrower range (1-15mm) in measuring threshold of fingers by Yes-No method, we did not calculate them.

The two-point discrimination test was carried out on subjects while their eyes were closed. A drafting divider, with the legs set at different distances, was pressed against the subject's skin at an angle of 30 to 45° to a depth of between 1 and 2 mm for about 1 s. The threshold recorded was the shortest distance at which a subject answered correctly. If the subject was unable to detect the maximum distance of 36 mm (15mm in tongue), the threshold was defined as 41 mm (20mm in tongue) for calculation purposes.

In Yes-No method, we performed one or odd times of trials, and defined the least distance in which more than half of all trials were successful. In TAFC method, we performed up to three times of trials, and defined the least distance as threshold, when all three trials were successful.

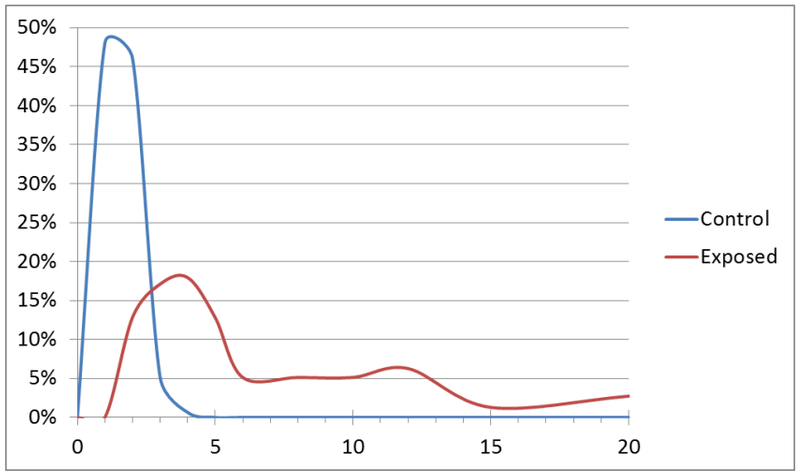
【Results】

Thresholds of tongue and bilateral index fingers in the methylmercury-exposed groups were higher than those in the control. About 30% of the subjects had normal two-point discrimination threshold.

Threshold in tongue (Yes-No method)

Control:
1.6±0.6mm

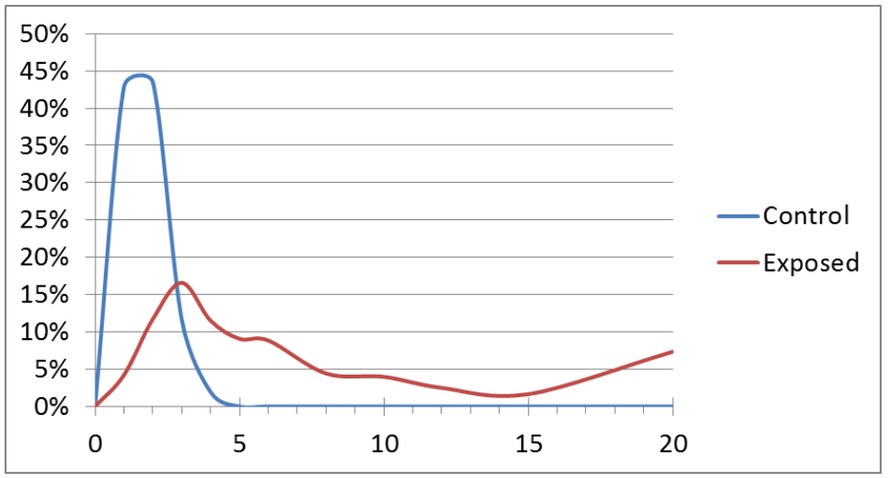
Exposed:
6.7±5.0mm



Threshold in tongue (TAFC method)

Control:
1.7±0.7mm

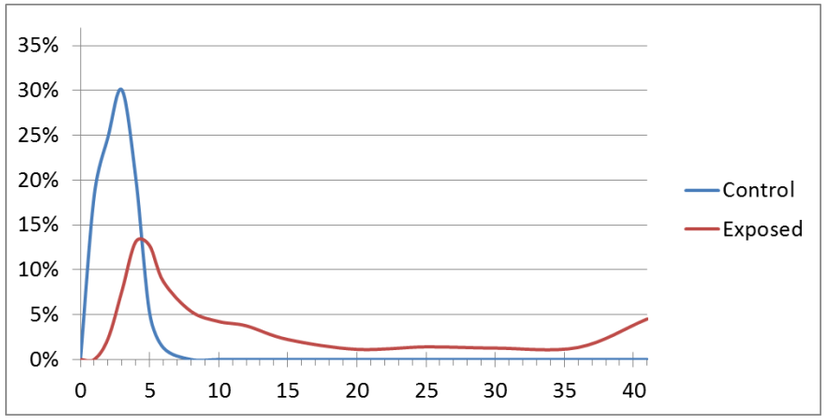
Exposed:
8.0±6.5mm



Threshold in right index finger (TAFC method)

Control:
2.7±1.2mm

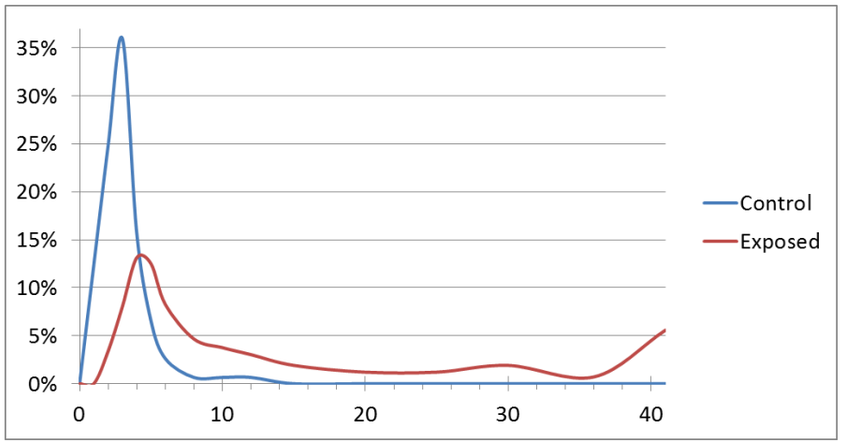
Exposed:
14.7±13.5mm



Threshold in left index finger (TAFC method)

Control:
3.0±1.6mm

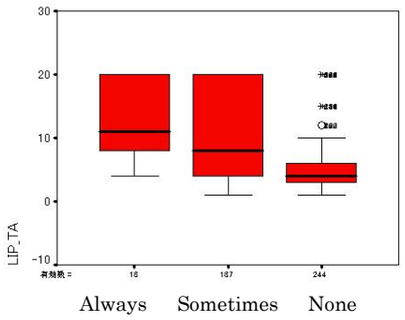
Exposed:
15.4±14.1mm



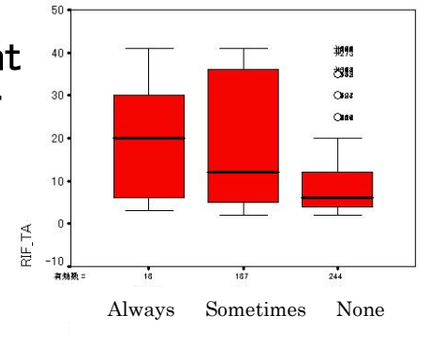
Relations between subjective complaints and two-point discrimination thresholds

Oral numbness

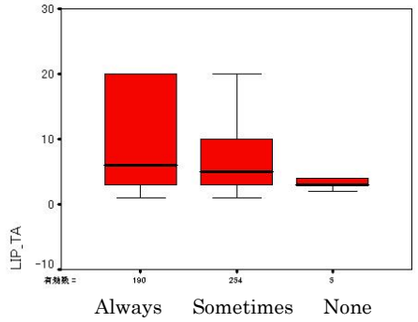
TPDT of tongue (TAFC)

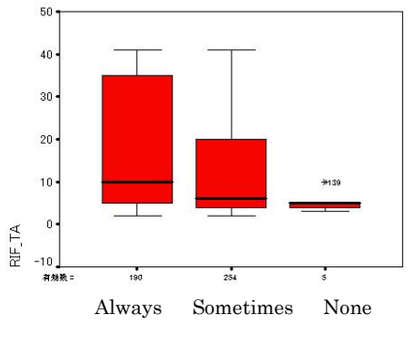


TPDT of Right index finger

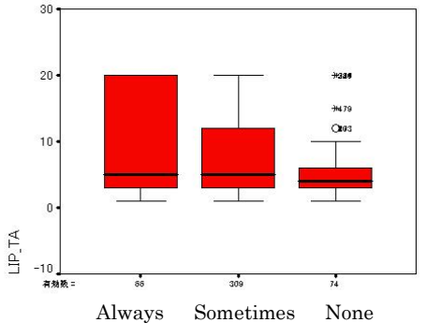


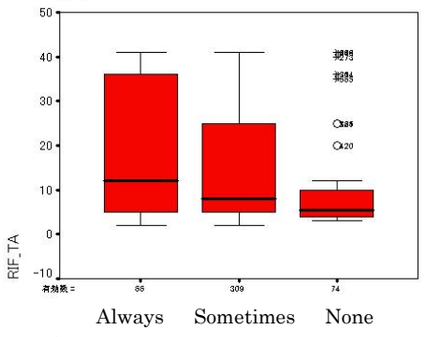
Four limbs numbness



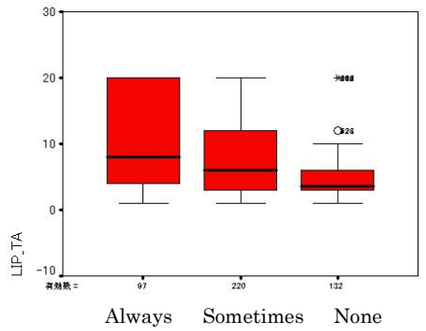


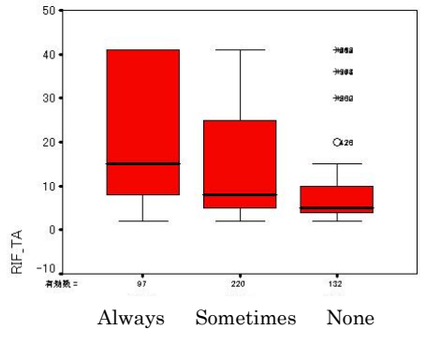
Dropping things from hand





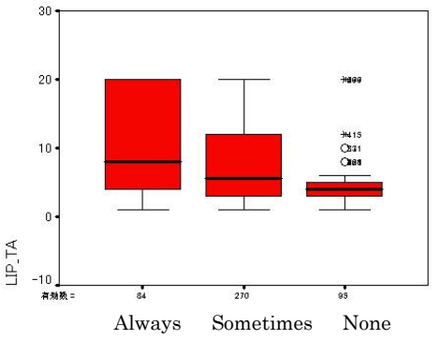
Difficulty in buttoning



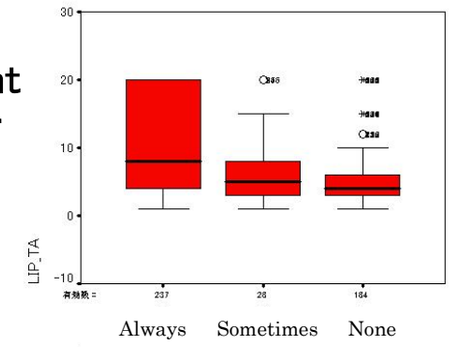


Limited peripheral vision

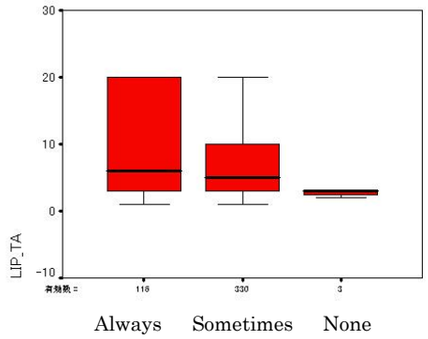
TPDT of tongue (TAFC)

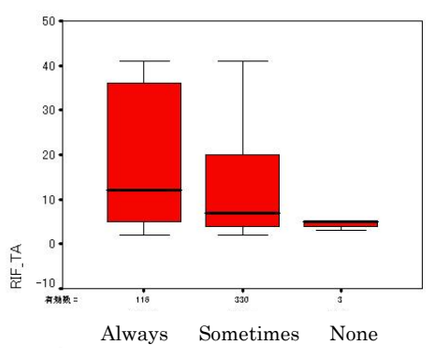


TPDT of Right index finger

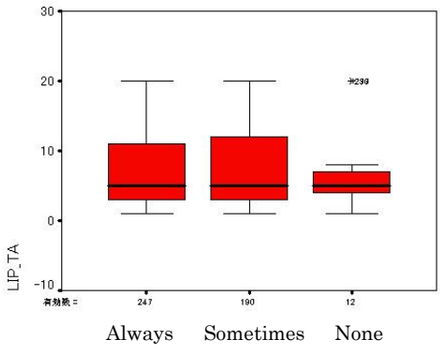


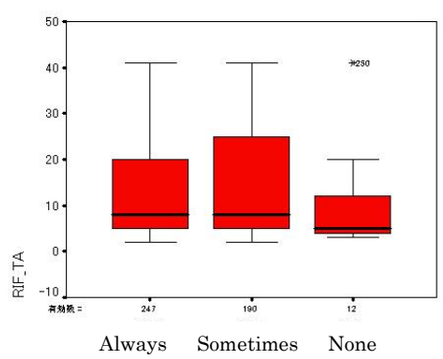
Cramps



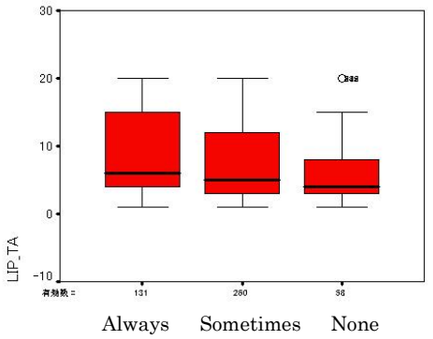


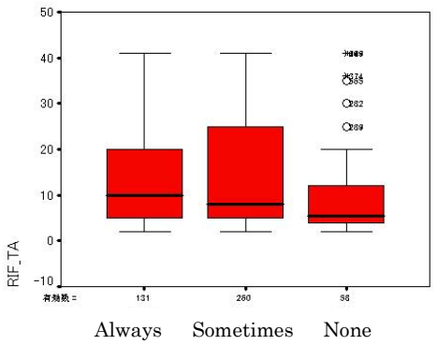
Headache





Sleep disturbance

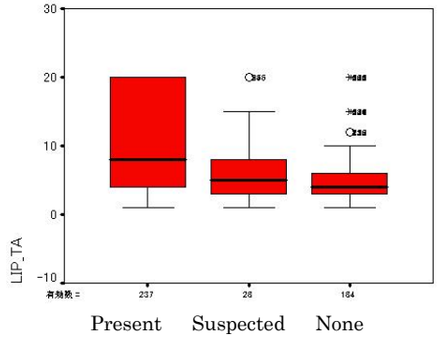




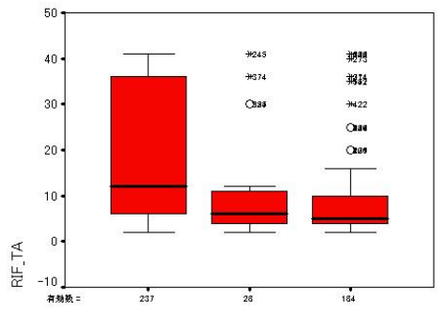
Relations between neurological findings and two-point discrimination thresholds

Oral sensory disturbance

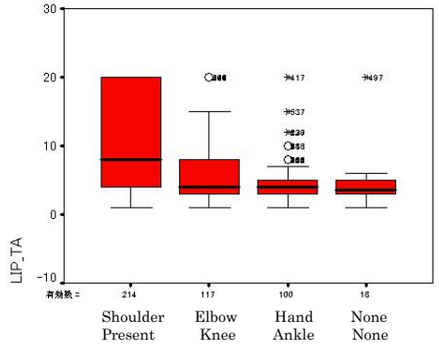
TPDT of tongue (TAFC)

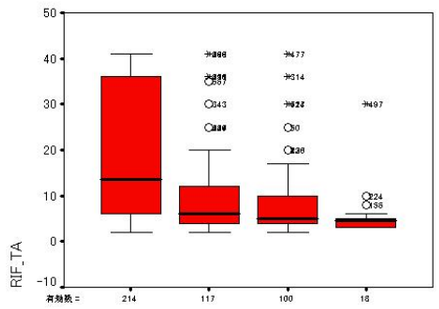


TPDT of Right index finger.

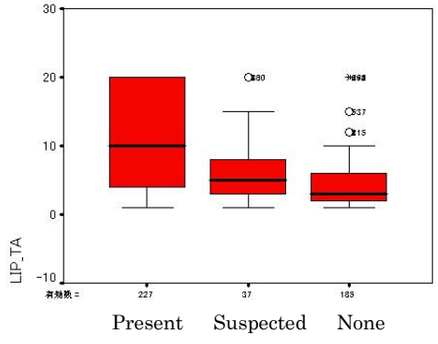


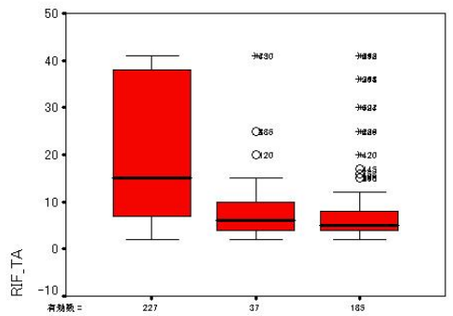
Four-limb sensory disturbance



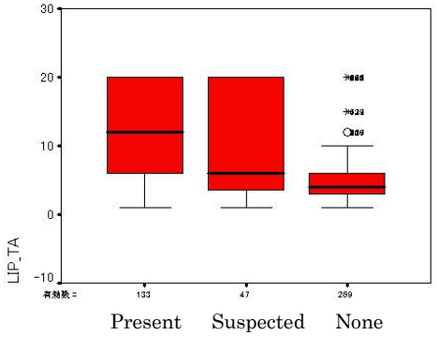


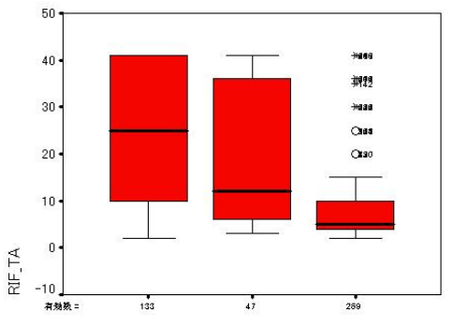
Systemic sensory disturbance





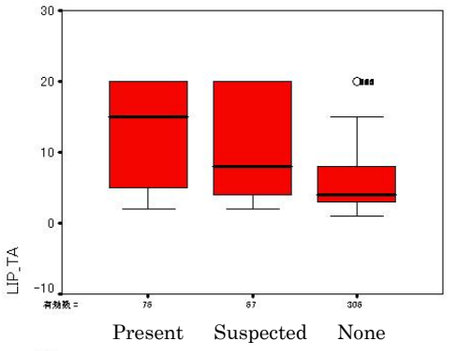
Visual constriction



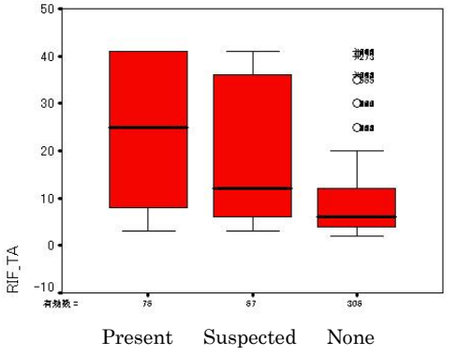


Speech disturbance

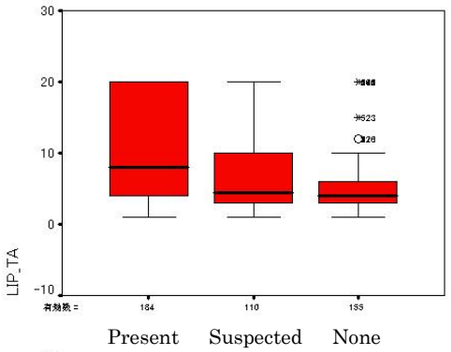
TPDT of tongue (TAFC)

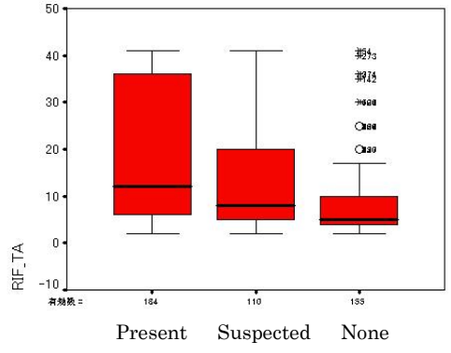


TPDT of Right index finger.

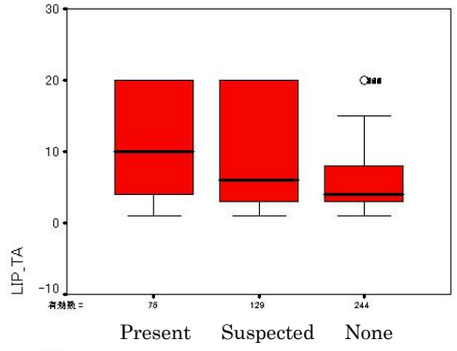


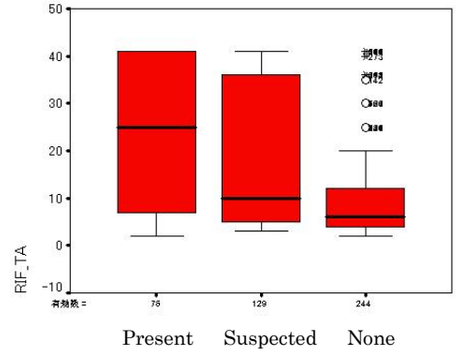
Abnormal F-N test (eyes closed)



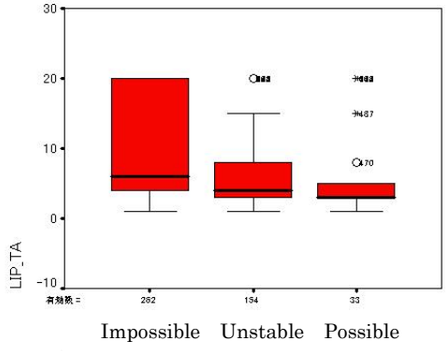


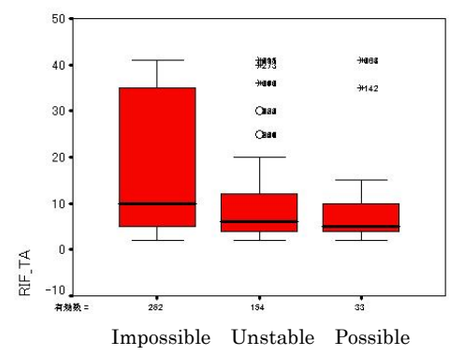
Adiadokokinesis





Unstable 1 foot stand.(eyes closed)





【Conclusion】

Abnormalities of two-point discrimination thresholds in subjects in the methylmercury-polluted areas are useful to evaluate disabilities and dysfunctions by methylmercury, even though they are not comprehensive indicators of health hazards of methylmercury.

Disclosure of the state of conflict of interest
Lead presenter: There are no companies, etc. in a relation of conflict of interest requiring disclosure in relation to the presentation.