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## Ultrasonographic Evaluation of Melamine-Exposed Children in Hong Kong

**TO THE EDITOR:** The recent melamine contamination of infant formula and milk products in China placed thousands of children in China and neighboring regions at risk for renal-stone formation and renal failure; six deaths were reported. In the wake of the crisis, screening programs were launched nationwide in the mainland of China. A similar program was initiated in Hong Kong<sup>1</sup>; here, we describe the results.

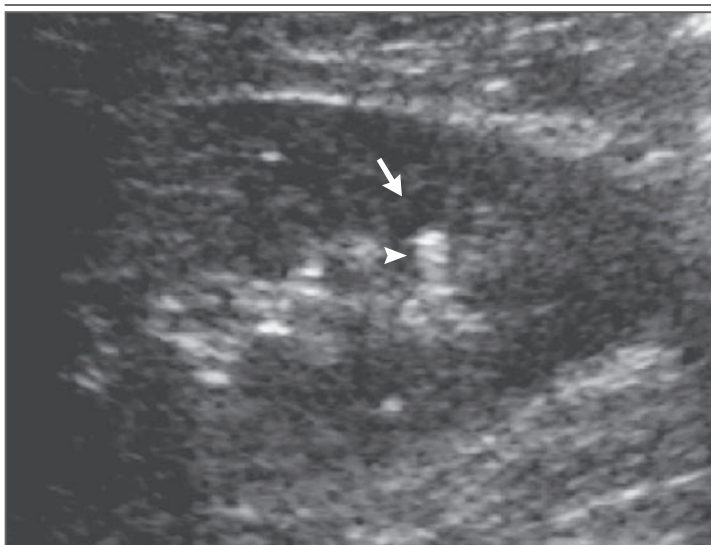
From September 28 through October 17, 2008, a total of 2140 children (1177 boys and 963 girls; age range, 1 month to 12 years; mean age, 6.45 years), all asymptomatic, underwent ultrasono-

graphic screening at Prince of Wales Hospital, one of the designated special assessment centers in Hong Kong. On ultrasonography, a stone (non-obstructive, 7 mm in length) was detected in only one child. Another child had increased echogenicity in both renal papillae. Six additional children had small, discrete, hyperechoic renal foci (<4 mm in diameter) near the renal papillae, all of which were associated with “comet-tail” artifacts<sup>2</sup> on gray-scale ultrasonography (Fig. 1). A “twinkling artifact”<sup>3</sup> was revealed by color Doppler imaging in two of the six children with hyperechoic foci. Limited low-dose computed tomography of the kidneys was performed in two of the six children and confirmed the presence of calcific foci.

It is unclear whether these echogenic renal foci were related to melamine-crystal deposition or were incidental findings. Renal histopathological characteristics in cats exposed to melamine have been shown to be due to melamine crystals, primarily within the distal tubules.<sup>4</sup> It is unknown whether filtered melamine crystals are trapped within the distal tubules in humans, rendering the renal papillae a susceptible site for deposition and aggregation. Currently, there is no noninvasive test that would ascertain the nature of these echogenic foci.

We encouraged the families of the children we screened to ensure adequate hydration, and we have planned for follow-up ultrasonography to be performed in the eight children with abnormal findings, 3 months after the initial studies.

Our current report from Hong Kong indicates that the adverse effects of melamine-tainted milk products do not initially appear to be as severe as first anticipated. In populations exposed to doses of melamine similar to those among the children in Hong Kong,<sup>5</sup> screening by means of ultrasonog-



**Figure 1.** Longitudinal Ultrasonogram of the Right Kidney in an 8-Year-Old Girl.

A small hyperechoic focus with a “comet-tail” artifact (arrowhead) is visible near a lower-pole hypoechoic pyramid (arrow) in an otherwise normal kidney. The child had ingested about 250 ml of the contaminated milk each day for a year.

raphy is likely to identify few findings and findings of unclear clinical relevance.

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## Melamine and Nephrolithiasis in Children in Taiwan

**TO THE EDITOR:** The adverse renal effects of melamine-tainted formula have raised international concern. To address public concerns about melamine, the department of health in Taiwan initiated services to screen exposed children.

From September 24 through October 23, 2008, we screened 1129 children in Taiwan who had

possible exposure to contaminated formula, investigating the clinical symptoms and risk factors for nephrolithiasis. Clinical presentation and urinary calcium and creatinine levels were evaluated, and urinalysis and renal ultrasonography were performed. We categorized our patients into three groups, according to exposure history.<sup>1,2</sup> The high-

**Table 1. Baseline Characteristics of the Study Children, According to Melamine Exposure.\***

Variable	High Exposure (>2.5 ppm) (N=44)	Low Exposure (0.05–2.5 ppm) (N=607)	Control (<0.05 ppm) (N=478)	P Value
Age — yr	4.32±2.60	3.97±2.72	4.26±3.60	0.28
Male sex — no.	22	324	292	0.03
Urinalysis findings — no.				
Occult blood (>2+)	1	26	22	0.77
Hematuria (red-cell count, >5/HPF)	0	13	14	0.40
Pyuria (white-cell count, >5/HPF)	0	25	11	0.11
Proteinuria (>2+)	0	3	3	0.85
Hypercalciuria (calcium:creatinine, >0.2)	0	7	5	0.77
Nephrolithiasis on renal ultrasonography — no.	9	2	1	<0.001
Clinical symptoms and history — no.				
Abdominal pain	0	10	3	0.23
Flank pain	0	0	2	0.26
Dysuria	2	16	7	0.24
Increased urinary frequency	2	9	7	0.28
History of UTI	1	8	3	0.40
Family history of nephrolithiasis	0	7	6	0.76
History of residence in the mainland of China	37	41	105	<0.001

\* Plus-minus values are means ±SD. HPF denotes high-power field, and UTI urinary tract infection.