

COGNITIVE DEVELOPMENT IN YUCHENG CHILDREN

Lai, T.J., Chen, Y.C., Chou, W.J., Guo, Y.L.^A, Ko, H.C., Hsu, C.C.

Department of Psychiatry and ^AIndustrial Health, National Cheng-Kung University Medical College, 138 Sheng-Li Road, Tainan, 70428 Taiwan, R.O.C.

Polychlorinated biphenyls (PCBs) are a family of industrial compounds that had widespread use from their introduction in the 1930s. The first evidence of systemic toxic effects came from a mass poisoning that occurred in Japan in 1968. It was caused by ingestion of a commercial brand of rice oil contaminated with polychlorinated biphenyls (PCBs) and its congeners. A mass outbreak of polychlorinated biphenyls poisoning similar to the Japan incident occurred in central Taiwan (called Yucheng). The neurodevelopmental outcome of the Yucheng children has become a major concern as more studies strongly suggest that there are long-lasting adverse effects of prenatal exposure to PCBs. The purpose of this study was to test the hypothesis that Yucheng children with prenatal exposure to PCBs-PCQs-PCDFs will continue to have sustained adverse cognitive functioning.

A clear description of the subjects of this study has been given in previously and also in "**Sexual development and biological findings in Yucheng children**". Measure tools of cognitive assessments were (1) Bayley Scale of Infant Development (BSID) for those below 30 months old. (2) Stanford Binet Intelligence Test for those aged from 30 months to 6 years. (3) Wechsler Intelligence Scale for Children, Revised (WISC-R) for those aged from 6 to 16. (4) Raven's Colored Progressive Matrices for those aged from 5 to 9. (5) Raven's Standard Progressive Matrices for those aged from 9 to 15. These were administered to all children at their homes in each appropriate year except BSID was done in every 6 months.

The mean age of Yucheng children and their controls on September 1, 1985 was 3.6 ± 2 years old. Each mean age of Yucheng children and their reference older sibs on September 1, 1985 were 5.69 ± 1.66 and 8.62 ± 1.28 years old. In the seven-year follow-up study of WISC-R between Yucheng children and their controls, there was a tendency for Yucheng children to score lower in Performance IQ (PIQ), Verbal IQ (VIQ) and Full-Scale IQ (FIQ) by average of 4 to 5 points. But the differences of scores of the PIQ, VIQ and FIQ between Yucheng children and their reference older sibs were decreasing in the later years, almost the same in the seventh-year data. Yucheng children almost always had lower scores in the other measure tools as compared with their controls, and they were statistically significant in the occasional years.

Data on the WISC-R test revealed that Yucheng children had consistently scored lower than their controls. In verbal IQ, the differences between Yucheng children and

their controls had been relatively small but tended to increase year by year and became statistically significant since 1990, the sixth-year of fieldwork. It may either suggest a possibly delayed effect of prenatal exposure to PCBs on the verbal-related cognitive development of Yucheng children or is purely due to other factors yet to be clarified. Unlike the data of the previous 6 years, the seventh-year data of WISC-R revealed that Yucheng children had a tendency to catch up their sibs in the cognitive development. There appeared to be "learning effects" in the WISC-R IQ values for all the children. The IQ scores increased with the age and year of testing. The learning effects were similar in all the children. These results are similar to findings in the Michigan study. They had delayed deficit in visual recognition memory at 7 months old and persistent poorer short-term memory function at 4 years old. Gladen and Rogan in North Carolina demonstrated the deficits seen in children on the BSID through 2 years of age are no longer apparent. It is comprehensible that Yucheng children demonstrate more prominent and persistent cognitive dysfunction because the group from North Carolina is a community population exposed to wide-spread low-level PCBs and DDE through food, skin, and lung absorption.

In conclusion, in the seventh year follow-up, children with prenatal exposure to PCBs and related contaminants continued to have slightly poorer cognitive performance.

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Figure 1. Performance IQ, Verbal IQ, and Full-Scale IQ scores on the WISC-R in Yucheng children and control children from 1985 to 1991. Error bars represent one S.E. * $p < 0.05$.

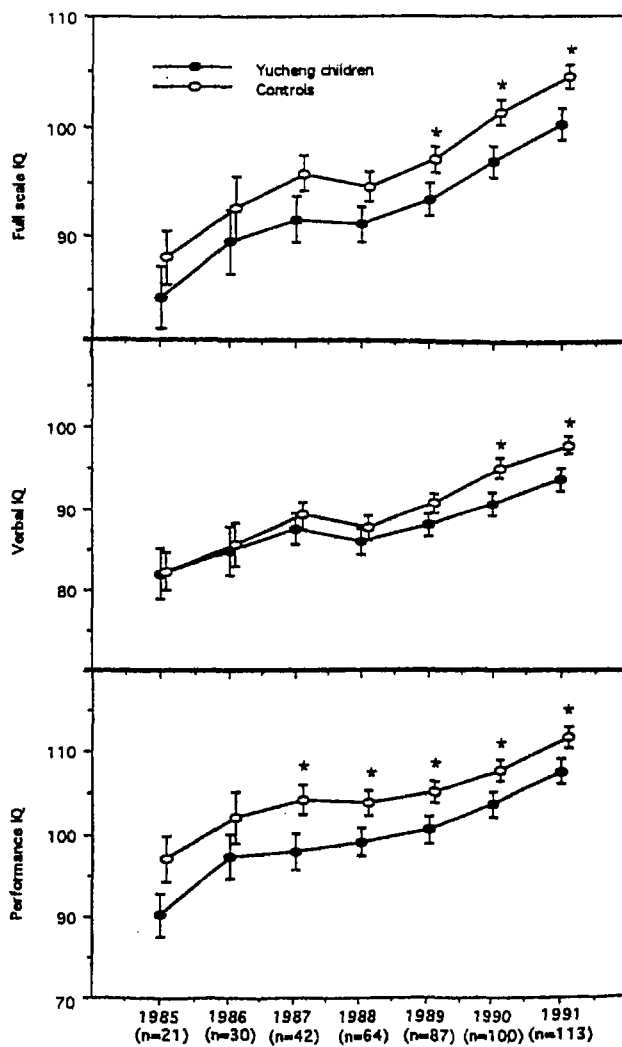


Figure 2. Performance IQ, Verbal IQ, and Full-Scale IQ scores on the WISC-R in Yucheng children and reference older sibs from 1985 to 1991. Error bars represent one S.E. * $p < 0.05$.

