

Mattresses and cot death

SIR, -Your note (April 20, p 969) on my work on the generation of phosphine, arsine, stibine, and related alkyl compounds through mattress biodeterioration and their possible role in cot death^{1,2} casts doubt on the involvement of these toxic gases because the symptoms normally associated with poisoning, particularly erythrocyte haemolysis, are not seen in cot death. You suggest that hypoxia is more Likely to be involved. Unfortunately, you failed to explain that the normal symptoms of poisoning are those that are observable, and that there is a less obvious poisoning action that is entirely consistent with all reported features of cot death, including hypoxia.

These gases have a powerful anticholinesterase action, and this explains reports of depression of the central nervous system in standard toxicological references. Infants breathing high concentrations of these gases will suffer destruction of blood cholinesterase and progressive accumulation of acetylcholine generated by the vagus nerve, resulting in cardiac failure before any other symptoms can develop. High concentrations of these gases occur when infants are overwrapped because the higher temperatures accelerate the biodeterioration of the mattresses; infants in the prone position are most at risk because these gases are heavier than air. Overwrapping and prone position are usually associated with cot death.³⁻⁵

Your account of our work suggests that phosphine, arsine, and stibine are generated only by deterioration of polyvinyl chloride cot mattress coverings, and that phosphine and stibine are derived from fire retardants based on phosphorus and antimony compounds. However, fire retardants in other coverings and foam fillings are also implicated.² Lambskin mattresses can also generate arsine or stibine. Arsenic poisoning results in arsenic deposits in hair, and if sheep feed on grass contaminated by soil containing arsenic or antimony, these elements are deposited in the wool; biodeterioration then generates the toxic gases.² Wool Contamination may be the explanation for the pockets of very high cot death rates in parts of Australia and New Zealand where lambskins are normally used as cot mattresses.

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- 3 Engelberts AC, de Jonge GA. Choice of sleeping positions for infants. *Arch Dis Child* 1990; 65: 462-67.
- 4 Nelson EAS, Taylor BJ, Weatherall IL. Sleeping Position and infant death bedding may predispose to hyperthermia and sudden infant death syndrome. *Lancet* 1989; i:199-201.
- 5 Fleming PJ, Gilbert R, Azaz Y, et al. Interaction between bedding and sleeping Position in sudden infant death syndrome; a population based case-control study. *Br Med J* 1990; 301:85-89.