

Cronobacter Sakazakii Infections: A Time for Action

At birth, a baby's immune system is still maturing, making all babies especially vulnerable to bacterial infections. Breastfeeding contains live cells and provides active and passive immunity to protect infants against infections. Powdered baby milk products do not contain these anti-infective factors and may sometimes contain dangerous bacteria that can multiply in warm conditions and cause life-threatening infections.

Recent cases of severe *Cronobacter* infection in infants in four states of the USA have focused attention on the risks of using Powdered Infant Formula (PIF). PIF includes powdered infant, follow-up and special formulas as well as breastmilk fortifiers. These products are non-sterile and can become contaminated with harmful bacteria during the manufacturing process. Extra precautions must therefore be taken when preparing PIF, and the World Health Organization recommends a warning on product labels (1):

Powdered infant formula is not sterile.

It may contain bacteria that can cause serious illness in infants.

Correct preparation and handling reduces the risk of illness.

In November and December, 2011, four newborns became ill in Florida, Illinois, Missouri and Oklahoma. Tragically, two of the babies died as a result of their infection. Although the two others survived, infections caused by *Cronobacter* are serious and may cause lasting neurological damage.

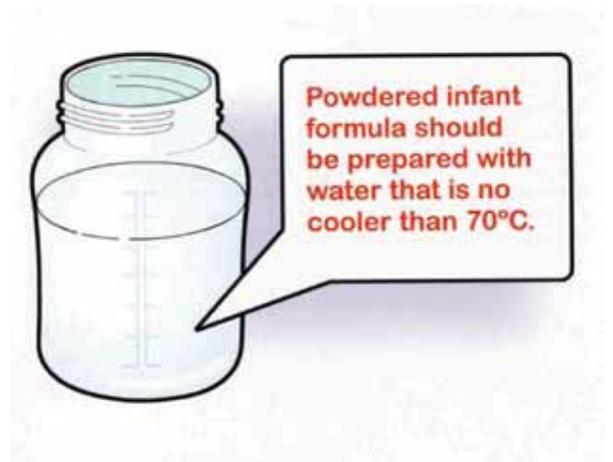
Wal-Mart, the giant distribution chain, issued a "voluntary pull and hold" of Enfamil Premium newborn baby formula, reflecting concern over previous cases of infection in the US that were linked to contamination of PIF.

Detecting Cronobacter: not an easy process

Cronobacter sakazakii, formerly called *Enterobacter sakazakii*, is a heat-resistant bacterium that can cause severe bacterial sepsis or meningitis in infants. The bacteria have been isolated from opened containers of formula and nursery water, and also from previously unopened containers of PIF. A 2006 study in Indonesia analyzed packages from Indonesia and Malaysia and found 47% of the 35 samples tested positive for bacteria in the Enterobacteriaceae family, and 10 of these samples (13.5%) contained *Cronobacter sakazakii* (2).

However, testing for the presence of *Cronobacter sakazakii* is not straightforward. Samples are not always available from the bodies of infected infants, or from unopened or opened containers of PIF. In the USA, the Centers for Control and Prevention of Disease (CDC) report that none of the products given to the infant in Flor-

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ida were available for testing, and neither were samples of bacteria from the infants in Oklahoma and Florida.

Tests on the remaining available samples and products are still underway, and the **Food and Drug Administration (FDA)** is inspecting facilities that manufacture the products which had been used by the infants. To date these recent infections have not been linked to previously unopened containers of PIF, but rather to opened containers of PIF or of bottled nursery water.

Recommendations issued by USA health authorities

While these investigations are ongoing, the US CDC and FDA issued a joint statement on December 31 2011: "Investigation of *Cronobacter* Bacteria Illness in Infants". This statement was subsequently updated by the CDC on January 13 2012. Update gives the following advice to parents and care-givers, with breastfeeding coming first:

- "Breastfeed: breastfeeding helps to prevent many kinds of infection among infants
- If your baby is given powdered infant formula, there are things you can do to protect your baby from infections – not just *Cronobacter* infections. Good hygiene, mixing the formula with water hot enough to kill germs, and safely storing formula can prevent growth of *Cronobacter* bacteria and other germs"
- The link <http://www.cdc.gov/Features/Cronobacter/> answers this question: What is "water hot enough to

kill germs"? It provides specific guidance: "Use hot water (158 degrees F/70 degrees C and above) to make formula: A simple way to heat water to this temperature is to boil a kettle of fresh water and to use it to make formula within 30 minutes of boiling".

Mixing the formula powder with water at this high temperature is critical, because *Cronobacter sakazakii* has been shown to be resistant to heat, as well as presenting increasing resistance to some antibiotics. The bacteria show luxuriant growth at warm temperatures, especially around between 37 and 43°C. These are the temperatures often used to mix powdered formula with water, and then to store the prepared formula. Even low levels of bacteria present in the unopened or opened containers of PIF or in bottled water can then multiply rapidly to levels that pose a risk for infant health.

WHO and FAO therefore include in the 2007 Guidelines (1) a lethal decontamination step to kill harmful bacteria:

"Mixing the formula powder with water at this high temperature is critical"

Powdered infant formula should be prepared with water that is no cooler than 70°C.

If powdered infant formula is used, correct preparation and storage reduces the risk of illness. Powdered infant formula should be prepared with water that is no cooler than 70°C (in order to kill *Enterobacter sakazakii*) and prepared feeds should be consumed immediately or stored in a refrigerator (to prevent growth of *Enterobacter sakazakii*).

The prepared formula must of course be cooled to drinking temperature before feeding to the baby. Never use a microwave oven to prepare or warm up feeds.

Government action around the world

Several government health and food safety agencies have already taken action and have included this decontamination step in their directions on how to prepare PIF more safely.

These government authorities provide detailed guidance and advice to parents and care-givers. The baby milk industry also has specific responsibilities, as stated by WHO and FAO: "The International Code of Marketing of Breastmilk Substitutes, article 9 on labelling states in section 9.2 that manufacturers and distributors of infant formula should include instructions for appropriate preparation, and a warning about the health hazards of inappropriate preparation" (3).

Surely it is time now for all governments and industry to follow these international recommendations and protect the health of babies globally?



References:

(1) WHO provides detailed guidance in the 2007 Guidelines on Preparation, Storage and Handling of PIF, issued jointly with the UN Food and Agriculture Organization, FAO:

<http://www.who.int/foodsafety/publications/micro/pif2007/en>

(2) Estuningsih S et al. Enterobacteriaceae in dehydrated powdered infant formula manufactured in Indonesia and Malaysia. J. Food Prot. 2006 Dec; 69(12): 3013-7

(3) Report of the second 2006 WHO/FAO Joint Meeting on *Enterobacter sakazakii* and *Salmonella* in PIF (MRA series no. 10):

<http://www.who.int/foodsafety/micro/jemra/meetings/jan2006/en/index.html> !■

Source:

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عند الولادة، يكون نظام مناعة الطفل في طور النضوج، ما يجعل كل الأطفال عرضة بشكل خاص للعدوى البكتيرية. تحتوي الرضاعة على خلايا حيّة وتؤمن مناعة إيجابية وسلبية لحماية الأطفال من الأمراض. لا يحتوي مسحوق منتجات حليب الأطفال على هذه العوامل المضادة للعدوى وقد تحتوي في بعض الأوقات على بكتيريا خطيرة قادرة على التكاثر في ظروف حارة وتسبب التهابات مهددة للحياة. هذا وقد ركزت مؤخراً حالات إصابة شديدة بالـ *Cronobacter* لدى أطفال في أربع ولايات من الولايات المتحدة الأمريكية، الإهتمام على أخطاء استعمال مسحوق حليب الأطفال. وتشمل هذه الفئة المسحوق المتخصص لحديثي الولادة ومسحوق المتابعة والصيغ الخاصة مثل مقويات حليب الرضاعة. إن هذه المنتجات غير معقمة وهي عرضة للتلوث ببكتيريا مضرّة خلال عملية التصنيع. لذلك، يجب تبني خطوات احترازية لدى تحضير هذه المنتجات، كما توصي منظمة الصحة العالمية بوضع تحذير على ملصقات هذه المنتجات.