Infant nutrition:
The first 1000 days and the long-term impact on health
The first 1000 days and the long-term impact on health

It has been recognised by health experts, that the first 1000 days – from conception to a child’s second birthday – is a critical window of opportunity to influence the future health outcomes. This critical period is the most influential time in a young child’s life, their behaviours and the nutrition they get in this time helps to set their future foundations for life and can have an impact on their health and happiness later in life.

Nutrition in this period is particularly crucial. Early nutrition wields both short and long-term effects on the health of an infant, by programming the infant’s development. Evidence suggests that this ‘developmental programming’ has a long-lasting effect on the risk of obesity in later life, and in turn, associated non-communicable diseases; type 2 diabetes, hypertension and cardiovascular disease.

Childhood obesity is an increasingly concerning topic; in 2013 it was estimated that over 42 million children under the age of five years worldwide were overweight or obese. The latest figures in the UK found that over a quarter of children aged 2-10 were overweight or obese. Overweight and obese children are likely to remain overweight or obese into adulthood, increasing their risks of developing non-communicable diseases at a younger age.

Importance of breastfeeding

Global guidelines recommend exclusive breastfeeding for the first six months of an infant’s life, and breastfeeding in combination with suitable, nutritionally balanced complementary foods beyond that. Breastfeeding is undoubtedly the best method of infant feeding, not only because breast milk is nutritionally superior, but it also has unique advantages that are not possible to replicate with bottle-feeding.

Research into the benefits of breastfeeding for both the infant and the mother, shows that these benefits are not due to the breast milk alone, but rather breastfeeding as a whole. Benefits for the mother include, but are not limited to, a reduced risk of breast and ovarian cancers, and a strengthening of the emotional bond with their infant.

Breastfed infants are at a reduced risk of developing allergies, gastrointestinal and respiratory infections, and urinary tract infections compared to formula-fed infants. Additionally, breastfed infants are at a reduced risk of being overweight or obese in later life, and therefore at a reduced risk of the associated health issues such as hypertension, diabetes and cardiovascular disease. A meta-analysis has shown that the risk of becoming overweight is reduced by 4% for each additional month of breastfeeding and the benefits of breastfeeding are still apparent with partial/combo...
Breastmilk substitutes

Although it is thought that almost all mothers can breastfeed successfully, it has been acknowledged that a small number of health conditions may justify the recommendation to cease breastfeeding temporarily or permanently⁴, in which case there is an explicit need for suitable breastmilk substitutes. In addition to this medical need, some women in the UK choose not to initiate breastfeeding, and many of those who do start change to formula feeding within six weeks of the baby’s birth, for various reasons.

That being said, the duration of breastfeeding is on the increase in the UK, with one in three mothers found to be still breastfeeding to some degree at six months in 2010, compared to one in four mothers in 2005¹⁷,¹⁸. Additionally, breastfeeding initiation is also on the rise, with figures showing that in 2010 81% of mothers started breastfeeding, compared to 76% in 2005¹⁸,¹⁹. Although 81% of mothers across the UK initiated breastfeeding at birth in 2010, this dropped to 69% at one week, 55% at six weeks, and just 34% of mothers still breastfeeding at six months²⁰.

Additionally, 92% of infants have received some infant formula by the age of six months²¹.

Infant formula is commercially known as ‘First’ Infant Milk, and is the only recommended alternative to breastmilk for infants aged younger than six months¹⁷,²². Infant formula is nutritionally complete and usually made from a base of cows’ milk. Breastmilk naturally contains all the essential nutrients an infant needs, and is adaptable to the infant’s requirements over time. Infant formula is designed to mimic breast milk as closely as scientifically possible, but does not have the ability to adapt in response to the infant’s needs. If an infant is not being breastfed after six months, follow-on formulae are available. These are fortified milks with increased levels of certain nutrients, such as iron and vitamin D, designed to help meet infant’s needs at this age.

Regulations for infant formula and follow-on milks

All formulae intended for infants must be safe and suitable to meet the nutritional needs of infants and promote healthy growth and development when consumed exclusively during the first six months of life. At six months, when complementary foods are introduced to an infant’s diet, nutrients should be added to the formulae only in amounts nutritionally beneficial to the infant²³.

Infant formulae and follow-on formulae are products designed specifically to satisfy the nutritional needs of healthy infants. The nutritional compositions, labelling, marketing and advertising of these formulae are covered in the Commission Directive 2006/141/EC²⁴. The composition of these products is tightly regulated; protein, fat, carbohydrate, minerals, vitamins are controlled and include, when necessary, minimum and maximum values.

Protein – what is it and why is it so important?

Childhood obesity is a serious public health concern. It is recognised that breastfed infants are the benchmark for appropriate growth in infancy; this is because breastfeeding is the ideal way for an infant to be fed. This is reflected in the most recent WHO Growth Charts, which are based on breastfed infants²⁵. Breastfed infants gain weight more slowly in their first year of life than formula-fed infants, which could go some way to contributing to their decreased risk of becoming overweight or obese in later life²⁶,²⁷.

There are various reasons why breastfed infants are less likely to be overweight or obese in later life than formula-fed infants. It has been suggested that elevated intakes of protein in infancy, can have adverse effects on weight in later life²⁸. Research suggests that the lower protein intake and slower growth of breastfed infants could be partially responsible for the decreased risk of overweight and obesity in breastfed infants.

Protein is an essential nutrient for growth and repair of the body, and is important for the maintenance of good health. Proteins are fundamental structural and functional components of every cell in the body, and are made up of long chains of amino acids. Out of 20 amino acids found in proteins, eight of these are defined as essential. In infants and young children an additional seven are considered to be conditionally essential. This is because infants and young children are unable to make enough of these amino acids rapidly enough to meet their high needs for growth²⁹. The amino acid content of breastmilk is the best estimate of the requirements of an infant³⁰. Of the essential amino acids, four – threonine, valine, leucine, and isoleucine – have been shown, when supplied in excess, to be associated with an increased secretion of insulin (insulinogenic amino acids)³¹.

The accelerated growth hypothesis is a proposed explanation of the contribution of protein to childhood obesity³².

The ‘early protein’ hypothesis suggests that high protein intakes during early life has subsequent impact on overweight and obesity risk in later life. The proposed mechanism links excess protein intake – and therefore excess insulinogenic amino acid intake – to hormonal
responses, such as the stimulation of insulin and insulin-like growth factor-I (IGF-1). This insulin and IGF-1 release may result in accelerated growth and increased adiposity.23,29

Innovation and reformulation of infant formula and follow-on milks

A study by Weber et al. (2014) on the effect of higher protein formulate during the first year of life, in comparison to lower protein formulate supports the option to lower the protein content of infant formulate and follow-on formulate. It was concluded that infants fed a lower protein formulate were at a reduced risk of obesity at age six.22. In response to the most recent science, the European Food Safety Authority has stated that infants are generally receiving protein in excess, so the protein of infant and follow-on formulate could be reduced.29

In response to these statements, in recent years, some companies have lowered the protein content of their infant formulate and follow-on formulate. However, EU regulations place limitations for protein reduction in these products, with a minimum protein level of 1.8g/100 calories required for both infant and follow-on formulate.29

Additionally, protein reduction is a complex process which affects the overall stability of the milk, as well as the mineral content.4 It is also important when reducing the protein content of infant and follow-on formulate that the overall quality of amino acids is considered, with breast milk being the model for quality.31 Manipulation of the protein involves reducing the amount of insulogenic essential amino acids to ensure that these are not available in excess, whilst ensuring essential amino acid needs are met. The aim of making these composition changes to infant formulate and follow-on formulate, is to achieve a slower growth rate of formula fed infants, comparable to that of a breastfed infant, and in turn to reduce the risk of becoming overweight or obese to formula-fed infants.29

Conclusion

In conclusion, in the first 1000 days – from conception to two years – is a critical time period for shaping the future of an infant. In particular, nutrition in this time frame is key for the future development and health of infants. The risk of childhood obesity may be significantly reduced if infants breastfeed – which remains the best possible nutrition in early life. However, when exclusive breastfeeding is not possible, or is not chosen, infant formulate must support the nutritional needs of the infant. Research suggests that the protein quantity and quality in infant formulate and follow-on formulate should be addressed and adapted to more closely mimic the protein composition of breast milk, in an effort to achieve a slower growth pattern, similar to that of breastfed infants.29

References

29. Asplund C, Cacheris MF, Deheeger M, Akrout M et al. (1995). Influence of macronutrients on adiposity changes to infant formulae and follow-on formulae, is to achieve a slower growth pattern, similar to that of breastfed infants.29

About the Author

Rosie Long works as a Nutrition Graduate at Nestlé UK in Gatwick, United Kingdom. She has recently graduated from Bournemouth University with a BSc (Hons) in Nutrition, and is an Associate Nutritionist on the UK Voluntary Register of Nutritionists. She has worked on a number of projects within SMA Nutrition and has developed a specific scientific knowledge of infant nutrition.