Enterobacter sakazakii

General description
Enterobacter sakazakii is a motile, gram-negative, non-spore-forming, rod-shaped bacterium, that has been found in infant formulas as a contaminant. Enterobacter species are biochemically similar to Klebsiella, but unlike Klebsiella, Enterobacter is ornithine positive. E. sakazakii has been found to be more resistant to osmotic and dry stress than other members of the Enterobacteriaceae family.

Human health effects
Enterobacter sakazakii has been associated with sporadic cases or small outbreaks of sepsis, meningitis, cerebritis and necrotizing enterocolitis. Most of the infections are seen in low-birth weight infants (i.e., less than 2,000 g) or infants born premature (i.e., less than 37 weeks of gestation). Mortality has been reported to be as high as 50% but has decreased to less than 20% in recent years.

Source and occurrence
The reservoir for E. sakazakii is unknown. Various environmental samples (surface water, soil, mud, bird faeces) have tested negative. It has been identified in the guts of certain flies. The organism has been frequently identified in factories that produce milk powder and other food substances and in households. Commercially produced non-sterile powdered infant formula has often been implicated as the source of the bacteria during outbreaks. In a study of 141 powdered infant formulas 20 were found to be culture-positive for E. sakazakii even though the formulas complied with Codex microbial requirements for coliforms (<3 cfu/g). The bacteria have been found in samples from newly opened sealed cans. Although sources of the bacteria other than infant formula has not been identified, environmental sources probably exist.

Routes of exposure
Disease caused by E. sakazakii in infants has been associated with the consumption of commercially prepared non-sterile infant formula. Contamination has been linked back to either the infant formula itself or formula preparation equipment (e.g. blenders). Many of the outbreaks have occurred without identified hygienic lapses during formula preparation. The organism has not been found in drinking water sources used to prepare the formula. There is no evidence for person-person or more general environmental transmission.

Significance in drinking water
There is no evidence that these bacteria are transmitted through drinking water although it is plausible that the organism could be present in poor quality water. E. sakazakii is sensitive to disinfectants and presence can be prevented by adequate treatment.

Selected bibliography