Two-year follow-up for children with melamine exposure in Hong Kong: a multicentre study

Key Messages
1. The level of melamine exposure in Hong Kong children was near the tolerable daily limit set by the World Health Organization.
2. No evidence of renal dysfunction was noted in subjects over the 2-year follow-up period.
3. There was no evidence that low levels of melamine exposure were associated with haematuria, proteinuria, or ultrasound abnormalities.
4. Asymptomatic children (with no evidence of acute renal complications) after low-dose melamine exposure do not need routine follow-up.

Introduction
In 2008, an outbreak of acute renal problems among children in the Chinese Mainland was linked to ingestion of melamine-tainted milk products (MTMPs). In animal studies, the main adverse effects of melamine exposure include renal stones, renal tubular necrosis, melamine crystalluria, and haematuria. There was no such study on humans. In Hong Kong, a large scale screening programme was initiated by the government. Many asymptomatic children who were exposed to MTMPs were found to have abnormal urinalysis or ultrasound findings. The clinical significance of the renal stones and deposits, and asymptomatic haematuria was unknown. This study aimed to investigate whether Hong Kong children with low melamine exposure have adverse renal outcomes.

Methods
This study was conducted from April 2009 to September 2011. Children with abnormal urinalysis or ultrasound findings were recruited from three centres; priority was given to those estimated to have been exposed to melamine, had clinical features of renal disease or were of a young age. Recruited subjects were followed up and received repeated renal ultrasound scans and urine testing for renal function over a 2-year period. Ethical approval was obtained from the relevant Cluster Clinical Research Ethics Committees. Written informed parental consent was obtained from all cases.

Results
We recruited 62 children with ultrasound abnormalities and 321 with urine test abnormalities. Ultrasound abnormalities included renal stones, echogenic foci compatible with renal deposits, and a dilated renal pelvis. None of the children developed renal failure or life-threatening complications. In some children, ultrasound abnormalities resolved without treatment. Urine test abnormalities
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Discussion

After 2 years of follow-up, no renal function abnormalities were detected in our subjects. The prevalence of haematuria and proteinuria was 0.2% each. There was no evidence that low-dose melamine exposure increases the risk of haematuria, proteinuria or renal dysfunction. Most abnormalities detected were unrelated to melamine consumption. No children had renal function deterioration over the 2-year follow-up. According to studies from the Chinese Mainland, although patients had acute problems, there were no long-term adverse effects.4,5

The main limitation of our study was that not all children who were screened were followed up. Nonetheless, the selection criteria prioritised children with highest risk of developing adverse renal complications. We were therefore able to undertake a relatively long period of follow-up to measure several markers of renal function and tubular damage on a cohort of children. Furthermore, despite involving only three centres, we assessed 55% of all children screened in the 2008 screening programme. This should provide a reasonable representation of the population. The second limitation was the lack of an objective marker of melamine exposure. However, detailed food questionnaires enabled a reasonable estimate of melamine exposure.

There was no evidence to support routine follow-up of asymptomatic children with no acute renal complications of melamine exposure. Low levels of melamine exposure are unlikely to pose a long-term health risk.

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References