



Fortification: nutritional additives for preterm and sick babies

Nutritional needs: challenges for preterm and sick babies

Breast milk is the ideal food for babies, as it provides all the nutrients and energy, and has additional benefits for the immune system and brain development.¹ However, babies that are born preterm, sick or with a low birthweight need additional protein, fat or carbohydrates and calories to support appropriate development and growth. One way to meet this additional demand is by human milk fortification (fortification of breast milk).

What is human milk fortification?



Fortification is an addition of nutrients to breast milk to provide additional calories, proteins, minerals, vitamins and trace elements. Traditionally, fortifiers are based on **cow milk**. More recently, **human milk**-based fortifiers are also available.²



Fortified breast milk can be fed through the mouth (enteral nutrition): cup, finger feeder or, if needed, through a tube. Sometimes, if none of these options are possible, the baby is fed via the vein, through the bloodstream (parenteral nutrition).³



For example, when a baby is born preterm or sick; in these cases immediate breastfeeding or feeding with a bottle with breast milk or formula is not possible. Therefore, other ways of feeding must be applied such as **enteral** or **parenteral nutrition**.

What is enteral nutrition?⁴



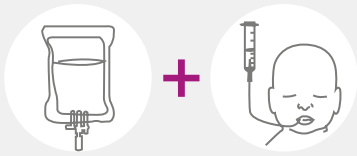
Enteral nutrition means that the baby is fed via the mouth e.g. through a **tube**, either by one which is going from the **nose to the stomach** or from the **mouth to the stomach**.

This process can be started soon after birth with small amounts of breast milk. Tube feeding is often recommended for preterm or sick born babies while they are not yet able to drink, suck, swallow and breathe as this ability develops at around 34 weeks of pregnancy.

What is parenteral nutrition?³

This way of feeding is administered when preterm or sick babies are not capable (yet) to be fully fed by mouth or by a tube. The nutritional solution gets to the child **through its veins**, which means the nutrients are getting into the body through the blood. If tolerated, giving small amounts of nutrition ((fortified) breast milk, donor milk or formula) via tube is started and progressively increased, while parenteral nutrition is reduced.

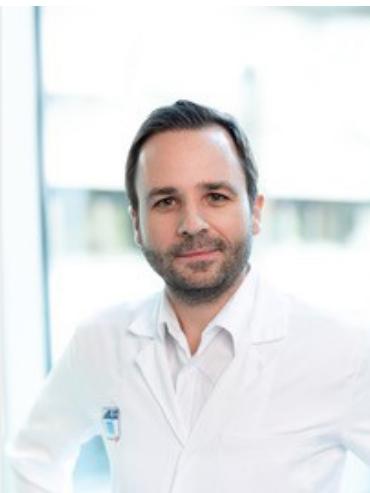




Usually, from birth, the aim is to provide a combination of enteral and parenteral nutrition, so nutrition will be given through the vein and via tube/mouth

When is fortification needed?²

If babies are born during an early stage of the third trimester (third trimester = 28-40 weeks of pregnancy) or even earlier, they lack the nutrients they would have received through the placenta later on after birth. As mentioned earlier, breast milk alone cannot always fulfil all the **nutritional needs** of preterm or sick babies, because they usually need **additional nutrients** such as carbohydrates, proteins, fat or minerals. These additional nutrients are important to lower the baby's risk of complications with their neurological development, decreased bone mineral density or slow growth, among others.



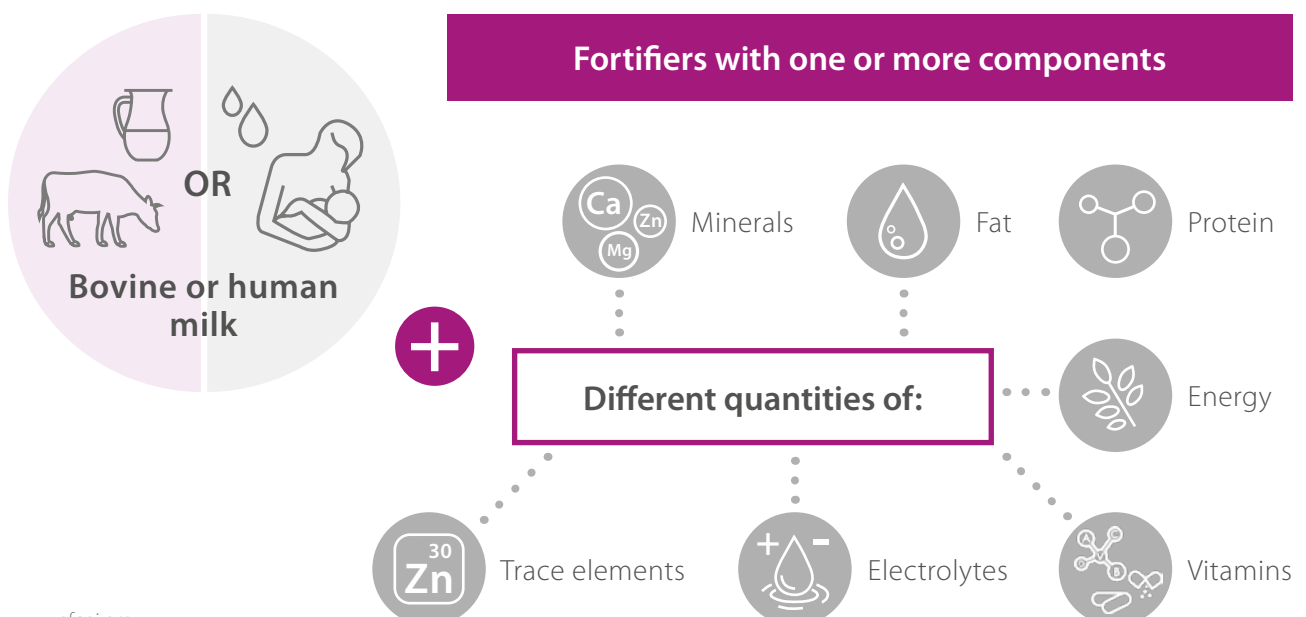
Christoph Binder

Priv. Doz., MD, PhD, Consultant, Head: Nutrition and Growth Research Medical University Vienna, Department of Paediatrics and Adolescent Medicine, Division of Neonatology, Paediatric Intensive Care and Neuropediatrics

"Individualised medicine and especially individualised fortification is the future and may have several benefits for the long-term health of newborns."

What kind of human milk fortifiers are available?²

Fortifiers can contain different amounts of nutrients. They are divided into two types: **multi-nutrient** fortifiers which contain amounts of several nutrients and **single-nutrient** supplements which only contain one nutrient (see graph below).



How and when is fortification administered?




Fortifiers are usually given when feedings reach a **certain amount**.² However, the guidelines for the weight and/or gestational age at which a baby is given a fortifier may differ among countries and hospitals, as well as the amount given to the baby.

How are fortifiers made?

Fortifiers are usually manufactured into a liquid or powder concentrate. The concentrate is mixed with breast milk, usually in a specific milk preparation room (often named milk kitchen) which is located either on or outside the hospital ward. It is fed based on the baby's condition (e.g. tube, bottle, cup, finger feeder). The fortifier can be added to the pumped breast milk or to donor human milk from a human milk bank. For more information on human milk banks see: <https://europeanmilkbanking.com/map>

What is standardised versus individualised (adjustable or targeted) fortification?²

Different methods of fortification are researched and used in clinics. The main difference lies in the way fortification is given as can be seen in the graphic:

Standard (STD) Fortification	Individualised Human Milk Fortification	
 <p>Fixed amount of (various) nutrients</p>	Adjustable Fortification	Targeted fortification
	 <p>Nutrient amount based on blood values</p>	 <p>Nutrient amount based on measured human milk composition (amount of protein, fat, carbohydrates, etc.)</p>



Are there possible risks of fortification?

Fortification is the standard of care in most neonatal units and comes with clear benefits. However, several uncertainties exist about the ideal point at which fortifier should be added to the milk or which fortifier is optimal for preterm babies. Standard (STD) Fortification is practical to use, but in some cases babies are not receiving enough nutrients (e.g. protein, fat etc.) and may therefore not grow the way they should.² However, the Adjustable (ADJ) Fortification, which is one of the individualised human milk fortification methods, is an alternative approach and nutrients can be added according to the preterm baby's needs.² However, more studies are needed to investigate the exact role and methods of fortification.



Gigi Khonyongwa-Fernandez

BSc, MSc, ACC, TICC (Mum of a former 24-week surviving twin, EFCNI PAB member, BOD President for NICU Parent Network (NPN))

“Preterm babies, like my son was, are vulnerable in so many ways, including with their nutrition, and require multi-layered levels of support. Fortification is one of those essential support levels needed to help them not just survive, but to thrive.”

How long do babies need fortifiers?

No general statement can be made here, as the duration depends very much on the individual condition and growth of the child, and also on the common practice at each unit. It is not uncommon that babies still need specific nutrition after leaving the NICU/hospital. This can be fortified human milk or specific types of formula.

Where can I find further information on newborn nutrition and feeding?



Factsheet “Breastfeeding a preterm baby”

Factsheet “Parenteral nutrition for very preterm and ill babies”

Images: EFCNI, Shutterstock.

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About EFCNI

The European Foundation for the Care of Newborn Infants (EFCNI) is the first pan-European organisation and network to represent the interests of preterm and newborn infants and their families. It brings together parents, healthcare experts from different disciplines, and scientists with the common goal of improving long-term health of preterm and newborn children. EFCNI’s vision is to ensure the best start in life for every baby.

For more information: www.efcni.org

References:

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2. Arslanoglu, S. et al. Front Pediatr. 2019; 7: 76.
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4. EFCNI. <https://www.efcni.org/health-topics/in-hospital/feeding-stages-enteral-and-parenteral-nutrition/> (accessed June 21, 2022).

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